



# Seals

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## Shaped seals

### Shaped seals: any shape, any size

TFC 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	0,78	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

TFC 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.

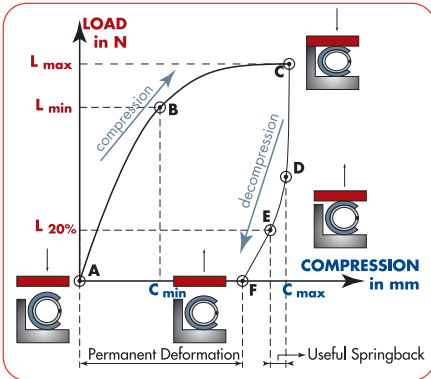
We know there are many applications that demand special designed seals. TFC will be pleased to help you, finding the right solution for your specific application.

TFC 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

## 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.

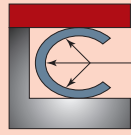
### Decompression cycle (C – F), releasing the load

- 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.

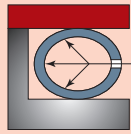
The different types of metal seals have different load-compression characteristics. Individual load compression diagrams can be obtained up on request.

### Terminology: Pressure energisation

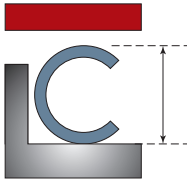
Meaning that the hydrostatic pressures are used to benefit the self-energisation of the seal. Especially at high pressures (above 21Mpa) this becomes a 'sealing-advantage' and enables High Tech Metal Seals to seal at 170Mpa and above.



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).



#### Axial section (mm)

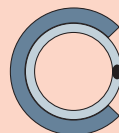
Also known as free height. This is the height of the High Tech Metal Seal before installation. This measure is always without plating- or coating-layer thickness.



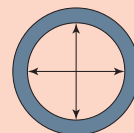
#### Working section (mm)

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.

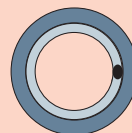
### TFC offers a variety of seals with other types of energisation



Spring energised C-ring



Gas filled O-ring



Spring energised O-ring

7  
Seals

8  
Disc & Coil Springs

9  
Circlips & Retaining Rings

10  
Bonding & Lubricants

## PTFE rotary shaft seals

PTFE lip seals bridge the gap between current technologies for both gas and liquid sealing applications. In many applications PTFE Rotary Shaft Seals can remove the need to change to bulky, multi-component mechanical face seals. Our PTFE Rotary Shaft Seals offer impressive operating characteristics.

They can run at speeds of 30 metres/sec, and cope with pressures up to 35 bar and temperatures  $-20^{\circ}\text{C}$  to  $+250^{\circ}\text{C}$ .

They are resistant to chemical attack, have low friction characteristics and are designed to ensure long seal life even in conditions of no lubrication or when used with abrasive media.



PTFE rotary seals

## PTFE / PTFE spring energised

We offer a comprehensive range of PTFE spring energised and Hydraulic Seals, which includes, Piston, Rod, Scraper, Rotary either O Ring energised or Spring Energised.

Our Springs can be produced to NACE approval.



PTFE seals

7  
Seals

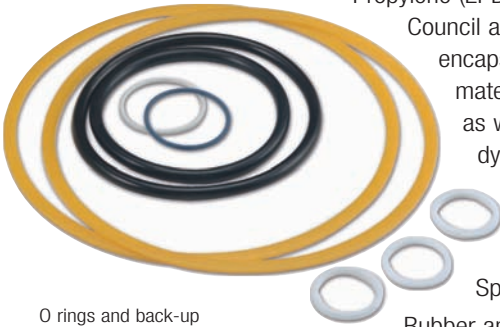
8  
Disc & Coil  
Springs

9  
Circlips &  
Retaining  
Rings

10  
Bonding &  
Lubricants

## O rings & cord

British Standard Imperial (BS) and British Metric (RM) sizes as well as Swedish, German, French and Japanese (JIS) metric sizes in Nitrile, Viton, Silicone, Fluorosilicone, Ethylene Propylene (EPDM), Neoprene, NWC (National Water Council approved), FEP (Viton and Silicone encapsulated), High Nitrile and Food Grade materials in a variety of shore hardnesses, as well as in PTFE to suit both static and dynamic applications.



O rings and back-up

## Back-up rings

Spiral, Single Cut and Solid PTFE as well as Rubber and Polyurethane Contoured back-up rings.

## Rotary shaft seals

In a variety of materials and styles ranging from standard metal cased and rubber covered; single and double lipped types to split seals (up to 1000mm diameter) and unitised seals for Truck and Trailer axles. TFC offer the added benefit of producing metal cased shaft seals to customer's specifications.



Rotary seals

## Shaft repair kits

The lower cost alternative to replacing or reworking of damaged shafts, thereby reducing machine downtime.



Shaft repair kits

**7**  
Seals

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