Engineered Gasket for Xtreme Critical Sealing
Prevent future leaks and blowouts today.

Sealing Gasket for Zero Fugitive Emissions & Extreme Critical Sealing Applications
The LineSeal™ gasket uses proprietary materials to address the regulations associated with fugitive emissions, requirements that are closely monitored and highly sensitive to regulatory agencies today.
LineSeal™ Sealing & Isolating Gaskets

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.

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.

Spring Energized PTFE (Teflon) Seal
( Others Available on Request: Viton, Kalrez,...etc.)

High Integrity 316 Stainless Steel Metal Core

Stainless Steel Spring

G-10 Reinforced Laminant

Spring Energized PTFE (Teflon) Seal
( Others Available on Request: Viton, Kalrez,...etc.)

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.

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.

Teflon is a registered trademark of DuPont Dow Elastomer.
**PSI sealing gaskets far exceed the sealing capabilities of flat gaskets.**

**Here’s why....**

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.

\[
Y = \text{Compressive load necessary to effect a seal.}
\]
\[
M = \text{Extra load (above Y factor) necessary to hold fluid pressure over the operational pressure range of the system.}
\]

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.
- 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.

**LineBacker® sealing gaskets**
utilize a patented rectangular sealing element, referred to as a "quad" ring, in combination with a unique groove design to effectively seal and isolate flanges of all types. With the unique "quad" ring design, elastic memory is provided for elastomers not normally associated with this characteristic.

**Other high quality sealing gaskets from PSI.**

**LineSeal®, LineBacker® and GasketSeal® Sealing Gaskets**

**Note:** For more information on the complete line of PSI gaskets, visit www.pipelineseal.com. Download the Sealing Gasket literature.
### LineSeal Material Properties

#### Common LineSeal Sealing Gasket Physical Properties

<table>
<thead>
<tr>
<th>Test Method</th>
<th>G-10 Epoxy/Glass</th>
</tr>
</thead>
<tbody>
<tr>
<td>D149</td>
<td>Dielectric Strength Volts/Mil (Short Time)</td>
</tr>
<tr>
<td>D695</td>
<td>Compressive Strength (psi)</td>
</tr>
<tr>
<td>D229</td>
<td>Water Absorption (%)</td>
</tr>
<tr>
<td>D257</td>
<td>Insulation Resistance Meg Ohms</td>
</tr>
<tr>
<td>D790</td>
<td>Flexural Strength (psi)</td>
</tr>
<tr>
<td>D256</td>
<td>IZOD Impact Strength (Ft-Lbs/Inch)</td>
</tr>
<tr>
<td>D638</td>
<td>Tensile Strength (psi)</td>
</tr>
<tr>
<td>D732</td>
<td>Shear Strength (psi)</td>
</tr>
<tr>
<td></td>
<td>Temperature Range (Degrees F)</td>
</tr>
<tr>
<td></td>
<td>Temperature Range (Degrees C)</td>
</tr>
</tbody>
</table>

#### Seal Element Temperature Limits

<table>
<thead>
<tr>
<th></th>
<th>PTFE (Teflon)</th>
<th>Viton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees Fahrenheit</td>
<td>Cryogenic to +450</td>
<td>-20 to +350</td>
</tr>
<tr>
<td>Degrees Celsius</td>
<td>Cryogenic to +232</td>
<td>-29 to +177</td>
</tr>
</tbody>
</table>

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

#### Suggested Sealing Gasket Material Compatibility

<table>
<thead>
<tr>
<th>Medium</th>
<th>Retainer</th>
<th>Seal</th>
<th>Temp. Range °F</th>
<th>Temp. Range °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Diesel Fuel</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Ethanol</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Fuel Oil</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>H2S</td>
<td>G-10</td>
<td>Teflon</td>
<td>-65 to +250</td>
<td>-54 to +121</td>
</tr>
<tr>
<td>Gas, Natural</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Gas, Sweet</td>
<td>G-10</td>
<td>Viton</td>
<td>-20 to +220</td>
<td>-29 to +138</td>
</tr>
<tr>
<td>Gas, Sour CO2 Mix</td>
<td>G-10</td>
<td>Teflon</td>
<td>-65 to +250</td>
<td>-54 to +121</td>
</tr>
<tr>
<td>Jet Fuel</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Oil, Crude</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Propane</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Propylene</td>
<td>G-10</td>
<td>Viton</td>
<td>-20 to +80</td>
<td>-29 to +27</td>
</tr>
<tr>
<td>Sewage</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Water (Hot)</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
<tr>
<td>Water (Sea)</td>
<td>G-10</td>
<td>Teflon or Viton</td>
<td>-65 to +250 / -20 to +280</td>
<td>-54 to +121 / -29 to +138</td>
</tr>
</tbody>
</table>

**General Notes:**

The foregoing performance data are 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 or PSI factory for specific applications. PSI’s responsibilities will be limited to those listed in the PSI standard warranties.
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.

1/8" Washer Material Physical Properties

<table>
<thead>
<tr>
<th>ASTM Test Method</th>
<th>G-10 Epoxy Glass</th>
<th>G-11 Epoxy Glass</th>
</tr>
</thead>
<tbody>
<tr>
<td>D149 Dielectric Strength Volts/Mil (Short Time)</td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>D695 Compressive Strength psi</td>
<td>50,000</td>
<td>50 - 80,000</td>
</tr>
<tr>
<td>D229 Water Absorption %</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Operating Temp °F</td>
<td>Cryogenic to +280</td>
<td>Cryogenic to +350</td>
</tr>
<tr>
<td>°C</td>
<td>Cryogenic to +138</td>
<td>Cryogenic to +177</td>
</tr>
</tbody>
</table>

Full length sleeve, single washer set configuration

Gasket
Isolating Sleeve
Isolating Washer
Steel Washer

One-piece sleeve & washer configuration

G-10 One-Piece Sleeve and Washer Set
Gasket

Buried Application Note: Consider using the ElectroStop™ monolithic isolation fitting.
**Typical Specification**

**All Critical Service Applications**

Materials for sealing gaskets on pipes containing water, aqueous fluids, oil, sour or natural gas (up to 30²F, 150°C) shall consist of the following components:

**Isolation and Sealing Gasket**

One isolating and sealing gasket, LineSeal Type “F”, 0.27” thick, 316 stainless steel core retainer laminated on both sides with a G-10 glass fiber reinforced laminate containing a precision tapered groove to accommodate the controlled compression of a PTFE(Teflon) spring energized seal. Sealing element placement shall accommodate either flat, raised or RTJ face flanges. The spring energized seal shall be pressure energized. The G-10 retainer shall have a 800 volts/mil dielectric strength and a minimum 69,000 psi compressive strength. The I.D. of the flange isolationg gasket shall match the bore of the flange in which it is installed.

**Quality**

Gaskets shall be manufactured at a facility that has a registered ISO 9001:2000 Quality Management System. Submittals shall include copy of valid registration. Performance suitability and material compatibility shall be determined by the user.

**Availability**

Gaskets shall be manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas, U.S.A., Telephone: 713-747-6948, Facsimile: 713-747-6029, www.pipelineseal.com e-mail: info@psipsi.com

**Warranty**

All products are warranted against failure caused by manufacturing defects for a period of one year. Any product found to be so defective and returned within one year from date of shipment will be replaced without charge.

The above warranty is made in lieu of, and we disclaim, any and all other warranties, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, and buyer agrees to accept the products without any such warranties.

We hereby disclaim any obligation or liability for consequential damages, labor costs or any other claims or liabilities of any kind whatsoever.

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**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® gasket?**

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® gaskets?**

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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**Extreme Critical Sealing for Industries**

**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.

**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.
**For Flange Isolation Kits over 24” in addition to the above please specify:**

<table>
<thead>
<tr>
<th>Flange Facing (Raised, RTJ, etc)</th>
<th>Nominal Bolt Diameter (Threads/Inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange I.D.</td>
<td>Sleeve Length</td>
</tr>
<tr>
<td>Flange O.D.</td>
<td>Pipe I.D.</td>
</tr>
<tr>
<td>Flange Thickness</td>
<td>Steel Sleeve I.D. (For Concrete Pipe)</td>
</tr>
<tr>
<td>Number of Studs/Bolts</td>
<td>Product In Line</td>
</tr>
<tr>
<td>Stud/Bolt Diameter</td>
<td>AWWA Class &amp; Table (Or other similar std.)</td>
</tr>
<tr>
<td>Stud/Bolt Hole Diameter</td>
<td>Internal Lining</td>
</tr>
</tbody>
</table>

Note: Caution! Bolts with smooth shank portions may not fit within sleeves. Verify prior to ordering.
How to Order
Please provide the following information:
1. Quantity
2. Nominal Pipe Size
3. Pressure Rating
4. Gasket Type: F and E
5. Gasket Style: LS
6. Retainer Material
7. Sealing Element
8. Weld-neck, Slip-on, R.T.J or Integral applications
9. Note all special requirements
10. Contact your local distributor or PSI

ISO 9001:2000 Quality Assurance
All PSI facilities are ISO 9001:2000 certified with extensive quality control procedures in effect to insure total compliance with product performance and reliability standards. In addition, all PSI gaskets are clearly marked with the following information to guarantee that the correct gasket is used for its intended application.
• Brand Name
• Material Make-up (retainer/seal element)
• Pipe Size
• Pressure Rating
• Date of Manufacture Stamp

PSI's Water Jet Cutting Machines
PSI's water jet machinery cut intricate parts with no heat-affected zone, heat distortion, or mechanical stresses caused by other cutting methods. In addition, they can cut with a narrow kerf, to provide better usage of raw material since parts can be tightly nested. As a result, this machinery provides PSI with the ability to provide more accurate gaskets, with more intricate shapes without wasting excess raw materials.

ElectroStop™ Monolithic Isolation Fittings...Alternative to Flange Isolation Kits.
The ElectroStop monolithic isolation fitting will serve as a positive leak proof, long lasting block against the flow of electric current in all piping systems. When you bury the ElectroStop isolation fitting you bury maintenance costs forever - an especially important feature for system operators and engineers.

The Industry’s “Dual ‘O’ Ring Seal”
Standard Test Include:
100% Hydrostatic Pressure & Electrical tests
100% Ultrasonic of Welds
100% Magnetic Particle of Welds
100% Dye Penetrant of Welds

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