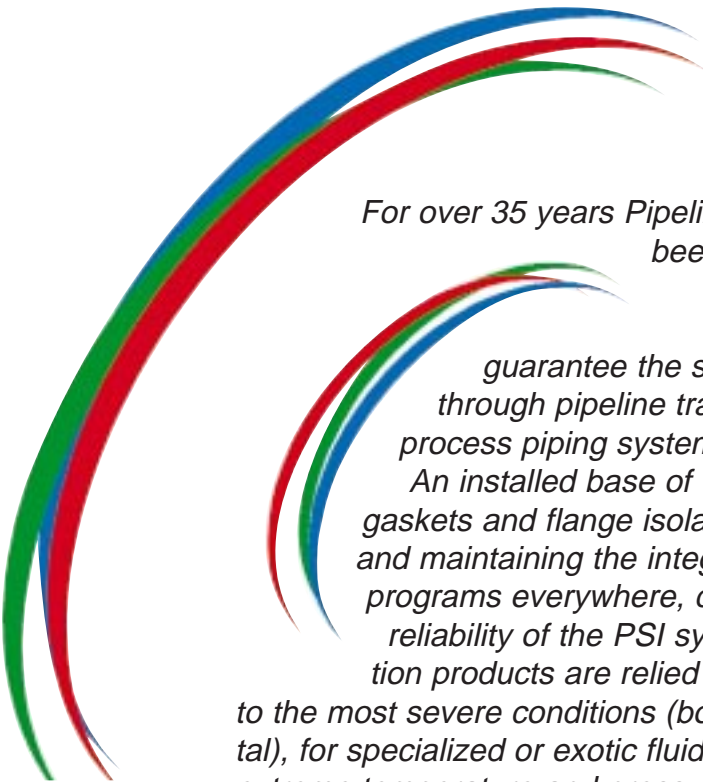




Flange Isolation Catalog



*Sealing and Isolating Gaskets
Flange Isolation Kits
Isolation Sleeves and Washers*



For over 35 years Pipeline Seal and Insulator, Inc. has been a technology leader in the field of high quality sealing and isolating products used to guarantee the safe flow of fluids passing through pipeline transmission, distribution and process piping systems.

An installed base of thousands upon thousands of gaskets and flange isolation kits, effectively sealing and maintaining the integrity of corrosion mitigation programs everywhere, confirms the effectiveness and reliability of the PSI system. In fact, PSI flange isolation products are relied upon for applications subject to the most severe conditions (both internal and environmental), for specialized or exotic fluids or for applications subject to extreme temperature and pressure fluctuations.

Flange isolation products include a wide selection of isolating/sealing gaskets along with a variety of sleeves and washers. For maximum flexibility, components may be ordered separately or as part of complete flange isolation kits.

Manufacturing facilities are located in the United States and Europe, with sales and service facilities located worldwide. All PSI facilities are ISO 9002 certified with extensive quality control procedures to insure total compliance with product performance and reliability standards.

Additions to the PSI line of flange isolation products are the LineBacker Zero™ sealing gasket, LineBacker 250™ sealing gasket and LineBacker 251™ sealing gasket, all designed to address problems associated with asbestos substitutes and fugitive emissions. This catalog includes suggested flange isolation material compatibility charts as well as technical specifications and an ordering/work sheet.

PSI Isolating Gasket Types and Styles

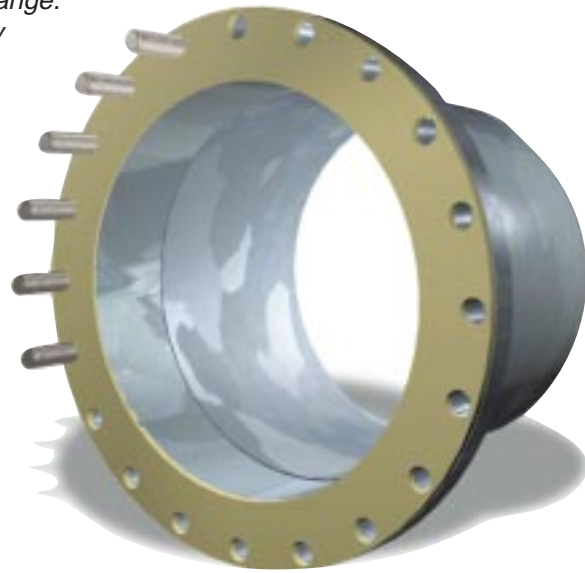
Type “E” Gaskets

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
- GasketSea® Sealing Gaskets
- Neoprene 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.



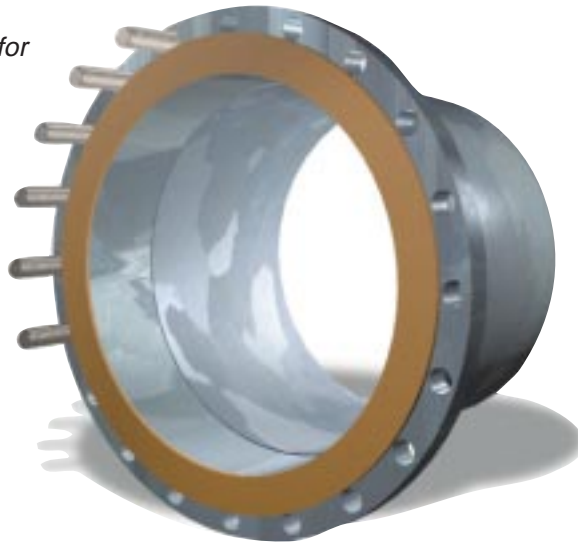
Type “F” Gaskets

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

Type “F” gaskets may be ordered in any one of the following configurations:

- LineBacker® Sealing Gaskets
- GasketSea® Sealing Gaskets
- Neoprene 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.

PSI Isolating Gaskets - Standard 1/8" Thick

GasketSeal[®] Sealing Gaskets

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[®] sealing gaskets incorporate near zero "m" and "y" factors that make it possible to effect a positive seal without tremendous 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.



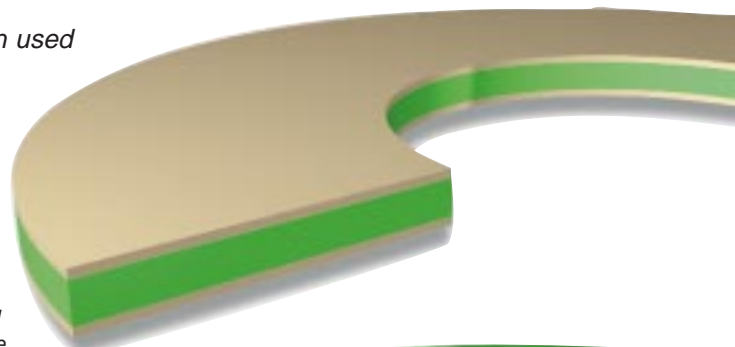
LineBacker[®] Sealing Gaskets

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 polyimide, TFE (Teflon) and vinyl 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 incorporate near zero "m" and "y" factors that make it possible to effect a positive seal without tremendous bolt loads that are required with flat gaskets. Refer to chart for LineBacker[®] sealing gasket temperature range and material compatibilities.



Neoprene Faced Phenolic Gaskets

Neoprene Faced Phenolic gaskets have been used as standard "flat" isolating gaskets in the oil and gas industries for many years. Soft neoprene rubber sheets are factory applied to both sides of a laminated phenolic retainer providing an effective sealing surface. The temperature limit of these gaskets is approximately +175° F. (80° C.).
Note: Due to improved sealing characteristics and retainer/seal element options, LineBacker or GasketSeal sealing gaskets should be considered in lieu of neoprene faced phenolic gaskets whenever possible.



Flat Gaskets

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.



Suggested Flange Isolation Material Compatibility

Medium	Retainer	Seal	Sleeve	Washer	Temp. Range °F	Temp. Range °C
Acetone	Phenolic	EPDM	Mylar	Phenolic	+32 to +80	0 to +27
Air	G-10	Nitrile	Mylar	Phenolic	-65 to +225	-54 to +107
Ammonia Dry	G-10	Teflon	Mylar	G-10	-65 to +220	-54 to +104
Ammonia (Wet)***	G-10	Teflon	Mylar	G-10	+32 to +100	0 to +38
Bleach	G-10	Teflon	Mylar	G-10	+32 to +80	0 to +27
Butylene (Butadiene)	G-10	Teflon	G-10	G-10	+32 to +100	0 to +38
Carbon Dioxide	G-10	Nitrile	Mylar	G-10	+32 to +150	0 to +66
Caustic Soda (NaOH)	G-10	Teflon	Mylar	G-10	-65 to +225	-54 to +107
Cryogenic	G-10	Teflon	G-10	G-10	-300 to +280	-184 to +138
Ethanol	G-10	Nitrile	Mylar	G-10	+32 to +100	0 to +38
Ethylene (Ethene)	G-10	Teflon	G-10	G-10	+32 to +80	0 to +27
Fuel Oil	G-10	Viton	Mylar	G-10	-20 to +280	-29 to +138
Gas, Natural	Phenolic	Nitrile	Mylar	Phenolic	-65 to +220	-54 to +104
Gas, Sour	Phenolic	Viton	Mylar	Phenolic	-20 to +220	-29 to +104
Gasoline	G-10	Teflon	Mylar	G-10	-65 to +225	-54 to +107
Hydrogen	G-10	Nitrile	Mylar	G-10	-65 to +250	-54 to +121
Jet Fuel	G-10	Viton	Mylar	G-10	-20 to +225	-29 to +107
LNG	G-11	Teflon	G-10	G-10	-300 to +100	-184 to +38
Mercaptan	G-10	Teflon	G-10	G-10	-20 to +80	-29 to +27
Methanol	G-10	Teflon	Mylar	G-10	+32 to +100	0 to +38
MTBE	G-10	Special Nitrile	G-10	G-10	+32 to +80	0 to +27
Nitrogen	Phenolic	Nitrile	Mylar	Phenolic	-65 to +220	-54 to +104
Oil, Crude	G-10	Viton	Mylar	G-10	-20 to +280	-29 to +138
Oxygen**	G-10	Teflon	G-10	G-10	-65 to +250	-54 to +121
Pentane	G-10	Teflon	G-10	G-10	+32 to +80	0 to +27
Propane	G-10	Nitrile or Teflon	G-10	G-10	+32 to +80	0 to +27
Propylene	G-10	Viton	G-10	G-10	+32 to +80	0 to +27
Sewage	G-10	Viton	Mylar	G-10	-20 to +280	-29 to +138
Spent Liquor	G-10	Teflon	G-10	G-10	+32 to +100	0 to +38
Steam*	G-7*	Teflon	Nomex	G-7*	To +450	To +232
Steam	G-3	Teflon	Nomex	G-3	To +392	to +200
Steam*	Yellow Jacket	No Seal	Nomex	G-7* or (G-3)	to +450* or (+392)	to +268* or (+200)
Styrene	G-10	Teflon	G-10	G-10	+32 to +80	0 to +27
Sulphur (Molten)	G-10	Teflon	G-10	G-10	+32 to +280	0 to +138
Tolulene	G-10	Viton or Teflon	G-10	G-10	+32 to +150	0 to +66
Water (hot)	G-10	Nitrile	Mylar	G-10	+175 to +250	+79 to +121
Water (Potable)	G-10	Nitrile	Mylar	G-10 or Phenolic	+32 to +250	0 to +121
Water (Sea)	G-10	Nitrile	Mylar	G-10 or Phenolic	+32 to +250	0 to +121
White Liquor	G-10	Teflon	G-10	G-10	+80 to +280	+27 to +138

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

** = These are organic materials that will feed a fire if a leak occurs and an ignition source exists.

*** = Ammonia (wet) - Data to +100°F (+38°C) only (same materials as dry).

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.
General Note:

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.

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 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.

One-piece Sleeves and Washers

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 +180°F (+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.

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.



Sleeve Material Physical Properties

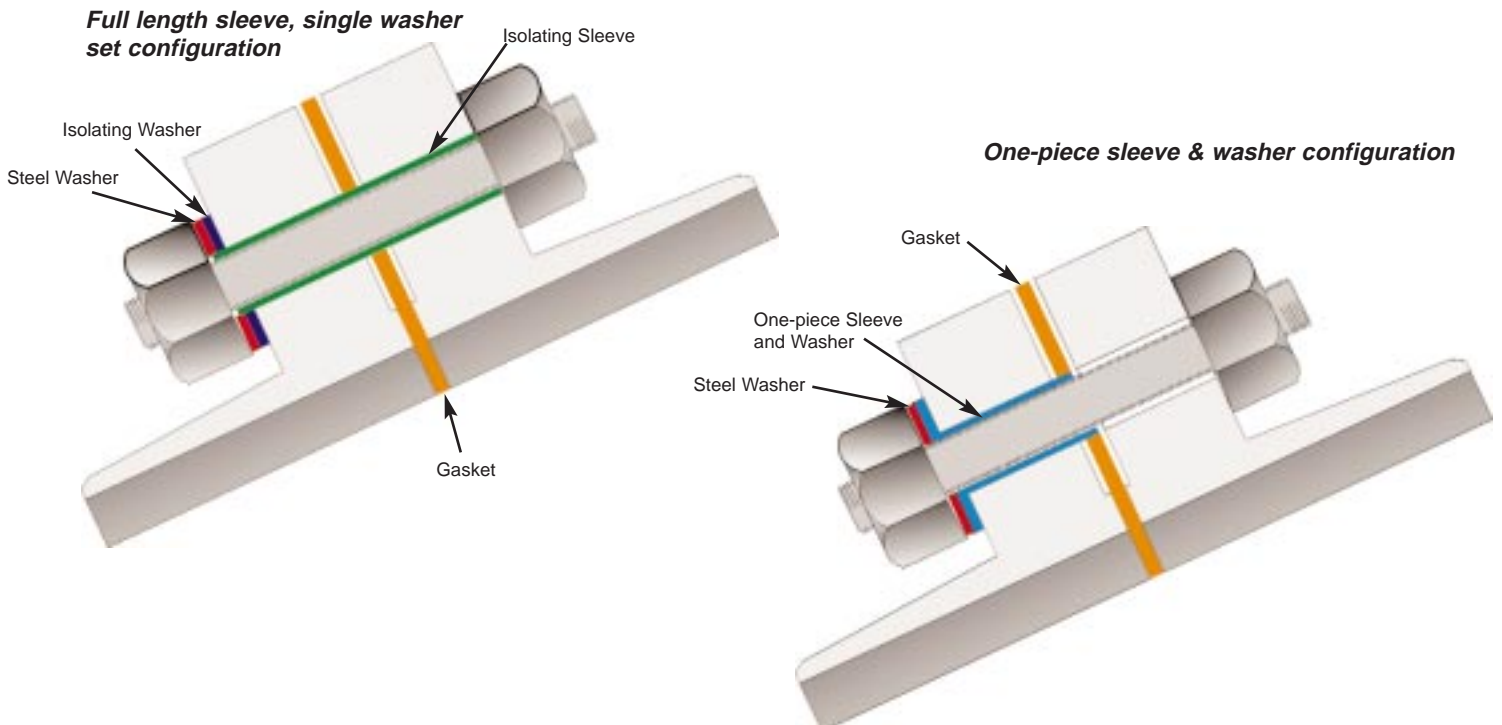
ASTM Test Method	Poly-ethylene	Mylar	Nomex	Phenolic	Silicone Glass G-7*	Epoxy Glass G-10	Epoxy Glass G-11	One-piece Sleeve & Washer
D149 Dielectric Strength Volts/Mil (Short Time)	400	4000	400	400	350	400	400	1,200
D695 Compressive Strength psi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18,000
D229 Water Absorption %	0.01	0.8	N/A	1.6	0.10	0.10	0.10	0.22
Operating Temp. °F	-30 to +180	-75 to +300	-65 to +450	-20 to +225	Cryogenic to +450	Cryogenic to +280	Cryogenic to +320	-30 to +180
°C	-34 to +82	-59 to +149	-54 to +232	-29 to +107	Cryogenic to +232	Cryogenic to +138	Cryogenic to +160	-34 to +82
D790 Flexural Strength psi	7,000	13,000	20,000	16,000	20,000	55,000	55,000	1,400
Cut Through Resistance ft-lbs.	1,800	3,500	4,000	No Test	No Test	16,000	No Test	3,400

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

1/8" Washer Material Physical Properties

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

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



Flange Isolation Kits

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)

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

ASTM	Test Method	Plain Phenolic	Neo-Faced Phenolic	G-3 Hi-Temp Phenolic	G-7* Silicone/Glass	G-10 Epoxy/Glass	G-11 Epoxy/Glass
D149	Dielectric Strength Volts/Mil (Short Time)	500	500	550	350-400	550	550
D695	Compressive Strength (psi)	25,000	25,000	50,000	40,000	50,000	50,000+
D229	Water Absorbtion (%)	1.6	1.6	0.7	0.07	0.10	0.10
D257	Insulation Resistance Meg Ohms	40,000	40,000	46,000	2,500	200,000	200,000
D790	Flexural Strength psi	22,500	22,500	60,000	27,000	60,000	75,000+
D785	Hardness Rockwell "M"	85	85	115	105	115	115
D256	IZOD Impact Strength Ft-Lbs/Inch	1.2	1.2	12.0	8.0	14.0	12.0
D638	Tensile Strength psi	20,000	20,000	42,000	25,000	45,000	43,000
D732	Shear Strength psi	10,000	10,000	18,000	20,000	22,000	22,000
	Temperature Range Degrees F	-65 to +220	-65 to +175	-65 to +392	Cryogenic to +450	Cryogenic to +280	Cryogenic to +349
	Temperature Range Degrees C	-54 to +104	-54 to +79	-54 to +200	Cryogenic to +232	Cryogenic to 138	Cryogenic to +176

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

Seal Element Temperature Limits

	Nitrile	Viton	Teflon	Neoprene	EPDM
Degrees Farenheit	-65 to +250	-20 to +350	Cryogenic to +450	-40 to +175	-65 to +300
Degrees Celsius	-54 to +121	-29 to +177	Cryogenic to +232	-40 to +79	-54 to +149

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:

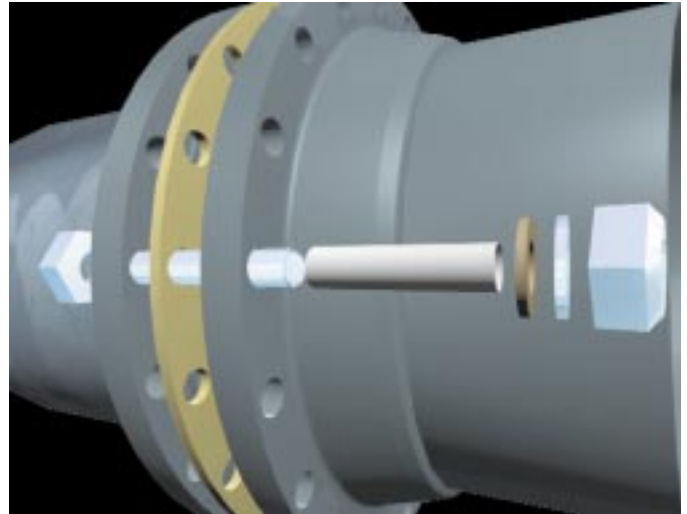
One - 1/8" thick steel washer

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:

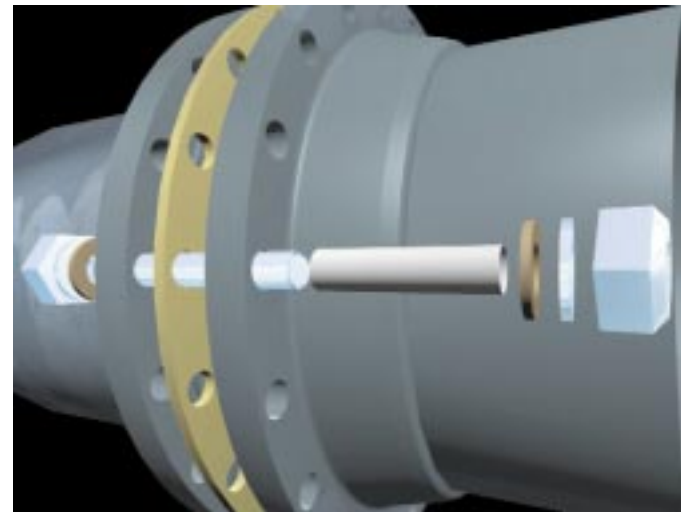
Two - 1/8" thick steel washers

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

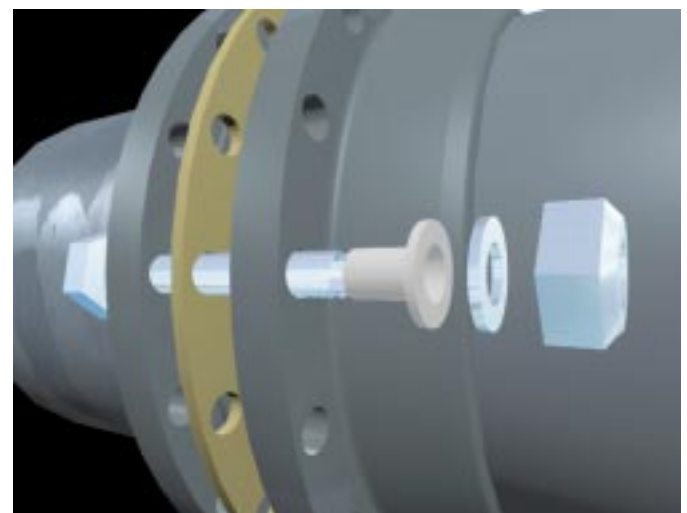
One-piece sleeve and washer set flange isolation kits include the following items for each bolt:

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.



Typical Specifications

General/Economical

Flange Isolation Kit Specification

Materials for flange isolation kits on pipes containing water, aqueous fluids or natural gas (up to 221°F, 105°C) shall consist of the following components:

Isolating and Sealing Gasket

One full faced isolating and sealing gasket, LineBacker® Sealing Gasket - Type "E", 1/8" thick, phenolic retainer containing a precision tapered groove to accommodate the controlled compression of a nitrile quad-ring sealing element. Sealing element placement shall accommodate either flat, raised or RTJ face flanges. The quad-ring seal shall be pressure energized. The phenolic retainer shall have a 500 volts/mil dielectric strength and a minimum 25,000 psi compressive strength. The full faced flange isolating gasket shall be 1/8" less in I.D. than the I.D. of the flange in which it is installed.

Full Length Bolt Isolating Sleeves

One full length Mylar sleeve (extending half way into both steel washers) for each flange bolt. The Mylar shall be a 1/32 inch thick tube with a 4000 volts/mil dielectric strength and water absorption of 0.8% or less.

Washers

Two, 1/8 inch thick, glass clad phenolic isolating washers for each bolt. Their compressive strength shall be 33,000 psi, dielectric strength 500 volts/mil and water absorption 1.6% or less.

Two, 1/8 inch thick steel washers for each bolt. The I.D. of all washers shall fit over the isolating sleeve and the steel and isolating washers shall have the same I.D. and O.D.

Quality

Flange isolating kits shall be manufactured at a facility that has a registered ISO 9002 Quality Management System. Submittals shall include copy of valid registration.

Availability

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

Performance suitability and material compatibility shall be determined by the user.

Top of the Line

Flange Isolation Kit Specification

Materials for flange isolation kits on pipes containing natural gas, oil and aqueous fluids (up to 280°F, 138°C) shall consist of the following components:

Isolating and Sealing Gasket

One full faced isolating and sealing gasket, LineBacker® Sealing Gasket - Type "E", 1/8" thick, G-10 retainer containing a precision tapered groove to accommodate the controlled compression of a Teflon (or Viton) quad-ring sealing element. Sealing element placement shall accommodate either flat, raised face or RTJ flanges. The quad-ring seal shall be pressure energized. The G-10 retainer shall have a 550 volts/mil dielectric strength and a minimum 50,000 psi compressive strength. The full faced flange isolating gasket shall be 1/8" less in I.D. than the I.D. of the flange in which it is installed.

Full Length Bolt Isolating Sleeves

One full length G-10 sleeve (extending half way into both steel washers) for each flange bolt. The G-10 shall be a 1/32 inch thick tube with a 400 volts/mil dielectric strength and water absorption of 0.10% or less.

Washers

Two, 1/8 inch thick, G-10 isolating washers for each bolt. Their compressive strength shall be 50,000 psi, dielectric strength 550 volts/mil and water absorption 0.10% or less.

Two, 1/8 inch thick zinc plated, hot rolled steel washers for each bolt. The I.D. of all washers shall fit over the isolating sleeve and both the steel and isolating washers shall have a same I.D. and O.D.

Quality

Flange isolating kits shall be manufactured at a facility that has a registered ISO 9002 Quality Management System. Submittals shall include copy of valid registration.

Availability

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

Performance suitability and material compatibility shall be determined by the user.

PSI Flange Isolation Ordering Guide/Work Sheet

Quantity	Nominal Pipe Size	ANSI Class	Gasket Type	Gasket Style	For GasketSeal® or LineBacker® Sealing Gaskets	Washers	Washer Material	Sleeve	Gasket I.D. Flange	Type
Specify Below	Specify Below	150# 300# 400# 600# 900# 1500# 2500#	E = With Bolt Holes F = Ring (No Bolt Holes) D = For RTJ Flanges	GS = GasketSeal® LB = LineBacker® NP = Neoprene PP = Plain RD = Red Devil YJ = Yellow Jacket GL = Garlock TF = Teflon®	Seal Element Neoprene Nitrile Viton EPDM Teflon (LB only)	SW = Single Washers DW = Double Washers	1 PC = 1 Piece Acetal Phen = Phenolic G-3 G-7 G-10 G-11	Poly = Polyethylene Mylar Nomex Phenolic G-7 G-10 G-11	Specify Below	W = Weld Neck S = Slip On R = RTJ BX = API BX RX = API RX O = Other Denote Specs. and Table

Quantity	Nominal Pipe Size	ANSI Class	Gasket Type	Gasket Style	For GasketSeal® or LineBacker® Sealing Gaskets	Washers	Washer Material	Sleeve	Gasket I.D. Flange	Type
					Retainer Seal Element					

For Flange Isolation Kits over 24" in addition to the above please specify:



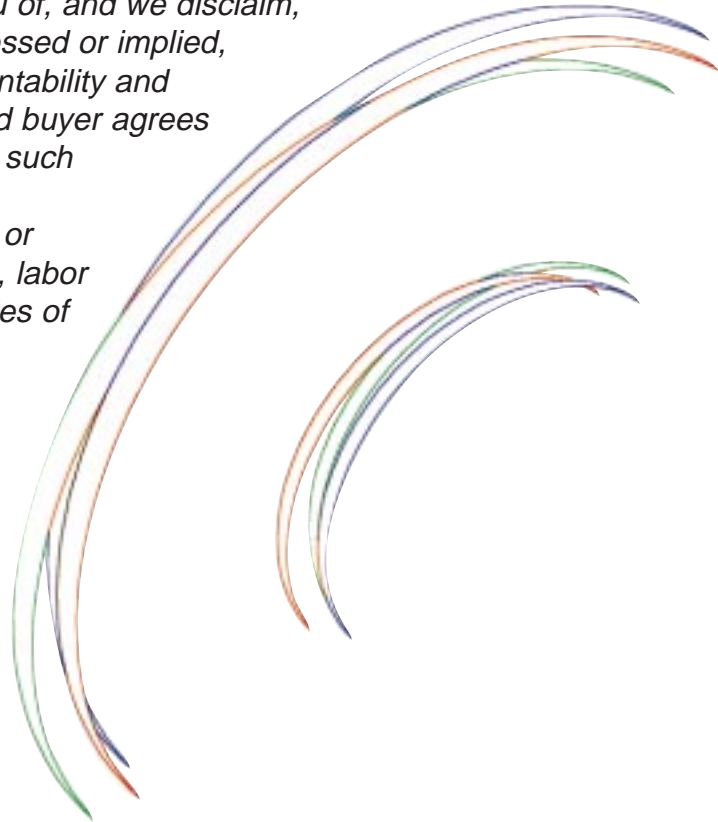
Flange I.D.	Sleeve Length	
Flange O.D.	Pipe I.D.	
Flange Thickness	Steel Sleeve I.D. <small>(For Concrete Pipe)</small>	
Number of Bolts	Product In Line	
Bolt Diameter	AWWA Class & Table <small>(Or other similar std.)</small>	
Bolt Hole Diameter	Internal Lining	
Bolt Circle Diameter		

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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