Pressure Seals, Inc.
Phone: (877)-PSI-SEAL Toll Free
Thousands of Seals, O-Rings, and U-Cups
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Metallic Spring Energized Teflon* Seals

Introduction
PSI's spring-loaded seals have been developed specifically to overcome the problems associated with fluoroplastics and elastomerics. They are designed for static, rotary and reciprocating applications in temperatures from cryogenic to 600˚F; and pressures from vacuum to 25,000 psi, to survive the most corrosive environments.

The innovative design combines a "C" shaped spring with a fluoropolymer-based seal jacket to achieve one of the most efficient and versatile sealing methods. The high strength stainless steel energizer provides strength and flexibility to control seal loading, even with temperature extremes, while the fluoroplastic jacket provides the well-known Teflon* virtues of low friction, corrosion resistance, sealability and wear resistance.

The optimum radius cantilever design of the jacket and spring creates a highly stable seal system. Further, the superior jacket design allows for optimum stress distribution and the elimination of jacket failure due to shear of the spring retention lip characteristic of competitive products.

By eliminating the spring retention lip, the spring can move without restraint relative to the jacket creating unique flexibility. This permits easy installation in situations where competitor designs would encounter severe problems. There are many applications that are ideal for metal spring-loaded lip seals including the following:

- Thermal extremes make the requirement for a stable seal element unobtainable using other designs or material.
- Control of friction loads is essential and unobtainable using other designs or material.
- High wear is unavoidable and cannot be compensated for by other designs.
- Manufacturing tolerances or the presence of side loads make the requirement for a flexible seal lip mandatory. Corrosive medium compromises elastomeric sealing or energizing elements.

*DuPont's Registered Trademark

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Spring Seal Materials

Typical Jacket Materials

Material Code	Name	Description
001	Virgin Teflon (unfilled)	The most corrosion resistant material for general applications at moderate speeds, pressures and temperatures. Exhibits low gas permeability characteristics.
059	Tetralon ACS	Modified bronze filled PTFE. Good for dynamic applications with high PV factor. Resists friction heating.
230	Tetralene B-1000	UHMW Polyethylene with friction-reducing fillers. Very tough and long wearing at temperatures below 200˚F. Excellent for sealing abrasive media. Good cryogenic resistance.
300	Tetralon 720	Polymeric filled PTFE. Excellent thermal stability. Impressive wear ratio of 1000:1 over unfilled PTFE. Suitable for sealing against soft mating surfaces.
430	Tetralon	Proprietary modified unfilled virgin PTFE. Excellent heat and wear resistance. Wear resistance property at least 10 to 100 times greater than virgin PTFE.
440	Tetralon TFC-031	Tetralon with glass fiber. Very good resistance to extrusion and cold flow. Good for cryogenic applications. Can be abrasive against soft metals.
450	Tetralon TFC-033	Similar to Tetralon TFC-031, but higher glass fiber content. Increased resistance to high temperatures or cryogenic conditions. Not recommended for use against soft metals.
490	TFC-082	Glass-moly filler. Recommended for high pressure and high temperature applications. Excellent creep resistance.
570	TFC-021	Graphite-filled PTFE. Excellent friction and wear characteristics. Recommended for use in water or water-based fluids.
600	TFC-108	Carbon-graphite filled PTFE. Excellent wear and extrusion resistance.
902	Tetralon 900 Series	Suitable for applications requiring low friction. Minimizes “stiction” Ultra wear resistance, non-abrasive filled PTFE material. Suitable for non-lubricated applications. Minimal wear debris.

For extreme operating conditions, check the factory for material recommendations.

Typical Spring Materials

Material Code	Name	Description
A	301 Stainless Steel	Good corrosion resistance for general applications.
B	Inconel 718	For extreme temperatures. Good resilience and tensile properties.
C	Elgiloy	The most resilient spring. Excellent chemical compatibility and corrosion resistance. Meets N.A.C.E. MR-01-75.
D	Hastelloy C-276	High nickel content for maximum corrosion resistance. Meets N.A.C.E. MR-01-75.
E	304 Stainless Steel	Meets N.A.C.E. MR-01-75. Good for general applications requiring corrosion resistance and non-magnetic characteristics.
F	17-7PH Stainless Steel	Good for cryogenic applications. Used in many military-aerospace requirements.
G	316 Stainless Steel	A good corrosion resistant alloy for applications requiring higher chemical compatibility.
H	302 Stainless Steel	Typical non-magnetic 300 series stainless steel.

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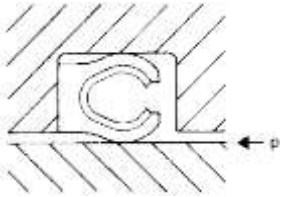
Seal Selection Guide

Select the seal type and TF series from the table below.

Seal Types

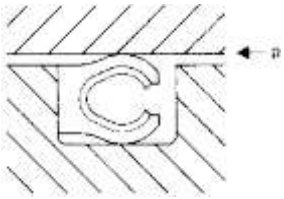
Reciprocating (Linear Motion) Rod Seal
Military Standard MIL-G-5514
TF 888R

Commercial-Industrial Standard
TF 1188R (Static Only)
TF 1288R

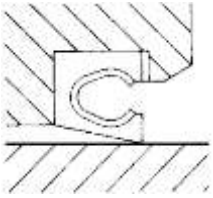


Reciprocating (Linear Motion) Piston Seal
Military Standard MIL-G-5514
TF 888P

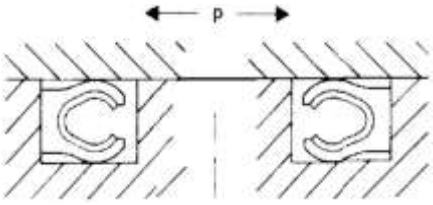
Commercial-Industrial Standard
TF 1188P (Static Only)
TF 1288P



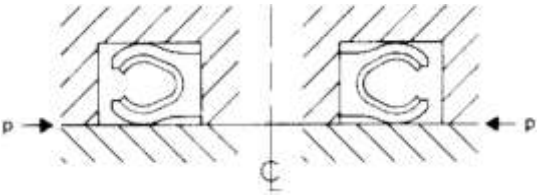
Reciprocating (Linear Motion) Rod Scraper
TF 1388



Static Face Seal I.D., Internal
TF 888F



Static Face Seal O.D., External
TF 888E



Ordering Information

Aerospace Static and Dynamic Applications				
Gland Design Per MIL-G-5514F				
Basic Part Number	Seal Type R = Radial Rod P = Radial Piston	Dash Number Corresponding to AS568	Jacket Material	Spring Material
TF 888	R	215	-001	A

Industrial Dynamic Applications				
Basic Part Number	Seal Type R = Radial Rod P = Radial Piston	Dash Number	Jacket Material	Spring Material
TF 1288	R	215	-001	A

Industrial Static Applications				
Basic Part Number	Seal Type R = Radial Rod P = Radial Piston	Dash Number Corresponding to AS568	Jacket Material	Spring Material
TF 1188	R	215	-001	A

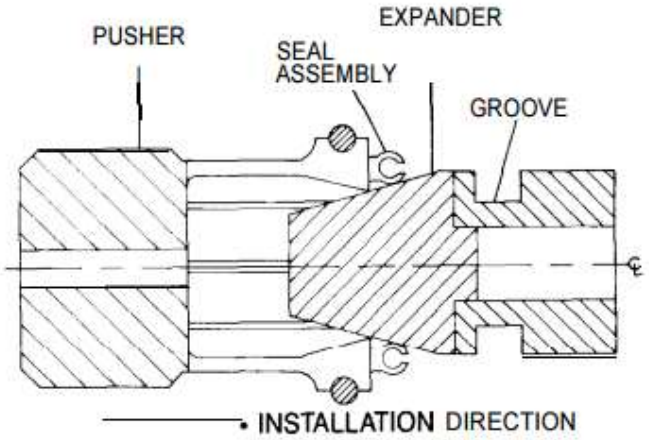
Rod Scraper Applications				
Basic Part Number		Dash Number Corresponding to AS568	Jacket Material	Spring Material
TF 1388		215	-001	A

Face Seals				
Basic Part Number	Seal Type F = Internal Pressure Face Seal E = External Pressure Face Seal	Dash Number	Jacket Material	Spring Material
TF 888	F	215	-001	A

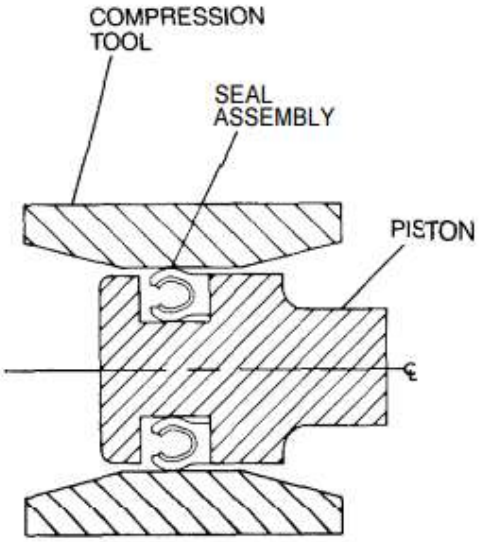
Spring Seal Installation

The installation of PSI Spring Seals is easy by the patented design features. However, care should always be taken during installation to assure that the jacket is undamaged and the seal is properly seated.

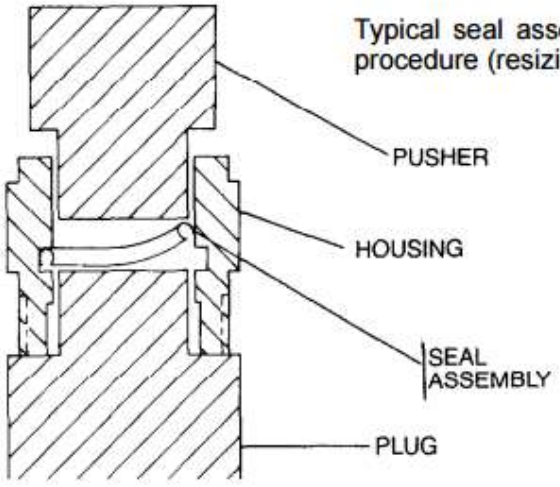
The illustration below shows some of the procedures for general installation techniques. PSI will supply tools or tool drawings on request to accommodate customer's hardware. Consult the factory regarding the method of installation and required tools best suited to your application.



Seal expansion over a ramp and into a one piece piston groove.



Typical seal assembly compression procedure (resizing) into groove.



Bore mounted rod seal installation using plug and pusher.

Alternate Design and Retrofit Information

Alternate Design

PSI spring energized seals are designed to be installed readily in standard O-Ring grooves. However, alternate seal gland housing configurations may be used safely for easy seal installation.

Figures 1 and 2 illustrate typical modified rod and piston seal gland housings.

Figure 3 illustrates a gland housing for a bi-directional piston seal.

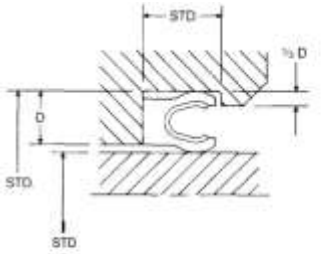


Figure 1

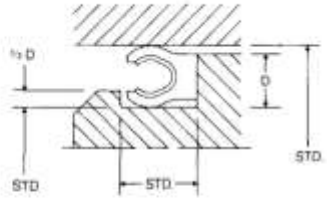
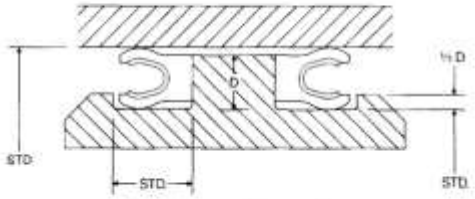


Figure 2

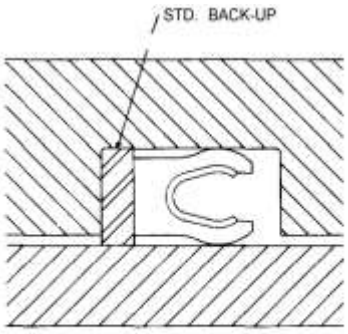


Bi-Directional Piston Seal

Figure 3

Alternate Retrofit

PSI spring energized seals can be used for retrofitting into existing seal glands. Standard spring energized seals are designed for installation into a no-backup gland. For existing equipment that is configured for one or two backup ring groove widths, refer to Figures 4 and 5.



One Backup Ring Groove

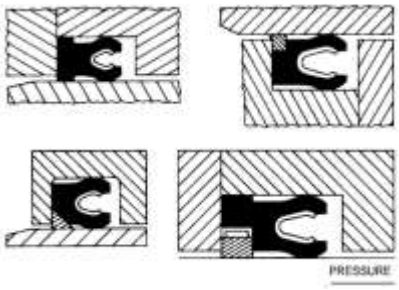
Figure 4

Two Backup Ring Groove

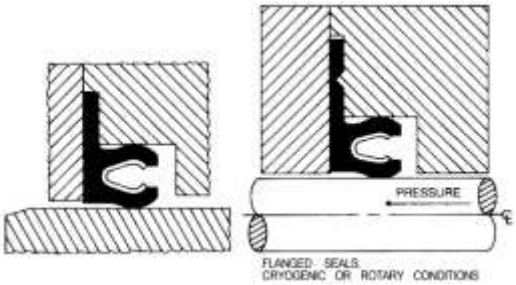
Figure 5

Special Applications

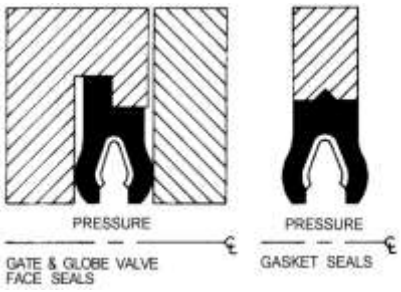
Anti-Extrusion Ring
In high pressure/high temperature dynamic applications, ring materials such as Tetra-Temp® PEEK resist deformation and extrusion. In some cases, the anti-extrusion ring is retained as an integral part in the heel of the seal for handling and installation. In wider glands, extrusion can be eliminated with one or two back-up rings.



Flanged Seal
For rotary applications, the hardware members lock the flanged heel in place to prevent seal rotation. For cryogenic applications, the flanged heel prevents shrinkage of the seal material from the O.D. mating surface.



Gasket Seals, Gate and Globe Valve Face Seals, Other Special Purpose Seals
To meet critical specifications or performance requirements, PSI can design and manufacture seals for virtually any need.



Symmetrical Cross Section Seals
To accommodate angular glands in conical or spherical hardware, angular planes can be machined.