Engineered Thermoplastic Seals

Materials:	Temp. Range		
Nylon	-30°C	to	93°C
UHMW-PE	-250°C	to	80°C
PEEK	-70°C	to	260°C
Carbon fibre filled PTFE	-268°C	to	288°C
Carbon Graphite filled PTFE	-268°C	to	288°C
Bronze filled PTFE	-268°C	to	288°C
Glass, Moly filled PTFE	-268°C	to	288°C
Virgin PTFE	-268°C	to	232°C

Product Description:

Engineered Thermoplastic Seals (ETS) are engineered plastic seals which incorporate a metallic spring. The spring loads the seal lips against the mating hardware, creating a seal capable of compensating for movement in dynamic applications. The spring provides the necessary lip squeeze to compensate for movement in dynamic applications. ETS are normally used in single acting dynamic applications and should be oriented with the spring cavity towards the pressure side. Pressure from the media being sealed provides additional sealing force as it acts upon the sealing lips.

ETS are typically used in applications where conventional elastomers are not acceptable due to application conditions such as:

- Media Compatibility
- Friction Sensitive Application
- Dynamic Sealing of Abrasive
- Non- Lubricating Media
- Temperature Extremes
- High Surface Speeds
- High PV Rates (Pressure x Velocity)
- Explosive Decompression

Due to the high performance requirements of an ETS, Hi-Tech Seals stocks mainly custom designed parts. Hi-Tech Seals can provide engineering support for seal design on demanding applications. Please contact a Hi-Tech Seals' representative with any questions and/or application requirements.

Part Numbers:

SS ___ - ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

I.D. O.D. Height Material

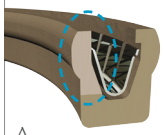
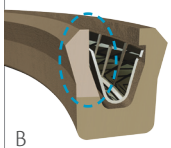
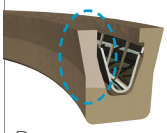
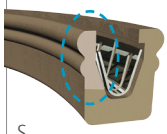
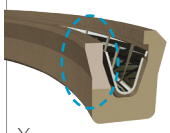
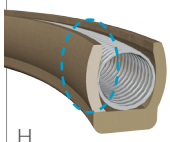
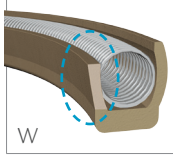
M - if Metric

Materials:

Blank	-	Glass, Moly filled PTFE	TCF	-	Carbon Fiber filled PTFE
NYLON	-	Nylon	TCG	-	Carbon Graphite filled PTFE
UHMW	-	UHMW	TBF	-	Bronze filled PTFE
PEEK	-	PEEK			

Designing an engineered thermoplastic seal

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

Seal Type	Advantages	Disadvantages
 A	• Low wear rate • Preferred design for oscillatory, slow rotary applications • Radius lip reduces probability of seal lip damage during installation	• Should not be used for dynamic sealing of abrasive media • May weep in high speed reciprocating applications due to seal lip hydroplaning
 B	• Improved sealability • Prefered design for dynamic sealing of gas/vapor • Beveled lip reduces probability of seal lip damage during installation	• Should not be used for dynamic sealing of abrasive media • May weep in high speed reciprocating applications due to seal lip hydroplaning
 D	• Locks seal into reduced glands • Reduced probability of seal lip hydroplaning • Low wear rate • Good excluder for debris/contamination	• Requires good lead-in chamfer if hardware is installed lip first • Possible weepage of light fluids or gases
 S	• Low wear rate • Redundant seal lip design • Trapped fluid between contact points provides added lubrication to seal	• Should not be used for dynamic sealing of abrasive media • May weep in high speed reciprocating applications due to seal lip hydroplaning
 X	• Improved sealability over D style lip • Preferred lip design for dynamic sealing of abrasive media • Reduced probability of seal lip hydroplaning	• Requires good lead-in chamfer if hardware is installed lip first • Lip design must be used in combination with other lip style
 H	• High load of helical wound spring improves sealability • Suitable for sealing cryogenic gases and fluids • Radius lip reduces probability of seal lip damage during installation	• Should not be used for dynamic sealing of abrasive media • May weep in high speed reciprocating applications due to seal lip hydroplaning
 W	• High load of helical wound spring improves sealability • Preferred lip design for dynamic sealing of abrasive media • Reduced probability of seal lip hydroplaning	• Requires good lead-in chamfer if hardware is installed lip first • Lip design must be used in combination with radius lip style

Images are depicted with a Bronze filled PTFE material.

2. Determine if the same sealing lip is appropriate for the static lip. Engineered Thermoplastic Seals do not need to be symmetrical.

Engineered Thermoplastic Seals

3. Identify which jacket material is required.

Variables to consider include temperature, chemical, pressure, velocity, and cost.

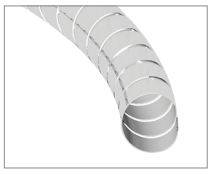
Jacket Materials:	Temp. Range		
PTFE	-268°C	to	232°C
Carbon/Graphite filled PTFE	-268°C	to	288°C
Glass, Moly filled PTFE	-268°C	to	288°C
Bronze filled PTFE	-268°C	to	288°C
PEEK	-70 °C	to	260°C
Nylon	-30°C	to	93°C
UHMWPE	-250°C	to	80°C

4. Select a Spring Design:

Our in-house manufacturing typically uses cantilever springs. Helical and slanted coil springs are available upon request.

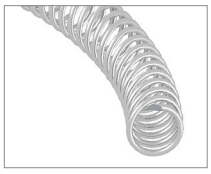
Cantilever Spring (Finger Spring)

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 applications where sealability is more of a concern than friction.



Slanted 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. Select a Spring Material.

Most springs are composed of stainless steel; however, Hastelloy®, Inconel, and Elgiloy® are used in applications that require additional corrosion resistance.