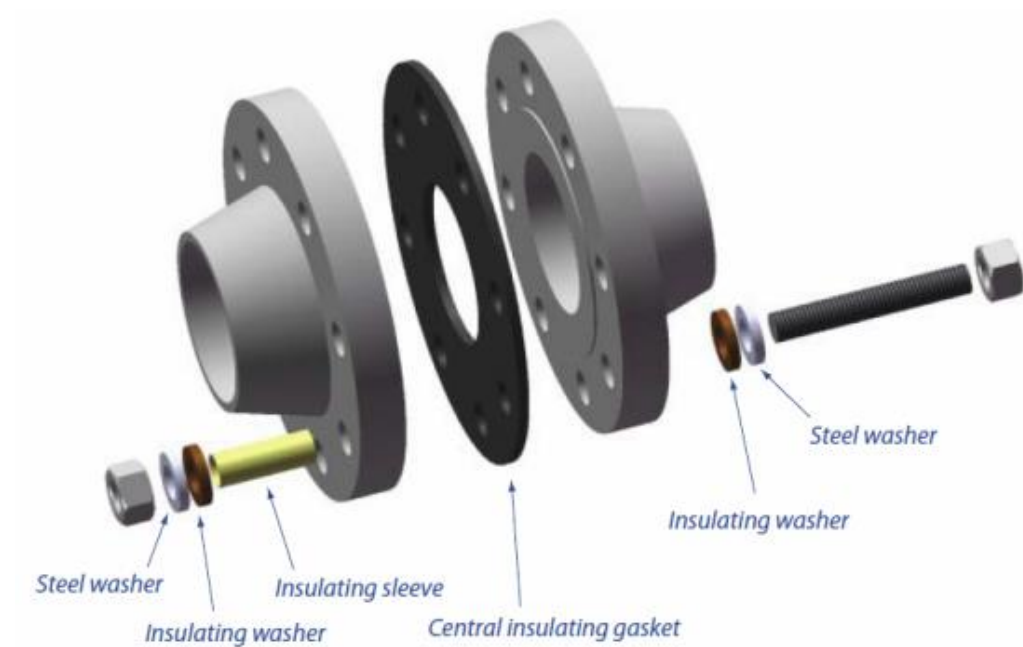


# *Flange Insulation Sets*



# Flange Insulation Sets

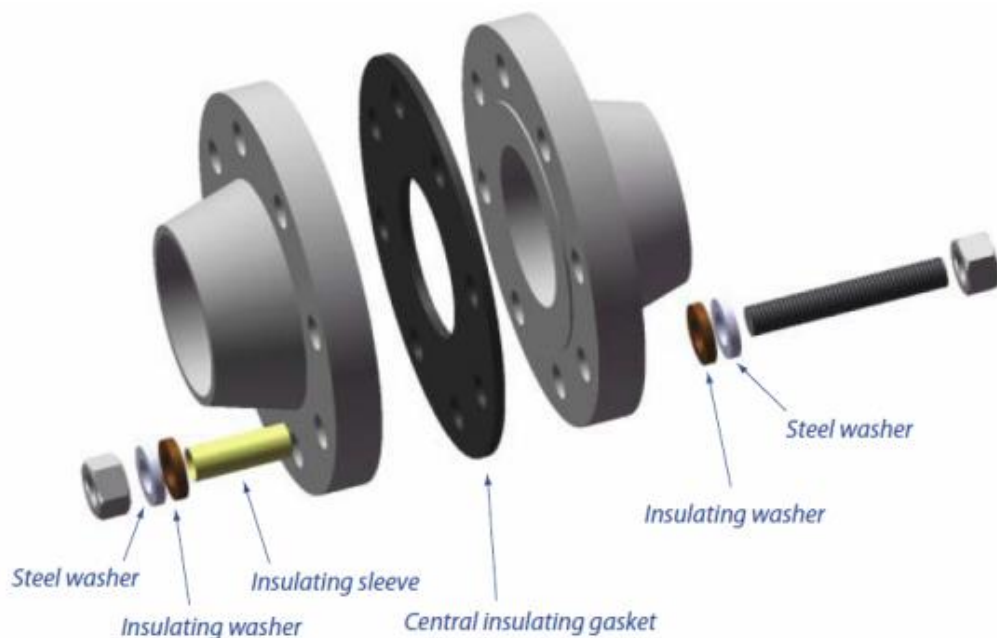
Insulation sets are used to limit corrosion in pipeline systems. Where dissimilar metals are present, the sets remove the possibility of the system acting as a galvanic cell and reduce the risk of galvanic corrosion of the pipe work. Insulation sets are also used to isolate cathodically protected piping systems where they prevent the flow of electro-static charge.

Each flange insulation set comprises one central flat or oval section gasket, one insulation, sleeve, two insulating and two plated steel washers per bolt. The sets are individually packed and clearly labelled with the flange rating, size, type and material combination.

## *Key function of Insulating gaskets:*

- Used to electrically isolate sections of pipe work
- Designed to minimise electro-chemical erosion
- Comprising materials with high dielectric strength
- Manufactured to suit flanged joints to ASME, BS, DIN and customer designs

## *Typical Flange Insulation Set components*



## *Standard Sleeve & Washer Materials in the Set are:*

- Mylar Sleeves
- G10 Insulation Washers
- Stainless Steel Metal Washers
- Others on request

# Flange Insulation Sets

## *Type E – Full Face Gasket*

Suitable for flat and raised face flanges. This style minimises the ingress of conductive foreign matter and reduces the risk of bridging. Typically used on oil and hydrocarbons where flange insulation is a requirement. Manufactured from materials with high dielectric strength to ensure minimum electrical contact between flanges.



## *Type F – Ring Gasket*

Utilises a RF gasket which centrally locates within the bolts. Typically used on oil and hydrocarbons where flange insulation is a requirement. Manufactured from materials with high dielectric strength to ensure minimum electrical contact between flanges



## *Type D – Ring Joint Gasket*

Type D insulation gaskets use the same basic materials as the standard insulation sets but are designed for RTJ flanges. The gasket is manufactured from reinforced phenolic resin. Type D gaskets have an oval cross-section and are suitable for low pressure up to class 600# rating applications. Care must be taken during installation of this gasket so that it is not overstressed during bolt up.



# Flange Insulation Sets

## Service Recommendations

The choice of insulation gasket for a given duty is dependent on the application conditions under which they will be operating. In addition to the temperature limitations, selection of the gasket must take into account the intended flange pressure class. The table below presents Klinger recommendations for safe sealing of ANSI flanges requiring insulating properties. The recommendations are based on both product knowledge and feedback from the field. For applications with specific service conditions ,please refer to Klinger for a recommendation.

## Gasket recommendations for ANSI B16.5 Raised Face Flange Class

✓ -recommended ; ✕ -not recommended

Pressure Class Rating ANSI B16.5 Raised Face

Gasket	150	300	600	900	1500	2500
Neophenolic	✓	✓*	✕	✕	✕	✕
Topchem 2003	✓	✓	✕	✕	✕	✕
C-4430	✓	✓	✓*	✕	✕	✕
Topchem 2000	✓	✓	✓*	✕	✕	✕
Style LPS	✓	✓	✓	✓*	✓*	✕
HPS-High Pressure Spring Energised PTFE	✓	✓	✓	✓	✓	✓

*\*subject to a technical evaluation-please contact Klinger*

The above table is applicable to Raised Face Flanges. For ANSI B16.5 & API 6A Ring Joint Flanges(RTJ) ,insulating oval shape Type D gaskets are available but are not recommended due to their susceptibility to crack under load especially in high pressure applications. Klinger would recommend to use other styles as per above table for high pressure (600# and above) RTJ flanges.

## Low Temperature Duty

Some applications require the use of insulating gaskets at low temperatures. In this case, care must be taken with materials that contain an elastomeric component since elastomers will harden as they pass through the glass transition temperature losing their resilience. The temperature at which this occurs is dependent on the elastomer ,eg. for Neoprene faced Phenolic Gaskets , the transition occurs at around -40 Deg C and should be avoided below this temperature. For low temperature applications, at lower pressures Klinger recommend either Topchem 2003 or Topchem 2000 ,and for higher pressure applications, a HPS -Spring Energised PTFE (Teflon) seal is recommended .

## Assembly of Insulating Gaskets

Assembly of insulating gaskets requires the same good fitting practice used to assemble standard gaskets.

When installing a gasket, the correct installation procedures should be followed ,and the flange surface finish (Ra) should be between 3.2 and 6.3 micro meters.

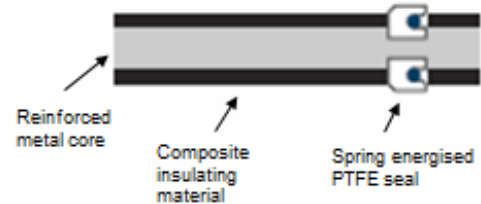
However it is important to note that for Neoprene faced Phenolic (Neophenolic) gaskets the following guidelines apply:

1. The bolt stress must be limited to 30,000 psi
2. Bolts should be tightened with a torque wrench only. Hydraulic tensioning is not recommended for these gaskets.

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# ISOMAX HPS Flange Insulation Set

The HPS is a high strength and high reliability flange gasket designed for electrical insulation and sealing in very critical service applications. The gasket is manufactured using a composite seal retainer material bonded to a high integrity metal core, 316 Stainless Steel is standard. The spring energized PTFE seal offers excellent sealability even at low loads.



- The HPS gasket is a high reliability gasket used for both insulating and general sealing applications
- The HPS is suitable in all services up to and including ANSI 2500# and API 15,000# classes.
- Each HPS insulation set comprises one central insulating gasket, one insulation sleeve per bolt and two insulating and two plated steel washers per bolt.

## Materials

- Metallic Core: 316 Stainless Steel
- (Duplex & Inconel available)
- Gasket Insulating Material: G-10 Glass Reinforced Epoxy (GRE) as standard (G-11 available)
- Seal Material: Spring-energized PTFE as standard
- (Viton available)
- Insulating Sleeve Material: GRE as standard
- (Mylar available)
- Insulating Washers Material GRE (standard)
- Steel Washer Material Zinc Plated Steel as standard (stainless steel available).

## General Characteristics

- Flange insulation as well as cathodic protection
- Reduces galvanic corrosion in dissimilar metal materials used in flange joints
- Allows mismatched ring-joint to raised-face flanges to be effectively sealed. HPS will seal in ring joint, raised-face and flat face/slip-on flange applications.
- Will withstand corrosive environments including high CO<sub>2</sub>, H<sub>2</sub>S and processed water
- The bore construction protects flange faces from media-induced corrosion and flow-induced erosion.
- The pressure energised seal allows for reduced flange assembly stress
- Easy to install and remove
- Reusable seal retainer and seals
- Suitable for all ANSI and API rated flanges
- High strength laminate material reduces failure due to over compression

## HPS Design

The design of the HPS gaskets incorporates a high-strength reinforced epoxy laminate bonded to a 316 stainless steel core as standard (other core materials available). This design results in the gasket having the strength of a traditional metallic gasket while at the same time allowing complete electrical insulation between the flange faces. PTFE Spring-energised seals are installed into machined grooves to provide a pressure-activated sealing system that allows the HPS to be used as a high pressure insulating gasket. (Viton o-rings also available if specified)

## Electrical Insulation

The HPS distinguishes itself by providing electrical flange insulation in a high-strength gasket.

The HPS significantly reduces the potential for electrical conductivity between two flange faces by providing a non-conducting, non-metallic interface.

This eliminates potential corrosion resulting from dissimilar metals making contact or from ground induced current corrosion of metal components in pipeline systems.

The HPS is an effective sealing system used in breaking electrical conductivity in piping systems with cathodic protection.

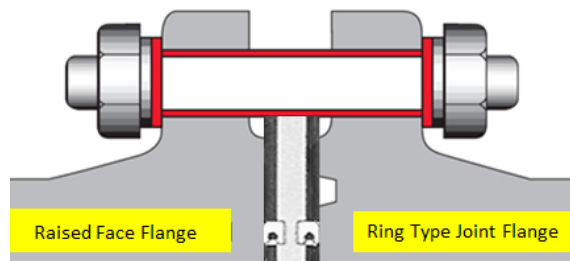
The HPS's steel core and construction enables the gasket to withstand higher system pressure, pressure cycling, over torquing than conventional insulating gaskets.

## Sealing raised face to Ring Joint flanges

The positioning of the sealing elements of the HPS gasket are designed to fit Raised Face, Flat Face and Ring Type Joint flanges.

Because of this design we are able to replace the old design of Phenolic RTJ gaskets commonly designated Type "D-Ring Joint Gasket" which were limited in their ability to take high stresses or excessive bolt loads which often resulted in gasket fracture, damage or failure in service with the ISOMAX HPS.

Because the HPS uses pressure-activated sealing elements which are designed to sit inside the ring groove on RTJ flanges it has the additional advantage of allowing the HPS to seal mismatched RTJ to raised face or flat faced flanges. This can be of great benefit to the customer when replacing flanges or valves using current stock inventory that may have a different flange face than the mating flanges in situ.



## HPS Flange Insulation Kit Components

The gasket set comprises the following as listed below:

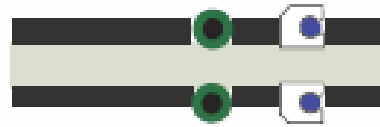
### Insulation Kit Contents:

Insulating facing:	G-10 glass reinforced epoxy resin standard. G11 also available on request.
Seal:	Spring energised PTFE (Viton also available)
Core:	Stainless steel 316
Standard Thickness:	7.0 mm.
Insulating Washers:	G-10 glass reinforced epoxy resin (other materials are available) 3.2mm thickness 2 washers per bolt
Steel Washers:	Zinc-plated steel, 3.2mm thickness (stainless steel washers also available) 2 washers per bolt
Insulating Sleeves:	G-10 glass reinforced epoxy resin. (Mylar and Nomex also available) 1 insulating sleeve per bolt

### Insulation Kit Properties

Material type:	G-10 Glass-reinforced epoxy resin	G-11 High temperature resin
Compressive strength:	50,000psi - minimum	50,000psi - minimum
Dielectric strength:	24.1-31.5 kV/mm	24.0 kV/mm
Maximum temp:	150°C	200°C
Water absorption:	0.1% - maximum	0.1% - maximum
Flexural strength:	65,000psi	57,700psi
Tensile strength:	50,000psi	41,000psi
Temperature range:	- 130°C to 150°C (limited by gasket material)	- 46°C to 200°C (limited by gasket material)
Seal:	Spring-energised PTFE (Viton rubber also available)	

# ISOMAX HPFS (Fire Safe Flange Insulation Set)



Metallic Core – SS316L  
 Insulating Core Material – GRE Nema G-II  
 Primary Sealing Material – Spring Energized PTFE  
 Secondary Seal – Fire Safe Coated Metal O-Ring  
 Insulating Sleeves - GII  
 Insulating Washers – Polymer Coated Steel.

The HPFS insulation gasket is a development of the HPS design to make a fire-safe insulation set. The HPFS includes an additional coated metallic seal to retain the internal pressure along with the spring energised PTFE seal used in the HPS.

HPFS uses coated metallic insulating washers to maintain compressive strength after being exposed to a fire. The development of the high-strength coated steel washers removes the need for the use of an additional insulating washer.

\*HPFS is fire safe tested to API 6FB.



Test Setup Prior to Burn



Test Gasket During Burn

## Applications:

HPFS gaskets are engineered for fire safe and extreme high reliability insulation and critical service applications.

- High Pressure Flanges : 150 – 2500 class
- Critical, Extreme service
- High pH service
- H<sub>2</sub>S , CO<sub>2</sub> service
- Locations where end users prefer an integral seal element and in applications where high volatile fluids are present

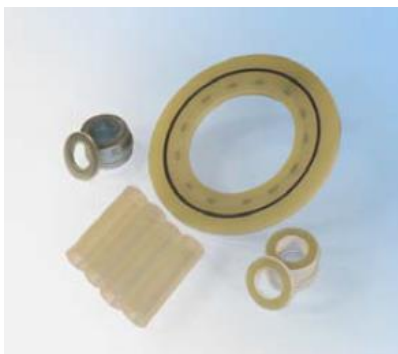
# Flange Insulation Sets

## ISOMAX LPS Flange Insulation Set

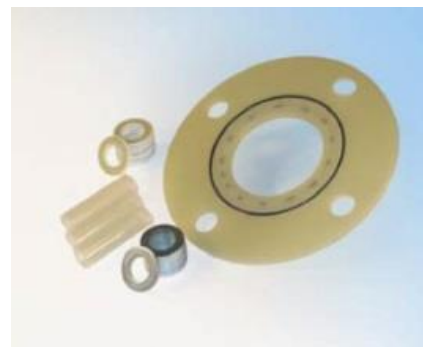
The LPS gasket is an economical seal for electrical flange isolation and general applications requiring higher performance capabilities than those offered by neoprene-faced phenolic gaskets.

The gasket comprises grooves that are machined into high strength G10 laminate and in to which are inserted either spring energized PTFE or Viton o-ring seals which offer excellent sealability at low loads. The LPS gasket is highly suited for use in classes up to and including class 600 lb gasket.

The LPS gasket is available in full face (Type E) and ring style (Type F) configuration.



Ring Face



Full Face

### General Properties

- Gives a high sealing reliability in low pressure system.
- Excellent electrical insulation when used on cathodic protection systems.
- Is suitable for most hydrocarbons services subject to seal ring material selection.
- Reduces galvanic corrosion in dissimilar metal flanges.
- Design eliminates media-induced corrosion and flow-induced erosion from flange faces.
- Design requires reduced flange/bolt assembly stress.
- Easy installation and removal.
- Suitable for all ANSI rated flanges up to class 600 lb.

### Materials

Gasket Insulating Material & Washers: G-10 Glass Reinforced Epoxy (GRE) as standard (G-11 high-temperature grade also available).

Spring energized PTFE or O-Ring pressure activated seal: PTFE (spring energized) as standard (Viton and Nitrile also available).

Insulation sleeves: GRE (standard) or Nomex for high temperature service.



# Flange Insulation Sets

## LPS Flange Gasket Advantages & Benefits

- Low pressure sealing (ANSI class 150, 300 and 600) service.
- Seals are pressure activated.
- High strength laminate material reduces failure due to excess compression.
- Excellent electrical insulation when used on cathodic protection systems
- Design eliminates media-induced corrosion and flow-induced erosion from flange faces
- Reduces galvanic corrosion in dissimilar metal flanges.
- Also available with a variety of elastomeric seals.
- Easy installation, assembly and removal as design requires reduced flange/bolt assembly stress.
- Flanges do not have to be spread as would be the case with RTJ gaskets. The LPS easily slips in place.
- Gasket is self-aligning and centering, quick to install, no special tools are required.
- Maintenance-free, corrosion resistant design.

## Insulation Kit Contents:

Insulating facing:	G-10 glass reinforced epoxy resin
Seal:	Spring energised Viton ( PTFE also available)
Thickness:	3.2mm.
Insulating Washers:	G-10 glass reinforced epoxy resin (other materials are available) 3.2mm thickness 2 washers per bolt
Steel Washers:	Zinc-plated steel, 3.2mm thickness (stainless steel washers also available) 2 washers per bolt
Insulating Sleeves:	G-10 glass reinforced epoxy resin. (Mylar and Nomex also available) 1 insulating sleeve per bolt

## Core Materials:

Material type:	G-10 Glass-reinforced epoxy resin	G-11 High temperature resin
Compressive strength:	50,000psi - minimum	50,000psi - minimum
Dielectric strength:	24.1-31.5 kV/mm	24.0 kV/mm
Maximum Temp:	150°C	200°C
Water absorption:	0.1% - maximum	0.1% - maximum
Flexural strength:	65,000psi	57,700psi
Tensile strength:	50,000psi	41,000psi
Temperature range:	- 130°C to 150°C (limited by gasket material)	- 46°C to 200°C (limited by gasket material)
Seal:	Spring-energised PTFE (Viton or Nitrile rubber also available)	

# Flange Insulation Sets

## Properties:

	Component	Dielectric Strength (Kv/mm)	Water Absorption (%)	Maximum Temperature (°C)
Neoprene faced Phenolic	Gasket	19.8	1.6	107
Klingsil C-4430	Gasket	21.3	10.6	400
Klinger Topchem 2000	Gasket	3.6	0.5	260
Klinger Topchem 2003	Gasket	16.7	0.5	260
G10	Gasket, Sleeve, Washer	24.1-31.5	0.1-max.	150
G11	Gasket, Sleeve, Washer	24.0	0.1 -max.	200
Mylar	Sleeve	157.5	0.8	145
Phenolic	Sleeve	5.5	1.0	107
Reinforced Phenolic	Washer	7.8	1.0	107

Note: The above values are based upon limited test data. Whilst every effort is made to ensure the information in this data sheet is accurate, it must be stressed that it is the users responsibility to ensure suitability for the intended end use. The values quoted above may be subject to modification at a later date.

## Flange Protection

It is recommended that a Klinger Flange Band Protector is also used to cover the outside of the flange to prevent the ingress of conductive matter.

Klinger Limited guarantees the quality, materials and workmanship of all its products either manufactured or distributed, but cannot be held responsible for the manner in which they are used, fitted or stored

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