

Type of Metal O-Ring/C-Ring:

	OI OE	<p>Metal O-Ring Internal or External Pressure Face Seal</p> <ul style="list-style-type: none"> - Avoids ingress of the working fluid into the seal - Moderate load - Moderate pressure capability
	OVI	<p>Metal O-Ring internally vented and pressure-energized Face Seal</p> <ul style="list-style-type: none"> - Moderate load - High pressure capability
	OVE	<p>Metal O-Ring externally vented and pressure-energized Face Seal</p> <ul style="list-style-type: none"> - Moderate load - High pressure capability
	OSI OSE	<p>Metal O-Ring externally/internally spring-energized Face Seal and Axial Seal</p> <ul style="list-style-type: none"> - High load - Moderate pressure capability - Lowest leakrate
	OGI OGE	<p>Metal O-Ring externally/internally gas-energized Face Seal and Axial Seal</p> <ul style="list-style-type: none"> - High load - Moderate pressure capability - Lowest leakrate
	CI	<p>Metal C-Ring Internal Pressure Face Seal</p> <ul style="list-style-type: none"> - Moderate load (lighter flanges & fewer bolts) - Good springback - High pressure capability
	CE	<p>Metal C-Ring External Pressure Face Seal</p> <ul style="list-style-type: none"> - Moderate load - Good springback - High pressure capability
	CA	<p>Metal C-Ring, Axial Seal</p> <ul style="list-style-type: none"> - Close tolerance seal - For light installation loads
	CSI	<p>Spring Energized Metal C-Ring, Internal Pressure Face Seal</p> <ul style="list-style-type: none"> - Lowest leakrate - High pressure capability - High load
	CSE	<p>Spring Energized Metal C-Ring, External Pressure Face Seal</p> <ul style="list-style-type: none"> - Lowest leakrate - High pressure capability - High load
	CSA	<p>Spring Energized Metal C-Ring, Axial Seal</p> <ul style="list-style-type: none"> - Capable of sealing higher reversing pressures than standard CA-seal



OI-Seals:

Internal pressure face seal - OI / OVI / OSI / OGI

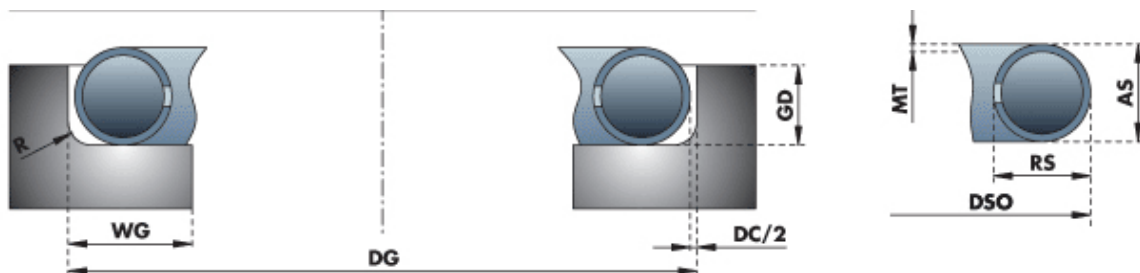
Seal dimension					Groove dimensions			
AS			MT	DC	DG	GD	WG	R
Axial section	Tolerance on AS	Material code	Material thickness	Diametrical clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
0.89	+0.08/-0.03	M	0.15	0.20	6.35-25	0.64-0.69	1.40	0.25
1.19	+0.08/-0.03	H	0.20	0.25	10.00-50	0.94-1.02	1.78	0.30
1.57	+0.08/-0.03	L	0.15	0.28	10-200	1.14-1.27	2.29	0.38
		M	0.25					
2.39	+0.08/-0.03	L	0.15	0.33	13-200	1.88-2.01	3.18	0.51
		M	0.25					
3.18	+0.08/-0.03	H	0.36	0.43	25-400	2.54-2.67	4.06	0.76
		M	0.25					
3.96	+0.10	H	0.51	0.61	75-650	3.18-3.30	5.08	1.27
		M	0.41					
4.78	+0.13	H	0.64	0.71	100-800	3.84-3.99	6.35	1.27
		M	0.51					
6.35	+0.13	H	0.81	0.76	200-1200	5.05-5.28	8.89	1.52
		M	0.64					
9.53	+0.13	H	1.24	1.02	300-2000	8.26-8.51	12.70	1.52
		M	0.97					
12.70	+0.15	H	1.65	1.27	800-3000	11.05-11.43	16.51	1.52
		M	1.27					

Internal pressure seal: Diameter Seal Outside = Reference

Formula: $DSO = DG - DC - (2 \times \text{Plating Thickness})$

Remarks:

- For DG take the Minimum Outer Groove Diameter
- Plating thickness is maximum plating thickness
- Tolerance on seal diameter and on groove diameter: see table



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Tel: 03-5240157 Fax: 03-5240217

聯絡人: 曾耀輝, Email: yhtseng@junjia.com.tw

OE-Seals:

External pressure face seal - OE / OVE / OSE / OGE

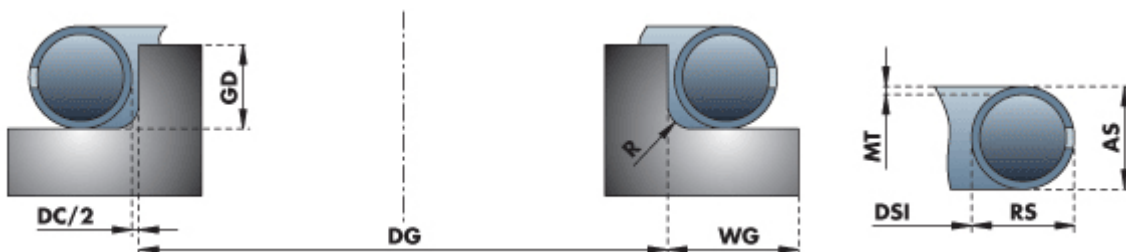
Seal dimension					Groove dimensions			
AS Axial section	Tolerance on AS	Material code	MT Material thickness	DC Diametrical clearance	DG Diameter Groove (range)	GD Groove Depth (min/max)	WG Width Groove (minimum)	R Radius (maximum)
0.89	+0.08/-0.03	M	0.15	0.20	6.35-25	0.64-0.69	1.40	0.25
1.19	+0.08/-0.03	H	0.20	0.25	10.00-50	0.94-1.02	1.78	0.30
1.57	+0.08/-0.03	L	0.15	0.28	10-200	1.14-1.27	2.29	0.38
		M	0.25					
2.39	+0.08/-0.03	L	0.15	0.33	13-200	1.88-2.01	3.18	0.51
		M	0.25					
3.18	+0.08/-0.03	L	0.15	0.43	25-400	2.54-2.67	4.06	0.76
		M	0.25					
3.96	+0.10	L	0.15	0.61	75-650	3.18-3.30	5.08	1.27
		M	0.41					
4.78	+0.13	L	0.15	0.71	100-800	3.84-3.99	6.35	1.27
		M	0.51					
6.35	+0.13	L	0.15	0.76	200-1200	5.05-5.28	8.89	1.52
		M	0.64					
9.53	+0.13	L	0.15	1.02	300-2000	8.26-8.51	12.70	1.52
		M	0.97					
12.70	+0.15	L	1.27	1.27	800-3000	11.05-11.43	16.51	1.52
		M	1.65					

External pressure seal: Diameter Seal Inside = Reference

Formula: $DSI = DG + DC + (2 \times \text{Plating Thickness})$

Remarks:

- For DG take the Maximum Inner Groove Diameter
- Plating thickness is maximum plating thickness
- Tolerance on seal diameter and on groove diameter: see table



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CI-Seals:

Internal pressure face seal.

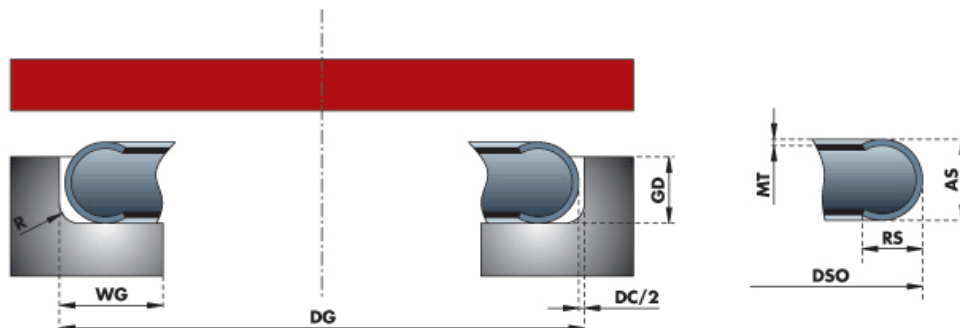
Seal dimension						Groove dimensions			
AS		RS		MT	DC	DG	GD	WG	R
Axial section	Tolerance on AS	Radial section	Material code	Material thickness	Diametrical clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
0.79	±0.05	0.71	M H	0.15 0.18	0.08	6-25	0.64-0.69	1.02	0.25
1.19	±0.05	0.96	M H	0.15 0.20	0.15	8-50	0.94-1.02	1.40	0.30
1.57	±0.05	1.26	M H	0.15 0.25	0.18	10-200	1.27-1.37	1.91	0.38
2.39	±0.05	1.91	M H	0.25 0.38	0.20	13-400	1.92-2.01	2.67	0.51
3.18	±0.08	2.54	M H	0.38 0.51	0.30	25-600	2.54-2.67	3.43	0.76
3.96	±0.08	3.17	M H	0.41 0.61	0.41	32-750	3.18-3.30	4.32	1.27
4.78	±0.10	3.82	M H	0.51 0.76	0.46	75-900	3.84-3.99	5.08	1.27
6.35	±0.10	5.08	M H	0.64 0.97	0.51	100-1200	5.08-5.28	6.60	1.52
9.53	±0.10	7.62	M H	0.97 1.27	0.76	300-2000	7.62-8.03	9.65	1.52
12.70	±0.13	10.16	M H	1.27 1.65	1.02	600-3000	10.16-10.67	12.70	1.52

Internal pressure seal: Diameter Seal Outside = Reference

Formula: $DSO = DG - DC - (2 \times \text{Plating Thickness})$

Remarks:

- For DG take the Minimum Outer Groove Diameter
- Plating thickness is maximum plating thickness
- Tolerance on seal diameter and on groove diameter: see table



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聯絡人: 曾耀輝, Email: yhtseng@junjia.com.tw

CE-Seals:

External pressure face seal.

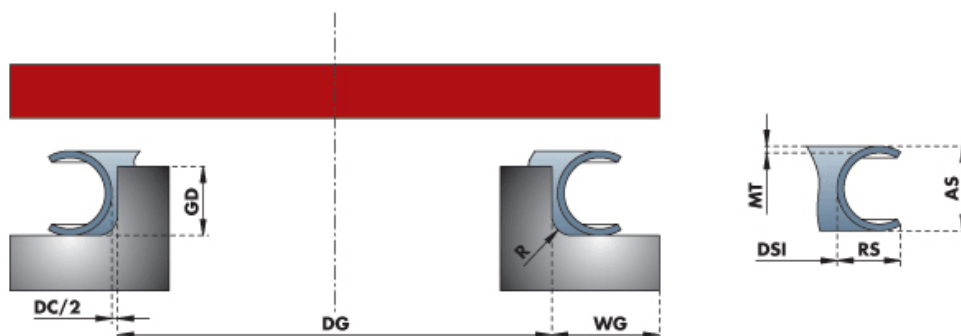
Seal dimension						Groove dimensions			
AS	RS	MT	DC	DG	GD	WG	R		
Axial section	Tolerance on AS	Radial section	Material code	Material thickness	Diametrical clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
0.79	±0.05	0.71	M H	0.15 0.18	0.08	6-25	0.64-0.69	1.02	0.25
1.19	±0.05	0.96	M H	0.15 0.20	0.15	8-50	0.94-1.02	1.40	0.30
1.57	±0.05	1.26	M H	0.15 0.25	0.18	10-200	1.27-1.37	1.91	0.38
2.39	±0.05	1.91	M H	0.25 0.38	0.20	13-400	1.91-2.01	2.67	0.51
3.18	±0.08	2.54	M H	0.38 0.51	0.30	25-600	2.54-2.67	3.43	0.76
3.96	±0.08	3.17	M H	0.41 0.61	0.41	32-750	3.18-3.30	4.32	1.27
4.78	±0.10	3.82	M H	0.51 0.76	0.46	75-900	3.84-3.99	5.08	1.27
6.35	±0.10	5.08	M H	0.64 0.97	0.51	100-1200	5.08-5.28	6.60	1.52
9.53	±0.10	7.62	M H	0.97 1.27	0.76	300-2000	7.62-8.03	9.65	1.52
12.70	±0.13	10.16	M H	1.27 1.65	1.02	600-3000	10.16-10.67	12.70	1.52

External pressure seal: Diameter Seal Inside = Reference

Formula: $DSI = DG + DC + (2 \times \text{Plating Thickness})$

Remarks:

- For DG take the Maximum Inner Groove Diameter
- Plating thickness is maximum plating thickness
- Tolerance on seal diameter and on groove diameter: see table



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CA-Seals:

Axial seal.

Seal dimension					
RS Radial section	Material code	MT Material thickness	DSO Diameter Seal Outside	DSI Diameter Seal Inside	Tolerance on DSO and DSI
1.57	M	0.15	BD+0.08	DSO-3.28	±0.03
1.57	M	0.15	BD+0.10	DSO-3.28	±0.03
2.39	M	0.25	BD+0.08	DSO-4.85	±0.03
2.39	M	0.25	BD+0.10	DSO-4.85	±0.03
3.18	M	0.38	BD+0.10	DSO-6.45	±0.03
3.18	M	0.38	BD+0.15	DSO-6.45	±0.05
3.18	M	0.38	BD+0.20	DSO-6.45	±0.05
3.96	M	0.41	BD+0.15	DSO-8.03	±0.05
3.96	M	0.41	BD+0.20	DSO-8.03	±0.05
4.78	M	0.51	BD+0.15	DSO-9.63	±0.05
4.78	M	0.51	BD+0.20	DSO-9.63	±0.05
6.35	M	0.64	BD+0.20	DSO-12.80	±0.05

Groove dimensions					
BD Bore Diameter (range)	Tolerance on BD	SD Shaft /Rod Diameter	Tolerance on RS	WG Width Groove (minimum)	R Radius (maximum)
12.70-38.00	+0.03	BD -3.12	-0.03	1.30	0.38
38.01-45.00	+0.03	BD -3.07	-0.03	1.30	0.38
30.00-38.00	+0.03	BD -4.70	-0.03	1.98	0.51
38.01-85.00	+0.03	BD -4.65	-0.03	1.98	0.51
50.00-85.00	+0.03	BD -6.25	-0.03	2.64	0.76
85.01-150.00	+0.05	BD -6.16	-0.05	2.64	0.76
150.01-200.00	+0.05	BD -6.05	-0.05	2.64	0.76
85.00-150.00	+0.05	BD -7.72	-0.05	3.28	1.27
150.01-250.00	+0.05	BD -7.62	-0.05	3.28	1.27
100.00-150.00	+0.05	BD -9.32	-0.05	3.96	1.27
150.01-300.00	+0.05	BD -9.22	-0.05	3.96	1.27
150.00-300.00	+0.05	BD -12.40	-0.05	5.28	1.52



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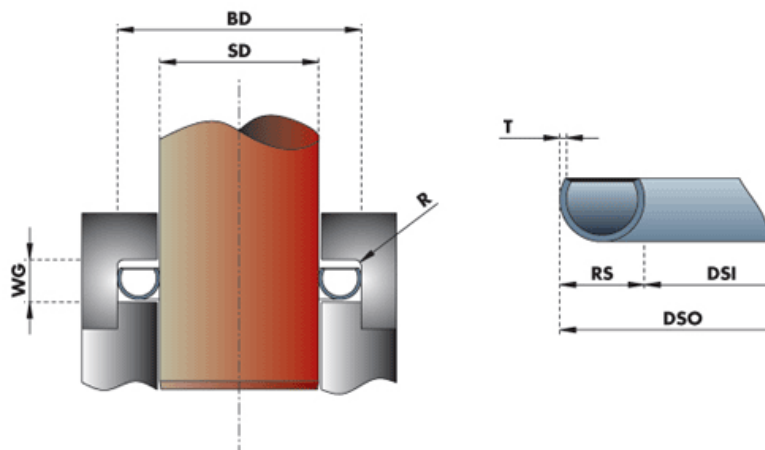
聯絡人: 曾耀輝, Email: yhtseng@junjia.com.tw

Axial pressure seal: Diameter Seal Outside = Reference

Formula: DSO = DSO (see table above)

Cavity Requirements:

- Bore diameter less 85 mm requires 0.015 maximum concentricity, above 85 mm 0,03.
- Static mating surface 0.2 – 0.4 Ra, dynamic 0.1 – 0.2 Ra.
- Hardness should be 60 Rc in both conditions.
- The pressure rating for CA-seals is 59 MPa (1.57M, 2.39M, 3.96M and 6.35M) up to 85 MPa for the 3.18M



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聯絡人: 曾耀輝, Email: yhtseng@junjia.com.tw

CSI-Seals:

Spring energized, internal pressure face seal.

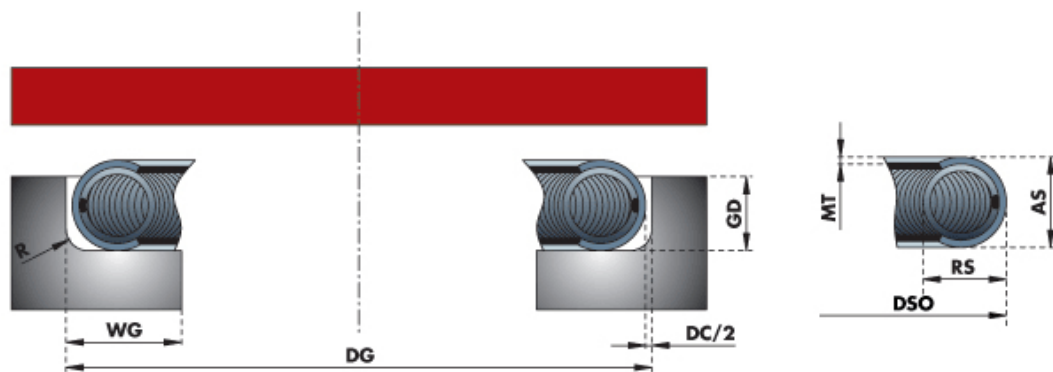
Seal dimension						Groove dimensions			
AS	Tolerance on AS	RS	Material code	MT	DC	DG	GD	WG	R
Axial section		Radial section		Material thickness	Diametrical clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
1.57	±0.05	1.50	M	0.15	0.15	20-280	1.27-1.37	2.30	0.37
2.39	±0.05	2.21	M	0.25	0.20	25-400	1.91-2.01	3.19	0.51
3.18	±0.08	2.90	M	0.38	0.30	25-600	2.54-2.67	4.07	0.76
3.96	±0.08	3.66	M	0.41	0.41	32-750	3.18-3.30	5.07	1.26
4.78	±0.10	4.39	M	0.51	0.46	75-900	3.84-3.99	6.35	1.26
6.35	±0.10	5.84	M	0.64	0.51	100-1800	5.08-5.28	8.90	1.51
9.53	±0.10	8.69	M	0.97	0.76	300-3000	7.62-8.03	12.70	1.51
12.70	±0.13	11.58	M	1.27	1.02	600-7600	10.16-10.67	16.50	1.51

Internal pressure seal: Diameter Seal Outside = Reference

Formula: $DSO = DG - DC - (2 \times \text{Plating Thickness})$

Remarks:

- For DG take the Minimum Outer Groove Diameter
- Plating thickness is maximum plating thickness
- Tolerance on seal diameter and on groove diameter: see table



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聯絡人: 曾耀輝, Email: yhtseng@junjia.com.tw

CSE-Seals:

Spring energized, external pressure face seal.

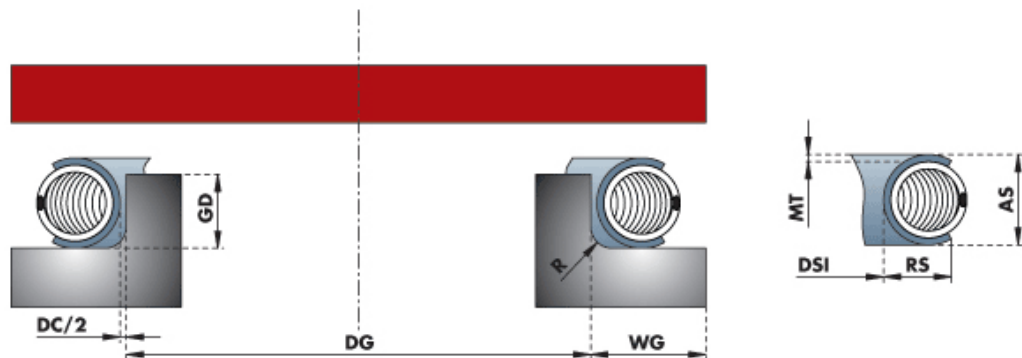
Seal dimension						Groove dimensions			
AS		RS		MT	DC	DG	GD	WG	R
Axial section	Tolerance on AS	Radial section	Material code	Material thickness	Diametrical clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
1.57	±0.05	1.50	M	0.15	0.15	20-280	1.27-1.37	2.30	0.37
2.39	±0.05	2.21	M	0.25	0.20	25-400	1.91-2.01	3.19	0.51
3.18	±0.08	2.90	M	0.38	0.30	25-600	2.54-2.67	4.07	0.76
3.96	±0.08	3.66	M	0.41	0.41	32-750	3.18-3.30	5.07	1.26
4.78	±0.10	4.39	M	0.51	0.46	75-900	3.84-3.99	6.35	1.26
6.35	±0.10	5.84	M	0.64	0.51	100-1800	5.08-5.28	8.90	1.51
9.53	±0.10	8.69	M	0.97	0.76	300-3000	7.62-8.03	12.70	1.51
12.70	±0.13	11.58	M	1.27	1.02	600-7600	10.16-10.67	16.50	1.51

External pressure seal: Diameter Seal Inside = Reference

Formula: $DSI = DG + DC + (2 \times \text{Plating Thickness})$

Remarks:

- For DG take the Maximum Inner Groove Diameter
- Plating thickness is maximum plating thickness
- Tolerance on seal diameter and on groove diameter:
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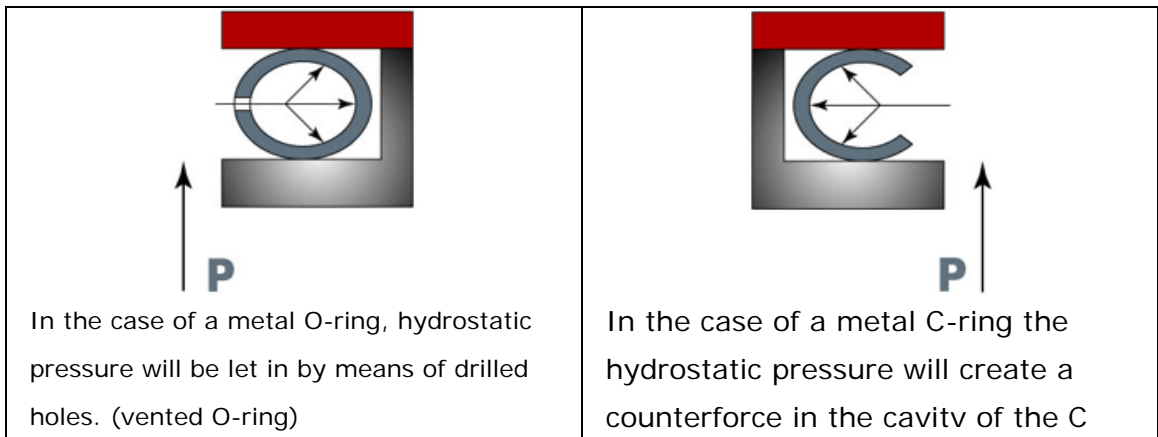
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Tel: 03-5240157 Fax: 03-5240217

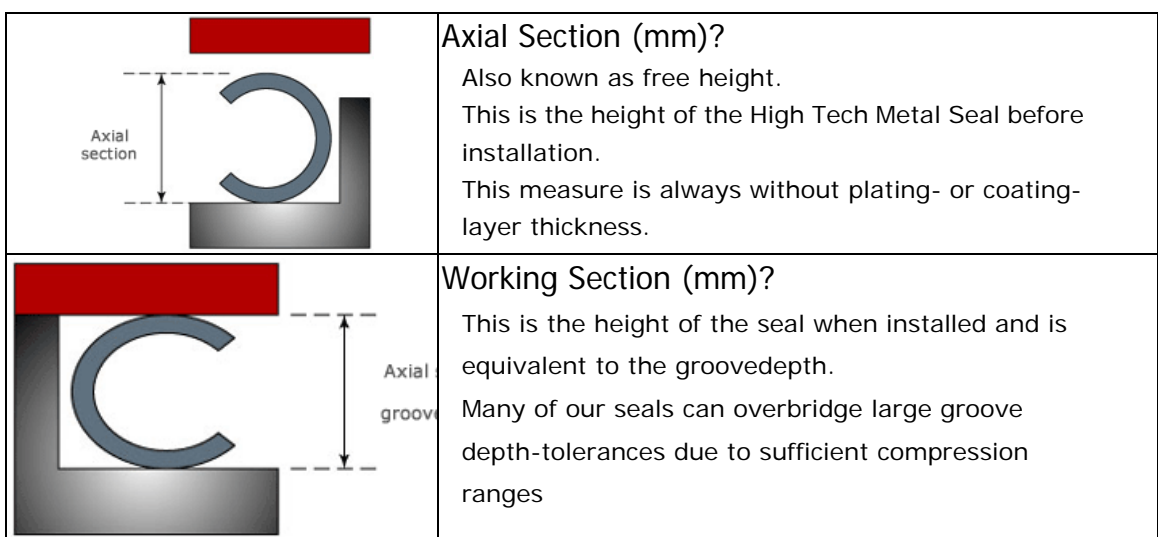
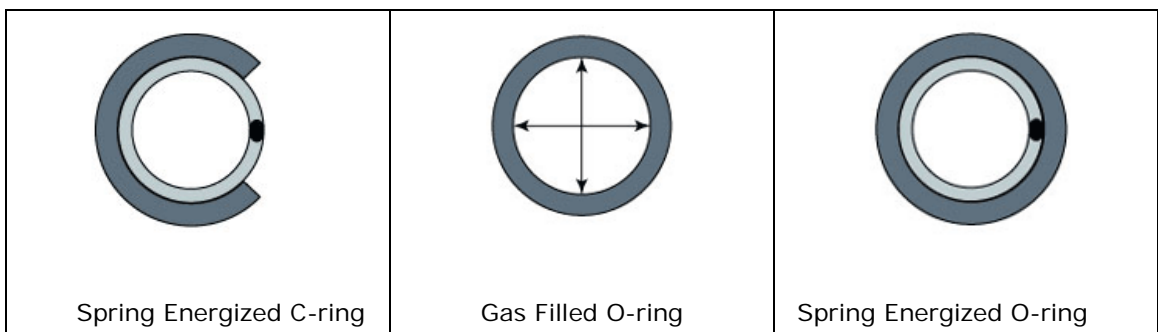
聯絡人: 曾耀輝, Email: yhtseng@junjia.com.tw

Pressure Energization:

Meaning that the hydrostatic pressures are used to benefit the self-energization of the seal. Especially at high pressures (above 21Mpa) this becomes a "sealing-advantage" and enables High Tech Metal Seals to seal at 170Mpa and above.



We offer a variety of seals with other types of energization:



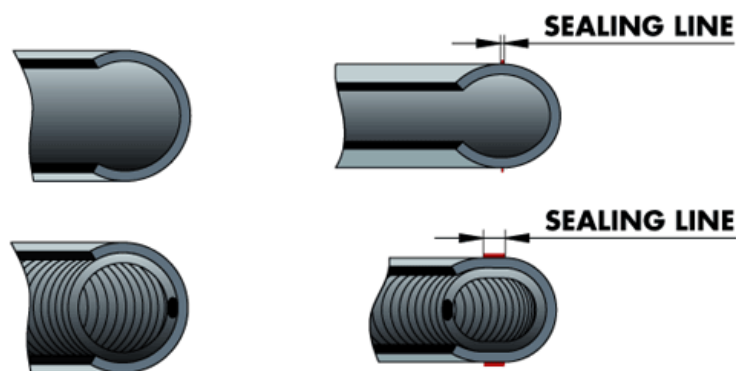
Ordering Information:

All measurements are indicated in millimeters unless otherwise mentioned.

1. Type of Seal: **CSI – 008000 - 2.39M - 1/1 - 1 - S30**

The first section of the part number refers to the type of seal you want to select.

CI	Metal C-ring, internal pressure face seal
CE	Metal C-ring, external pressure face seal
CSI	Metal C-ring, spring energized, internal pressure face seal
CSE	Metal C-ring, spring energized, external pressure face seal
CA	Metal C-ring, axial seal
CSA	Metal C-ring, spring energized axial seal
OI	Metal O-ring, internal pressure face seal
OE	Metal O-ring, external pressure face seal
OVI	Metal O-ring, internal vented and pressure energized face seal
OVE	Metal O-ring, external vented and pressure energized face seal
OGI	Metal O-ring, pressure filled, internal pressure face seal
OGE	Metal O-ring, pressure filled, external pressure face seal
OSI	Metal O-ring, spring energized, internal pressure face and axial seal
OSE	Metal O-ring, spring energized, external pressure face and axial sea
WI	Metal Wire-ring, internal pressure face seal
WE	Metal Wire-ring, external pressure face seal



As shown on the figures above, C seals without spring have a smaller sealing surface (after compression) though we need a much higher load to compress the seal. (We can make the same remark for O-seals, with or without spring.)

Depending on the application we propose either spring energized or non spring energized seals.



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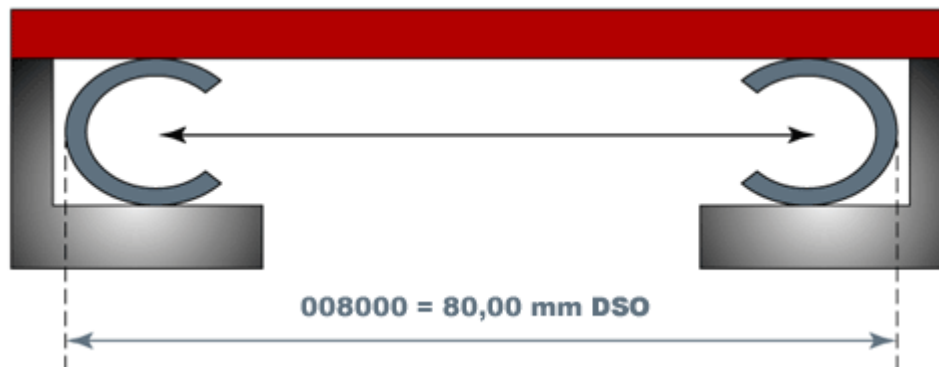
2. Seal diameter:

CSI – 008000 - 2.39M - 1/1 - 1 - S30

This part of the part number refers to the seal diameter (0.01 mm) without plating/coating thickness.

Seal types for internal pressure and all axial seal types: Diameter Seal Outside (**DSO**).

Seal types for external pressure: Diameter Seal Inside (**DSI**).



3. Cross section:

CSI – 008000 - 2.39M - 1/1 - 1 - S30

2,39 is the cross-section (free-height) of the seal in mm. The letter M refers to the wall thickness of the seal (in this case medium). Sealjackets and springs are available in different standard heights and wall thicknesses:

L	Light: Lowest available wall thickness. Combines lower load values with higher springback. (Only available for O-Rings)
M	Medium: Standard wall thickness for spring energized seals, wall thickness for medium duty seals.
H	Heavy-duty wall thickness, high load values for high-pressure capability.

Please contact us for non-standard dimensions.

For our standard cross-sections and wall-thicknesses we refer to the specific tables.



4. Material code:

CSI – 008000 - 2.39M - 1/1 - 1 - S30

The material code "1/1" indicates the material used for jacket and spring. In this case both sealjacket and spring are made out of Inconel X-750. Code 1/9 for example means that the sealjacket consists out of Inconel X-750 (1) and the spring is made out of 302 stainless steel wire (9). The following table will give you a brief overview of the most common standard materials. Our engineering department will carefully select the right seal material for your specific application. Special stainless steels and high performance nickel alloys are our standard materials. Please contact us for non-standard materials.

Code	Material	Code	Material
1	Nickel alloy X-750	6	304 SS, high tensile strength
2	Nickel alloy 718	7	316 SS
3	321 SS	8	Hastelloy
4	Nickel alloy 600	9	302 SS
5	304 SS		

5. Temper code:

CSI – 008000 - 2.39M - 1/1 - 1 - S30

To obtain other sealing properties (higher load and springback values) our seals can undergo a variety of heat treatments. The different Heat Treatments are indicated by the temper code in the part number. Beneath you can find a table with the different temper codes we can offer and recommend, depending on the specific application.

Temper code	Temper Description	Applicable Material Code
1	Work Hardened	All
2	Age Hardened	Alloy X-750 and 718
3	Annealed	Alloy X-750 and 718
4	Solution and Precipitation heat treatment	Alloy X-750 and 718



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6. Finishing layer & thickness:

CSI – 008000 - 2.39M - 1/1 - 1 - S30

This last section in our part number determines the finishing layer and his thickness.

We can offer a wide range of specialized platings and coatings which creates a ductile outer surface layer and ensures optimum sealing by filling out all imperfections in the mating surfaces. The plating or coating layer also reduces the coefficient of friction of the seal so the seal can slide and bed-down during compression what prevents galling.

Seal coatings and platings not only provide better physical properties to the seal (ductility and softness) but are also chosen to withstand high temperatures and agressive environments (corrosive or oxidizing sealing conditions).

The table below can be helpful to determine the type of plating needed. (In most cases silverplating is an added value to improve sealing capacity and to lower leakrate.)

Code	Finish Material	Properties, Uses and Limitations
S	Silver (Ag)	Ideal plating, soft (excellent) anti-galling, good corrosion and temperature resistance, wide variety of applications, Tmax 430°C (oxydizing), 650°C (non oxyd + C2 izing)
G	Gold (Au)	Soft, excellent chemical and oxidation resistance. Tmax = 930°C.
C	Copper (Cu)	Relatively soft, inexpensive. Tmax 930°C.
N	Nickel (Ni)	Hard, used instead of silver in hot, oxydizing environments. Tmax = 1200°C.
L	Lead (Pb)	Extremely soft, excellent for cryogenics, use for low load seals (70N/mm max). Tmax = 200°C.
T	Teflon (PTFE)	Extremely soft (no high load seals, 80N/mm max), chemically inert. Tmax = 230°C.
/	Unplated	Applications where no extreme leaktightness is required. Tmax depends on basematerial.

The finish of the mating surfaces is an important factor in the choice of the plating/coating thickness. Rougher surfaces require thicker finishes for good sealing capability.

A soft plating like lead can handle larger Ra-values than for instance nickel. The table below is a helpful guideline to choose the finish thickness.

Thickness Code	Finish Thickness	Groove Surface Finish
30	0,01 - 0,03 mm	0,4 Ra max
50	0,03 - 0,05 mm	0,8 Ra max
70	0,05 - 0,07 mm	1,6 Ra max

Thicker finishes are available on request (up to 0,25 mm). We can handle special tolerances on silver finishes.

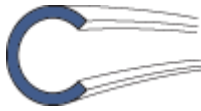


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Metal C-Ring Internal Pressure Face Seal

- Moderate load (lighter flanges & fewer bolts)
- Good springback
- High pressure capability



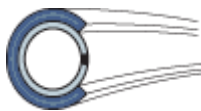
Metal C-Ring External Pressure Face Seal

- Moderate load
- Good springback
- High pressure capability



Metal C-Ring, Axial Seal

- Close tolerance seal
- For light installation loads



Spring Energized Metal C-Ring, Internal Pressure Face Seal

- Lowest leakrate
- High pressure capability
- High load



Spring Energized Metal C-Ring, External Pressure Face Seal

- Lowest leakrate
- High pressure capability
- High load



Spring Energized Metal C-Ring, Axial Seal

- Capable of sealing higher reversing pressures than standard CA-seal

