**PSI Isolating Gasket Types**

**Type “E” Gaskets**
Type “E” Gaskets extend to the outside diameter of the flange. They feature precision located bolt holes, to automatically center the gasket, and offer maximum protection against foreign material “shorting-out” the flange. Type “E” gaskets may be ordered in any one of the following configurations:

- LineBacker® Sealing Gaskets
- GasketSeal® Sealing Gaskets
- Rubber Faced Phenolic Gaskets
- Plain Phenolic Gaskets
- Red Devil Gaskets
- Yellow Jacket Gaskets
- Garlock Gaskets
- Teflon® Gaskets

When configured as a LineBacker® Sealing Gasket, the sealing element may be positioned anywhere between the I.D. of the gasket and I.D. of the bolt circle.

**Type “F” Gaskets**
Type “F” Gaskets are made to fit within the bolt hole circle of the flange. The O.D. of the gasket extends out to the I.D. of the bolt hole circle for good protection against foreign material “shorting-out” the flange. Type “F” gaskets may be ordered in any one of the following configurations:

- LineBacker® Sealing Gaskets
- GasketSeal® Sealing Gaskets
- Rubber Faced Phenolic Gaskets
- Plain Phenolic Gaskets
- Red Devil Gaskets
- Yellow Jacket Gaskets
- Garlock Gaskets
- Teflon® Gaskets

When configured as a LineBacker® Sealing Gasket, the sealing element may be positioned anywhere between the I.D. of the gasket and I.D. of the bolt circle.

**Type “D” Gaskets**
Type “D” Gaskets are available for RTJ flanges but the LineBacker® Sealing Gasket is an excellent alternative to “D” gaskets because the sealing element may be positioned anywhere between the I.D. of the gasket and I.D. of the ring groove. Inquire about the LineSeal™ sealing gasket for RTJ flange applications.

_Teflon is a registered trademark of DuPont Dow Elastomer._
GasketSeal® sealing gaskets are considered one of the most effective methods for sealing and isolating flanges of all types. The gasket consists of two molded semi “O” rings (with precise crown to void ratio) mounted in grooves on opposite sides of an isolating retainer. While maintaining all the advantages of a full “O” ring seal, the semi “O” ring seal eliminates the need for a sealing groove in the flange face to reduce problems associated with alignment. GasketSeal® gaskets are self energizing with theoretical near zero “m” and “y” factors resulting in effecting a positive seal without excessive bolt loads required with flat gaskets. GasketSeal® sealing gaskets are available in a wide variety of retainer and sealing element combinations for matching gaskets to service and environmental conditions. Refer to the chart for the GasketSeal® sealing gasket temperature ranges and material compatibilities. Note: Flange Faces, see page 11.

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. Materials such as AFLAS, TFE (Teflon) and KALREZ may therefore be used as sealing elements which dramatically increases the options available for matching gasket materials to service and environmental conditions. This greater variety of materials also provides excellent temperature and chemical range compatibility. LineBacker® sealing gaskets are self energizing with theoretical near zero “m” and “y” factors resulting in effecting a positive seal without excessive bolt loads required with flat gaskets. Refer to chart for LineBacker® sealing gasket temperature range and material compatibilities. Note: Flange Faces, see page 11.

Rubber Faced Phenolic gaskets have been used as standard “flat” isolating gaskets in the oil and gas industries for many years. Neoprene (Nitrile or EPDM) rubber sheets are factory applied to both sides of a laminated phenolic retainer providing an effective sealing surface. Note: Due to improved sealing characteristics and retainer/seal element options, LineBacker or GasketSeal sealing gaskets should be considered in lieu of rubber faced phenolic gaskets whenever possible.

Flat gaskets are used in special applications such as elevated temperatures that often require materials such as Red Devil or Yellow Jacket. Please contact a PSI representative for additional information on available options.

* = Other thicknesses available through special order.
Sleeves and Washers

Isolating Sleeves
Isolating sleeves are available in the following materials:
• Mylar
• Polyethylene
• Phenolic
• Nomex®
• G-7 Silicon Glass
• G-10 Epoxy Glass
• G-11 Epoxy Glass

Designed to easily fit over standard size flange bolts/studs within standard size bolt holes, PSI isolating sleeves have a wall thickness of 1/32” (0.79mm) and are used with separate isolating and steel washers. They are available for standard American bolt sizes from 1/2” (12.7mm) to 3-1/2” (88.9mm) as well as metric bolt sizes from 12mm and larger.

Isolating Washers - Standard 1/8” Thick*
Isolating washers are available in the following materials:
• High Strength Glass Clad Phenolic
• G-3 High Temp. Phenolic
• G-7 Silicon Glass
• G-10 Epoxy Glass
• G-11 Epoxy Glass

Designed to provide tough, positive isolation, PSI isolating washers are available for bolt sizes from 1/2” (12.7mm) through 3-1/2” (88.9mm) and are made to fit over the isolating sleeves.

* = Other thicknesses available through special order.

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. Note: 304 stainless steel available for special order.

One-piece Sleeves and Washers
Molded Acetal 1 PC
Molded from acetal resin and available for bolt diameters from 1/2” to 1-1/2” (12.7 to 38.1mm), one-piece sleeves and washers are structurally tough but limited to applications where the flange temperature does not exceed +180ºF (+80°C) and compressive loads do not exceed 18,000 psi.
They are generally used as single washer sets because they’re molded to specific lengths and, in many instances, are longer than the thickness of a single flange. A washer centering ring positions the steel washer on the unit properly to avoid uneven pressures on the washers.

G-10 1 PC
Completely assembly custom made where ANSI rating exceeds 600#, operating temperatures up to 300°F (+149°C) and can handle compressive loads of 50,000 psi.
One - 1/8” thick steel washer
One - 1/8” thick G-10 washer
One - G-10 Isolating Sleeve

Note: Caution! Bolts with smooth shank portions may not fit within sleeves. Verify prior to ordering.

Custom Fabricated: G-10 One-Piece
Completely Assembled - No Loose Parts.
For pipe diameters over 24” or ANSI Class pressure ratings of 600# or greater, use G-10 sleeves and G-10 washers where temperatures and other conditions permit.
# Sleeve Material Physical Properties

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>D149 Dielectric Strength</td>
<td>400</td>
<td>4000</td>
<td>400</td>
<td>400</td>
<td>350</td>
<td>400</td>
<td>400</td>
<td>1,200</td>
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<tr>
<td>D695 Compressive Strength psi</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>D229 Water Absorption %</td>
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<td>N/A</td>
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<td>0.10</td>
<td>0.10</td>
<td>0.22</td>
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<td>-75 to +300</td>
<td>-65 to +450</td>
<td>-20 to +225</td>
<td>Cryogenic to +450</td>
<td>Cryogenic to +280</td>
<td>Cryogenic to +320</td>
<td>-30 to +180</td>
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<tr>
<td>°C</td>
<td>-34 to +82</td>
<td>-59 to +149</td>
<td>-54 to +232</td>
<td>-29 to +107</td>
<td>Cryogenic to +232</td>
<td>Cryogenic to +138</td>
<td>Cryogenic to +160</td>
<td>-34 to +82</td>
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<tr>
<td>D790 Flexural Strength psi</td>
<td>7,000</td>
<td>13,000</td>
<td>20,000</td>
<td>16,000</td>
<td>20,000</td>
<td>55,000</td>
<td>55,000</td>
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<tr>
<td>Cut Through Resistance ft-lbs.</td>
<td>1,800</td>
<td>3,500</td>
<td>4,000</td>
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<td>No Test</td>
<td>16,000</td>
<td>No Test</td>
<td>3,400</td>
</tr>
</tbody>
</table>

* = G-7 material should not be used with hydrocarbons, not even trace amounts.

# 1/8” Washer Material Physical Properties

<table>
<thead>
<tr>
<th>ASTM Test Method</th>
<th>Glass Clad Phenolic</th>
<th>G-3 Hi-Temp Phenolic Glass</th>
<th>G-7* Silicone Glass</th>
<th>G-10 Epoxy Glass</th>
<th>G-11 Epoxy Glass</th>
<th>One-piece Molded Acetal</th>
</tr>
</thead>
<tbody>
<tr>
<td>D149 Dielectric Strength Volts/Mil (Short Time)</td>
<td>500</td>
<td>550</td>
<td>350-400</td>
<td>550</td>
<td>550</td>
<td>1,200</td>
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<tr>
<td>D695 Compressive Strength psi</td>
<td>33,000</td>
<td>50,000</td>
<td>40,000</td>
<td>50,000</td>
<td>50 - 80,000</td>
<td>18,000</td>
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<tr>
<td>D229 Water Absorption %</td>
<td>1.6</td>
<td>0.7</td>
<td>0.07</td>
<td>0.10</td>
<td>0.10</td>
<td>0.22</td>
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<tr>
<td>Operating Temp. °F</td>
<td>-65 to +300</td>
<td>-65 to +392</td>
<td>Cryogenic to +450</td>
<td>Cryogenic to +280</td>
<td>Cryogenic to +350</td>
<td>-30 to +180</td>
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<tr>
<td>°C</td>
<td>-54 to +149</td>
<td>-54 to +200</td>
<td>Cryogenic to +232</td>
<td>Cryogenic to +138</td>
<td>Cryogenic to +177</td>
<td>-34 to +82</td>
</tr>
</tbody>
</table>

* = G-7 material should not be used with hydrocarbons, not even trace amounts.

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**Full length sleeve, single washer set configuration**

**One-piece sleeve & washer configuration**

![Diagram 1](image1)

![Diagram 2](image2)
Flange Isolation Kits

Flange isolation kits are available for all flange sizes, types, pressure ratings and materials. Each kit is individually and securely packed in a reinforced corrugated cardboard box, which is clearly labeled as to its contents for convenience in warehousing and field use. Very large diameter gaskets are packaged separately from the sleeves and washers for convenience in storing and handling.

Each gasket is labeled with:
- Materials (Retainer Material or Retainer/Seal Element Combination)
- Pipe Size
- ANSI Class
- Date of Manufacture
- Type Flange (Weld Neck or Slip-on)
- Installation Procedure
- Torque Values

Sleeves and Washers
Sleeves and washers are enclosed in a strong polyethylene bag to eliminate any possibility of loss. A chart showing the recommended sequence for tightening flange bolts is also included with each kit, as well as with each individual gasket.

Common LineBacker® & GasketSeal® Sealing Gasket Physical Properties

<table>
<thead>
<tr>
<th>ASTM</th>
<th>Test Method</th>
<th>Plain Phenolic</th>
<th>Rubber Faced Phenolic</th>
<th>G-3 Hi-Temp Phenolic Glass</th>
<th>G-7* Silicone Glass</th>
<th>G-10 Epoxy Glass</th>
<th>G-11 Epoxy Glass</th>
</tr>
</thead>
<tbody>
<tr>
<td>D149</td>
<td>Dielectric Strength Volts/Mil (Short Time)</td>
<td>500</td>
<td>500</td>
<td>550</td>
<td>350-400</td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>D695</td>
<td>Compressive Strength (psi)</td>
<td>25,000</td>
<td>25,000</td>
<td>50,000</td>
<td>40,000</td>
<td>50,000</td>
<td>50,000+</td>
</tr>
<tr>
<td>D229</td>
<td>Water Absorption (%)</td>
<td>1.6</td>
<td>1.6</td>
<td>0.7</td>
<td>0.07</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>D257</td>
<td>Insulation Resistance Meg Ohms</td>
<td>40,000</td>
<td>40,000</td>
<td>46,000</td>
<td>2,500</td>
<td>200,000</td>
<td>200,000</td>
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<tr>
<td>D790</td>
<td>Flexural Strength (psi)</td>
<td>22,500</td>
<td>22,500</td>
<td>60,000</td>
<td>27,000</td>
<td>60,000</td>
<td>75,000+</td>
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<tr>
<td>D785</td>
<td>Hardness Rockwell “M”</td>
<td>85</td>
<td>85</td>
<td>115</td>
<td>105</td>
<td>115</td>
<td>115</td>
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<td>D256</td>
<td>IZOD Impact Strength (Ft-Lbs/Inch)</td>
<td>1.2</td>
<td>1.2</td>
<td>12.0</td>
<td>8.0</td>
<td>14.0</td>
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<td>D638</td>
<td>Tensile Strength (psi)</td>
<td>20,000</td>
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<td>25,000</td>
<td>45,000</td>
<td>43,000</td>
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<tr>
<td>D732</td>
<td>Shear Strength (psi)</td>
<td>10,000</td>
<td>10,000</td>
<td>18,000</td>
<td>20,000</td>
<td>22,000</td>
<td>22,000</td>
</tr>
</tbody>
</table>

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Seal Element Temperature Limits

<table>
<thead>
<tr>
<th></th>
<th>Nitrile</th>
<th>Viton</th>
<th>Teflon</th>
<th>Neoprene</th>
<th>EPDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees Fahrenheit</td>
<td>-40 to +250</td>
<td>-20 to +350</td>
<td>Cryogenic to +450</td>
<td>-40 to +175</td>
<td>-65 to +300</td>
</tr>
<tr>
<td>Degrees Celsius</td>
<td>-40 to +121</td>
<td>-29 to +177</td>
<td>Cryogenic to +232</td>
<td>-40 to +79</td>
<td>-54 to +149</td>
</tr>
</tbody>
</table>

Consider both retainer and seal element temperature limits together for GasketSeal® and LineBacker® Sealing Gaskets.
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

**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.

**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

**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.

**One-Piece Sleeve and Washer Sets**
One-piece sleeve and washer set flange isolation kits include the following items for each bolt:
Two - 1/8" thick steel washers
One - One-piece Isolating sleeve

**Application Considerations**
Easier to install, one-piece sleeves also allow the inspector a visual indication of sleeve usage. Due to the relatively low compressive strength of this material, its use is not recommended for high pressure or large diameter flanges that require high torque loads.

**Note:** G-10 One-Piece sleeve/washer assembly available for additional strength and convenience. See page 6 photo.

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

**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

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. Note: Graphics not to scale, for illustration use only.