Hexitallic

FLANGE ISOLATION PRODUCTS

Bringing **innovation** to cathodic protection.





INTRODUCING: ISOFLEX™ & ISOPRO



Comprehensive product range that addresses both industry and customer specific requirements.



From economical options to bestin-class proprietary offerings and everything in between.



A new isolation gasket that will exceed dielectric & sealing capabilities of all current market products.



Addressing age-old methods that focus on "gasket-to-flange" contact surfaces and asking, "Why not in between"?



Boxed kit availability, including: gasket, isolating sleeves & washers, metal backup washers.



World-Class Application Engineering Support Available via: phone, email & live chat.



Professional Grade training, workshops and seminars, which are centered on "Best Practices" approach to installation / bolt-up procedures. Sessions range from 2 - 6 hours, but are completely customomisable to fit your specific needs.

| PRODUCT SELECTOR | ISOFLEX-FS | ISOFLEX-LT | ISOPRO-IP | ISOPRO-LSE | ISOPRO-HSE | I-FLEX-LP |
|-------------------------------|------------|------------|-----------|------------|------------|-----------|
| | Page 4-7 | Page 8-9 | Page 10 | Page 10 | Page 11 | Page 12 |
| Electrical Resistance | ~ | V | V | V | ~ | V |
| Critical Service | V | | | | | |
| General Service | ~ | V | V | V | ~ | V |
| Fire-Safe | ~ | | | | | |
| Galvanic Corrosion Protection | V | ~ | V | ~ | ~ | V |
| High Pressure Service | ~ | | | | ~ | |
| Intermediate Pressure Service | ~ | V | V | V | ~ | |
| Low Pressure Service | ~ | V | V | V | ~ | V |
| Inclined Plane Design | | | V | | | |
| MESC SPE 85/300-2017 | ~ | | | | | |
| Outperforms Spring Energised | ~ | V | | | | |
| Patent Design | V | V | | | | |

ISOFLEXTM

ISOPRO

- Exceeds the current market sealing performance
- Flexitallic's proprietary and patented designs that incorporate proven technology and proprietary materials
- · A product platform consisting of two bestin-class designs and will grow over time.
- Matches capabilities of products that are currently available in the market
- Meets difficult-to-change and longstanding written specifications
- For use in non-critical service and low(er) temperature applications.



ISOFLEX[™]-LT

Superior

ISOPRO-HSE

High pressure

Spring Energised

Gasket

alternative to Inclined Plane and Spring Energised Gaskets

Superior class leading innovative design and performance

ISOFLEX[™]-FS

I-FLEX-LP

Superior replacement for Neoprene, Phenolic

ISOPRO-LSE

ISOPRO-IP

Inclined Plane

Low pressure Spring Energised Gasket

COMMON INDUSTRY PITFALLS

- Sole emphasis on the isolating properties at the expense of overall sealability.
- Emphasis exclusively on dielectric strength rather than resistance under compression representative of bolted connection.
- Several high-end designs rely on narrow line seals which are more vulnerable to flange face imperfections.
- Positioning of the narrow line seal is towards the inner diameter of the flange.

- Consequences of metal protrusion on isolating properties, as seen in spring energised seals.
- Creep relaxation of soft sealing components like elastomers and PTFE.
- Reliance (upon compression) on the non-metallic GRE for mechanical strength is not ideal.
- Drawbacks of glass reinforced epoxy (GRE), such as permeation, chemical attack, strength and creep.
- Sleeve length not specific to washers, flanges and gasket thickness combination.



ISOFLEX[™]-FS **BEST FOR SEALING. BEST FOR ISOLATION.**

THE ISOFLEX™-FS DESIGN IS AIMED AT ELIMINATING THE **CONCERNS AND PITFALLS OF EXISTING MARKET OFFERINGS.**

ISOFLEX[™]-FS is a fire safe isolation gasket that is ideal for high pressure & critical service applications utilizing:

- Two part serrated metallic core (Flexpro[®])
- Faced with Corriculite, a fire safe non-conductive sealing material
- Polyimide isolating film. Dielectric Strength of 3000 V/mil
- Complete with NEMA grade glass reinforced epoxy (GRE) inner and outer rings
- ISOFLEX™-FS is API 6FB Fire Safe. One gasket satisfies both general & fire safe services.

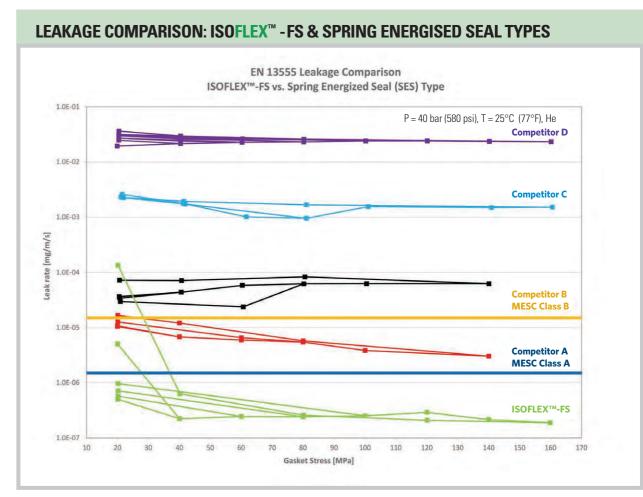


A CLOSER LOOK AT ISOFLEX™-FS CORRICULITE® FACINGS Seal location is engineered to ideally position the sealing area Prevents the onset of galvanic more closely to the fasteners. corrosion and provides gas tight sealing performance with wide range of fluid compatibility. **INNER RING:** API 6FB Fire Safe. **NEMA GRADE GRE** • Inherently non-conductive. GRE components are auxiliary. Sealing is exclusively accomplished by faced serrations **OUTER RING:** & polyimide isolation barrier. **NEMA GRADE GRE** GRE components are auxiliary. **GASKET CORE: POLYIMIDE** Sealing is exclusively **DUAL Flexpro® SEAL DESIGN** accomplished by faced (Kammprofile) **ISOLATION BARRIER** serrations & polvimide 4X Wider Seal with Flexpro[™] than Spring Excellent electrical resistance. Boasts a isolation barrier. Energised Seals. Less susceptible to strong combination of thermal, chemical localized flange damage. and mechanical properties. Compressive load rests on the Flexpro™ Dielectric Strength (ASTM D149): 3000 V/mil. (Kammprofile) to effect excellent tightness. Flexpro™ facings and polymide isolation barrier extend beyond the metallic core.

ISOFLEX[™]-FS **BEST FOR SEALING. BEST FOR ISOLATION.**

POLYIMIDE FILM TYPICAL PROPERTIES

| Properties | Test Standard | Typical Value | Unit |
|---------------------|----------------------|------------------------|--------|
| Dielectric Strength | ASTM D149 | 3000 | V/mil |
| Volume Resistivity | ASTM D257 | 1.0 x 10 ¹⁵ | Ohm cm |
| Tensile Strength | ASTM D882 | 24 | ksi |



Spring Energised Seal (SES) type isolation gaskets are inconsistent in sealing performance.

The results (purple, blue, black, red) are all different manufacturer's spring energised seal gaskets and have varying results (inconsistent sealing performance). Yellow and blue lines are Shell MESC Class A & B ("A" being more stringent). Sealing performance of all competitor's spring energised seal type gaskets were higher than the allowable leakage rate of MESC Class A. Whereas, ISOFLEXTM-FS leakage rate (even at varying gasket stresses) was below the allowable leakage rate.



CORRICULITE® - FACED FLEXPRO™ OUTPERFORMS THE SPRING ENERGISED **SEAL IN IN CYCLIC SERVICE.**

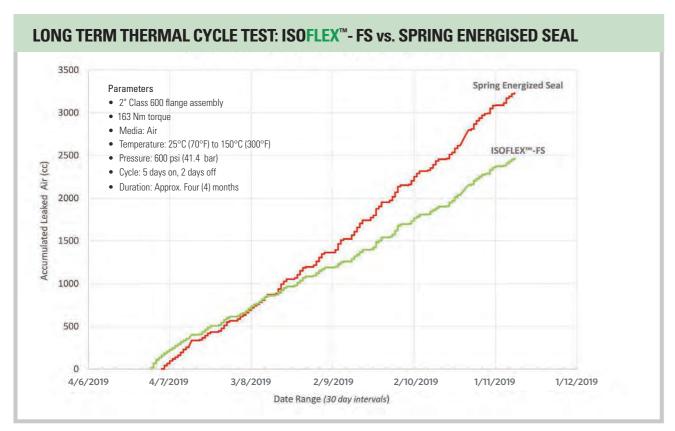


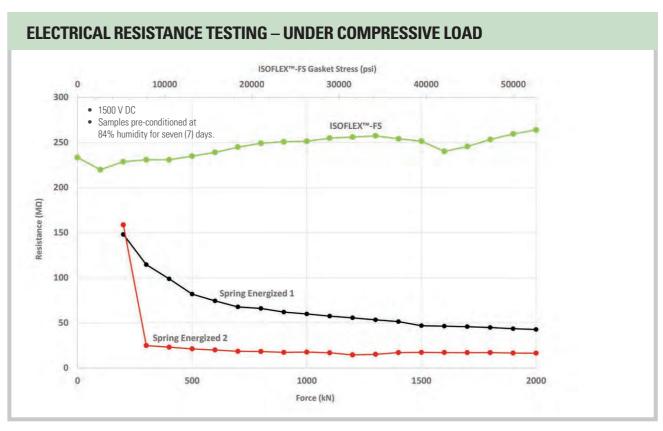
Chart shows leak rate of ISOFLEX™FS vs Spring Energised Seal. The test was conducted as 5 days on, 2 days off, to induce thermal cycling. ISOFLEX™-FS sealed tighter, as shown by lower accumulative leaked gas.



Post Test Observations

- Both load & heat cause the GRE to creep into the flange bore
- ISOFLEXTM-FS has no issues as zero load rests on GRE

ISOFLEX[™]-FS **BEST FOR SEALING. BEST FOR ISOLATION.**



Under compressive load (and elevated humidity level), the shortcomings of the SES type design are apparent as it pertains to diminishing electrical resistance and a rapid drop in resistivity. Achieving a high level of electrical resistance with high humidity is important, due to potentially high humid climate that the isolation gasket may be installed in. Electrical resistance measured under compressive load shows the actual resistance the gasket can offer once installed.



Testing peformed at the elevated humidity level of 84%.



Increased levels of moisture are directly related to humidity intensity. Moisture reduces electrical resistance & isolation properties.



Achieving a high level of electrical resistance with high humidity is a significant result, even more so while under increasing compressive load.

SPRING ENERGISED 1



Diminishing electrical resistance is seen as a result of the spring moving closer towards the flange under compressive load.

SPRING ENERGISED 2



A rapid drop in resistivity is experienced as a result of the spring cutting through the PTFE.

ISOFLEX[™]-FS



Electrical resistance of the ISOFLEXTM-FS remains constant at the extreme gasket stress of 363 MPa.



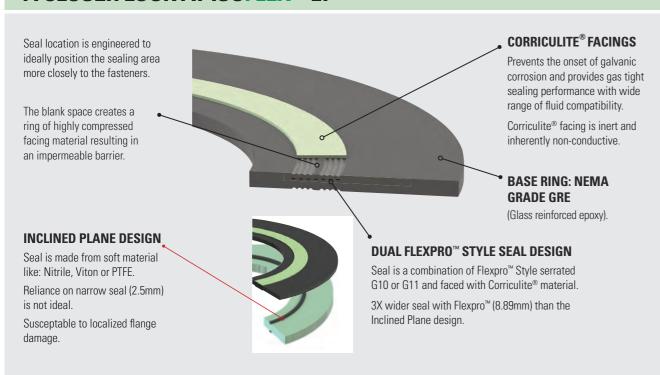
ISOFLEX[™]-LT

THE ISOFLEX™-LT DESIGN IS LESS SUSCEPTABLE TO **LOCALIZED FLANGE DAMAGE.**

- Base ring is made with NEMA Grade glass reinforced epoxy (GRE).
- Seal design based on trusted Flexpro[®] (Kammprofile) style serrations in the GRE base ring.
- Faced with Corriculite[®], to provide a
- The combination of the seal design and Corriculite® creates a ring of highly compressed facing material resulting in an impermeable barrier.

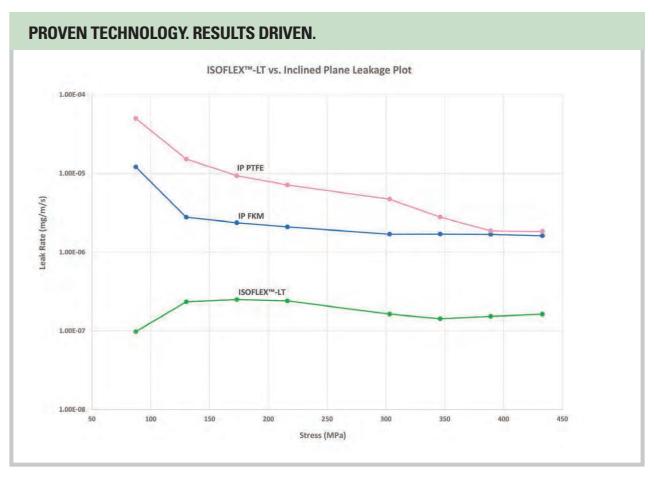


A CLOSER LOOK AT ISOFLEX™-LT



ISOFLEX[™]-LT

ISOFLEX™-LT SEALS BETTER THAN THE INCLINED PLANE STYLE GASKETS **OFFERED BY COMPETITORS.**



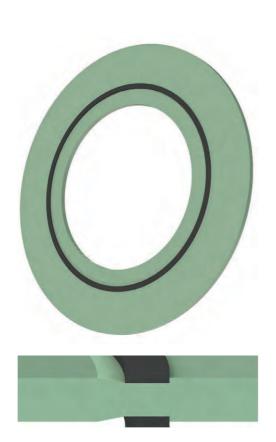
Above test results show that ISOFLEX™-LT seals better than the inclined plane style gaskets offered by competitors.



ISOPRO-IP

ISOPRO-IP IS A FLANGE ISOLATION GASKET **UTILIZING NEMA GRADE GLASS REINFORCED EPOXY (GRE) THAT IS PRECISION MACHINED** TO FORM GROOVES WITH INCLINED PLANE GEOMETRY IN WHICH A SOFT **SEALING MATERIAL IS LOCATED.**

- A better alternative to neoprene or nitrile faced phenolic. Available in G10 or G11.
- The engineered groove geometry enables the internal pressure to energize the sealing element.
- Ideal for low to medium pressure classes and general service use.
- Sealing element is made of Nitrile, Viton, or PTFE.



ISOPRO-LSE

ISOPRO-LSE IS A FLANGE ISOLATION **GASKET COMPRISING OF TWO SPRING ENERGISED PTFE SEALS LOCATED** IN PRECISION MACHINED OFFSET **GROOVES IN A GLASS REINFORCED EPOXY (GRE) CARRIER.**

- Designed to effect a high integrity seal while proving effective electrical isolation across bolted flange connections.
- The epoxy outer provides electrical isolation, the PTFE spring energised seal forms an impermeable, gas tight
- Gaskets can be sized to the bore of the pipe or vessel mitigating turbulent flow, fluid dead spots and erosion.
- Suitable in applications requiring basic dissimilar metal to metal isolation or as part of a more complex passive and/or active isolation system.
- A high integrity seal over a wide range of applied stress and suitable for use across all flange pressure classes.



- The relatively narrow width of the spring energised seal ensures a tight seal even at very low applied loads. Unique seal geometry provides additional seal energisation when the system is pressurised.
- Compatible with all commonly encountered up and down steam hydrocarbon media, from sweet and sour crude to refined product.
- Insulating washers and sleeves are fabricated from high performance glass epoxy laminate (typically G10 or G11) offering both high compressive strength and pinch resistance. Backing washers are zinc plated carbon steel. Other materials for sleeves, insulating and backing washers are available on request.

ISOPRO-HSE

ISOPRO-HSE IS A FLANGE ISOLATION GASKET COMPRISING OF TWO SPRING ENERGISED PTFE SEALS. LOCATED IN PRECISION MACHINED **GROOVES IN A RIGID 3 PLY** LAMINATE; A CENTRAL METALLIC **CORE FACED WITH G10 GLASS/ EPOXY COMPOSITE.**



- Designed to effect a high integrity seal while proving effective electrical isolation across bolted flange connections.
- Suitable in applications requiring basic dissimilar metal to metal isolation or as part of a more complex passive and/or active isolation system.
- The epoxy composite outer layers provide electrical isolation while the metallic core affords high structural integrity that in conjunction with the PTFE spring energised seal forms an impermeable, gas tight barrier.
- Unique manufacturing process results in a high strength mechanical bond between the individual lamina.
- Gaskets can be sized to the bore of the pipe or vessel mitigating turbulent flow, fluid dead spots and erosion.

- Capable of effecting a high integrity seal over a wide range of applied stress and is suitable for use across all flange pressure classes.
- The relatively narrow width of the spring energised seal ensures a tight seal even at very low applied loads. Unique seal geometry provides additional seal energization when the system is pressurized.
- Compatible with all commonly encountered up and down stream hydrocarbon media, from sweet and sour crude to refined product.
- NACE compliance certification for the laminate core is available on request.
- Insulating washers and sleeves are fabricated from high performance glass epoxy laminate (typically G10 or G11) offering both high compressive strength and pinch resistance. Backing washers are zinc plated carbon steel. Other materials for sleeves, insulating and backing washers are available on request.

I-FLEX-LP

THE FLEXITALLIC I-FLEX LP IS A FLANGE ISOLATION GASKET FABRICATED FROM A HIGH PERFORMANCE, COMPRESSION **ENHANCED, CREEP RESISTANT PTFE BASED SEALING MATERIAL.**

- The I-Flex-LP gasket is capable of effecting a seal over a wide range of applied stress making the product suitable for use in an extensive range of standard and non-standard bolted connections.
- Soft compressive materials and a relatively wide sealing face make the product more robust with regard to use on a wide range of flange sealing face conditions when compared with 'O' Ring and/or spring energised based gasket insulation technology.
- This special design exceeds the requirements of 'Saudi Aramco Std. 02-SAMSS-010'.



KIT COMPONENTS



ISOLATING SLEEVES AND WASHERS

| Isolating Sleeves - Typical Temperature Limits | | | | | | |
|--|-----------|-----------|-----------|-------------|-------------|------------|
| | Mylar | Nylon | Phenolic | PTFE | G10 | G11 |
| Max Temp °C (°F) | 150 (302) | 65 (150) | 121 (250) | 260 (500) | 150 (302) | 200 (392) |
| Min Temp °C (°F) | -70 (-94) | -29 (-20) | -54 (-65) | -240 (-400) | -129 (-200) | -129 (-200 |

Note: Sleeves are cut to length accounting for double washer (DW) or single washer (SW) use, flange thickness including raised face height, and gasket thickness.

| | Phenolic | G10 | G11 | Mica Faced Flexpro®** |
|------------------|-----------|-------------|-------------|-----------------------|
| Max Temp °C (°F) | 121 (250) | 150 (302) | 200 (392) | 538 (1000) |
| Min Temp °C (°F) | -54 (-65) | -129 (-200) | -129 (-200) | -50 (-58) |

Note: Standard metallic washer offering is Zinc Plated Carbon Steel. Stainless Steel available upon request. ** Provided when Fire Safety is required.



WHAT IS CORRICULITE®?

THE NEW STANDARD FOR SEALING SOLUTIONS IN CORROSIVE ENVIRONMENTS



| IFFITE AF | JLITE® ARI | F OI F A D |
|-----------|------------|------------|
| | IIIIF AR | |
| | | LUELAII |

FIRE SAFE - PASSES API 6FB FIRE TEST PROVIDES GAS TIGHT SEALING PERFORMANCE WIDE RANGE
OF CHEMICAL
COMPATIBILITY

MATERIAL IS INERT AND INHERENTLY NON CONDUCTIVE

PREVENTS THE ONSET OF GALVANIC CORROSION

NOT SUSCEPTIBLE TO COLD FLOW LIKE PTFE OR ELASTOMERS

TEMPERATURE RANGE -45°C (-49°F) TO 225°C (+440°F)

SEALS TIGHTER
THAN GRAPHITE

COST EFFECTIVE, FLANGE CORROSION PROTECTION

Responding to customer demands for an improved material with strong anti-corrosion characteristics.

Flexitallic created Corriculite® - a filler material for spiral wounds and facing for Isolation gaskets.

Corriculite® was specifically designed for use in corrosion-sensitive environments, such as seawater and hydrocarbon services.

Our proprietary material is widely utilized across a number of industries, including oil and gas, power and marine. A WINNING COMBINATION OF OPTIMUM SEALING AND ANTI-CORROSION PROPERTIES.

A PROVEN SOLUTION

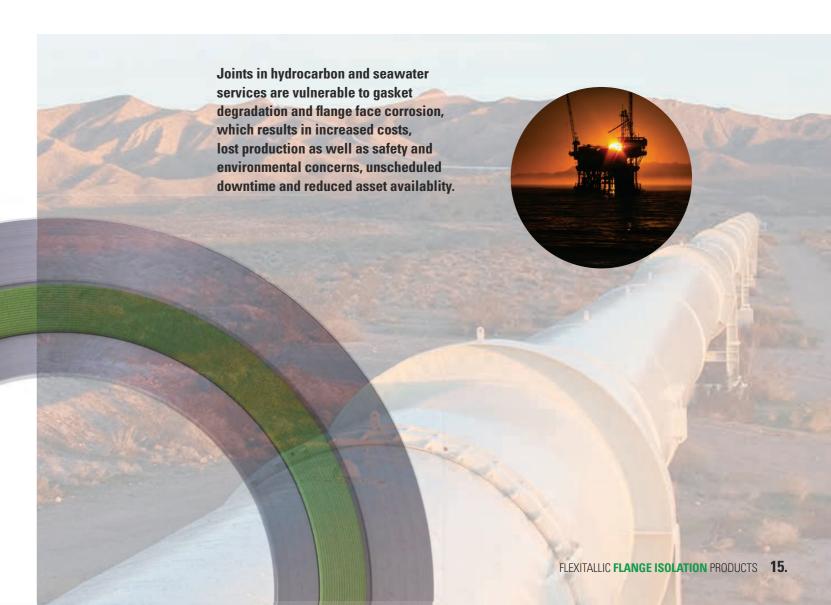
A number of benchmark tests have been carried out to validate the performance of Corriculite® as sealing material in corrosion sensitive conditions.

For more information visit: Corriculite.com



An example of corrosion caused by use of conventional graphite gaskets.







ISOLATION PRODUCT OVERVIEW













| | I-FLEX-LP | ISOPRO-IP | | |
|----------------------------|--|--|--|--|
| GASKET OVERVIEW | Sigma® 500 soft cut gasket | "Inclined Plane" type - Glass Reinforced Epoxy (GRE) with machined recess & soft sealing element | | |
| PRIMARY ISOLATION | Sigma® 500 gasket | NEMA Grade GRE (glass-reinforced epoxy) G10 or G11 | | |
| PRIMARY SEALING | PTFE | Nitrile, Viton, PTFE | | |
| FACING MATERIAL(S) | No additional facing | No additonal facing | | |
| THICKNESS (mm) | 3.2mm (1/8") | 3.2mm (1/8") | | |
| TEMPERATURE RANGE | Refer to datasheet | Refer to datasheet | | |
| PRESSURE RANGE | ASME B16.5 CLASS 150-300. EN1092-1 PN10-40 | ASME B16.5 CLASS 150-900. EN1092-1 PN10-100 | | |
| COLOUR | Blue | Green | | |
| CERTIFICATIONS & APPROVALS | Sigma® 500 gasket material: WRAS certification, TA-Luft, DIN 3535-6 tested, USP Plastic Class VI approved, tested in accordance to EC Regulation No. 10/2011.G10*. NEMA - available on request | NEMA - available on request | | |
| | KIT OVERVIEW | | | |
| ISOLATION SLEEVE MATERIALS | G10* | G10* | | |
| ISOLATION WASHER MATERIALS | G10* | G10* | | |
| METALLIC WASHER MATERIAL | Stainless Steel 316* | Zinc Plated Carbon Steel* | | |
| | REQUIRED FOR ORDERING | | | |
| STYLE TYPE | Style "F" (Ring). FF available on request | Style "F" (Ring) or Style "E" (Full Face) | | |
| SIZE / PRESSURE | Flange standard size and pressure rating | | | |
| WASHER CONFIGURATION | Double Washer (DW) or Single Washer (SW) | | | |
| FLANGE FACE TYPE | Raised Face (RF), Flat Face (FF), Ring Type Joints (RTJ) | | | |
| | | | | |

| ISOPRO-LSE | ISOPRO-HSE | ISOFLEX™-LT | ISOFLEX™-FS |
|---|---|--|--|
| Glass Reinforced Epoxy (GRE) with Spring Energised PTFE seal | Glass Reinforced Epoxy (GRE) with Metal Core and Spring Energised PTFE seal | Glass Reinforced Epoxy (GRE) with Flexpro™(kammprofile) serrations and Corriculite® facing | Dual Flexpro™ with Corriculite® facing separated by polyimide film. GRE inner and outer rings. Fire Safe design. |
| Glass Reinforced Epoxy (GRE) and Spring Energised PTFE seal | Glass Reinforced Epoxy (GRE) and Spring Energised PTFE seal | NEMA Grade GRE (glass-reinforced epoxy) G10 or G11 | Polyimide film |
| Spring Energised PTFE seal | Spring Energised PTFE seal | Corriculite® faced serrations precision- machined for concentrated load | Dual Flexpro™ with Corriculite® facing |
| No additional facing | No additional facing | Corriculite® | Corriculite® |
| 3.2mm (1/8") | 6.6mm | 3.2mm (1/8") | 6.35mm (1/4") |
| Refer to datasheet | Refer to datasheet | Refer to datasheet | Refer to datasheet |
| ASME CLASS 150-600 EN1092-1 PN10-100 | ASME CLASS 150-2,500. EN1092-1 PN10-400. API 6A CLASS 3,000-10,000 | ASME B16.5 CLASS 150-900. EN1092/1 PN10-100 | ASME CLASS 150-2,500. EN1092-1 PN10-400. API 6A CLASS 3,000 and 5,000 |
| Light Green | Black | Black & Green | Black & Green |
| NEMA - available on request | NEMA/NACE - available on request | NEMA - available on request | Fire Safety API 6FB • Exceeds MESC SPE 85/300-2017 Fugitive Emissions Class A Requirements. NEMA/NACE - available on request |
| | KIT OVERV | /IEW | |
| G10* | G10* | G10* | G10* |
| G10* | G10* | G10* | Mica faced Flexpro™*** |
| Zinc Plated Carbon Steel* | Zinc Plated Carbon Steel* | Zinc Plated Carbon Steel* | Zinc Plated Carbon Steel* |
| | REQUIRED FOR (| ORDERING | |
| Style "F" (Ring) or Style "E" (Full Face) | Style "F" (Ring) or Style "E" (Full Face) | Style "F" (Ring) or Style "E" (Full Face) | |
| Flange standard size & pressure rating | Flange standard size & pressure rating | Flange standard size and pressure rating | |
| Double Washer (DW) or Single Washer (SW) | Double Washer (DW) or Single Washer (SW) | Double Washer (DW) or Single Washer (| SW) |
| Raised Face (RF), Flat Face (FF) Ring Type Joints (RTJ) | Raised Face (RF), Flat Face (FF), Ring Type Joints (RTJ) | Raised Face (RF), Flat Face (FF), Ring Type Joints (RTJ) | Raised Face (RF), Flat Face (FF), Ring Type Joints (RTJ)** |

^{*}Other materials available on request. **Flanges below 2" may need modifications for smaller bores.

^{*}Other materials available on request. **Flanges below 2" may need modifications for smaller bores. ***Alternative materials available for non fire safe applications.



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About The Flexitallic Group

The Flexitallic Group is a global leader in specialised sealing solutions and products serving the oil and gas, power generation, chemical and petrochemical industries in emerging and developed markets. Focused on the upstream, downstream and power generation sectors, it has operations in France, the United States, Canada, Mexico, the United Kingdom, Germany, Italy, Belgium, the United Arab Emirates, Thailand and China plus a network of worldwide licensing partners and distributors.

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