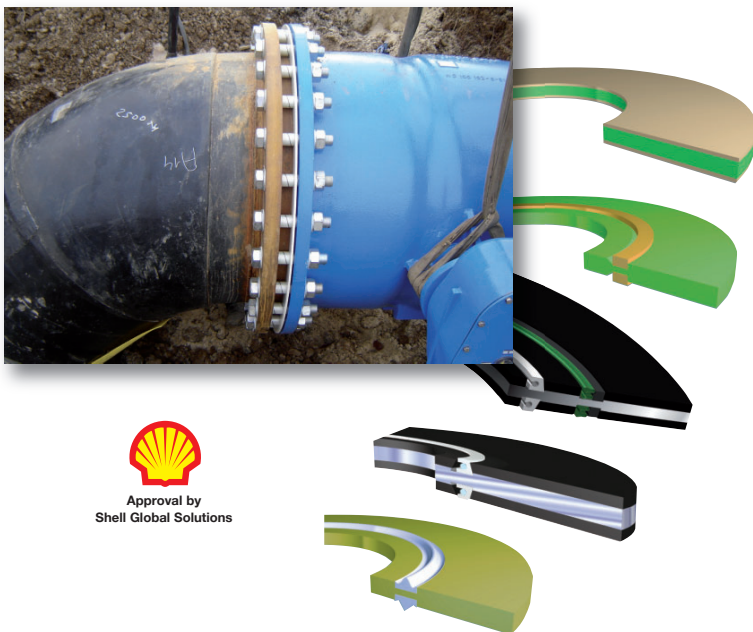


PSI Flange Isolations

Rubber Faced Phenolic (RFP)

LineBacker®, VCS/LineSeal™, VCFS, GasketSeal®, EPDM



Approval by
Shell Global Solutions

General Information • Selection Guide • Technical Data • Installation Instruction

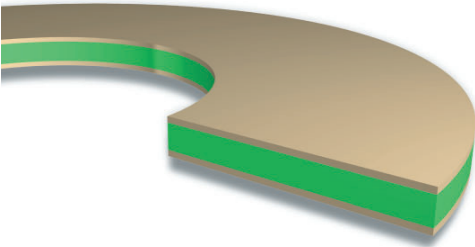
EXCLUSIVE AGENT:



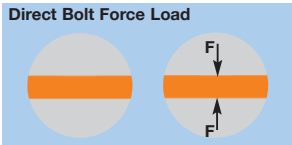
中華五金有限公司

CHUNG WAH METAL CO., LTD.

PSI Flange Isolation – Rubber Faced Phenolic (RFP)
General Information



Schematic diagram:



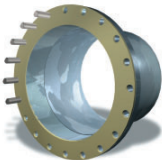
Rubber Faced Phenolic is worldwide used as standard isolating gasket in the oil and gas industry. The phenolic sheets are on both sides laminated with soft neoprene or nitrile, providing an effective sealing surface in the direct bolt force load. For DVGW (gas) and KTW (potable water) approval, the GLV-UniSeal® gaskets are available.

Technical Data

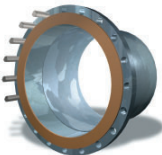
Description		
Gasket Material	PSI flange isolation gaskets are available in: Laminated phenolic sheets (HP) both sides faced with Neoprene (CR) or Nitrile (NBR-Perbunan). Colour: black	
ASTM	Test Method	Rubber Faced Phenolic (only*, DW**)
D149	Dielectric strength (KV/mm)	20
D659	Compressive strength (psi)	25,000
D229	Water absorption (%)	1,6
D257	Isolating resistance (MOhm)	40,000
D790	Flexural strength (psi)	22,500
D638	Tensile strength (psi)	20,000
D732	Shear strength (psi)	10,000
	Temperature range (°C)	-54 to +80°C
	Carrier plate thickness (mm)	3,2

*only: only gasket WITHOUT isolating sleeves and washers
**DW: Gasket, one isolating sleeve per bolt and 2 isolating and steel washers per bolt

Two versions available:

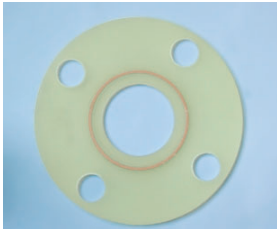


Type E (FF)
Sealing gasket with screw bolt holes according to the flange standard (Full Face)



Type F (IBC)
Sealing gasket with screw bolt holes according to the flange standard (I.B.C.)

PSI Flange Isolation – LineBacker® General Information



LineBacker® isolating gaskets can be manufactured to any diameter.

Various LineBacker® retainers and seals can be utilised to suit specific applications.

PSI's unique sealing elements provide elastic memory to a wide assortment of materials.

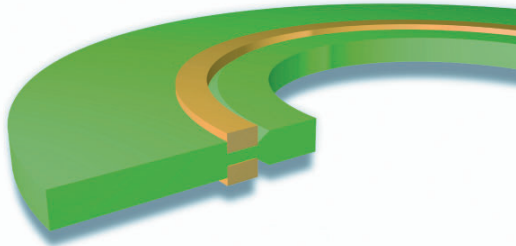
LineBacker® gaskets can be ordered individually.

LineBacker®



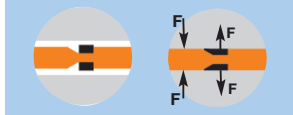
LineBacker® sealing gaskets utilize a patented rectangular sealing element, referred to as a “quad” ring, in combination with a unique groove design to effectively seal and isolate flanges of all types. With the unique “quad” ring design, elastic memory is provided for elastomers not normally associated with this characteristic. Materials such as Kel-F, polyimide, PTFE (Teflon) and vinyl may therefore be used as sealing elements which dramatically increase 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.

Features



Schematic diagram:

Indirect Bolt Force Load



The isolation version is high quality seal. It functions as an electrical separation point and prevents contact corrosions.

- Prevention of flange leaks.
- Guards against blowouts.
- Usable with any type of flange.
- Matches gasket materials to service conditions.
- Lowest possible clamp and compressive load.
- Increases gasket life.

For DVGW (gas) and KTW (potable water) approval, the GLV-UniSeal® gaskets are available.

* PGE on request !

Common LineBacker® Laminates/Retainers Physical Properties & Max. Temperature Limits

ASTM	Test method	Plain Phenolic **	G-3 Hi-temp. Phenolic **	G-7* Silicone/ Glass **	G10 Epoxy/ Glass	G-11 Epoxy/ Glass
D149	Dielectric Strength Volts/Mil (Short Time)	500	550	350 – 400	550	550
D659	Compressive Strength (psi)	25,000	50,000	40,000	65,000	60,000
D229	Water Absorption (%)	1.6	0.7	0.07	0.04	0.07
D257	Isolating Resistance Meg Ohms	40,000	46,000	2,500	200,000	200,000
D790	Flexural Strength psi	40,000	46,000	2,500	65,000	62,000
D638	Tensile Strength psi	20,000	42,000	25,000	51,000	42,500
D732	Shear Strength psi	10,000	18,000	20,000	21,000	22,000
	Temperature Range Degrees C	-54 to +104°C	-54 to +200°C	Cryogenic up to +232°C	Cryogenic up to +150°C	Cryogenic up to +200°C

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

Seal Element Temperature Limits

Nitrile	EPDM	Viton	Teflon
-40 to +121°C	-54 to +149°C	-29 to +177°C	Cryogenic to +232°C

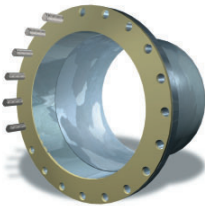
To determine the overall temperature range of a complete sealing gasket, consider **both** retainer and seal element temperature limitations

How To Order

To order LineBacker® sealing/isolating gaskets please indicate the following:

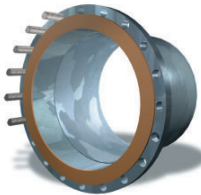
1. Pipe Size
2. Pressure Rating up to class 600/PN 100 (ANSI, DIN, API)
3. Gasket Model (LineBacker®)
4. Retainer Material
5. Sealing Element
6. Gasket Type (E or F)
7. Type of flange (weld neck, slip-on, RTJ, etc.)
8. Quantity
9. For pipe sizes greater than 61cm contact PSI.

Performance data and technical information provided herein is intended for guideline purposes only. Suitability of product configurations for specific applications should be determined by the user.



Gasket Type E (FF)

Sealing gasket with screw bolt holes according to the flange standard (Full Face)



Gasket Type F (IBC)

Sealing gasket with screw bolt holes according to the flange standard (I.B.C.)

PSI Flange Isolation – LineBacker®

Technical Information



Suggested Flange Isolation Material Compatibility

Medium	Retainer	Seal	Temperature range °F	Temperature range °C
Acetone	Phenol ****	EPDM	+32 to +80	0 to +27
Air	G-10	Nitrile	-40 to +225	-40 to +107
Ammonia Dry	G-10	Teflon	-65 to +220	-54 to +104
Ammonia (Wet)***	G-10	Teflon	+32 to +100	0 to +38
Bleach	G-10	Teflon	+32 to +80	0 to +27
Butylene (Butadiene)	G-10	Teflon	+32 to +100	0 to +38
Carbon Dioxide	G-10	Nitrile	+32 to +150	0 to +66
Caustic Soda (NaOH)	CONSULT FACTORY			
Cryogenic	G-10	Teflon	-300 to +280	-184 to +138
Ethanol	G-10	EPDM	+32 to +100	0 to +38
Ethylene (Ethene)	G-10	Teflon	+32 to +80	0 to +27
Fuel Oil	G-10	Viton	-20 to +280	-29 to +138
Gas, Natural	Phenol ****	Nitrile	-40 to +220	-40 to +104
Gas, Sour	G-10	Viton	-20 to +220	-29 to +104
Gasoline	G-10	Teflon	-65 to +225	-54 to +107
Hydrogen	G-10	Nitrile	-40 to +250	-40 to +121
Jet Fuel	G-10	Viton	-20 to +225	-29 to +107
LNG	G-11	Teflon	-300 to +100	-184 to +38
Mercaptan	G-10	Teflon	-20 to +80	-29 to +27
Methanol	G-10	Teflon	+32 to +100	0 to +38
MTBE	G-10	Special Nitrile	+32 to +80	0 to +27
Nitrogen	Phenol ****	Nitrile	-40 to +220	-40 to +104
Oil, Crude	G-10	Viton	-20 to +280	-29 to +138
Oxygen**	G-10	Teflon	-65 to +250	-54 to +121
Pentane	G-10	Teflon	+32 to +80	0 to +27
Propane	G-10	Nitrile or Teflon	+32 to +80	0 to +27
Propylene	G-10	Viton	+32 to +80	0 to +27
Sewage	G-10	Viton	-20 to +280	-29 to +138
Spent Liquor	G-10	Teflon	+32 to +100	0 to +38
Steam	CONSULT FACTORY			
Styrene	G-10	Teflon	+32 to +80	0 to +27
Sulphur (Molten)	G-10	Teflon	+32 to +280	0 to +138
Tolulene	G-10	Viton or Teflon	+32 to +150	0 to +66
Water (hot)	G-10	EPDM	+175 to +280	+79 to +138
Water (Potable)	G-10	EPDM	+32 to +280	0 to +138
Water (Sea)	G-10	EPDM	+32 to +280	0 to +138
White Liquor	G-10	Teflon	+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 up to +100°F (+38°C) only (same materials as dry).

**** = on request

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.

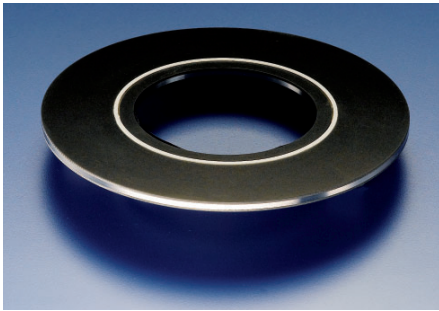
PSI's responsibilities will be limited to those listed in the PSI standard warranties.

Metal Retainers:

LineBacker® gaskets are available with a wide range of metal retainers to offer compatibility with flange metals, for extremely hazardous fluids or for extremes in temperatures and pressures.

PSI Pikotek® Flange Isolation – VCS/LineSeal™

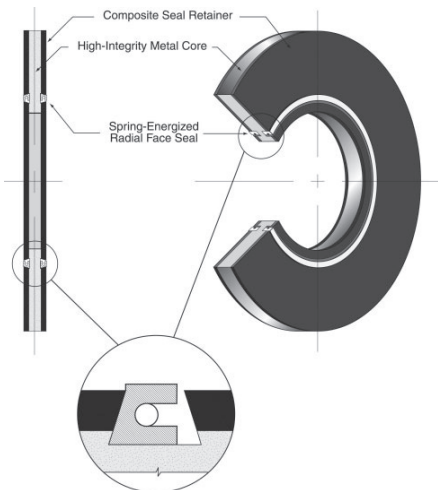
General Information



The PSI **Pikotek** VCS/LineSeal™ is a “Very Critical Service” system designed for electrical flange isolation and general sealing applications. This seal is suitable for use in raised-face, flat-face and RTJ flanges in all pressure classes including API 10,000 psi service. In addition to its superior sealing characteristics and excellent dielectric properties, the VCS/LineSeal™ is ideal for isolating flanges made from dissimilar metals thus mitigating galvanic corrosion and for mitigating localized flange face corrosion.

VCS/LineSeal™ Isolation System Advantages and Benefits

- Extreme high-reliability sealing and isolating solution for all critical services
- Seals and isolates at all pressures up through ANSI 2500 class and API 10,000 psi service
- Withstands severe service conditions including large bending moments, vibration, temperature and pressure cycling
- Designed to withstand corrosive environments, including high concentrations of CO₂, H₂S, produced water, etc.
- Outstanding isolation properties for cathodic protection
- Pressure-activated seals provide high confidence sealing and eliminate costly leaks
- Seal 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 (e.g. over tightening bolts)
- Available to match any flange specification (ANSI, API, MSSP, BS, DIN, AS, others)
- Can mate mismatched RTJ with raised-face flanges
- Easy installation, make up and removal:
 - Flanges do not have to be spread as with ring gaskets. The VCS/LineSeal™ easily slips into place
 - Sealing system results in low required bolt loads.
Less make up force is required resulting in less flange and bolt stress
 - VCS/LineSeal™ is self-aligning and centering, quick to install; no special tools are required
- Maintenance-free, corrosion-resistant design is resistant to deforming under load, which makes the gasket reusable



VCS/LineSeal™ Design

The unique design of the VCS/LineSeal™ system incorporates high-strength, glass-reinforced epoxy laminate bonded to a stainless steel core. This provides the strength of a traditional metallic seal while maintaining complete electrical isolation between the flange faces. Seal grooves are machined through the laminate isolating material and into the stainless steel core. This provides a strong base for the seal to seat into and breaks the potential leak/weep path that is inherent in glass laminate materials. Spring-energized Teflon internal face seals are installed in the dovetail-shaped seal grooves and provide pressure-activated sealing that sets the VCS/LineSeal™ apart from other less reliable sealing solutions. Other seal configurations are also available such as Viton, Nitrile or Silicon.

PSI Pikotek® Flange Isolation – VCS/LineSeal™

General Information

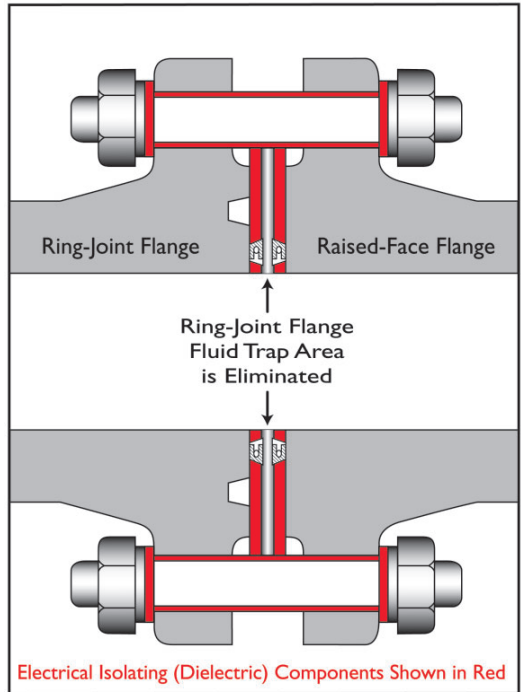


Electrical Insulation

In addition to its superior sealing characteristics, the PSI **Pikotek** VCS/LineSeal™ distinguishes itself by providing electrical flange isolation in a high-strength sealing mechanism. The VCS/LineSeal™ significantly decreases electrical potential between two flange faces by providing a non-conducting, non-metallic interface. This effectively eliminates corrosion resulting from dissimilar metal contact or ground current induced corrosion of metal piping components. When used with isolating sleeves and washers, the VCS/LineSeal™ is particularly effective in breaking electrical conductivity in piping systems with cathodic protection. What makes the VCS/LineSeal™ unique among isolating gaskets is its strength and durability. Traditional isolating gaskets have been fragile and prone to failure because they are often made from brittle, non-metallic materials (e.g. phenolic resin) and are not capable of withstanding imperfect installation practices. The VCS/LineSeal™ steel core and patented construction enables the seal to withstand far more system pressure, pressure cycling, bending moments, overtorquing and overall abuse than conventional isolating gaskets with zero risk of product failure.

Sealing Characteristics

The primary job that any gasket must perform is to seal the pressure differential between the internal and external environment. The VCS/LineSeal™ performs this task through the use of its spring-energized, pressure-activated sealing elements. At low system pressure, the spring acts to deflect the lips of the seal, thus enabling low pressure sealing. As the pressure increases and comes in direct contact with the sealing element, the system pressure deflects the seal lips and more sealing force is applied against the flanges. This high pressure sealing is accomplished while maintaining complete electrical flange isolation. This high-reliability sealing system makes the PSI Pikotek VCS/LineSeal™ the seal to use when failure cannot be tolerated. The fact that the VCS/LineSeal™ uses pressure-activated sealing elements which are located inboard of the ring groove on RTJ flanges has the additional benefit of allowing the VCS/LineSeal™ to seal mismatched RTJ to raised-face or flat-face flanges. This feature is very useful when replacing valves using stock inventory that may have a different flange face than the mating flanges.





Metallic Core

The core of each gasket is made of annealed 316 stainless steel. Other metals, including Duplex and Inconel are available upon special order.

Isolating Material Options

Test Method	G-10*	G-11*	G-10CR** (Cryogenic)
Compressive Strength (PSI)	65,000	50,000	65,000
Dielectric Strength (VPM)	750-800	500	800
Max. Continuous Operating Temp.	302°F (150° C)	392°F (202° C)	265°F (130° C)
Min. Continuous Operating Temp.	-200°F (-129° C)	-50°F (-46° C)	-459°F (-273° C)
Water Absorption (%)	0.05	0.085	0.085
Flexural Strength (PSI)	65,000	57,700	57,700
Tensile Strength (PSI)	50,000	41,000	41,000
Bond Strength (lb.)	2,600	2,200	2,200
Shear Strength (lb.)	22,000	21,200	21,200

* NEMA grade Glass-Reinforced Epoxy (GRE) laminate
** Produced to NIST G10CR process specification for materials used in cryogenic applications

Seal Material

The sealing elements are intended to provide an impervious barrier through which no contained media or other substance can penetrate. Consequently, the composite retainer backing material behind the seal remains uncontaminated and thus permanently holds the seal in place in a static, fully encapsulated manner.

Seal Material Options

1. Teflon (Spring-Energized) Standard

Recommended for all environments. Helical wound spring provides radial load. Encapsulation in the seal groove eliminates creep or cold flow. This sealing system truly distinguishes PSI **Pikotek** gaskets from all other flange sealing systems.

Temperature range: -250°F to +392°F (-157°C to +200°C)
(note: gasket material is limiting factor)

2. Viton

General purpose oilfield elastomer. Excellent resistance to aliphatic hydrocarbons, glycols and H2S. Good resistance to aromatic hydrocarbons.

No recommended for: Systems with amine inhibitors and in piping systems containing significant partial pressures of polar gases (i.e. CO2) where radical pressure drops (i.e., 2000 PSI to 0 PSI) commonly occur.

Temperature range: -15°F to +392°F (-26°C to +200°C)

3. Buna-Nitrile

General purpose elastomer only suitable for mild chemical resistance.

Temperature range: -200°F to +240°F (-129°C to +116°C)

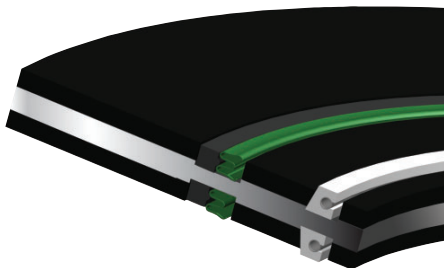
4. Silicon

Suitable for use in portable water applications. Approved by WRAS.

Temperature range: -67°F to +572°F (-55°C to +300°C)

Special seal ring materials are available on request and subject to technical acceptability.

PSI Pikotek® Flange Isolation – VCFS General Information



The World's only Firesafe Isolating System

The VCFS* (VCS FireSafe*)

- Based upon proven PSI Pikotek VCS/LineSeal™ platform
- Provides Complete Flange Electrical Isolation
- Tandem Seal Technology
- Primary Sealing System has 20+ years successful track record
- Secondary Sealing System is dual purpose fire safe and backup
- Passed API 6FB, 3rd Edition Fire Test
- Use in Conjunction with Cathodic Protection Systems
- Mitigates Potential Flange Rotation
- Provides a Tighter Seal Under Low Bolt Loads



The VCFS* utilizes PSI **Pikotek** standard VCS design with its 20 plus year track record of success in sealing Very Critical Service. The FS* version was created by taking a standard VCS configuration and adding a secondary sealing element that is capable of maintaining a seal while subject to a 1500°F (815°C) fire. The VCFS* combines the VCS's proven track record of electrical isolation and sealing integrity in aggressive situations with a solution that has fully passed the API 6FB, 3rd Edition fire test.

The VCFS* is suitable in all services up to and including ANSI 2500# and is offered for ring type joint (RTJ) flanges from 6" - 24" and raised face flanges from 2" - 24". The VCFS* is designed for service where the cost of joint failure cannot be tolerated and the operator desires both electrical isolation and added sealing integrity in the case of a fire.

The VCFS* consists of a PTFE spring-energized primary sealing element and an E-ring secondary seal, all seated in a high-strength metal core upon which an insulating laminate is permanently bonded. Due to its unique pressure activated sealing mechanism, the gasket requires far less bolt stress to seal than other gasket types. In addition, the engineered E-ring will serve as a secondary seal during normal operation and the primary sealing element during a fire.

The API 6FB Fire Test

The API 6FB test requires that any sealing end connection hold for 30 minutes in a flame condition and then for a 60 minute cool down period. After the assembly is cooled to room temperature the line is de-pressurized and then re-pressurized. During all facets of the test the gasket must not exceed an API prescribed leakage rate.

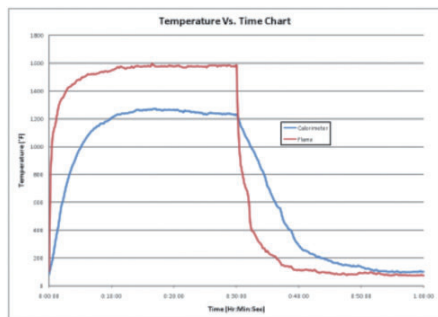


Chart 1:

Temperature logging for the calorimeter blocks and thermocouples during the full 60 minutes burn and cool down cycle.

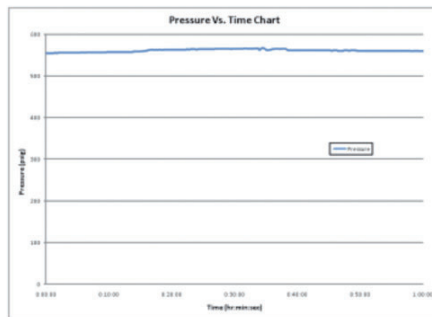


Chart 2:

Pressure versus time curve for this test.

PSI Pikotek® Flange Isolation – VCFS

Technical Information



Isolating Material Options

Test Method	G-10* (Cryogenic)	G-11*
Compressive Strength (PSI)	65,000	50,000
Dielectric Strength (VPM)	750-800	500
Max. Continuous Operating Temp.	302°F (150° C)	392°F (202° C)
Min. Continuous Operating Temp.	-200°F (-129° C)	-50°F (-46° C)
Water Absorption (%)	0.05	0.085
Flexural Strength (PSI)	65,000	57,700
Tensile Strength (PSI)	50,000	41,000
Bond Strength (lb.)	2,600	2,200
Shear Strength (lb.)	22,000	21,200

* NEMA grade Glass-Reinforced Epoxy (GRE) laminate

HCS Washer System:

As part of the development of the VCFS Firesafe gasket we had to overcome the potential of the loss of bolt load during the burn process of the API 6FB test. Therefore we developed the new X37 hardened coated steel washer system that withstood those demands.

Metal

- Grade 1050 steel
- Heat treated per ASTM F-436 specification
- Quenched and tempered for hardening
- Hardness of rockwell C scale 38 to 45 (HRC 38 - HRC 45)

Coating

- The coating is a proprietary formulation called X37
- The formulation consists of a corrosion resistant pretreatment and multiple coats of a resin bonded modified PTFE coating with hardening agents
- The formulation provides a high dielectric, lubrication and an overall strong and durable coating
- Dielectric of ~ 1000 Volts/mil
- Maximum working temperature of 482°F / 250°C
- Minimum working temperature -40°C
- 2000 hours salt spray test

*Note:

The "FS" or "Fire Safe" designation denotes only that this gasket has successfully passed the API 6FB fire test. Due to the fact that every fire is unique and many uncontrolled variables are present, no other claims regarding suitability or performance in a fire are made. Each designer, user and/or operator will need to assess their individual situation when deciding to install FS style gaskets. Patent Pending.

PSI Flange Isolation – GasketSeal®

General Information



GasketSeal® isolating gaskets can be manufactured to any diameter.

Match seal element and retainer materials to suit specific applications.

Unique seal element provides advantages of an “O” ring seal without groove positioning problems

GasketSeal® gaskets can be ordered individually as part of an insulation kit.

GasketSeal®

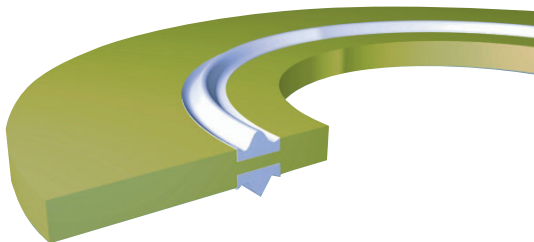


Approval by
Shell Global Solutions

GasketSeal® sealing gaskets are considered one of the most effective methods for sealing and insulating flanges of all types. The gasket consists of two moulded 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. Gasket Seal® 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.

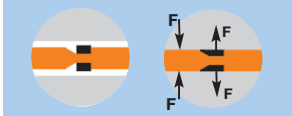
GasketSeals are available in a wide variety of retainer and sealing element combinations for matching gaskets to service and environmental conditions.

Features



Schematic diagram:

Indirect Bolt Force Load



- Prevention of flange leaks.
- Guards against blowouts.
- Usable with any type of flange.
- Matches gasket materials to service conditions.
- Lowest possible clamp and compressive load.
- Increases gasket life.
- The isolation is a high quality **seal**. It functions as an electrical separation point and prevents contact corrosion.

Gas (DVGW) and potable water (KTW/W270) approval, the GLV-UniSeal® gaskets are available.

PSI Flange Isolation – GasketSeal®

Technical Information



Common GasketSeal® Laminates/Retainers Physical Properties & Max. Temperature Limits

ASTM	Test Method	Plain Phenol **	G-3 Hi-temp. Phenol **	G-7* Silicone/ Glass **	G10 Epoxy/ Glass	G-11 Epoxy/ Glass
D149	Dielectric Strength Volts/Mil (Short Time)	500	550	350 – 400	550	550
D659	Compressive Strength (psi)	25,000	50,000	40,000	65,000	60,000
D229	Water Absorption (%)	1.6	0.7	0.07	0.04	0.07
D257	Insulation Resistance Meg Ohms	40,000	46,000	2,500	200,000	200,000
D790	Flexural Strength (psi)	40,000	46,000	2,500	65,000	62,000
D638	Tensile Strength (psi)	20,000	42,000	25,000	51,000	42,500
D732	Shear Strength (psi)	10,000	18,000	20,000	21,000	22,000
	Temperature Range Degrees C	-54 to +104°C	-54 to +200°C	Cryogenic up to +232°C	Cryogenic up to +150°C	Cryogenic up to +200°C

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

** = on request

Seal Element Temperature Limits

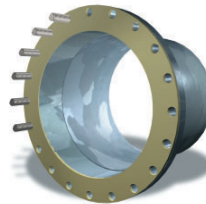
Nitrile	Viton
-40 to +121°C	-29 to +177°C

To determine the overall temperature range of a complete sealing gasket, consider **both** retainer and seal element temperature limitations.

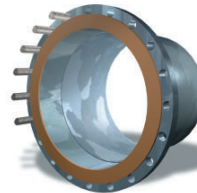
To order GasketSeal® sealing/insulating gaskets please indicate the following:

1. Pipe Size
2. Pressure Rating (ANSI, DIN, API)
3. Gasket Model (GasketSeal®)
4. Retainer Material
5. Sealing Element
6. Gasket Type (E or F)
7. Type of Flange (Weld Neck, slip-on, RTJ, etc.)
8. Quantity
9. For pipe sizes greater than ND 600 contact PSI.

Performance data and technical information provided herein is intended for guideline purposes only. Suitability of product configurations for specific applications should be determined by the user.



Gasket Type E (FF)
Sealing gasket with screw bolt holes according to the flange standard (Full Face)



Gasket Type F (IBC)
Sealing gasket with screw bolt holes according to the flange standard (I.B.C.)

PSI Flange Isolation – EPDM

General Information



You can order the EPDM isolation seal in varying strengths, versions, types E or F and with an isolation set.

The PSI range of EPDM gaskets offer durability and strength. For gaskets having a thickness greater than 4 mm we insert a polyester scrim which adds strength to the durable EPDM gasket material. This polyester scrim insertion reduces the risk of damage to the gasket by possible overtightening of the flanges.

For DVGW (gas) and KTW (potable water) approval, the GLV-UniSeal® are available.

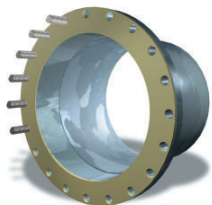
Schematic diagram:

Direct Bolt Force Load



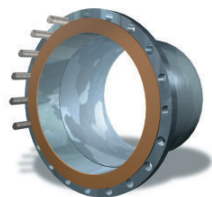
To order EPDM sealing/insulating gaskets please indicate the following:

1. Pipe Size
2. Pressure Rating (DIN, Ansi, BS, ASTM)
3. Gasket Application
4. Material Thickness
5. Gasket Type (E or F)
6. Type of Flange (Weld Neck, slip-on, RTJ, etc.)
7. Quantity



Gasket Type E (FF)

Sealing gasket with screw bolt holes according to the flange standard (Full Face)



Gasket Type F (IBC)

Sealing gasket with screw bolt holes according to the flange standard (I.B.C.)

Material Specification

Material EPDM (Ethylene-Propylene-(Diene) Copolymer	
Polyester Scrim Insertion	4 mm thickness – 1 ply polyester scrim insertion 6 mm thickness – 2 ply polyester scrim insertion
Colour	Black
Durometer Hardness "A"	70 + 5 deg. Shore
Tensile Strength (min.)	9 MPA
Elongation min.	300%
Temp. (Short Term 10 hours)	+150°C
Temp. (Continuous 1000 hours)	-30 to +120°C
Compression set at 70°C for 24 hours	31%
Conductivity	Non-Conductive > 10 x 12 Ohms to infinity
Resilience	Very good
Tear Strength	Good 23 KN/M

General remarks:

The above-mentioned performance data are only for information. The suitability for special applications should be determined by the user. Changes with regard to temperature, pressure, concentration or compounds acting synergistically may exclude the proposed application. The material selection is at the sole risk of the user. Consult a professional or PSI for specific applications.

The liability of PSI is limited to the liability listed in its general guarantees.

PSI Flange Isolations – LineSeal™, LineBaker®, GasketSeal® Certificates



Aramco Overseas Company B.V.

As a result of the inspection lot 107000051269, your manufacturing plant is approved to supply the following ICOMs:

ICOM	Description
6000000366	GASKET KIT INSULATING; AB, SLEEVES AND GASKETS, CONSISTING OF WASHERS, SLEEVES AND GASKETS

Shell Global Solutions

CERTIFICATE OF ACCEPTANCE

This is to certify that Supplier Technical Assessment Record (STAR) level 2 of the:

Company:	Pipeline Seal & Insulator Co. Ltd
Manufacturing location:	Unit 3 & 5 Chester Road, Gormouth Business Park, Eaton Socon, St Neots, Cambridgeshire PE19 8YT, UK.

has been accepted by Shell Global Solutions for the following product:

PSI - LineSeal® G10 Electrical isolating gasket consisting of a stainless steel core covered with a glass fibre reinforced epoxy layer on both sides. A PTFE spring energized to seal ring is applied to provide the sealing function.

Designed to: SPE 85/201, SPE 85/203, SPE 85/200.

The PSI - LineSeal® G10 Electrical isolating gasket passed Type Acceptance Testing in accordance with specification SPE 85/200 (T-2 973.758), which includes:

- Shell leak tightness test at ambient temperature and pressures up to 50 MPa.
- Thermal cycle test - EN 15555 ROTT & HOTT tests, Hot Blow Out Test (HOTT) and
- Visual examination.

Final testing at Amtec in Lauffen Germany was witnessed by Shell-GSI (Mr. W. van Maaren). Ref. Amtec report number 301 542.1.2, of 06/09/2007. Title: "LineSeal G10 retainer with 316L stainless steel core and PTFE/Teflon spring energized seal" and Shell-GSI report number GS 08 30086 and Shell-GSI report "Review of PSI St. Neots fabrication workshop for gaskets" of 01-11-2007 (W. van Maaren).

The 2-STAR rating in the Shell Global Solutions Technically Accepted Manufacturers And Products (TAMAP) database is applicable to:

MESC Product Group Description: BSAEED

MESC Sub-sub Groups:

- Flange insulation kits, consisting of insulating sleeves, resulting washers and metal washers
- MESC 85.46.09.001 - 1 921.1 for ASME class 900.
- MESC 85.46.09.001 - 1 278.1 for ASME class 900.
- MESC 85.46.09.331 - 1 664.1 for ASME class 1500 and
- MESC 85.46.09.331 - 1 664.1 for ASME class 2500.

Shell Flange Emission Class: B.

Pressure Class Range: ASME Classes 600, 900, 1500 and 2500

Size Range: DN 15 (1/2") - DN 600 (24")

Temperature Range (max): -100°C to +150°C

Brand name & Model Designation: PSI - LineSeal® G10

Reference Drawing(s): LS-201 sheet 1 of 1 rev.0

Shell GSI report no.: GS 08 30086

PSI certified with Amtec Laboratory is number: 301542.1.A

Activity code: 5007074

Acceptance certificate no.: 2008-03-013

Issued by Shell Global Solutions International B.V. GSNL_OSEMH

Original acceptance: 6 November 2007

Current certificate: 08 April 2008

Certificate expiry: 8 November 2012

Issued by Shell Global Solutions International B.V. GSNL_OSEMH

Shell Global Solutions

CERTIFICATE OF ACCEPTANCE

This is to certify that Supplier Technical Assessment Record (STAR) level 2 of the:

Company:	Pipeline Seal & Insulator Co. Ltd
Manufacturing location:	Unit 3 & 5 Chester Road, Gormouth Business Park, Eaton Socon, St Neots, Cambridgeshire PE19 8YT, United Kingdom.

has been accepted by Shell Global Solutions for the following product:

LineBaker® G10 Electrical isolating gasket, full faced with precision located bolt holes, 1/8" thickness, retainer containing a tapered groove to accommodate a PTFE-sealing ring

Designed to: MESC SPE 85/201, SPE 85/203, SPE 85/200.

The PSI - LineBaker® G10 Electrical isolating gasket passed Type Acceptance Testing in accordance with specification SPE 85/200 (T-2 973.758), which includes:

- Shell leak tightness test at ambient temperature and pressures up to 50 MPa.
- Thermal cycle test - EN 15555 ROTT & HOTT tests, Hot Blow Out Test (HOTT) and
- Visual examination.

The final testing at Amtec in Lauffen Germany was witnessed by Shell-GSI (Mr. W. van Maaren). Ref. Amtec report number 301 542.2, of 06 Sept. 2007. Title: "LineBaker G10 retainer with Teflon seal". Shell-GSI report number GS 08 30086 and Shell-GSI report "Review of PSI St. Neots fabrication workshop for gaskets" of 01-11-2007 (W. van Maaren).

The 2-STAR rating in the Shell Global Solutions Technically Accepted Manufacturers And Products (TAMAP) database is applicable to:

MESC Product Group Description: BSAEED

MESC Sub-sub Groups:

- Flange insulation kits, consisting of insulating sleeves, resulting washers and metal washers
- MESC 85.46.09.001 - 1 274.1 for ASME class 150 and
- MESC 85.46.09.331 - 1 664.1 for ASME class 300.

Shell Flange Emission Class: B.

Pressure Class Range: ASME Classes 150 and 300

Size Range: DN 15 (1/2") - DN 600 (24")

Temperature Range (max): -100°C to +150°C

Brand name & Model Designation: PSI - LineBaker® G10

Reference Drawing(s): LS-201 sheet 1 of 1 rev.0

Restrictions/Conditions Applicable: Not applicable

Original acceptance: 6 November 2007

Current certificate: 08 April 2008

Certificate expiry: 8 November 2012

Issued by Shell Global Solutions International B.V. GSNL_OSEMH

with 316L 1.A

to no: 674

Name: C.A.W. Glandsop

Signature:



Petroleum Development Oman L.L.C.

CERTIFICATE OF REGISTRATION - PRODUCT VENDOR

CERTIFICATE NUMBER: 103821

First Registered With: PDO Date of Issue: 07/04/2008

PETROLEUM DEVELOPMENT OMAN LLC

CERTIFIES THAT:

Manufacturer: Pipeline Seal & Insulator Co Ltd

Country of Origin: UK

Local Agent: Middle East Petroleum Services LLC

Postal Address: P.O. Box 1521, PC 130 Al Athelbah - Sultanate of Oman

IS REGISTERED WITH THE COMPANY AS AN APPROVED PRODUCT VENDOR WITH EFFECT FROM THE DATE OF ISSUE OF THIS CERTIFICATE FOR THE FOLLOWING PRODUCT GROUP CATEGORIES:

Corrosion Monitoring & Cathodic Protection

AWT 25 - INSULATING FLANGE KITS, GASKETS, NYLON SLEEVES - BS 15 19 15 - INSULATION KITS
FLANGERS, GASKETS/SLEEVES/WASHERS

SAID AL KINDY (FPS)
HEAD BUSINESS SERVICES

NB: This Certificate is valid until: 05/02/2010

PLEASE REFER OVERLEAF FOR DETAILS.

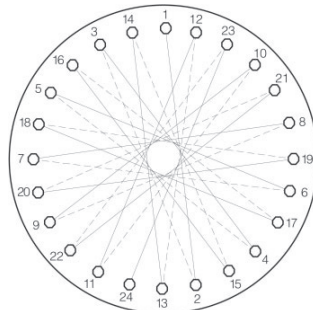
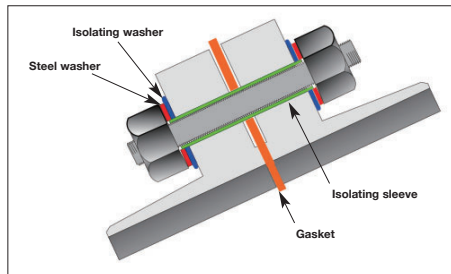
Address post registration, non procurement related queries to e-mail address Said.S.Henawy@pdo.com
Telephone number + (968) 24073314

PSI Flange Isolation Installation Instruction



How to tighten the flange bolts

1. Clean flanges.
 2. Insert gasket between flange faces.
 3. Insert isolating sleeves in bolt holes.
- Isolation sleeve length to be calculated as follows:**
 $2 \times \text{flange thickness including raised face} + 1 \times \text{thickness of the flange isolation} + 2 \times \text{thickness of the isolation washer}$
4. (If using stud bolts run one nut on one end until end of nut is flush with stud bolt). Place one steel washer and one isolating washer over bolt and insert in bolt hole.
 5. Fit one isolating washer and one steel washer on protruding bolt end. Hand-tighten the nuts.
 6. In order to achieve an even distribution of pressure at the flange sealing ring we recommend to tighten the bolts as shown above until the flange faces and the sealing ring are in contact.
 7. Tighten bolts alternately across the diameter of the flange (see drawing above).
 8. Always use torque wrench to ensure even tightening.
 9. Do not overtighten or leakage may occur.
 10. Ensure that bolts are well lubricated. No grease on sealing surfaces.



The example shows 24 bolts. With flanges having a different number of bolts you should generally follow the same procedure.

In order to achieve an even distribution of pressure at the flange sealing ring we recommend tightening the bolts as shown above until the flange faces and the sealing ring are in contact.

Please take the torque moments from the chart below.

Please ensure that the bolts are greased/lubricated sufficiently so as to avoid damage to the threads by friction. In gas applications, it is advisable to use a PTFE based grease to ensure good readings when measuring gas with gasometers.

Metric Size	Tightening torque (Nm)						INCH Size	Tightening torque (Nm) A 193 B7
	5.6 Ck 35	8.8	10.9	12.9	A2 - 70	42 CrMo 4 A 320 L7M 40 CrMoV 47		
M4	1	3	4	5	2	2		
M5	3	6	8	10	4	4		
M6	5	10	15	17	7	6		
M8	10	24	36	42	17	15		
M10	21	50	70	85	34	30		
M12	37	85	120	145	59	52	1/2 -13 UNC	80
M16	90	210	300	350	145	128	5/8 -11 UNC	160
M20	180	410	570	690	280	264	3/4 -10 UNC	320
M22	240	550	780	940	380	360	7/8 -9 UNC	480
M24	310	700	1,000	1,200	480	456	1 -8 UNC	750
M27	450	1,050	1,480	1,775	-	672	1-1/8 -7 UNC	1,050
M30	610	1,400	2,000	2,400	-	912	1-1/4 -7 UNC	1,450
M33	830	1,900	2,700	3,250	-	1,240	1-3/8 -6 UNC	1,900
M36	1,060	2,500	3,450	4,200	-	1,600	1-1/2 -6 UNC	2,500
M39	1,380	3,200	4,500	5,400	-	2,080	1-3/4 -8 UNC	4,600
M42	1,700	4,000	5,600	6,700	-	2,560	2 -8 UNC	8,400
M45	2,120	5,000	7,000	8,400	-	3,200	2-1/4 -8 UNC	9,800
M48	2,570	6,000	8,450	10,150	-	3,840		
M52	3,310	7,750	10,800	13,000	-	4,960		
M56	4,120	9,600	13,500	16,200	-	6,200		
M60	5,130	12,000	16,800	20,200	-	7,680		

Warning!

The utilization of a screw recommended ≥ 8.8 with the max. tightening torque on DIN-flanges could deform the flange face. We advise to use 80% of the max. tightening torque for the bolts.

The max. tightening torques are calculated at 85 % of the apparent yield point with coefficient to friction from $\mu = 0.140$ slightly lubricated.

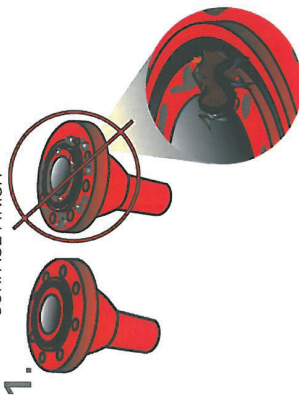
If relatively soft and flexible gaskets are used and tightened in a cold condition, the sealing material may relax when the system is put into operation, and the bolts may turn loose. We therefore recommend to retighten the bolts after the operating temperature has been reached - if possible without the operating pressure and at ambiente temperature. In any case the bolts should be checked and re-tightened, if required, after the initial operation and before bringing the system back from ambiente temperature to the operating temperature.

GPT™ INSTALLATION

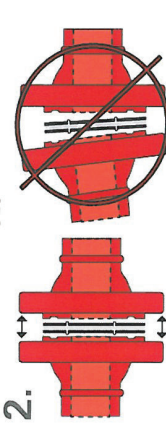
an EnPro Industries company



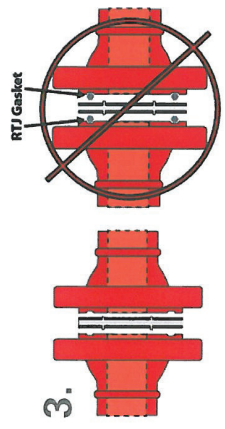
1. SURFACE FINISH



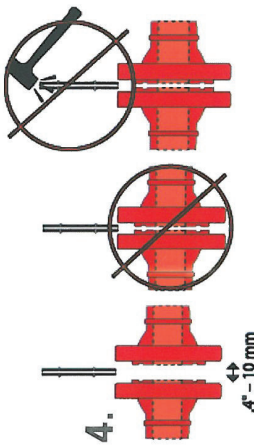
2. PARALLEL FLANGES



3.



MINIMUM GAP - NO HAMMER



4" - 10 mm

.16 friction factor

Steel washer



5.

G10 Washer

Steel Washer

G10 Washer

Sleeve

Steel Washer

G10 Washer

Sleeve

Steel Washer

G10 Washer

Sleeve

Steel Washer

G10 Washer

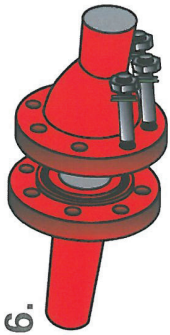
Sleeve

Steel Washer

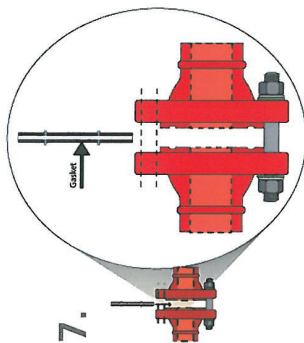
G10 Washer

Sleeve

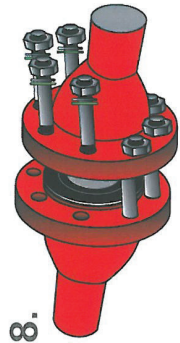
6.



7.

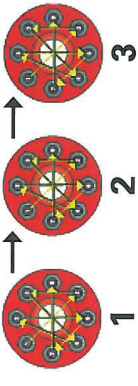
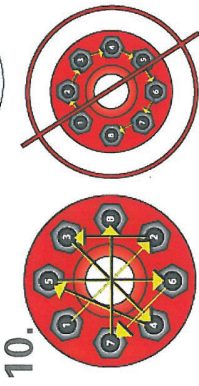
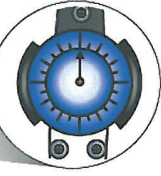
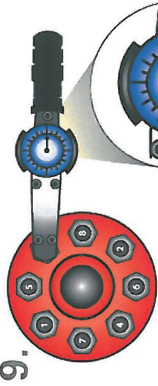


8.



RECOMMENDED BOLT TORQUE VALUES

Torque Table for VCS (use max value), VCSiD, PBE, LineBacker® and GasketSeal®										
NPS	150#			300#			600#			NPS
	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)	
1/2	20	40	60	20	40	60	20	40	60	1/2
3/4	20	40	60	40	75	120	40	75	120	3/4
1	25	40	60	40	75	120	40	75	120	1
1 1/4	25	40	60	45	75	120	45	75	120	1 1/4
1 1/2	30	40	60	80	130	210	80	130	210	1 1/2
2	60	75	120	45	75	120	45	75	120	2
2 1/2	65	75	120	75	130	210	75	130	210	2 1/2
3	75	80	120	85	130	210	85	130	210	3
3 1/2	55	75	120	85	130	210	125	205	340	3 1/2
4	60	75	120	90	130	210	130	205	340	4
5	100	130	210	100	130	210	200	225	505	5
6	110	130	210	90	130	210	185	335	505	6
8	125	130	210	145	205	340	280	445	745	8
10	155	205	340	130	335	595	385	625	1045	10
12	170	205	340	285	445	745	400	625	1045	12
14	215	305	595	270	445	745	550	850	1415	14
16	210	305	505	380	605	1045	735	1120	1885	16
18	305	445	745	405	625	1045	970	1445	2405	18
20	285	445	745	405	625	1045	970	1445	2405	20
22	435	625	1045	705	1120	1885	1280	1825	3040	22
24	455	625	1045	775	1120	1885	1640	2285	3775	24
26	445	625	1045	1030	1735	2885	1520	2285	3775	26
28	430	625	1045	1085	1735	2885	1850	2775	4620	28
30	445	625	1045	1375	2180	3645	1950	2775	4620	30
32	720	1120	1885	1700	2720	4530	2685	4005	6870	32
34	705	1120	1885	1755	2720	4530	2805	4005	6870	34
36	720	1120	1885	2055	3325	5545	3735	5555	9255	36
38	730	1120	1885	1085	1345	2240	3045	4005	6870	38
40	715	1120	1885	1325	1735	2885	3055	4005	6870	40
42	745	1120	1885	1380	1735	2885	4170	5555	9255	42
44	730	1120	1885	1630	2180	3645	4100	5555	9255	44
46	740	1120	1885	2180	2720	4530	4245	5555	9255	46
48	740	1120	1885	2115	2720	4530	5430	7460	12435	48
50	1105	1825	3040	2530	3325	5545	7185	9760	16270	50
52	1115	1825	3040	2810	3325	5545	7030	9760	16270	52
54	1125	1825	3040	3655	4805	8005	7230	9760	16270	54
56	1120	1825	3040	3805	4805	8005	8810	12480	20820	56
58	1130	1825	3040	3705	4805	8005	9145	12480	20820	58
60	1115	1825	3040	3810	4805	8005	11855	15690	26145	60



Equal Torque

Notes:
See notes on next page.

Torque Table for VCS, VCSID, PQE, LineBacker®, and GasketSeal®												
NPS	900#				1500#				2500#			
	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)	Minimum (ft-lb)	Recommended (ft-lb)	Max (ft-lb)
½	60	130	210	60	130	210	65	130	210	130	210	210
¾	85	130	210	65	130	210	70	130	210	130	210	210
1	105	205	340	105	205	340	110	205	340	205	340	340
1¼	115	205	340	115	205	340	175	305	505	305	505	505
1½	170	305	505	170	305	505	250	445	745	445	745	745
2	110	205	340	110	195	325	170	305	505	305	505	505
2½	165	305	505	170	305	505	280	445	745	445	745	745
3	125	205	340	255	445	745	375	625	1045	625	1045	1045
3½	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4	235	445	745	385	625	1045	705	1120	1885	1120	1885	1885
5	365	625	1045	665	1120	1885	1125	1825	3040	1825	3040	3040
6	275	445	745	530	850	1415	1705	2775	4620	2775	4620	4620
8	530	850	1415	935	1445	2405	1775	2775	4620	2775	4620	4620
10	555	850	1415	1525	2265	3775	3500	5555	9255	5555	9255	9255
12	570	850	1415	1810	2775	4820	4895	7460	12435	7460	12435	12435
14	775	1120	1885	2630	4005	6670	N/A	N/A	N/A	N/A	N/A	N/A
16	1025	1445	2405	3885	5555	9255	N/A	N/A	N/A	N/A	N/A	N/A
18	1565	2265	3775	4930	7460	12435	N/A	N/A	N/A	N/A	N/A	N/A
20	1945	2775	4620	6525	9760	16270	N/A	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24	3710	5585	9255	10335	15690	26145	N/A	N/A	N/A	N/A	N/A	N/A
26	4865	7460	12435	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
28	6245	9760	16270	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30	6555	9760	16270	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32	8270	12490	20820	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
34	10255	15690	26145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
36	10635	15690	26145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	11035	15690	26145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
40	10715	15690	26145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42	11085	15690	26145	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
44	13430	19390	32310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
46	16085	23630	39390	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48	16555	23630	39390	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

- The max recommended values is not an absolute max values for the products relevant to this table. The absolute max value for these products could exceed the maximum allowable limits of the other components in bolted flange assemblies therefore GPT has chosen not to display this information. (Please contact the factory for additional information)
- All values have been calculated assuming a 0.16 Coefficient of Friction and new nuts and bolt. If using non-lubricated bolts increase torque by 15%, if using PTFE or Xylan coated studs use Recommended values.
- "M" - Maintenance Factor = 0. "Y" - Minimum Design Seating Stress = 7500psi M&Y values are specific to GPT isolating gasket including: VCS, VCSID, VCSID, PQE, LineBacker, and Gasket Seal
- The above "Max" torque value is based on the use of bolts with a yield strength of 100,000psi.
- The minimum values are based on flange design codes calling for minimum seating stress (value). Sometimes minimum seating stress is inadequate to seat the gasket because the bolting and flange rigidity are insufficient to effect a proper seal. Care should be taken to ensure that flange conditions provide a suitable seating surface.



an EnPro Industries company



Torque Table for VCS, VCFS (use max value), VCSID, PGE, LineBacker®, and GasketSeal®

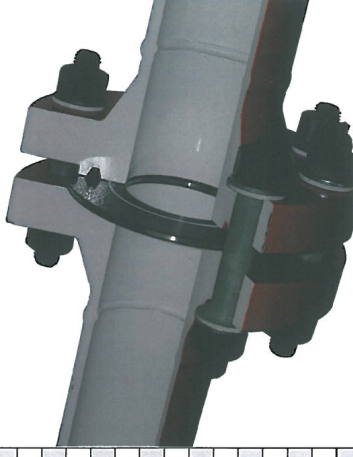
NPS	150#				300#				600#				NPS
	Minimum [N-m]	Recommended [N-m]	Max [N-m]	Minimum [N-m]	Recommended [N-m]	Max [N-m]	Minimum [N-m]	Recommended [N-m]	Max [N-m]	Minimum [N-m]	Recommended [N-m]	Max [N-m]	
½	27	54	81	27	54	81	27	54	81	27	54	81	½
¾	27	54	81	54	102	163	54	102	163	54	102	163	¾
1	34	54	81	54	102	163	54	102	163	61	102	163	1
1¼	34	54	81	61	102	163	61	102	163	61	102	163	1¼
1½	41	54	81	108	176	285	108	176	285	108	176	285	1½
2	81	102	163	102	163	285	102	163	285	102	163	285	2
2½	88	102	163	102	176	285	102	176	285	102	176	285	2½
3	102	108	163	115	176	285	115	176	285	115	176	285	3
3¾	75	102	163	115	176	285	169	169	278	169	278	461	3¾
4	81	102	163	122	176	285	176	278	461	176	278	461	4
5	136	176	285	126	176	285	271	414	685	271	414	685	5
6	169	176	285	122	176	285	251	414	685	251	414	685	6
8	169	176	285	197	278	461	380	803	1010	380	803	1010	8
10	210	278	461	258	414	685	522	847	1417	522	847	1417	10
12	230	278	461	359	540	803	1010	542	847	1010	542	847	12
14	292	414	685	366	603	1010	746	1152	1918	746	1152	1918	14
16	285	414	685	515	847	1417	897	1519	2529	897	1519	2529	16
18	414	603	1010	549	847	1417	1315	1959	3261	1315	1959	3261	18
20	400	603	1010	549	847	1417	1315	1959	3261	1315	1959	3261	20
22	560	847	1417	956	1519	2529	1708	2474	4122	1708	2474	4122	22
24	617	847	1417	1051	1519	2529	2224	3017	5118	2224	3017	5118	24
26	603	847	1417	1437	2352	3912	2081	3017	5118	2081	3017	5118	26
28	563	847	1417	1465	2352	3912	2508	3762	6264	2508	3762	6264	28
30	603	847	1417	1864	2669	4942	2644	3762	6264	2644	3762	6264	30
32	976	1519	2529	2305	3686	6142	3654	5430	9043	3654	5430	9043	32
34	956	1519	2529	2279	3686	6142	3603	5430	9043	3603	5430	9043	34
36	976	1519	2529	2788	4508	7518	5064	7332	12548	5064	7332	12548	36
38	950	1519	2529	1444	1824	3037	4178	5430	9043	4178	5430	9043	38
40	958	1519	2529	1786	2352	3912	4304	5430	9043	4304	5430	9043	40
42	1010	1519	2529	1971	2352	3912	5559	7332	12548	5559	7332	12548	42
44	950	1519	2529	2391	2669	4942	5859	7332	12548	5859	7332	12548	44
46	1003	1519	2529	2629	3686	6142	5795	7332	12548	5795	7332	12548	46
48	1003	1519	2529	2668	3686	6142	7862	10114	16860	7862	10114	16860	48
50	1498	2474	4122	3403	4508	7518	9742	13233	22059	9742	13233	22059	50
52	1512	2474	4122	3536	4508	7518	9531	13233	22059	9531	13233	22059	52
54	1525	2474	4122	5010	6515	10853	9603	13233	22059	9603	13233	22059	54
56	1519	2474	4122	5199	6515	10853	12089	16864	26228	6515	10853	16864	56
58	1532	2474	4122	5023	6515	10853	12634	16864	26228	6515	10853	16864	58
60	1512	2474	4122	5168	6515	10853	15843	21273	35448	6515	10853	21273	60

Notes:

1. The max recommended values is not an absolute max values for the products relevant to this table. The absolute max value for these products could exceed the maximum allowable limits of the other components of the bolted flange assemblies therefore GPT has chosen to display this information. (Please contact the factory for additional information).
2. All values have been calculated assuming a 0.16 Coefficient of Friction and new nuts and bolt. If using pre-lubricated bolts increase torque by 15%. If using PRTE or Aylan coated studs use Recommended values.
3. "M" - Maintenance Factor = 0. "Y" - Minimum Design Seating Stress = 7500(psi). M&Y values are specific to GPT Isolating gasket including: VCS, VCFS, VCSID, PGE, LineBacker, and Gasket Seal.
4. The above "Max" torque value is based on the use of bolts with a yield strength of 100,000(psi).
5. The minimum values are based on flange design codes calling for minimum seating stress(Y value). Sometimes minimum seating stress is inadequate to seat the gasket because the bolting and flange rigidity are insufficient to effect a proper seal. Care should be taken to ensure that flange conditions provide a suitable seating surface.



an EnPro Industries company



Torque Table for VCS, VCSF (use max value), VCSID, PGE, LineBacker®, and GasketSeal®									
NPS	900#				1500#				NPS
	Minimum [N-m]	Recommended [N-m]	Max [N-m]	Minimum [N-m]	Recommended [N-m]	Max [N-m]	Minimum [N-m]	Recommended [N-m]	
1/2	81	176	285	81	176	285	88	176	1/2
3/4	88	178	285	81	176	285	95	176	3/4
1	142	278	461	142	278	461	149	278	1
1 1/4	156	278	461	156	278	461	237	414	1 1/4
1 1/2	230	414	685	230	414	685	339	603	1 1/2
2	149	278	461	149	264	414	230	414	2
2 1/2	224	414	685	230	414	685	353	603	2 1/2
3	169	278	461	346	603	1010	508	847	3
3 1/2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3 1/2
4	346	603	1010	522	847	1417	956	1519	4
5	485	847	1417	902	1519	2529	1525	2474	5
6	373	603	1010	719	1152	1918	2312	3762	6
8	719	1152	1918	1288	1959	3261	2407	3762	8
10	752	1152	1918	2088	3071	5118	4745	7532	10
12	773	1152	1918	2454	3762	6264	6637	10114	12
14	1051	1519	2529	3566	5430	9843	N/A	N/A	14
16	1380	1959	3261	4993	7532	12548	N/A	N/A	16
18	2122	3071	5118	6765	10114	16860	N/A	N/A	18
20	2637	3762	6264	8947	13233	22059	N/A	N/A	20
22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22
24	5030	7532	12548	14284	21273	35448	N/A	N/A	24
26	6596	10114	16860	N/A	N/A	N/A	N/A	N/A	26
28	8467	13233	22059	N/A	N/A	N/A	N/A	N/A	28
30	8887	13233	22059	N/A	N/A	N/A	N/A	N/A	30
32	11213	16934	28228	N/A	N/A	N/A	N/A	N/A	32
34	13804	21273	35448	N/A	N/A	N/A	N/A	N/A	34
36	14419	21273	35448	N/A	N/A	N/A	N/A	N/A	36
38	14881	21273	35448	N/A	N/A	N/A	N/A	N/A	38
40	14528	21273	35448	N/A	N/A	N/A	N/A	N/A	40
42	19329	21273	35448	N/A	N/A	N/A	N/A	N/A	42
44	18209	25289	43806	N/A	N/A	N/A	N/A	N/A	44
46	21808	32038	53392	N/A	N/A	N/A	N/A	N/A	46
48	22459	32038	53392	N/A	N/A	N/A	N/A	N/A	48

4990 Iris St., Wheat Ridge, CO 80033

Tel.: (303) 988-1242 Fax: (303) 988-1922

www.gptindustries.com

6455 Clara Road, Suite 300, Houston, TX 77041

Tel.: (713) 747-6948 Fax: (713) 747-6029

www.gptindustries.com

Unit 3-5, Chester Road, Colnworth Business Park,
Eaton Socon, St. Neots, Cambridgeshire, PE 19 8YT

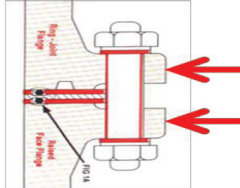
Tel.: +44 (0) 1480 404661 Fax: +44 (0) 1480 404642

www.gptindustries.com

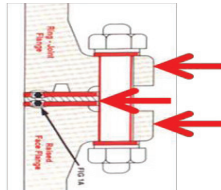
Flange Isolation Testing Procedure

Dry flange connection test – test procedure for flanges not containing media

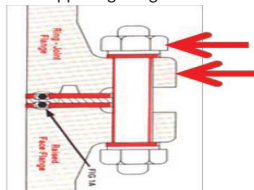
- 1.1 Testing Isolation using a Ohm Meter/Multi Meter with an adjustable voltage setting
- 1.2 Install the Pikotek isolation kit according to the installation instructions provided.
- 1.3 Ensure that the flanges are not shorted by any conductive objects.
- 1.4 Connect leads to Ohm Meter/Multi Meter and adjust to a test voltage between 50 and 500 volts
- 1.5 Test the resistance between the two mating flanges



- 1.6 If gasket being tested has a steel core (e.g. VCS and VCFS) also test the resistance between each flange and the steel core.



- 1.7 Use the Ohm Meter/Multi Meter to test the resistance between each of the bolts and one flange, complete the same testing between the bolts and the opposing flange.



- 1.8 The measured resistance for any of the above tests should be above 20MΩ.

Isolation test using a Radio Frequency Insulator Tester

- 2.1 Install the Pikotek isolation kit according to the installation instructions provided.
- 2.2 Ensure that the flanges are not shorted by any conductive objects.
- 2.3 Use the Radio Frequency Insulator Tester to test the isolation between the two mating flanges.
- 2.4 If the gasket that is being used in the flange connection has a steel core, VCS/LineSeal, also test the isolation between the each flange and the steel core.
- 2.5 Test the isolation between each of the bolts and one of the flanges, and then repeat the same testing procedure between the bolts and the opposing flange.

E X P E R I E N C E C O U N T S



ElectroStop®



Monolithic Isolation Fittings

**The Industry's
"Dual 'O'Ring Seal"**

Standard Tests Include:

- 100% Hydrostatic Pressure & Electrical Tests
- 100% Ultrasonic of Welds
- 100% Magnetic Particle of Welds
- 100% Dye Penetrant of Welds

40 YEARS
OF FIELD PROVEN PERFORMANCE
AND RELIABILITY.

EXCLUSIVE AGENT:



中華五金有限公司
CHUNG WAH METAL CO., LTD.

The ElectroStop® monolithic isolation fittings 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.

Eliminates Short Circuits

Bolts, sleeves and washers - the major source of short circuits in most isolation assemblies - are eliminated with the ElectroStop® isolation fitting.

Eliminates Field Assembly

The ElectroStop® isolation fitting is completely factory assembled and tested. There are no flanges, gaskets, nuts, bolts, sleeves or washers to handle and consequently no fluid leaks due to improper field assembly.

Is Less Expensive

Purchase the ElectroStop® isolation fitting for less than the cost of the component parts of insulated flange assemblies in most pipe sizes. Install the ElectroStop® isolation fitting for less than the labor costs of installing an insulated flange assembly.

Is Coated Both Internally and Externally

A two part epoxy is sprayed to a thickness of .010-.012" (.25 to .30mm) to within 2" (50.8mm) of each weld end.

Is 100% Hydrostatically Tested

All ElectroStop® fittings undergo hydrostatic and cyclic pressure tests at 1.5 times rated operating pressure in accordance with the latest ANSI standards. Testing is conducted between plates or end caps to ensure the most arduous conditions.

Is 100% Electrically Tested

All ElectroStop® fittings undergo a electrical resistance and voltage test prior to shipping.

Is Completely Weld Inspected

All ElectroStop® fittings undergo a weld inspection with combinations of ultrasonic (UT), magnetic particle (MT) and dye penetrant (LT) on all welds. In addition, X-ray tests can be conducted upon request at time of order.

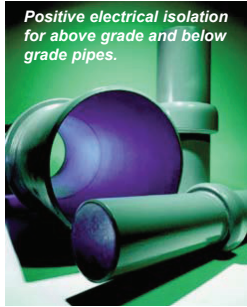
Is Manufactured In Accordance With

ISO 9001:2008 Quality Assurance

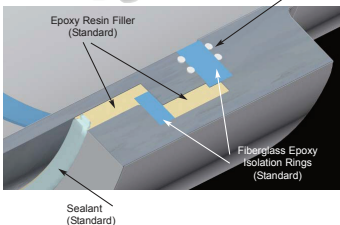
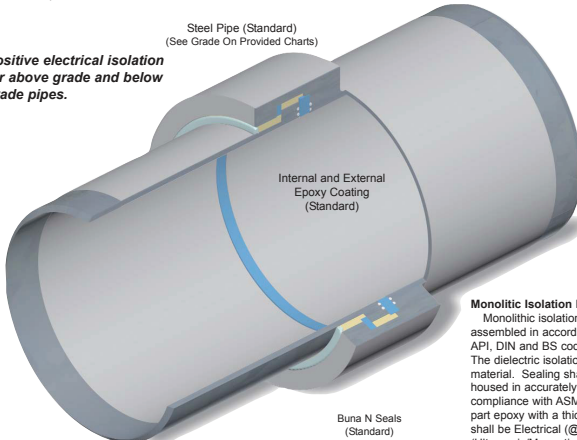
Control over all stages of production is ensured by close adherence to an in-place and on going ISO 9001:2008 quality assurance program which is constantly monitored and subject to periodic audit.

The ElectroStop®

Positive electrical isolation for above grade and below grade pipes.



Positive electrical isolation for above grade and below grade pipes.



The ElectroStop®

Monolithic Isolation Fitting Specification

Monolithic isolation fittings shall be boltless and completely factory assembled in accordance with the appropriate requirements of ASTM, API, DIN and BS codes. All welds shall be butt weld construction. The dielectric isolation material shall be a thermosetting fiberglass epoxy material. Sealing shall be by two (2) static, self energized "O" ring seals housed in accurately machined grooves, fully protected from cavitation in full compliance with ASME design codes. Interior and exterior coating shall be a two part epoxy with a thickness of 12 to 15 mils to within 2" of each end. Testing shall be Electrical (@5kv, 25 Mohm), Hydraulic (@ 1.5 x O.P.) and Weld (Ultrasonic/Magnetic Particle/Dye Penetrant).

The Monolithic Isolation Fitting shall be the ElectroStop™ Isolation Fitting as manufactured by Pipeline Seal & Insulator, Inc., Houston, Texas.

Quality Assurance

Each monolithic isolation fitting shall be manufactured at a facility that has a Registered ISO 9001:2008 Quality Management System. Copy of current ISO 9001:2008 Registration shall be provided with material submittal.

EXCLUSIVE AGENT:

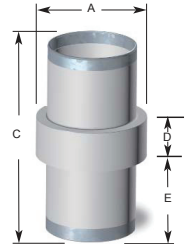


中華五金有限公司
CHUNG WAH METAL CO., LTD.

150# ANSI CLASS (PN or DP 25)

Note: Pipe Grade B stocked. Other 150# Pipe Grade made to order.

NOMINAL DIAMETER Inches (mm)	WALL THICKNESS Inches (mm)	PIPE GRADE	DIMENSIONAL DATA - Inches (mm)				WEIGHT Lbs. (Kg)
			A	C	D	E	
1 (25.4)	0.13 (3.3)	B	2.68 (68.0)	27.50 (698.5)	2.99 (76.0)	11.94 (303.3)	6.6 (3.0)
2 (50.8)	0.15 (3.8)	B	3.86 (98.0)	27.50 (698.5)	3.15 (80.0)	11.66 (296.2)	11.4 (5.2)
3 (76.2)	0.22 (5.6)	B	4.92 (125.0)	27.50 (698.5)	3.62 (92.0)	11.50 (292.1)	24.2 (11.0)
4 (101.6)	0.24 (6.1)	B	6.10 (155.0)	27.50 (698.5)	3.84 (100.0)	11.40 (289.6)	35.9 (16.3)
6 (152.4)	0.28 (7.1)	B	8.50 (216.0)	27.50 (698.5)	5.12 (130.0)	11.10 (282.0)	65.3 (29.7)
8 (203.2)	0.32 (8.1)	B	10.59 (269.0)	27.50 (698.5)	5.75 (146.0)	10.85 (275.6)	101.2 (46.0)
10 (254.0)	0.37 (9.5)	B	12.60 (320.0)	31.50 (800.0)	6.22 (158.0)	12.70 (322.6)	151.8 (69.0)
12 (304.8)	0.41 (10.4)	B	13.54 (344.0)	39.33 (999.0)	6.30 (160.0)	16.52 (419.6)	242.0 (110.0)
14 (355.6)	0.31 (7.9)	B	16.50 (419.0)	23.62 (600.5)	7.48 (190.9)	8.07 (205.0)	220.0 (99.8)
16 (406.4)	0.34 (8.7)	B	18.82 (478.0)	35.43 (900.0)	8.27 (210.0)	13.58 (345.0)	386.9 (176.0)
18 (457.2)	0.31 (7.9)	B	20.83 (529.0)	31.50 (800.0)	8.82 (225.0)	11.34 (288.0)	338.8 (153.7)
20 (508.0)	0.37 (9.5)	B	22.83 (579.9)	39.37 (1000.0)	9.21 (234.0)	15.08 (383.0)	514.5 (233.4)
24 (609.6)	0.37 (9.5)	B	27.36 (695.0)	39.37 (1000.0)	10.79 (274.0)	14.29 (363.6)	704.0 (319.3)
26 (660.4)	0.37 (9.5)	B	28.90 (734.0)	39.37 (1000.0)	11.26 (286.0)	14.05 (356.9)	719.4 (326.3)
28 (711.2)	0.37 (9.5)	B	30.87 (784.0)	39.37 (1000.0)	11.65 (295.0)	13.95 (354.3)	783.2 (355.3)
30 (762.0)	0.37 (9.5)	B	33.07 (840.9)	39.37 (1000.0)	11.97 (304.0)	13.70 (348.8)	860.2 (390.2)
32 (812.8)	0.37 (9.5)	B	35.04 (890.0)	39.37 (1000.0)	12.36 (314.0)	13.50 (343.0)	939.4 (426.1)
36 (914.4)	0.37 (9.5)	B	38.98 (990.0)	47.24 (1199.9)	12.99 (330.0)	17.12 (434.8)	1174.8 (532.9)



150# ANSI CLASS (PN or DP 25)

150# ANSI Pressure Rating = 285 psi

ElectroStop Continuous Operating Pressure = 355 psi

Test Pressure = 540 psi

Working Temperature: Range = 14° F. to 212° F.

(-10° C. to 100° C.)

Electrical Resistance (Dry Air) = 25 Mohms @ 1kv D.C.

Breakdown Voltage (Dry Air) = 5kv @ 50Hz for 1 minute.

All data supplied is for standard fittings. Please contact factory for nominal diameters, pressures (up to 2500 ANSI), temperatures (up to 160° C, 320° F.) and electrical characteristics not shown. The information is subject to change at the manufacturer's discretion.

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.

How To Order

To order ElectroStop® monolithic isolation fittings, please indicate the following:

1. Quantity
2. Nominal Pipe Size
3. ANSI, DIN, API Pressure Class or Actual Working Pressure.
4. Pipe Grade
5. Wall Thickness
6. Temperature Limits
7. Product Conveyed
8. Contact your local distributor or Pipeline Seal and Insulator, Inc.

* Note: 100% X-Ray inspection available upon request at time of order.

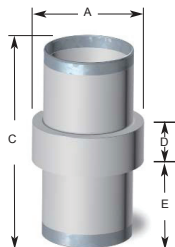
EXCLUSIVE AGENT:



中華五金有限公司
CHUNG WAH METAL CO., LTD.

300-400# ANSI CLASS (PN or DP 64) Note: Pipe Grade B and X52 stocked. Other 300#-400# Pipe Grade made to order.

NOMINAL DIAMETER Inches (mm)	WALL THICKNESS Inches (mm)	PIPE GRADE	DIMENSIONAL DATA - Inches (mm)			E	WEIGHT Lbs. (Kg)
			A	C	D		
1 (25.4)	0.13 (3.3)	B	2.99 (75.9)	27.50 (698.5)	3.62 (92.0)	11.94 (303.3)	9.2 (4.2)
2 (50.8)	0.15 (3.8)	B	3.78 (96.0)	27.50 (698.5)	3.62 (92.0)	11.63 (295.4)	13.2 (6.0)
3 (76.2)	0.22 (5.5)	B	4.89 (127.0)	27.50 (698.5)	3.93 (100.0)	11.50 (292.1)	25.5 (11.6)
4 (101.6)	0.24 (6.1)	B	6.14 (156.0)	27.50 (698.5)	4.41 (112.0)	11.40 (289.6)	37.2 (16.9)
6 (152.4)	0.28 (7.1)	B	8.50 (216.0)	27.50 (698.5)	5.51 (140.0)	11.00 (279.4)	68.2 (31.0)
8 (203.2)	0.32 (8.1)	X52	10.63 (270.0)	27.50 (698.5)	6.30 (160.0)	10.60 (269.2)	127.6 (58.0)
10 (254.0)	0.37 (9.5)	X52	13.86 (352.0)	31.50 (800.0)	7.09 (180.0)	12.20 (309.9)	202.8 (92.0)
12 (304.8)	0.41 (10.4)	X52	15.91 (404.0)	39.33 (999.9)	8.03 (204.0)	15.67 (398.0)	319.0 (145.0)
14 (355.6)	0.37 (9.3)	X52	17.64 (448.0)	31.50 (800.0)	8.43 (214.0)	11.54 (293.0)	338.8 (153.7)
16 (406.4)	0.44 (11.2)	X52	19.49 (495.0)	39.37 (1000.0)	9.21 (234.0)	15.08 (383.0)	524.7 (238.0)
18 (457.2)	0.47 (12.0)	X52	21.50 (546.0)	31.50 (800.0)	10.24 (260.0)	10.63 (270.0)	519.2 (235.5)
20 (508.0)	0.50 (12.7)	X52	23.82 (605.0)	47.24 (1200.0)	10.79 (274.0)	18.22 (463.0)	778.2 (353.0)
24 (609.6)	0.50 (12.7)	X52	27.76 (705.0)	47.24 (1200.0)	12.76 (324.0)	17.24 (438.0)	998.7 (453.0)
26 (660.4)	0.56 (14.2)	X52	29.76 (756.0)	39.37 (1000.0)	13.23 (336.0)	13.07 (332.0)	1062.6 (482.0)
30 (762.0)	0.63 (16.0)	X52	34.61 (879.0)	47.24 (1200.0)	14.80 (376.0)	16.22 (412.0)	1676.4 (760.4)
36 (914.4)	0.75 (19.0)	X52	40.59 (1031.0)	51.18 (1300.0)	17.32 (440.0)	16.92 (429.8)	2481.6 (1125.7)



300-400# ANSI CLASS (PN or DP 64)

300# ANSI Pressure Rating = 740 psi

400# ANSI Pressure Rating = 990 psi

ElectroStop Continuous

Operating Pressure = 990 psi

Test Pressure = 1,500 psi

Working Temperature: Range = 14° F. to 212° F.

(-10° C. to 100° C.)

Electrical Resistance (Dry Air)

= 25 Mohms @ 1kv D.C.

Breakdown Voltage (Dry Air)

= 5kv @ 50Hz for 1 minute.

All data supplied is for standard fittings. Please contact factory for nominal diameters, pressures (up to 2500 ANSI), temperatures (up to 160° C, 320° F.) and electrical characteristics not shown. The information is subject to change at the manufacturer's discretion.

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.

How To Order

To order ElectroStop® monolithic isolation fittings, please indicate the following:

1. Quantity
2. Nominal Pipe Size
3. ANSI, DIN, API Pressure Class or Actual Working Pressure.
4. Pipe Grade
5. Wall Thickness
6. Temperature Limits
7. Product Conveyed
8. Contact your local distributor or Pipeline Seal and Insulator, Inc.

* Note: 100% X-Ray inspection available upon request at time of order.

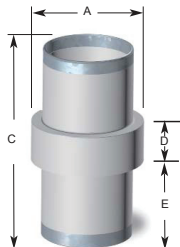
EXCLUSIVE AGENT:



中華五金有限公司
CHUNG WAH METAL CO., LTD.

600# ANSI CLASS (PN or DP 100) Note: Pipe Grade B and X52 stocked. Other 600# Pipe Grade made to order.

NOMINAL DIAMETER Inches (mm)	WALL THICKNESS Inches (mm)	PIPE GRADE	DIMENSIONAL DATA - Inches (mm)				WEIGHT Lbs. (Kg)
			A	C	D	E	
1 (25.4)	0.13 (3.3)	B	2.99 (75.9)	27.50 (698.5)	3.62 (91.9)	11.94 (303.3)	9.2 (4.2)
2 (50.8)	0.15 (3.8)	B	4.33 (110.0)	27.50 (698.5)	4.25 (108.0)	11.63 (295.4)	16.7 (7.6)
3 (76.2)	0.22 (5.6)	B	5.91 (150.0)	27.50 (698.5)	4.57 (116.0)	11.50 (292.1)	33.0 (15.0)
4 (101.6)	0.24 (6.1)	B	6.89 (175.0)	27.50 (698.5)	5.12 (130.0)	11.20 (284.5)	44.0 (20.0)
6 (152.4)	0.28 (7.1)	X52	9.45 (240.0)	27.50 (698.5)	5.91 (150.0)	10.80 (274.3)	81.4 (37.0)
8 (203.2)	0.32 (8.1)	X52	11.57 (294.0)	27.50 (698.5)	7.01 (178.0)	10.25 (260.4)	138.6 (63.0)
10 (254.0)	0.36 (9.1)	X52	13.86 (352.0)	31.50 (800.0)	8.03 (204.0)	11.70 (297.2)	220.5 (100.0)
12 (304.8)	0.41 (10.4)	X52	15.91 (404.0)	39.33 (1000.0)	8.82 (224.0)	15.25 (387.4)	363.0 (165.0)
14 (355.6)	0.37 (9.4)	X52	17.83 (453.0)	31.50 (800.0)	9.84 (250.0)	10.83 (275.0)	389.4 (176.6)
16 (406.4)	0.44 (11.2)	X52	19.76 (502.0)	39.53 (1000.0)	10.79 (274.0)	14.29 (363.0)	568.8 (258.0)
18 (457.2)	0.47 (11.9)	X52	21.73 (552.0)	31.50 (800.0)	11.81 (300.0)	9.84 (250.0)	587.4 (266.4)
20 (508.0)	0.50 (12.7)	X52	23.98 (609.0)	47.24 (1200.0)	12.68 (322.0)	17.28 (438.0)	864.2 (392.0)
24 (609.6)	0.50 (12.7)	X52	29.34 (745.0)	47.24 (1200.0)	14.09 (357.9)	16.58 (421.0)	1289.6 (585.0)
26 (660.4)	0.56 (14.2)	X52	30.83 (783.0)	47.24 (1200.0)	15.20 (386.0)	16.00 (407.0)	1467.4 (665.6)
30 (762.0)	0.63 (16.0)	X52	35.71 (907.0)	51.18 (1300.0)	16.77 (426.0)	17.20 (437.0)	2151.6 (976.0)
36 (914.4)	0.75 (19.0)	X52	42.52 (1072.0)	51.18 (1300.0)	19.37 (492.0)	15.90 (403.9)	3306.6 (1500.0)



600# ANSI CLASS
(PN or DP 100)

600# ANSI Pressure Rating = 1,480 psi

ElectroStop Continuous Operating

Pressure = 1,480 psi

Test Pressure = 2,225 psi

Working Temperature Range

= 14° F. to 212° F.

(-10° C. to 100° C.)

Electrical Resistance (Dry Air)

= 25 Mohms @ 1kv D.C.

Breakdown Voltage (Dry Air)

= 5kv @ 50Hz for 1 minute.

All data supplied is for standard fittings. Please contact factory for nominal diameters, pressures (up to 2500 ANSI), temperatures (up to 160° C, 320° F.) and electrical characteristics not shown. The information is subject to change at the manufacturer's discretion.

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.

How To Order

To order ElectroStop® monolithic isolation fittings, please indicate the following:

1. Quantity
2. Nominal Pipe Size
3. ANSI, DIN, API Pressure Class or Actual Working Pressure.
4. Pipe Grade
5. Wall Thickness
6. Temperature Limits
7. Product Conveyed
8. Contact your local distributor or Pipeline Seal and Insulator, Inc.

* Note: 100% X-Ray inspection available upon request at time of order.

EXCLUSIVE AGENT:



中華五金有限公司
CHUNG WAH METAL CO., LTD.



GPT

4990 Iris St., Wheat Ridge, CO 80033
Tel: (303) 988-1242 Fax: (303) 988-1922

6455 Clara Road, Suite 300, Houston, TX 77041
Tel: (713) 747-6948 Fax: (713) 747-6029

Unit 3-5, Chester Road, Colmworth Business Park
Eaton Socon, St. Neots, Cambridgeshire, PE 19 8YT
Tel: +44 (0) 1480 404661 Fax: +44 (0) 1480 404662
www.gptindustries.com



Certificate No. 10125

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中華五金有限公司
CHUNG WAH METAL CO., LTD.