

| Seal Materials                  | Temp. Range |    |       |
|---------------------------------|-------------|----|-------|
| Polytetrafluoroethylene (PTFE)  | -260°C      | to | 260°C |
| Carbon/Graphite Reinforced PTFE | -200°C      | to | 260°C |
| Glass/Moly Reinforced PTFE      | -200°C      | to | 260°C |
| Bronze Reinforced PTFE          | -200°C      | to | 260°C |
| Carbon Reinforced PTFE          | -200°C      | to | 260°C |
| KasPex™ PEEK                    | -70°C       | to | 260°C |
| UHMW-PE                         | -250°C      | to | 80°C  |

Our standard spring loader material is SS301. Other materials are available upon request.

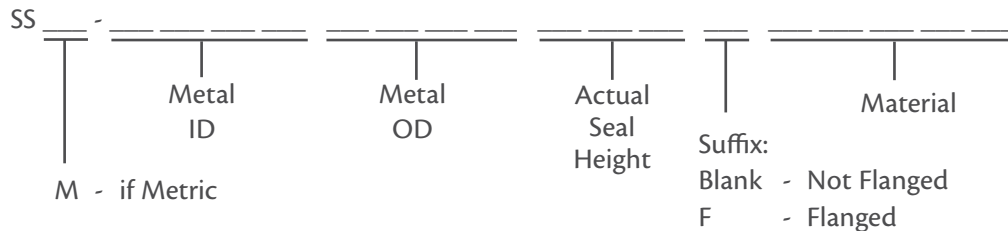


## Product Description

Spring energized seals are lip seals that incorporate a metal or composite spring into the seal design. The spring energizes the seal lip against the mating hardware, creating a seal capable of compensating for movement in a dynamic application. They are used in single acting dynamic applications and should be oriented with the spring towards the pressure side.

Spring energized seals are primarily used in extreme environments where a standard moulded elastomers or thermoplastics cannot meet the application requirements due to the material limitations. As these seals are designed to meet varying applications and high-performance requirements, Hi-Tech Seals mainly stocks custom design seals. Installation of these seals is often quite difficult and as such they are strongly recommended to be used in open or split gland designs.

## Part Numbers:

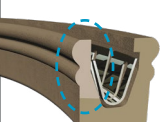
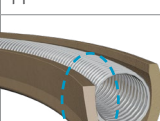


### Materials:

- Blank - Virgin PTFE
- NYLON - PA
- UHMW - UHMW-PE
- PEEK - KasPex™ PEEK
- TCF - Carbon Reinforced PTFE
- TCG - Carbon Graphite Reinforced PTFE
- TBF - Bronze Reinforced PTFE
- TMG - Moly Glass Reinforced PTFE

## Designing an Spring Energized Seal

1. Select a dynamic lip configuration that suits application needs:

| Seal Type  | Advantages   | Disadvantages  |
|--|--|--|
|  <p>A</p>   | <ul style="list-style-type: none"> <li>• Low wear rate</li> <li>• Preferred design for oscillatory, slow rotary applications</li> <li>• Radius lip reduces probability of seal lip damage during installation</li> </ul>                               | <ul style="list-style-type: none"> <li>• Should not be used for dynamic sealing of abrasive media</li> <li>• May weep in high speed reciprocating applications due to seal lip hydroplaning</li> </ul> |
|  <p>B</p>   | <ul style="list-style-type: none"> <li>• Improved sealability</li> <li>• Preferred design for dynamic sealing of gas and vapor</li> <li>• Beveled lip reduces probability of seal lip damage during installation</li> </ul>                            | <ul style="list-style-type: none"> <li>• Should not be used for dynamic sealing of abrasive media</li> <li>• May weep in high speed reciprocating applications due to seal lip hydroplaning</li> </ul> |
|  <p>D</p>   | <ul style="list-style-type: none"> <li>• Locks seal into reduced glands</li> <li>• Reduced probability of seal lip hydroplaning</li> <li>• Low wear rate</li> <li>• Good excluder for debris and contaminants</li> </ul>                               | <ul style="list-style-type: none"> <li>• Requires good lead-in chamfer if hardware is installed lip first</li> <li>• Possible weepage of light fluids or gases</li> </ul>                              |
|  <p>S</p>  | <ul style="list-style-type: none"> <li>• Low wear rate</li> <li>• Redundant seal lip design</li> <li>• Trapped fluid between contact points provides added lubrication to seal</li> </ul>  | <ul style="list-style-type: none"> <li>• Should not be used for dynamic sealing of abrasive media</li> <li>• May weep in high speed reciprocating applications due to seal lip hydroplaning</li> </ul> |
|  <p>X</p> | <ul style="list-style-type: none"> <li>• Improved sealability over D style lip</li> <li>• Preferred lip design for dynamic sealing of abrasive media</li> <li>• Reduced probability of seal lip hydroplaning</li> </ul>                                | <ul style="list-style-type: none"> <li>• Requires good lead-in chamfer if hardware is installed lip first</li> <li>• Lip design must be used in combination with other lip style</li> </ul>            |
|  <p>H</p> | <ul style="list-style-type: none"> <li>• High load of helical wound spring improves sealability</li> <li>• Suitable for sealing cryogenic gases and fluids</li> <li>• Radius lip reduces probability of seal lip damage during installation</li> </ul> | <ul style="list-style-type: none"> <li>• Should not be used for dynamic sealing of abrasive media</li> <li>• May weep in high speed reciprocating applications due to seal lip hydroplaning</li> </ul> |
|  <p>W</p> | <ul style="list-style-type: none"> <li>• High load of helical wound spring improves sealability</li> <li>• Preferred lip design for dynamic sealing of abrasive media</li> <li>• Reduced probability of seal lip hydroplaning</li> </ul>               | <ul style="list-style-type: none"> <li>• Requires good lead-in chamfer if hardware is installed lip first</li> <li>• Lip design must be used in combination with radius lip style</li> </ul>           |

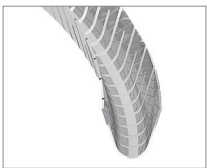
Images are depicted with a bronze reinforced PTFE material.

2. Determine if the same sealing lip is appropriate for the static lip. spring energized seals do not have to be symmetrical.

3. When determining which jacket material is required for your application, variables to consider include:

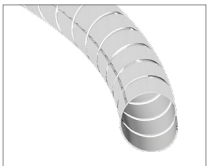
- Temperature
- Chemical
- Pressure
- Velocity
- Cost

4. When manufacturing spring energized seals we typically use cantilever springs, though helical wound and slanted/canted coil springs are available upon request.



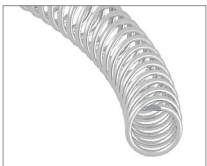
#### Cantilever Spring (V-Spring or Finger Spring)

A cantilever spring is recommended for dynamic, medium load applications where low friction is desired. The V-shape spring provides constant compression load and is further energized by system pressure.



#### Helical Wound Spring

A helical wound spring is made from a metal ribbon, which is coiled into a helix. The spring compresses radially producing a very high load versus deflection. The helical wound spring is preferred for static applications or in applications where sealability is of a higher concern than friction.



#### Slanted/Canted Coil Spring

A slanted coil spring, also known as a canted coil spring, is manufactured from a round wire that is coiled and angled. The process creates a compression force in the radial direction. The canted coil design is suited for dynamic applications where low friction is critical.

5. The most common spring material is stainless steel. Hastelloy®, Inconel, and Elgiloy are available for applications that require additional corrosion resistance.