



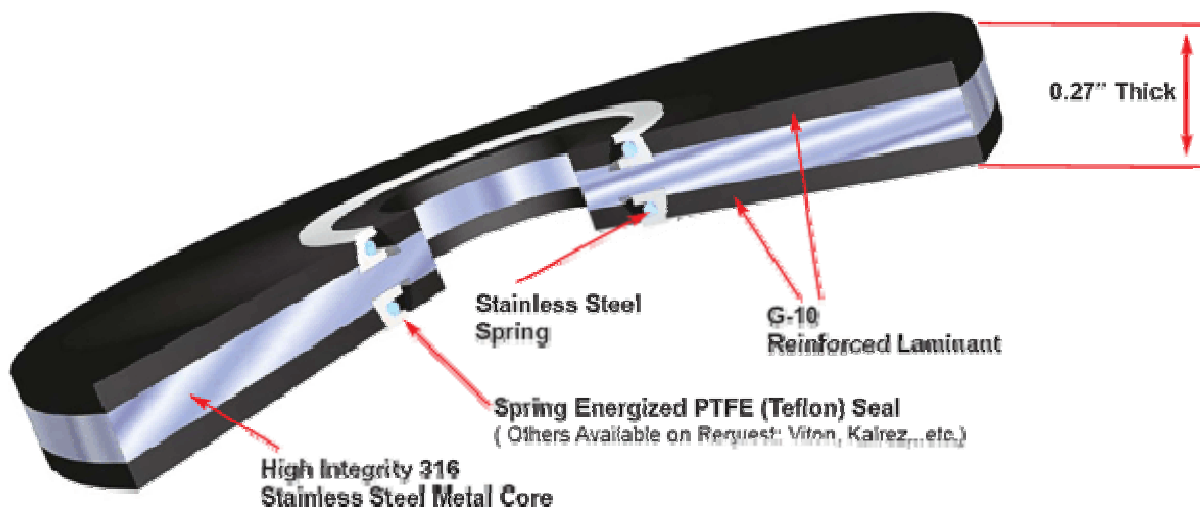
POWER PLANT SUPPLY CO DIVISION OF 140951 CANADA INC.
POWER CANADA SOLUTIONS



POWER PLANT SUPPLY CO
<http://www.powercanadasolutions.com/flange-gasket.html>
ONTARIO/Western Canada QUEBEC: 416 752 3339
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PSI LineSeal™ Sealing & Isolating Gaskets

**Sealing Gaskets for Zero Fugitive Emissions
& Extreme Critical Sealing Applications**



LineSeal Features

- Extreme, high-reliability sealing and electrical isolation solution for critical service applications.
- Seals and isolates all pressure ratings through ANSI 2500 class and API 15,000 psi service.
- Withstands severe service conditions including vibration, temperature and pressure fluctuations.
- Designed to withstand corrosive environments, including high concentrations of CO₂, H₂S, produced water and aggressive inhibitors.
- Good electrical isolation properties for cathodic protection.
- Pressure-activated seals provide high confidence sealing, eliminates costly leaks and provides a solution for fugitive emissions.
- Gasket is sized to the bore to protect flange faces from media-induced corrosion and flow-induced erosion.
- Prevents turbulent flow at flanged connections.
- Mitigates galvanic corrosion in dissimilar metal flanges.
- High-strength laminate material resists failure due to excess compression.



- Available to match any flange specification (ANSI, ASME, API, MSS, BS, DIN, AS, others).
- Can mate mismatched RTJ with raised-face flanges.
- Easy installation, make up and removal:
 - Sealing system is not sensitive to low bolt loads - providing reliable sealing through a range of bolt stress.
 - Gasket is self-aligning and centering - quick to install and no special tools are required.
- Maintenance-free corrosion-resistant design is resistant to deforming under load.
- Works in Ring Joint Flanges, reducing fluid entrapment, flow induced erosion and media induced corrosion between flanges.



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LineSeal Applications

- **H₂S service.**
- **High pressure flanges.**
- **Critical service applications.**
- **High pH service.**
- **Locations where one prefers an integral seal element.**
- **Sealing flanges without dissimilar metal contact** that occurs with Chevron in spiral-wound type gaskets.
- **Production Fields**
In gathering and injection piping - tank farms - oil and gas processing systems - for sour gas and water handling systems. For Christmas trees - pumps - valves - and wherever it is important to guard against the loss of product.
- **Petroleum Marketing Facilities**
In terminal and tank farm piping - marine and airport fueling systems - and other product handling facilities where it is essential to prevent loss of product or damage due to a flange leak or blowout.
- **LNG and SNG Systems**
For loading, unloading, liquefaction, regasification and processing of LNG - the production and processing of SNG - and wherever it is essential to provide a leak-proof flange for use from cryogenic to very high temperatures.

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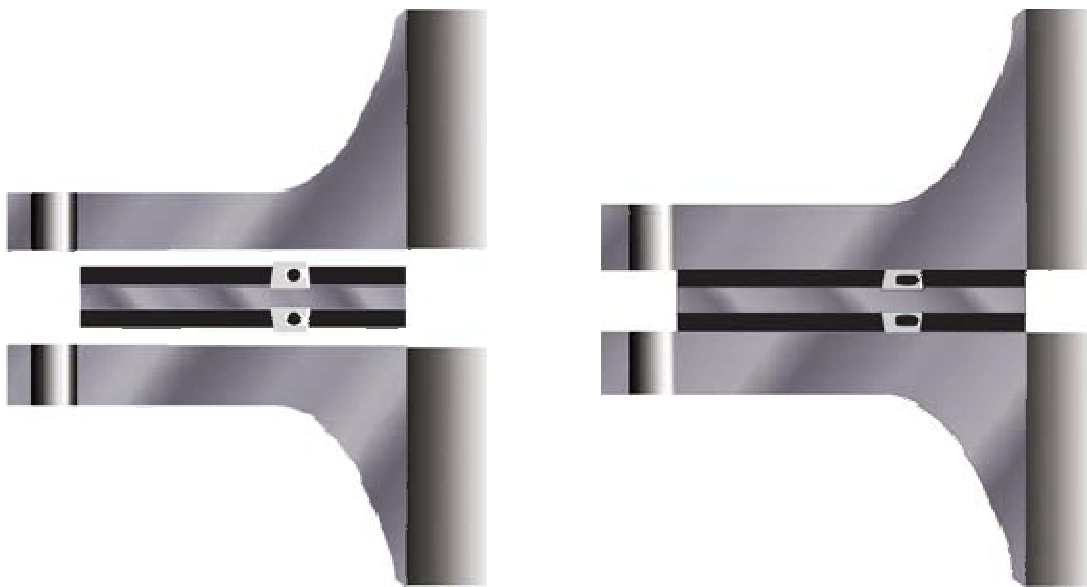
- **Pipeline and Distribution Piping**

In compressor and pumping station piping - metering and measurement facilities - valves and other control equipment - and elsewhere on a mainline piping system where a long-lasting, leak-proof flange is essential. In gas distribution piping - underground storage facilities - town border stations - industrial meter-regulator sets - and district regulators.

- **Refineries**

In piping systems for heavy gasoline - caustic - acid based materials - carbon slurry - and wherever it is essential to protect plant and personnel from damage due to flange leaks or blowouts.

LineSeal™ Operation



Before Tightening

The flange faces come into contact with the sealing elements, which extend slightly above the surface of the retainer. As the flange is tightened the sealing elements are compressed into the machine groove, developing an initial high unit pressure against the flange faces.

Note: LineSeal can work with ring joint flanges, reducing fluid entrapment.

After Tightening

The flange faces come into firm contact with the retainer, thus compacting the sealing elements within grooves. At the same time, the unique LineSeal spring energized seal provides elastic memory for polymers not normally associated with this characteristic - resulting in a simple flat gasket with extremely high loading and self-energizing characteristics without adverse cold flow problems.



PSI sealing gaskets far exceed sealing capabilities of flat gaskets. Here is why...

Near zero M and Y factors.

PSI sealing gaskets consist of a sealing element positioned within a groove on opposite sides of a retainer. Elastic memory characteristics of the confined sealing elements result in near zero M and Y factors, making it possible to effect a positive seal without the tremendous bolt loads that are required to crush flat gaskets into a configuration capable of producing a marginal seal, at best.

Y = Compressive load necessary to effect a seal.

M = Extra load (above Y factor) necessary to hold fluid pressure over the operational pressure range of the system.

Near zero M and Y factor sealing gaskets can be used effectively on coated flange mating surfaces made from glass, plastics, epoxy, ceramics and other materials that would tend to be damaged when over compressed.

Lower bolt torques required to effect a seal.

- Reduction in installation time and the need for impact wrenches or cheater bars.
- Eliminates the need for retightening due to flat gasket cold flow.
- Reduces the need for high tensile strength bolts or studs.
- Assures a positive seal first time, every time while eliminating costly delays to tighten leaking flanges during initial pressurization.

Increases gasket life.

- The micro-exposure of the seals to any external environment serves to dramatically lengthen the life of the gasket.

Absolutely eliminates cold flow problems.

- The encapsulation of the sealing elements produces a positive cold flow control, there by strengthening their sealing power.

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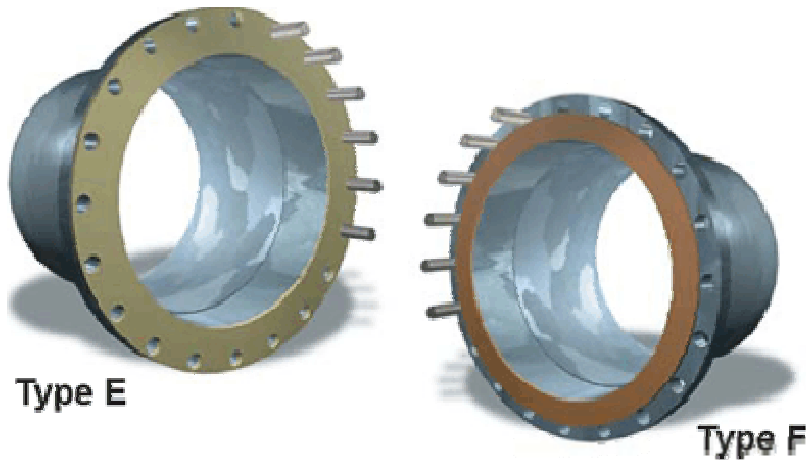
- Sealing elements with high cold flow characteristics now may be used to achieve a superior seal in virtually any media, temperature, pressure or pipe size.

Pressure energized, controlled confinement of PSI sealing elements.

- Sealing elements maintain contact with mating surfaces even though the surfaces may tend to warp or separate due to thermal shock, pressure fluctuations or other external forces.
- Low Pressure Applications - The spring energizes seal.
- High Pressure Applications - The line pressure energizes seal.

Match gasket materials to service conditions.

- Sealing elements may be made of a selection of elastomers.
- Retainers may be made of a variety of dielectric materials.
- Sealing elements may be positioned anywhere between the I.D. of the gasket and the I.D. of the bolt circle.
- Allows the ability to use PSI sealing gaskets with ring joint, flat face, raised face or any combination of these flange types in a given size and pressure rating.



Sealing elements may be positioned anywhere between the I.D. of the gasket and the I.D. of the bolt circle.

- Allows PSI sealing gaskets to be used with ring joint, flat face, raised face flanges, or any combination of these flange types in a given size and pressure rating.

LineSeal Material Properties

ASTM Test	Tested Parameter	G10 Epoxy / Glass
D149	Dielectric Strength (Volts/mil) Short Time	800
D695	Compressive Strength (psi)	69,000

D229	Water Absorption (%)	0.10
D257	Insulation Resistance (Meg Ohms)	300,000
D790	Flexural Strength (psi)	650,000
D256	IZOD Impact Strength (Ft-Lbs/Inch)	26.0
D638	Tensile Strength (psi)	51,000
D732	Shear Strength (psi)	21,000
	Temperature Range	Cryogenic to +302°F (+150°C)
	Seal Element Temperature Limits, PTFE (Teflon)	Cryogenic to +450°F (+232°C)
	Seal Element Temperature Limits, Viton	-20°F to +350°F (29°C to +177°C)

Note: Consult with a specialist for cryogenic applications and/or extreme temperature variations, hazardous fluids or for extremes in temperatures and pressures.

LineSeal Test Results - Typical

Description	Test Method	LineSeal Value
Compression Test	EN 13555 @ 150°C	140 Mpa Gasket Stress
Creep Relaxation	EN 13555 @ 150°C	0.99 Relaxation Factor
Leakage Test	EN 13555 @ 40 bar Helium @ 5 Mpa to 80 Mpa gasket stress	1.0 x 10 ⁻³ mg/m/s Leakage Rate
Hot Blowout Test	HOBT @ 151°C @ 165 bar	No Blowout
Shell Leakage Test	T-2.232686 @ ambient @ 52 Mpa	4.2 x 10 ⁻⁷ pa-m ³ /s/mm Leakage Rate
Shell Cycle Test	T-2.232686 @ 150° C. @ 45.6 Mpa	< 0.10 bar pressure loss

Suggested Sealing Gasket Material Compatibility

Medium	Retainer	Seal	Temp. Range °F	Temp. Range °C
Carbon dioxide	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Diesel fuel	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C

Ethanol	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Fuel Oil	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
H ₂ S	G-10	Teflon	-65 to +250°F	-54 to +121°C
Gas, natural	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Gas, sweet	G-10	Viton	-20 to +280°F	-29 to +138°C
Gas, sour CO ₂ mix	G-10	Teflon	-65 to +250°F	-54 to +121°C
Jet fuel	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Nitrogen	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Oil, crude	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Propane	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Propylene	G-10	Viton	-20 to +280°F	-29 to +138°C
Sewage	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Water, hot	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C
Water, sea	G-10	Teflon Viton	-65 to +250°F -20 to +280°F	-54 to +121°C -29 to +138°C

Note: The above performance data is intended as guidelines only. Performance suitability for any specific applications should be determined by the user. Variation in temperature, pressure, concentration or mixtures acting synergistically may preclude suggested service use. Material selection is at the sole risk of the user. Consult with a specialist for specific applications.

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LineSeal™ Flange Isolation Kits

Single Washer Set

Single washer set flange isolation kits include the following items for each bolt:

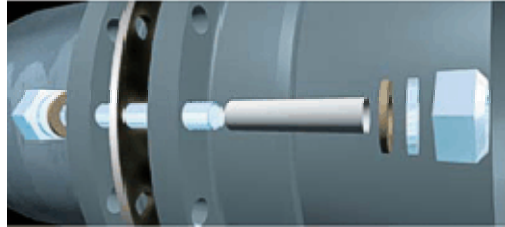
- One - 1/8" thick steel washer
- One - Isolating washer
- One - Isolating sleeve



Double Washer Set

Double washer set flange isolation kits include the following components for each bolt:

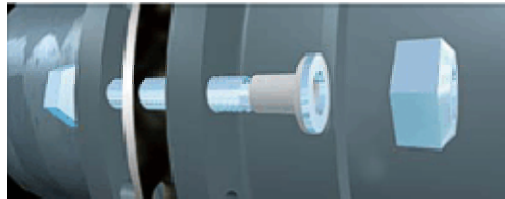
- Two - 1/8" thick steel washers
- Two - Isolating washers
- One - Full length isolating sleeve



G-10 One-Piece Sleeve and Washer Sets

One-piece sleeve and washer set flange isolation kits include the following items for each bolt:

- One - 1/8" thick steel washer
- One - 1/8" thick G-10 Washer
- One - G-10 Isolating Sleeve



Steel Washers

Steel washers are designed to fit over the isolating sleeve or the retainer ring on the one-piece sleeves and washers. The outside diameter is sized to fit within the bolt facing on ANSI standard flanges. They are made of 1/8" (3.2mm) thick plated hot-rolled steel. (Stainless steel available)

Application Considerations

In buried applications, single washer configurations may be used to allow the Cathodic Protection (CP) current to reach the nuts and bolts. If desired, nuts on the opposite side of the cathodically protected flange may be included as part of the CP system.

Application Considerations

Double washer configurations may be used for added protection against the possibility of "shorting out" the nuts and bolts. In addition, double washer sets electrically isolate the nuts and bolts from both flanges.

Application Considerations

Easier to install, one-piece sleeves also allow the inspector a visual indication of sleeve usage.



Frequently Asked Questions

1. Why would one use a LineSeal™ gasket as opposed to a LineBacker® gasket?

LineSeal gaskets are especially effective for sealing extremely critical flange applications such as high concentrations of H₂S at high pressures where even trace amounts of leakage could prove fatal. The G-10 retainer material is not compromised by exposure to this hazardous fluid while the soft, one-piece sealing elements eliminate any chance of a leakage emanating from between the flange faces.

2. In what applications is the LineSeal gasket considered better than a PSI LineBacker® or GasketSeal®?

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Exposure to high temperatures, fluctuating temperatures and/or corrosive fluids is where the Line-Seal gasket proves especially effective at creating and maintaining a seal. The largest portion of the G-10 retainer is totally protected from any fluids by the seal elements which are positioned in close proximity to the barrel of the flange.

3. How do the dielectric characteristics of LineSeal gaskets compare to LineBacker® or GasketSeal®?

LineSeal gaskets are offered for extreme critical service applications where the need for superior sealing characteristics exceed its electrical isolation characteristics. Any gasket with a metal core is a compromise when compared to a gasket constructed completely from dielectric materials.

4. Is there an environment where a Viton Seal would be preferred over a Teflon® seal?

When fluctuating temperatures are encountered and pressure changes fluctuate across a broad range, the Teflon® seal may lose its pliability over time. Under these conditions, the LineSeal with a spring energized rubber Viton seal element should be considered.

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