



VEDOVELL Spring Energized Seals

Due to the nature of spring energized seal applications, a wide range of available seal jacket and seal spring materials are offered to customers to provide an engineered product that fits with the entire scope of their various applications. Spring energized seals are a last resort for most companies that consider using them in their application. Typically, by the time a company has to resort to the use of a spring energized seal, all other attempts at using more conventional seals have failed. This is exactly why such a wide range of materials for these seals are available; to provide the right combination of materials to completely meet the specifications set by the parameters of an application. This section will touch on seal jacket materials, seal spring materials and describe their use.

Seal Jacket Materials

Seal Jacket Materials fall into four general categories: *PTFE (Virgin Teflon®, Filled PTFE, Alloyed PTFE and Thermoplastics)*. Each has specific application niches, with benefits as well as shortcomings. An attempt will be made to inform the reader of the relative shortcomings of each material so that you may be aware of potential trouble spots when applying a material to specific applications.

PTFE

PTFE is the premium of spring energized seal materials. It is readily available from a number of sources in resin form or as compression molded shapes. For seals, the material should be processed for maximum amorphousity (highest elongation, smallest grain structure).

PTFE is excellent for most low and medium pressure static applications. PTFE will handle temperatures up to approximately 350°F without sacrificing most of its properties. It is excellent for dynamic applications where speeds and/or cycles are minimal. It provides the lowest friction of any seal material and is also very kind to the metal speed operation.

Filled PTFE

5% Molybdenum Disulphide Filled PTFE.

5% Moly filled PTFE is used for increased temperature (up to 400°F) and pressure applications. It provides good sealing characteristics (low compressive modulus) while offering better extrusion resistance and lower wear than unfilled PTFE. It is useful for liquids and gasses where high temperatures, pressures and cycling rates are present. It loses some sealability to PTFE in lower temperature and pressure applications. It should be processed for maximum amorphousity.

15% Graphite Filled PTFE

15% Graphite filled PTFE is useful at high temperatures (up to 500°F). It is generally used for liquids and steam at moderate (up to 3,000 psi) pressures. Because of the heavy fill, the material becomes somewhat porous to high pressure gasses. It should be processed for maximum crystallinity.

15% Glass, Moly Filled PTFE

15% Glass, Moly Filled PTFE material was developed for sealing at very high pressures. With the right jacket design, pressures up to 40,000 psi have been successfully sealed with this material. Like 15% graphite filled PTFE, it has some porosity to high pressure and temperature gasses, however, may be the only choice in very high pressure gas systems. It should be processed for maximum crystallinity.



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Alloyed PTFE

PTFE/Ryton® alloy is a required material for seal applications involving very high speed reciprocating or rotary motions. It has a high temperature rating (up to 575°F) that makes it an excellent general purpose material with mid-range pressure requirements.

Thermoplastics

UHMW Polyethylene

UHMWPE has two exceptional characteristics which make it an excellent choice for spring energized seals. It is an extremely abrasion resistant material and may be used with an abrasive media such as paint or fluids with high levels of particle contamination. It is also FDA approved for elongation properties at cryogenic temperatures. It is the best choice for cryogenic pumps, valves, etc., however, it should not be used at temperatures above 180°F.

GUR® UHMW Polymer

GUR® UHMW, extremely close in relation to UHMW, has the following advantages: superior performance against virtually all acids, solvents, salts, etc; zero moisture absorption; and superior wear surface to nylon and other materials. Because of its self-lubricating, non-stick and wear-resistant characteristics, GUR® UHMW has been used in such applications as ore/coal, cement, gravel and mining industries. As its sister material, UHMW, GUR® has a temperature limit, it is 140°F.

Hytrel® (DuPont Polyester Elastomers)

Hytrel® is included as a material because of its high resistance to radiation. It should be specified in all nuclear applications, valves, cylinders, actuators, pipe snubbers, etc.

Seal Spring Materials and Designs

The primary function of the spring is to provide energy to the sealing jacket for effective sealing at low system pressures. The spring also is used to compensate for the low resiliency or lack of memory of the jacket materials in relation to wear in dynamic applications. When operating conditions permit, an elastomer energizer may be used as an alternative to the metal energizer.

301 Stainless Steel Spring-MIL-S-5059 This stainless steel is the general purpose spring material. It may be used in applications involving most corrosive chemicals at all ranges of pressure and moderate temperatures.

Elgiloy Spring Elgiloy is an extremely strong cobalt/nickel alloy used in highly corrosive environments.

V-Section Finger Spring The V-Section Finger Spring is designed to provide maximum deflection capability. Designing for deflection provides a low rate spring. Having a low rate spring heavily deflected provides a fairly constant spring load transmittance to the sealing lip throughout most dynamic applications. It is most useful if wear compensation, low constant friction or high shaft runouts and/or disparities are design requirements.



Helical Wound Spring The Helical Wound Spring is designed especially for maximum load capability. Designing for load provides a high rate spring useful for applications where maximum contact pressure is desired to provide minimum leakage. It is useful in most static applications and in dynamic applications where shaft runouts are low and sealing requirements are stringent.














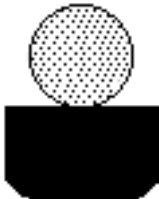

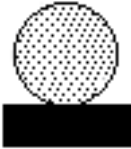






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Machined Teflon® Seal Design Chart

Teflon® seals can be used to upgrade existing designs as well as to provide a positive seal for newly designed products. The following diagrams are a few of the many machined designs available from Vedovell. If you do not see your required design or are unsure of the right one, please inquire. We will be glad to assist you.

 <p>Standard double bump General purpose "V" spring</p>	 <p>Standard single bump General purpose for rougher surfaces "V" spring</p>	 <p>Silicone filled FDA approved "V" spring</p>	 <p>Large cross section Large gland cross-section "V" spring</p>
 <p>Flange seal Prevents seal rotation "V" spring</p>	 <p>Scraper - standard Can make different OD-ID designs "V" spring</p>	 <p>Helical spring seal Cryogenics</p>	 <p>Wiper High abrasion resistance</p>
 <p>Back-ups and wear band</p>	 <p>Metric, all styles and sizes</p>	 <p>Piston cups</p>	 <p>Slyd-ring, skive-cut</p>
 <p>Standard double bump O-ring actuated</p>	 <p>Glyd-ring O-ring</p>	 <p>V-packing</p>	 <p>Back-up ring O-ring</p>
	 <p>U-packing</p>	 <p>Double delta O-ring</p>	