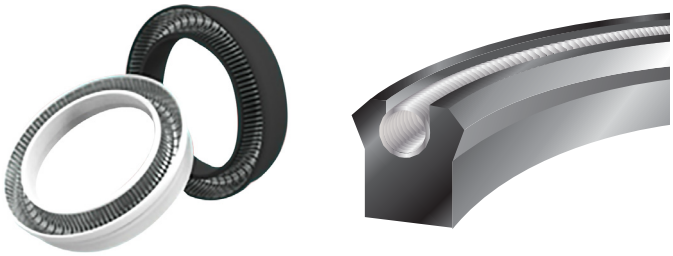
Spring-Energized Seals

CTG manufactures spring-energized seals and sealing systems to fit your design specifications. We make seals in whatever size you need, using the materials of your choice. Our experienced team of engineers can assist in material selection to meet your needs.



Whether you want a lip seal, piston seal, rod seal, or face seal, CTG will create the seal to meet your exact specifications

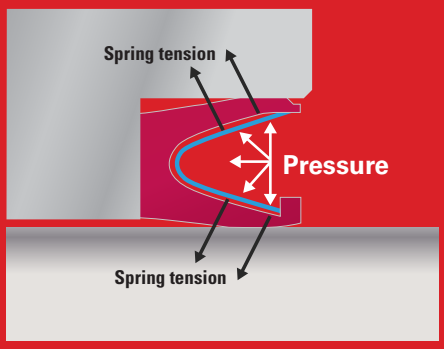
Design Principles

Spring-energized seals are designed so that the tension of the internal spring is sufficient to hold the seal firmly in place, even when the system is not active. In pressurized systems, the pressure of the fluid (either liquid or gas) provides a supplementary force that creates an even tighter seal between the two sealing surfaces.

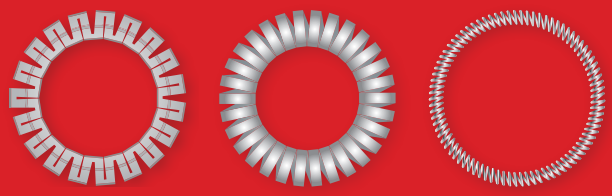
To help ensure that a spring-energized seal functions as required, it is important to select materials for the spring and the seal that are appropriate for the expected operating conditions. High temperatures or corrosive fluids require one of our high performance materials.

Spring design can also play a part. CTG uses three types of springs: v-springs, helical coil springs, and canted coil springs.

We can help you design the right seal for your specifications. Contact our experienced engineers to get expert feedback on your specialized needs.



Tension from the spring and pressure from the external gas or liquid combine to hold the seal against the rod



The three types of springs—v-spring, helical coil, and canted coil

Applications

- Rotary (lip seal)
- Reciprocating (rod or piston seal)
- Face (static or dynamic face seal)
- High pressure
- High temperature
- Corrosive environments

Benefits

- Lip seals provide great performance compared to traditional O-rings
- Lip seals can replace O-rings without any need to modify the gland (groove)
- A rod or piston seal can be made with a wiper extension to help ensure that the system remains sealed in even the dirtiest environment
- Face seals can handle low-speed dynamic applications without degradation
- Face seals are a good choice when clamping forces must be kept low

The following table details the materials that are commonly used to construct seal jackets. Many other elastomers can also be used as the seal material.

Seal Jacket Material	Temperature Range (°F)*	Comments
Virgin PTFE	-400 to 450	The most suitable material for cryogenic service; also useful for light gases and light duty applications.
Graphite-filled PTFE	-320 to 475	Excellent choice when lubricants cannot be added (the graphite acts as a dry lubricant).
Glass-filled PTFE	-350 to 500	Has high compressive strength, excellent chemical resistance, low creep, good compressive strength, and good wear resistance under load and permanent deformation.
Glass/moly-filled PTFE	-250 to 550	Useful in high-speed applications and in applications that use hardened components.
Carbon/graphite-filled PTFE	-320 to 475	Has good wear and creep resistance; good for applications that require dynamic sealing at extreme temperatures.
Calcium fluoride-filled PTFE	-350 to 500	Has excellent compressive strength, excellent chemical resistance, and improved wear resistance under load and permanent deformation.
Carbon/graphite/PPS-filled PTFE	-200 to 550	A heavy-duty material, excellent for non-lubricated service at high temperatures and pressures.
UHMW-PE	-320 to 200	An FDA-approved material with high wear resistance.
PEEK	-100 to 550	A high-modulus material with excellent thermal and mechanical properties. Useful for ultrahigh pressure applications.

* Temperature ranges given here are approximate; the values relevant to any particular situation depend upon the application. If you are unsure which material would be best for your case, ask us—we will help you design a seal that meets the temperature tolerance needs of your system.

Spring Material	Maximum Temperature (°F)	Chemical and Corrosion Resistance	Typical Uses
301 Stainless steel	500	+	General purpose
316 Stainless steel	500	++	General purpose
Hastelloy® C-276	*	+++	Highly-corrosive or high-temperature environments
Elgiloy®	*	++++	Applications that are simultaneously highly corrosive and high temperature; NACE-approved material for salt water applications

* When a spring is made from one of these alloys, the seal material is the limiting factor for service temperature.

To discuss your application, give us a call!

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