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quality sealing and engineering plastics solutions

ECONOMOS[®]

Metallic O- and C-rings

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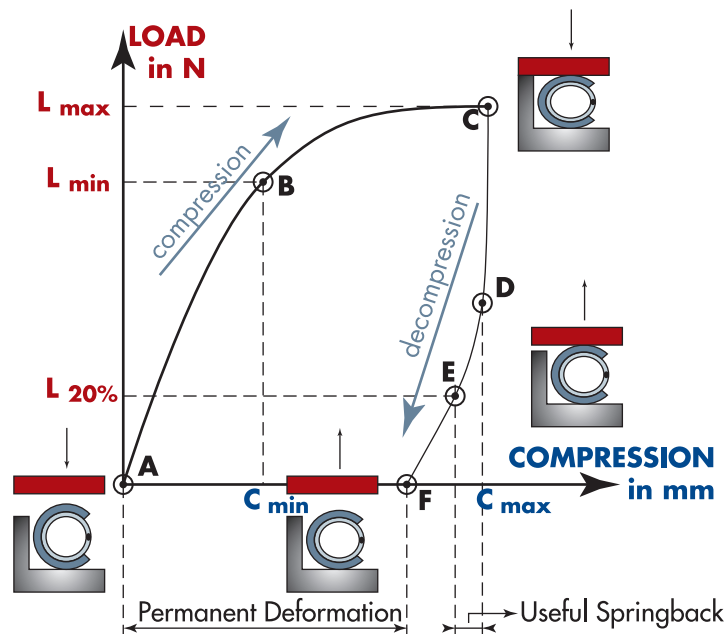
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How does a metal seal work ?



COMPRESSION CYCLE (A – C), INSTALLATION OF THE SEAL

- A Seal before compression
- B Seal at minimum compression (C_{min}) = maximum groove depth
- C Seal at maximum compression (C_{max}) = minimum groove depth
Between these two points (B and C) optimum sealing is obtained. Minimum and maximum groove depth for any given seal can be found in the data sheets further in this catalogue.

DECOMPRESSION CYCLE (C – F), RELEASING THE BOLD LOAD

- D At this point the seals' resilience overcomes the remaining (decompression) load, this resilience is called springback.
- E Springback of the seal at 20% of the maximum load (L_{max}) is the useful springback.
- F Springback of the seal at zero load is total springback = elastic recovery of the seal.

The different types of metal seals have different load-compression characteristics. Individual load compression diagrams can be obtained up on request.

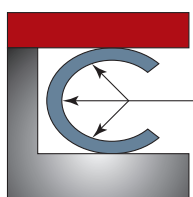
How does a metal seal work ?

TERMINOLOGY

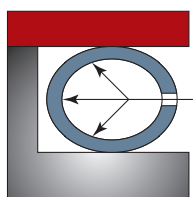
Pressure energization

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.

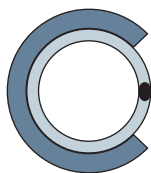


In the case of a metal C-ring the hydrostatic pressure will create a counter force in the cavity of the C.

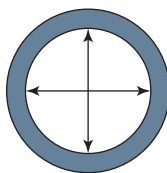


In the case of a metal O-ring, hydrostatic pressure will be let in by means of drilled holes. (vented O-ring)

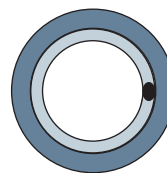
ECONOMOS OFFERS A VARIETY OF SEALS WITH OTHER TYPES OF ENERGIZATION



Spring energised C-ring



Gas filled O-ring



Spring energised O-ring



Axial Section (mm)

Also known as free height.

This is the height of the High Tech Metal Seal before installation.

This measure is always without plating- or coating-layer thickness.

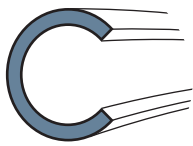


Working section (mm)

This is the height of the seal when installed and is equivalent to the groove depth .

Many of our seals can over bridge large groove depth-tolerances due to sufficient compression ranges .

C-ring standard profiles

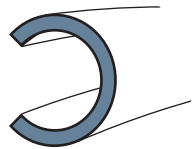


CI

METAL C-RING INTERNAL PRESSURE FACE SEAL

Features:

- Moderate Load (lighter flanges and fewer bolts)
- Good springback
- High pressure capability

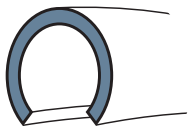


CE

METAL C-RING EXTERNAL PRESSURE FACE SEAL

Features:

- Moderate Load
- Good springback
- High pressure capability

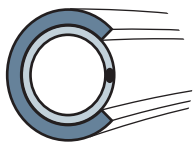


CA

METAL C-RING, AXIAL SEAL

Features:

- Close tolerance seal
- For light installation loads

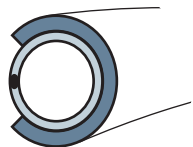


CSI

SPRING ENERGISED METAL C-RING INTERNAL PRESSURE FACE SEAL

Features:

- Lowest leak rate
- High pressure capability
- High load

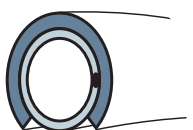


CSE

SPRING ENERGISED METAL C-RING EXTERNAL PRESSURE FACE SEAL

Features:

- Lowest leak rate
- High pressure capability
- High load



CSA

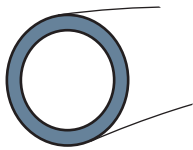
spring energised Metal C-ring, axial Seal

Features:

- Capable of sealing higher reversing pressure than standard CA seal

O-ring standard profiles

Standard O-ring

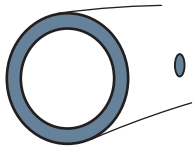


OI
OE

METAL O-RING INTERNAL PRESSURE FACE SEAL

Features:

- Avoids ingress of the working fluid into the seal
- Moderate load
- Moderate pressure capability

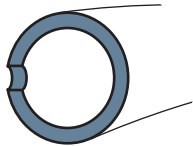


OVI

METAL O-RING INTERNALLY VENTED AND PRESSURE-ENERGISED FACE SEAL

Features:

- Moderate Load
- High pressure capability

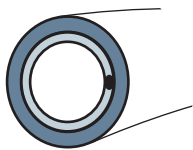


OVE

METAL O-RING EXTERNALLY VENTED AND PRESSURE-ENERGISED FACE SEAL

Features:

- Moderate Load
- High pressure capability

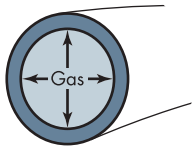


OSI
OSE

METAL O-RING EXTERNALLY/INTERNALLY SPRING- ENERGISED FACE SEAL AND AXIAL SEAL

Features:

- High Load
- Lowest leak rate
- Moderate pressure capability

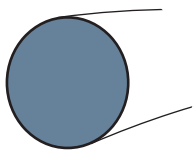


OGI
OGE

METAL O-RING EXTERNALLY/INTERNALLY GAS- ENERGISED FACE SEAL

Features:

- High Load
- Lowest leak rate
- Moderate pressure capability



WI
WE

METAL WIRE-RING EXTERNAL/INTERNAL PRESSURE FACE SEAL

Features:

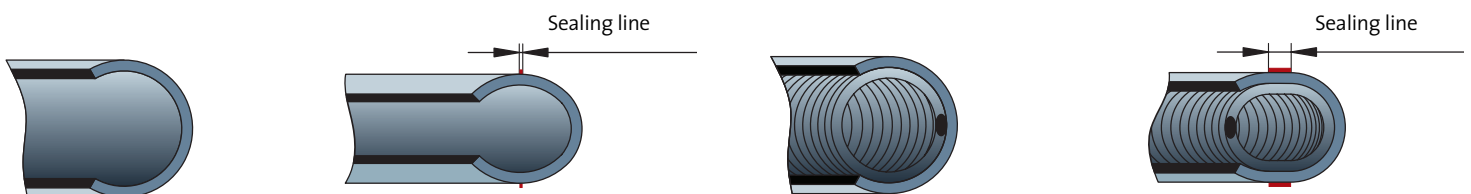
- High Load "crush sealing"
- High pressure capability
- Low cost

How to order

How to order

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 seal
WI	Metal Wire-ring, internal pressure face seal
WE	Metal Wire-ring, external pressure face seal



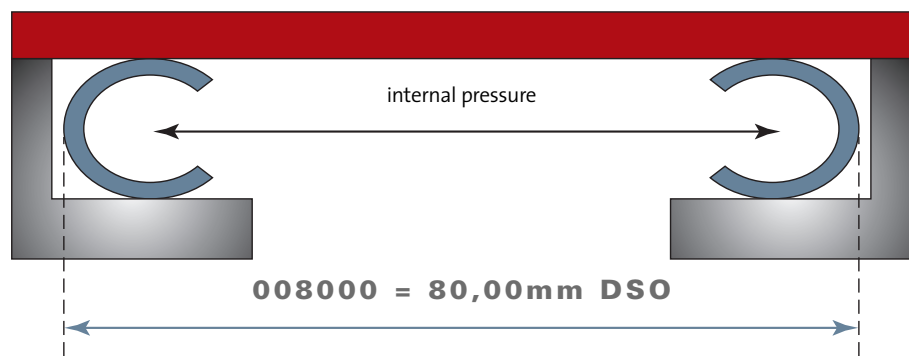
As shown on the figures above, C seals without spring have a smaller sealing surface (after compression) though we need a much higher load to compress the seal. (We can make the same remark for O-seals, with or without spring.) Depending on the application we propose either spring energized or non spring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

The part number system

CSI-**008000**-2,39M-1/1-1-S30 This part of the number refers to the **SEAL DIAMETER** (0,01mm) 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).



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). Seal jackets 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 ECONOMOS for non-standard dimensions.

For our standard cross-sections and wall-thicknesses we refer to the specific tables further on in this catalogue.

Metal O-ring, Internal vented, gold plated



Metal C-Ring, Axial Seal, non-plated



How to order

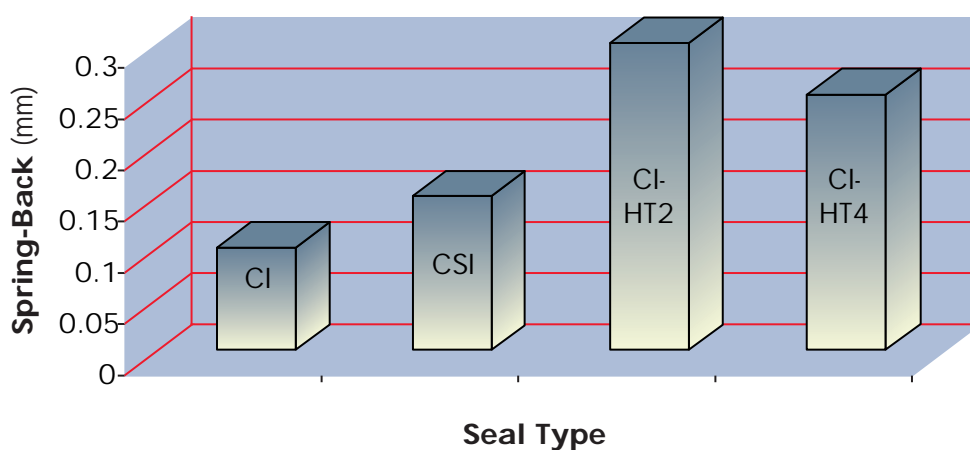
How to order

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 seal jacket and spring are made out of Inconel X-750. Code 1/9 for example means that the seal jacket 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 ECONOMOS 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		

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



The part number system

CSI-008000-2,39M-1/1-1-**S30**

This last section in our part number determines the **FINISHING LAYER AND THICKNESS**. ECONOMOS can offer a wide range of specialised 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 aggressive environments (corrosive or oxidising sealing conditions).

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

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+C2izing))
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 (70 N/mm max), Tmax = 200°C
T	Teflon (PTFE)	Extremely soft (no high load seals, 80 N/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). Our plating department can handle special tolerances on silver finishes.

Table 1

OI-Datasheet

INTERNAL PRESSURE FACE SEAL; OI / OVI / OGI / OSI

Seal dimensions					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	0,2	6,35-25	0,64-0,69	1,4	0,25
1,19	+0,08/-0,03	H	0,20	0,25	10,00-50	0,94-1,02	1,78	0,3
1,57	+0,08/-0,03	L M H	0,15 0,25 0,36	0,28	10-200	1,14-1,27	2,29	0,38
2,39	+0,08/-0,03	L M H	0,15 0,25 0,46	0,33	13-200	1,88-2,01	3,18	0,51
3,18	+0,08/-0,03	M H	0,25 0,51	0,43	25-400	2,54-2,67	4,06	0,76
3,96	+0,10	M H	0,41 0,51	0,61	75-650	3,18-3,30	5,08	1,27
4,78	+0,13	M H	0,51 0,64	0,71	100-800	3,84-3,99	6,35	1,27
6,35	+0,13	M H	0,64 0,81	0,76	200-1200	5,05-5,28	8,89	1,52
9,53	+0,13	M H	0,97 1,24	1,02	300-2000	8,26-8,51	12,7	1,52
12,70	+0,15	M H	1,27 1,65	1,27	800-3000	11,05-11,43	16,51	1,52

Internal pressure seal: Diameter Seal Outside = Reference

FORMULA: $DSO = DG - DC - (2 \times \text{plating thickness})$

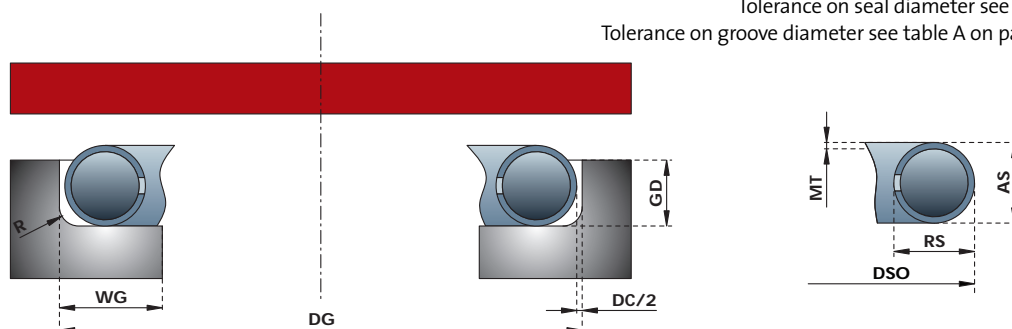
Remarks:

For DG take the Minimum outer groove diameter

Plating thickness is maximum plating thickness see table 1 on page 11

Tolerance on seal diameter see table C on page 23

Tolerance on groove diameter see table A on page 23 column H10



OE-Datasheet

OE-

EXTERNAL PRESSURE FACE SEAL; OE / OVE / OGE / OSE

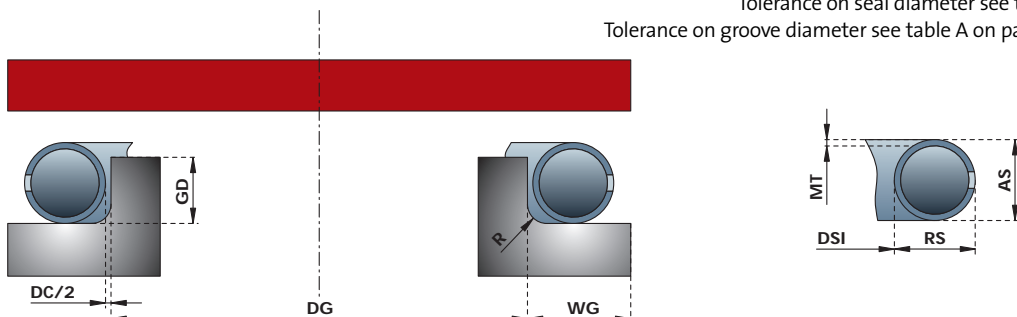
Seal dimensions					Groove Dimensions			
AS			MT	DC	DG	GD	WG	R
Axial Section	Tolerance on AS	Material Code	Material Thickness	Diametrical Clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
0,89	+0,08/-0,03	M	0,15	0,2	6,35-25	0,64-0,69	1,4	0,25
1,19	+0,08/-0,03	H	0,20	0,25	10,00-50	0,94-1,02	1,78	0,3
1,57	+0,08/-0,03	L M H	0,15 0,25 0,36	0,28	10-200	1,14-1,27	2,29	0,38
2,39	+0,08/-0,03	L M H	0,15 0,25 0,46	0,33	13-200	1,88-2,01	3,18	0,51
3,18	+0,08/-0,03	M H	0,25 0,51	0,43	25-400	2,54-2,67	4,06	0,76
3,96	+0,10	M H	0,41 0,51	0,61	75-650	3,18-3,30	5,08	1,27
4,78	+0,13	M H	0,51 0,64	0,71	100-800	3,84-3,99	6,35	1,27
6,35	+0,13	M H	0,64 0,81	0,76	200-1200	5,05-5,28	8,89	1,52
9,53	+0,13	M H	0,97 1,24	1,02	300-2000	8,26-8,51	12,7	1,52
12,70	+0,15	M H	1,27 1,65	1,27	800-3000	11,05-11,43	16,51	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 see table 1 on page 11
- Tolerance on seal diameter see table C on page 23
- Tolerance on groove diameter see table A on page 23 column h10



CI-Datasheet

INTERNAL PRESSURE FACE SEAL; CI

Seal dimensions						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	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 0,2	0,15	8-50	0,94-1,02	1,4	0,3
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	0,2	13-400	1,91-2,01	2,67	0,51
3,18	+/- 0,08	2,54	M H	0,38 0,51	0,3	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	6,6	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	12,7	1,52

Internal pressure seal: Diameter Seal Outside = Reference

FORMULA: $DSO = DG - DC - (2 \times \text{plating thickness})$

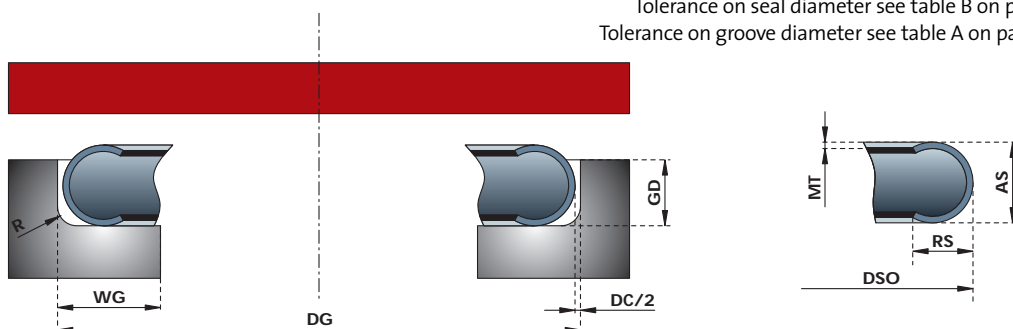
Remarks:

For DG take the Minimum outer groove diameter

Plating thickness is maximum plating thickness see table 1 on page 11

Tolerance on seal diameter see table B on page 23 column h11

Tolerance on groove diameter see table A on page 23 column H10



CE-Datasheet

CE-

EXTERNAL PRESSURE FACE SEAL; CE

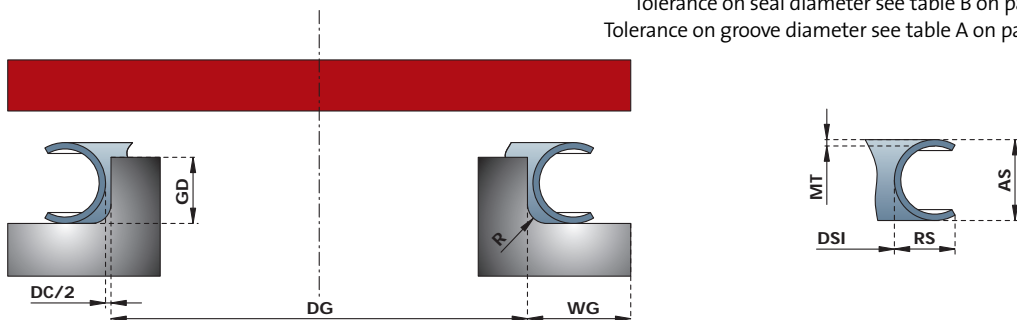
Seal dimensions						Groove Dimensions			
AS	RS	MT	DC	DG	GD	WG	R		
Axial Section	Tolerance on AS	Radial Section	Material Code	Material Thickness	Diametrical Clearance	Diameter Groove (range)	Groove Depth	Width Groove (minimum)	Radius (maximum)
0,79	+/- 0,05	0,71	M H	0,15 0,18	0,08	6-25	0,64-0,69	1,02	0,25
1,19	+/-0,05	0,96	M H	0,15 0,2	0,15	8-50	0,94-1,02	1,4	0,3
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	0,2	13-400	1,91-2,01	2,67	0,51
3,18	+/- 0,08	2,54	M H	0,38 0,51	0,3	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	6,6	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	12,7	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 see table 1 on page 11
 Tolerance on seal diameter see table B on page 23 column H11
 Tolerance on groove diameter see table A on page 23 column h10



CSI-Datasheet

SPRING ENERGISED, INTERNAL PRESSURE FACE SEAL; CSI

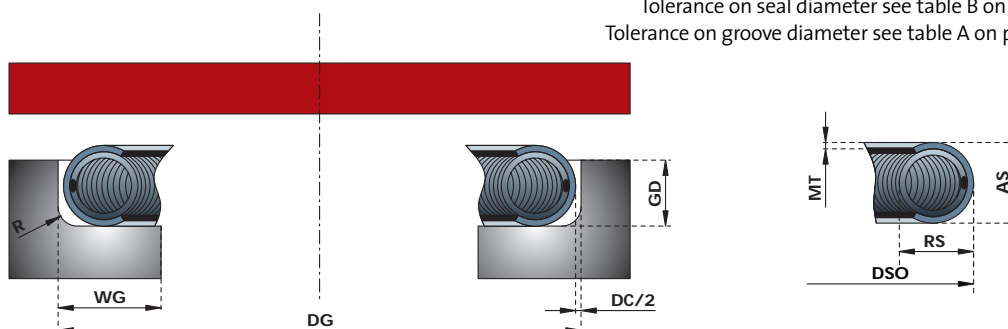
Seal Dimensions						Groove Dimensions			
AS		RS		MT	DC	DG	GD	WG	R
Axial Section	Tolerance on AS	Radial Section (maximum)	Material Code	Material Thickness	Diametrical Clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
1,57	+/- 0,05	1,5	M	0,15	0,15	20-280	1,27-1,37	2,3	0,37
2,39	+/- 0,05	2,21	M	0,25	0,2	25-400	1,91-2,01	3,19	0,51
3,18	+/- 0,08	2,9	M	0,38	0,3	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	8,9	1,51
9,53	+/- 0,10	8,69	M	0,97	0,76	300-3000	7,62-8,03	12,7	1,51
12,70	+/- 0,13	11,58	M	1,27	1,02	600-7600	10,16-10,67	16,5	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 see table 1 on page 11
- Tolerance on seal diameter see table B on page 23 column H11
- Tolerance on groove diameter see table A on page 23 column H10



CSE-Datasheet

CE-

SPRING ENERGISED, EXTERNAL PRESSURE FACE SEAL; CSE

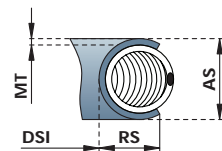
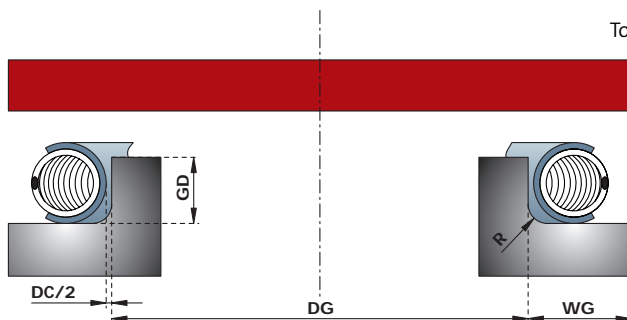
Seal Dimensions						Groove Dimensions			
AS		RS		MT	DC	DG	GD	WG	R
Axial Section	Tolerance on AS	Radial Section (maximum)	Material Code	Material Thickness	Diametrical Clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
1,57	+/- 0,05	1,5	M	0,15	0,15	20-280	1,27-1,37	2,3	0,37
2,39	+/- 0,05	2,21	M	0,25	0,2	25-400	1,91-2,01	3,19	0,51
3,18	+/- 0,08	2,9	M	0,38	0,3	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	8,9	1,51
9,53	+/- 0,10	8,69	M	0,97	0,76	300-3000	7,62-8,03	12,7	1,51
12,70	+/- 0,13	11,58	M	1,27	1,02	600-7600	10,16-10,67	16,5	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 see table 1 on page 11
- Tolerance on seal diameter see table B on page 23 column H11
- Tolerance on groove diameter see table A on page 23 column h10



CA-Datasheet

SPRING ENERGISED, INTERNAL PRESSURE FACE SEAL; CSI

Seal dimensions					
RS		MT	DSO	DSI	
Radial Section	Material code	Material Thickness	Diameter Seal Outside	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

Axial pressure seal: Diameter Seal Outside = Reference

FORMULA: DSO = DSO (see table above)

Remarks:

For seal calculation always take BD Minimum

Cavity Requirements:

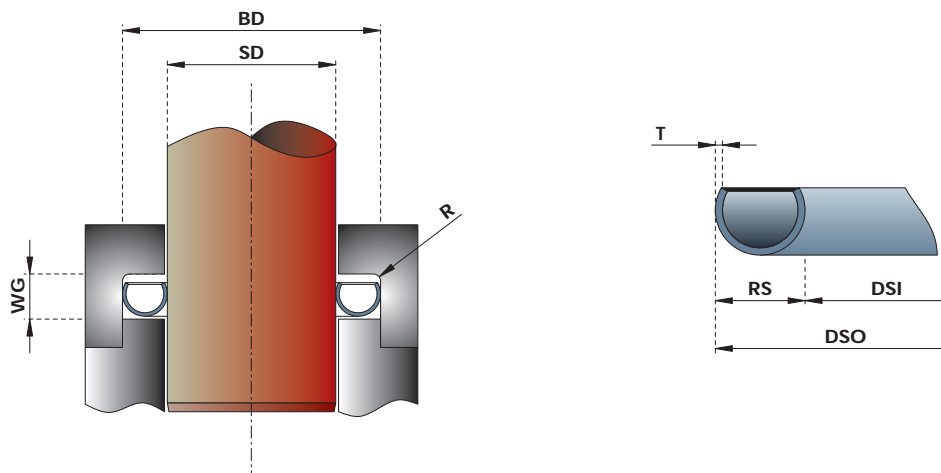
Bore diameter less 85 mm requires 0,015 maximum concentricity, above 85 mm 0,03.

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 59MPa (1,57M, 2,39M, 3,96M and 6,35M) up to 85 MPa for the 3,18M

Groove Dimensions

BD		SD		WG	R
Bore Diameter (range)	Tolerance on BD	Shaft/Rod Diameter	Tolerance on RS	Width Groove (minimum)	Radius (maximum)
12,70-38,00	+0,03	BD -3,12	-0,03	1,3	0,38
38,01-45,00	+0,03	BD -3,07	-0,03	1,3	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 -6,15	-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



WI-Datasheet

INTERNAL PRESSURE FACE SEAL; WI

Seal dimensions			Groove Dimensions			
AS		DC	DG	GD	WG	R
Axial Section	Tolerance on AS	Diametrical Clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
0,89	+0,08/-0,03	0,2	6,00-25	0,64-0,69	1,4	0,25
1,57	+0,08/-0,03	0,28	10-200	0,94-1,02	2,29	0,38
2,39	+0,08/-0,03	0,33	20-400	1,88-2,01	3,18	0,51
3,18	+0,08/-0,03	0,43	32-600	2,54-2,67	4,06	0,76

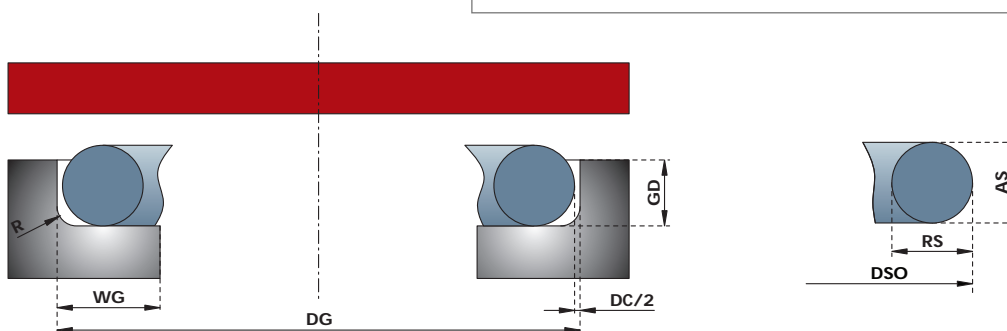
Internal pressure seal: Diameter Seal Outside = Reference

FORMULA: $DSO = DG - DC - (2 \times \text{plating thickness})$

Remarks:

For DG take the Minimum outer groove diameter
 Plating thickness is maximum plating thickness see table 1 on page 11
 Tolerance on seal diameter see table C on page 23
 Tolerance on groove diameter see table A on page 23 column H10

Wire rings are used as reinforcement rings for compensators (bellows), air channels etc.
 Wire rings are made out of stainless steel with cross section diameters that ranges from 2 to 12 mm.
 Since there are no standards we always make these rings tailor made according to our client demands (stainless steel type, diameter, cross section, tolerances, ...)



WE-Datasheet

WE-

EXTERNAL PRESSURE FACE SEAL; WE

Seal dimensions			Groove Dimensions			
AS		DC	DG	GD	WG	R
Axial Section	Tolerance on AS	Diametrical Clearance	Diameter Groove (range)	Groove Depth (min/max)	Width Groove (minimum)	Radius (maximum)
0,89	+0,08/-0,03	0,2	6,00-25	0,64-0,69	1,4	0,25
1,57	+0,08/-0,03	0,28	10-200	0,94-1,02	2,29	0,38
2,39	+0,08/-0,03	0,33	20-400	1,88-2,01	3,18	0,51
3,18	+0,08/-0,03	0,43	32-600	2,54-2,67	4,06	0,76

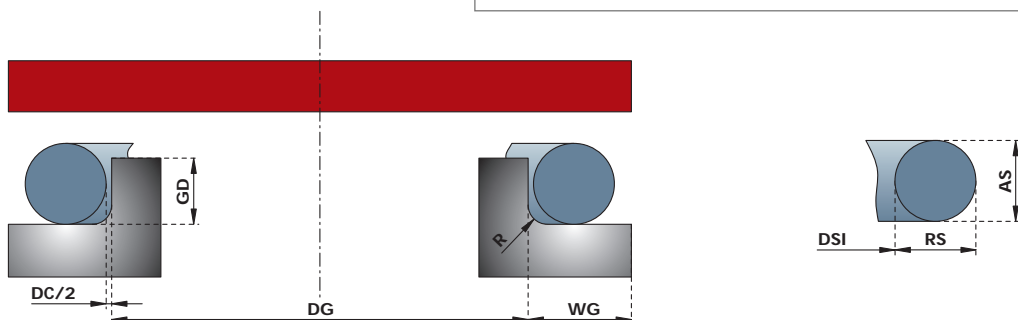
External pressure seal: Diameter Seal Outside = Reference

FORMULA: $DSI = DG + DC(-2 \times \text{plating thickness})$

Remarks:

- For DG take the Minimum outer groove diameter
- Plating thickness is maximum plating thickness see table 1 on page 11
- Tolerance on seal diameter see table C on page 23
- Tolerance on groove diameter see table A on page 23 column h10

Wire rings are used as reinforcement rings for compensators (bellows), air channels etc.
 Wire rings are made out of stainless steel with cross section diameters that ranges from 2 to 12 mm.
 Since there are no standards we always make these rings tailor made according to our client demands (stainless steel type, diameter, cross section, tolerances, ...)



Shaped Seals and Specials

SHAPED SEALS **SHAPED SEALS; ANY SHAPE, ANY SIZE**

ECONOMOS offers shaped seals, custom made in all possible shapes.

For various applications, the availability of special shaped metal seals offers great design flexibility.

O seals are the most flexible to shape, they can be formed in almost any shape.

C seals can also be shaped, but there are limitations in the shape type.

For each cross section there is a limitation in the applied radius.

The table below indicates the minimum outer corner radius for various cross sections of metal O, C and W rings.

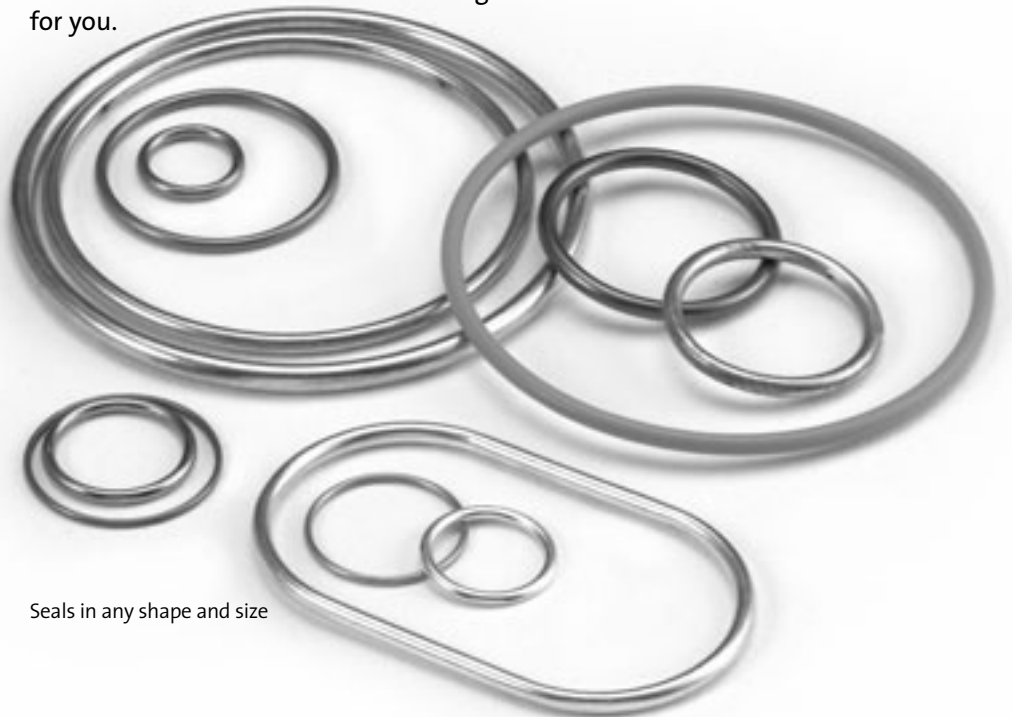
Axial Section	0,79	0,89	1.19	1.57	2.39	3.18	3.96	4.78	6.35	9.53	12.7	15.88
Minimum Outer Radius	3.2	3.2	5	6.5	13	25	50	75	100	200	300	400

SPECIALS **OTHER HIGH TECH METAL SEALS, SPECIAL DESIGNS**

ECONOMOS can offer besides O and C-types of metal seal a variety of other seal types: U-rings, V-rings, seals with internal limiters, etc.

We know there are many applications that demand special designed seals. ECONOMOS will be pleased to help you finding the right solution for your specific application.

ECONOMOS is an innovative company; our specialists and partner engineers at HTMS are determined to find the ideal sealing solution for you.



Seals in any shape and size

Tolerances

TABLE A

Groove Tolerances		
Nominal Diameter mm	Tolerances in μm	
	h10	H10
0-3	0 / -40	0 / +40
3-6	0 / -48	0 / +48
6-10	0 / -58	0 / +58
10-18	0 / -70	0 / +70
18-30	0 / -84	0 / +84
30-50	0 / -100	0 / +100
50-80	0 / -120	0 / +120
80-120	0 / -140	0 / +140
120-180	0 / -160	0 / +160
180-250	0 / -185	0 / +185
250-315	0 / -210	0 / +210
315-400	0 / -230	0 / +230
400-500	0 / -250	0 / +250
500-760	0 / -300	0 / +300
760-1050	0 / -400	0 / +400
1050-1425	0 / -500	0 / +500
1425-1940	0 / -630	0 / +630

TABLE B

C-Ring Tolerances		
Nominal Diameter mm	Tolerances in μm	
	h11	H11
0-3	0 / -60	0 / +60
3-6	0 / -75	0 / +75
6-10	0 / -90	0 / +90
10-18	0 / -110	0 / +110
18-30	0 / -130	0 / +130
30-50	0 / -160	0 / +160
50-80	0 / -190	0 / +190
80-120	0 / -220	0 / +220
120-180	0 / -250	0 / +250
180-250	0 / -290	0 / +290
250-315	0 / -320	0 / +320
315-400	0 / -360	0 / +360
400-500	0 / -400	0 / +400
500-760	0 / -500	0 / +500
760-1050	0 / -630	0 / +630
1050-1425	0 / -760	0 / +760
1425-1940	0 / -1000	0 / +1000

O-Ring Tolerances on O-Ring Diameter	
Cross Section(mm)	Tolerances in μm
0,89-4,78	+ 130
4.79-9.52	+200
9.53-12.70	+250

TABLE C

Conversions

conversions

PASCALE CONVERSION

To convert to pascale	Multiply by
atmosphere	$1,013 \times 10^5$
bar	$1,000 \times 10^5$
dyne/centimeter ²	$1,000 \times 10^1$
inch of mercury (0°C)	$3,386 \times 10^3$
inch of water (4°C)	$2,491 \times 10^2$
kilogram/meter ²	9.807
pound/inch ² (psi)	$6,894 \times 10^3$
pound/foot ²	$4,788 \times 10^1$
torr (mm of mercury 0°C)	$1,333 \times 10^2$

PSI CONVERSION

To PSI	From PSI
psi = in. of H ₂ O x (3,6127 x 10 ⁻²)	in. of H ₂ O = psi x 27,68
psi = in. of Hg x (0,49118)	in. of Hg = psi x 2,036
psi = mm of H ₂ O x (1,4223 x 10 ⁻³)	mm of H ₂ O = psi x 703,1
psi = mm of Hg x (1,9339 x 10 ⁻²)	mm of Hg = psi x 51,71
psi = cm of H ₂ O x (14,223 x 6 ⁻³)	cm of H ₂ O = psi x 70,3
psi = kg/cm ² x (14,223)	kg/cm ² = psi x 0,0703
psi = bar x (14,503)	bar = psi x 0,0689
psi = mbar x (1,4503 x 10 ⁻²)	mbar = psi x 68,95
psi = Pa x (1,4503 x 10 ⁻⁴)	Pa = psi x 6895
psi = kPa x (1,4503 x 10 ⁻¹)	kPa = psi x 6,895

METRIC

English	Metric
1 mm = 0,03937 in.	in. = 25,4mm
1 cm = 0,3937 in.	in. = 2,54cm
1 m = 39,37 in.	in. = 2,54 x 10 ⁻²

TEMPERATURE

Celsius	Fahrenheit
°C = (°F-32)/1,8	°F = 1,8°C + 32

CONTACT ECONOMOS®

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For full literature on any ECONOMOS® product please contact; marketing@economos.com