



PRODUCT CATALOGUE

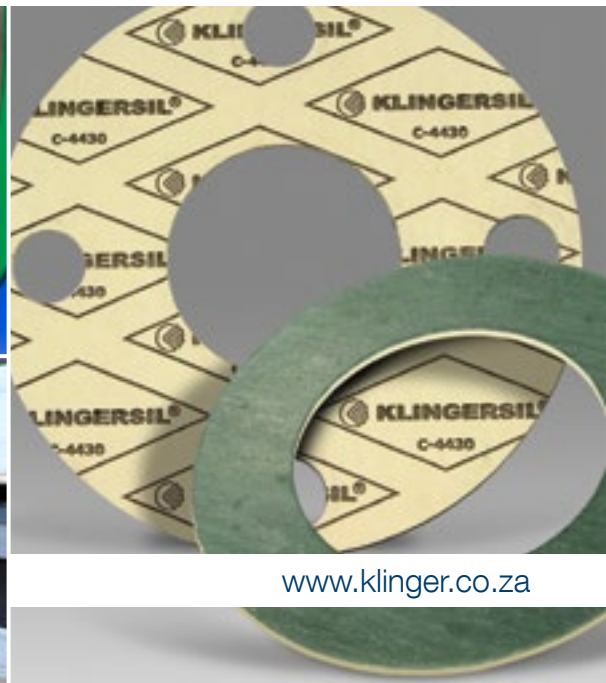


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OUR COMPANY



HISTORY

The group of Independent Klinger Companies has its origins in 1886, founded by Austrian engineer Richard Klinger who pioneered compressed asbestos gasket materials.

Product innovation and a problem solving philosophy have been the cornerstones of Klinger operating policy since its inception. The constant development of new products and technical services to meet the demand of the Fluid Sealing and Fluid Control industries has resulted in Klinger becoming a global player and market leader in almost every industry sector, with Group sales exceeding €400 million. Today Klinger has production plants and service organisations in almost every industrialized country in the world with extensive research and development facilities in Switzerland and Austria.

The Richard Klinger SA (Pty) Limited operation was commissioned in May 1968 to produce sheet jointing for the fast-developing Southern African industrial and mining markets. From humble beginnings, and with National Trading Company (Pty) Limited as their partners, Klinger products soon became synonymous with quality and innovation in the petrochemical, mining, pulp and paper, pharmaceutical, and metal melting industries in the Southern African region.

With South Africa becoming part of the global economy after the first democratic elections in 1994, the Directors of both companies saw a need to further develop the product range and capacity of Klinger and so established a joint venture aptly named Klinger NTC (Pty) Limited. At the same time, Klinger's largest competitor, T & N Industrial Products, was acquired and the entire operation relocated to the 14000m² premises currently occupied in Wadeville, Gauteng.

In January 1999, Klinger exercised its options to repurchase the 50% share owned by National Trading Company in Klinger NTC, thus resulting in Klinger (Pty) Limited becoming a wholly owned subsidiary of the Group of Independent Klinger Companies. This development held a number of lucrative opportunities for the South African subsidiary, not least of which was the opportunity to supply large format sheet jointing to Group companies on a global basis.

In support of Government's empowerment drive, Klinger Mzansi was formed in 2003, and is now a fully BBBEE accredited company.

A further development resulted from a need to differentiate Klinger and Klinger Mzansi from their opposition and to add value to the sales and marketing of their range of products. Customers were demanding a service which inevitably led to the training of end-user staff on gasket installation, best practices and eventually to the supervised fitment of gaskets within bolted connections.

QUALITY

Klinger Mzansi has implemented a documented Quality Management System throughout all of its operations that complies with the requirements of ISO 9001 : 2015. Accreditation of the Quality Management System is provided by Lloyds Register and is subjected to audits on a regular basis.

The independent Quality Department within Klinger Mzansi ensures that documented procedures are followed, and that the required quality control checks are performed on all products, against all applicable manufacturing specifications or customer requirements.

Regular audits are conducted on our suppliers to ensure that raw materials or products used during manufacture comply with all the group specification requirements.

HEALTH AND SAFETY

Written policies and procedures are followed to ensure the continued wellbeing of all of our personnel. As a minimum, the standards required by the Occupational Health and Safety Act and associated Regulations are complied with in our manufacturing facilities and office environments. A formal Health and Safety Committee, comprising representatives from all our divisions, facilities and branches, meets on a regular basis to assess the effectiveness of the management systems that are utilised.

APPLICATIONS AND INDUSTRIES

With a head office situated in Wadeville, Gauteng and branch operations in Durban, Secunda, Sasolburg and Port Elizabeth, Klinger Mzansi is well positioned to supply sealing products and services to customers in South Africa and other African countries.

Klinger Mzansi supplies products and services from the following product divisions:

- » **Sheet jointing** - A comprehensive range of locally manufactured non-asbestos calendered sheet materials, as well as modified PTFE and reinforced graphite sheeting.
- » **Pump & valve gland packing** - An extensive range of Klinger braided packing is manufactured locally. The Seal Ryt brand of gland packing is also available through Klinger Mzansi.
- » **Gaskets** - The largest manufacturing facility in Africa can produce a full range of soft cut, spiral wound and metal reinforced gaskets to any specification or customer requirement.
- » **Joint integrity management** - On-site technical support, training and gasket fitment using a range of manual and hydraulic bolt torque and tensioning equipment.

Klinger Mzansi's product offerings are used in a wide range of industrial applications within the following sectors:

- | | |
|------------------|--------------------|
| » Petrochemical | » Power generation |
| » Sugar | » Shipping |
| » Refining | » Chemical |
| » Metal melting | » Food & beverage |
| » Mining | » Pulp and paper |
| » Transportation | |

Some of the major companies that currently make use of Klinger Mzansi's products and services are:

- | | |
|-------------------|------------------|
| » Alusaf | » Columbus |
| » Impala Platinum | » SAB Miller |
| » Anglo Gold | » Engen |
| » Mittal | » Sappi |
| » Anglo Platinum | » Eskom |
| » Mondi | » Sasol |
| » BHP Billiton | » Goldfields |
| » Natref | » Tongaat Hulett |
| » Chevron | » Illovo |
| » PetroSA | » Xstrata |



GASKET SELECTION CRITERIA

THE MANY, VARIED DEMANDS PLACED ON GASKETS



A common perception is that the suitability of a gasket for any given application depends upon the maximum temperature and pressure conditions. This is not the case.

Maximum temperature and pressure values alone can not define a material's suitability for an application. These limits are dependent upon a multiplicity of factors as shown in the diagram opposite. It is always advisable to consider these factors when selecting a material for a given application.

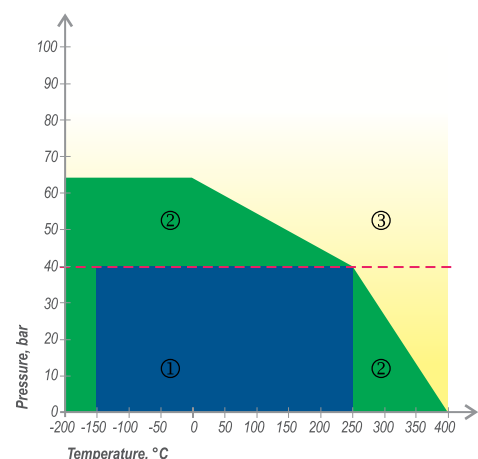
SELECTING GASKETS WITH pT DIAGRAMS

The Klinger pT diagram provides guidelines for determining the suitability of a particular gasket material for a specific application based on the operating temperature and pressure only.

Additional stresses such as fluctuating load may significantly affect the suitability of a gasket in the application and must be considered separately. Always refer to the chemical resistance of the gasket to the fluid.

Areas of Application

- ① In area one, the gasket material is normally suitable subject to chemical compatibility.
- ② In area two, the gasket materials may be suitable but a technical evaluation is recommended.
- ③ In area three, do not install the gasket without a technical evaluation.



SEMI-METALLIC GASKETS

SPIRAL WOUND

KLINGER MAXIFLEX

Spiral wound gaskets have the ability to recover under the action of fluctuating loads caused by process fluid pressure and temperature changes, flange face temperature variations, flange rotation, bolt stress relaxation and creep.

The gasket-sealing element consists of a pre-formed metallic winding strip with layers of a softer, more compressible sealing material which, during compression, is densified and flows to fill imperfections in the flange surfaces when the gasket is seated. The metal strip holds the filler giving the gasket mechanical resistance and resilience.

Maxiflex Spiral Wound Gaskets can be manufactured to international specifications such as ASME B16.20 or EN 1514, using a range of materials according to different service conditions.

- » Outer guide rings are fitted to centralise the gasket between the bolts and to act as a compression limiter.
- » Inner rings are fitted to reduce the gap between the inside diameter of the gasket and the bore of the flange. This reduces turbulence, erosion damage and protects the gasket sealing element from the contained media.
- » Inner and outer rings are manufactured from a variety of metals to suit particular applications.

Below are the most common gasket configurations.



Maxiflex Style R

- » Maxiflex spiral wound sealing element
- » Wide choice of materials for filler and metal strip
- » Suitable for high pressure and temperature applications
- » Recommended flanges - tongue and groove, male to female and flat face to recess
- » General and critical duties



Maxiflex Style R (Graphite faced)

- » Maxiflex spiral wound sealing element
- » Covered with 0.5mm flexible graphite
- » Used on manhole covers
- » Low bolt load applications
- » Uneven sealing faces



Maxiflex Style CR

- » Maxiflex spiral wound sealing element
- » Solid metal outer ring used as a centring device and compression stop
- » Used mainly on raised face and flat face flanges
- » General duties



Maxiflex Style HX-RIR (For heat exchanger applications)

- » Maxiflex spiral wound sealing element
- » The inner ring could have pass bars or could carry either a metal clad or soft gasket with pass bars
- » Manufactured to customer designs
- » Overwind without filler facilitates gasket location



Maxiflex Style RIR

- » Maxiflex spiral wound sealing element
- » Solid metal inner ring
- » High pressure temperature capability
- » Male to female flanges
- » General and critical duties



Maxiflex Pro

- » Maxiflex spiral wound sealing element
- » A combination of inner and outer rings
- » Maxiprofile inner ring
- » Double integrity seal



Maxiflex Style CRIR

- » Maxiflex spiral wound sealing element
- » Solid metal inner & outer ring
- » Suitable for high pressure and temperature applications
- » Raised face or flat flanges
- » Prevents turbulence and erosion damage to flange
- » Prevents damage to the gasket bore and inner windings
- » Acts as a heat shield/ corrosion barrier
- » General and critical duties



SEMI-METALLIC GASKETS

SERRATED METAL

MAXIPROFILE (STYLE 109)

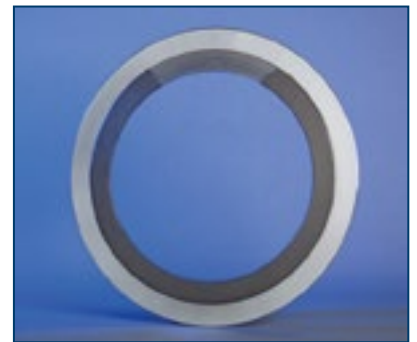
The Klinger Maxiprofile is a composite gasket, which utilises a serrated metal core with a soft facing material. The metal core is machined on each contact face with concentric serrations which provide high pressure areas, ensuring that the soft coating flows into any imperfections in the flange even at relatively low bolt loads. The result is a gasket, which combines the benefits of soft cut materials with the advantages of seal integrity associated with metallic gaskets.

Expanded graphite is the most common facing material used for Maxiprofile gaskets. However, other materials can be used, such as PTFE for chemically aggressive duties or mica for high temperature duties.

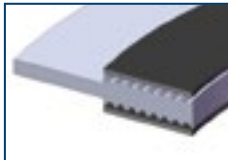
General properties of Maxiprofile gaskets:

- » Have a wide range of seating stresses under which the seal is effected and maintained
- » Can be used when there is insufficient bolt load to seal conventional gasket materials
- » Easy to handle and fit
- » Suitable for a wide range of operating conditions
- » The soft facing layer prevents damage to the flange
- » Provide a high integrity seal including thermocycling and shock loading conditions
- » Can be refurbished with a new facing layer and reused

The following Maxiprofile styles are available:



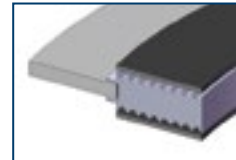
Maxiprofile LA1
(integral guide ring)



Maxiprofile LA2
(no guide ring)



Maxiprofile LA3
(loose fitting guide ring)



MRG (METAL REINFORCED GASKETS)

STYLE 108

The Klinger Style 108 MRG is a rigid laminated gasket, consisting of graphite layers bonded to each face of a solid steel core.

The Klinger Style 108 MRG gasket was initially designed to provide a high performance, low seating stress gasket replacement to the traditional metal jacketed and compressed asbestos fibre type gaskets utilised on heat exchanger applications.

Benefits of Klinger Style 108 gasket:

- » Low seating stress values
- » Excellent sealing characteristics
- » Excellent corrosion resistance
- » Narrow gasket width available
- » Particularly suitable for rectangular or non-round shapes



SEMI-METALLIC GASKETS

JACKETED

Metal Jacketed Gaskets are the most basic type of semi-metallic gaskets combining the high pressure suitability and blow out resistance of metallic materials with the improved compressibility of soft materials. Metal jacketed gaskets offer an economical seal where sealing faces are narrow and can be produced in a variety of shapes, making them a good option for heat exchanger jointing.

Metal Jacketed Gaskets can be manufactured to suit a range of chemical environments by the selection of a suitable jacketing metal.

General properties:

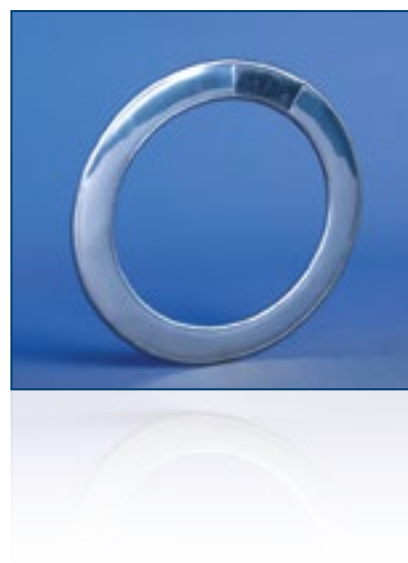
- » Economical
- » Easy to handle and install
- » Suitable for high temperatures
- » Suitable for narrow flanges
- » Good blow-out resistance

Styles:

- » **100** - Double jacket
- » **101** - Single jacket
- » **105** - Corrugated double jacket

Applications:

- » Heat exchangers
- » Exhaust gaskets
- » Valve bonnet gaskets
- » Narrow flanges



CORRUGATED METAL

STYLE 104

Corrugated gaskets are manufactured from corrugated metallic rings in a wide range of materials. They are a universal gasket for a range of applications but are particularly suited to applications involving narrow flanges or where bolt loads are low.

Corrugated rings are often supplied with a soft facing layer offering either full or partial coverage of the core. The layer, normally graphite or PTFE, improves the sealability of the product and ensures high integrity even at low gasket loadings. Due to the sealing characteristics of faced corrugated gaskets they are an excellent substitute for CAF gaskets or for corrugated gaskets with asbestos cord rope layers.

General properties:

- » Good blow-out resistance
- » Economical
- » Suitable for high temperatures
- » Easy to handle and install

Physical properties:

- » Metal core nominal thickness: 0.5mm
- » In the delivery condition, the total thickness of a gasket with graphite layers amounts to approximately 2.3mm
- » Graphite facing thicknesses: 0.5mm standard and 0.8mm on request
- » Also available with a U-Shaped Eyelet fitted to the bore and the outside periphery of the gasket. The eyelet fitted to the bore prevents contamination of the process media and protects the graphite from the process media
- » Surface identification: size, material and manufacturer

Styles:

- » **104** - No facing layer (Taylor ring)
- » **104G** - Flexible graphite facing layer
- » **104P** - PTFE facing layer



METALLIC GASKETS

METALLIC RING JOINT GASKETS

Metallic ring joint gaskets are heavy duty, high-pressure gaskets largely used in offshore petrochemical applications. They are precision-engineered components designed to be used in conjunction with precision-machined flanges. All our Ring Joints are manufactured according to ASME B16.20 and API 6A.

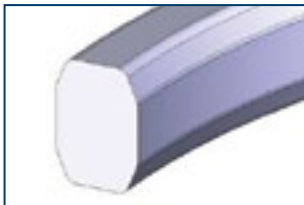
The gasket material is selected on the basis of chemical compatibility with the media and the hardness of the flange. The gasket material ideally needs to be roughly 30 BHN less than the flange material to ensure sufficient deformation of the gasket without damaging the flange facing.

Worn, pitted or corroded flange sealing surfaces can impede the sealing ability of RTJ gaskets. In such instances, a serrated octagonal RTJ gasket, covered with flexible graphite, can provide a temporary or emergency solution until the flange can be repaired or replaced.

The following Ring Type Joint styles are available:



Style BX



Style R Octagonal



Style R Oval



Style RX



COMMONLY USED MATERIALS

LOW CARBON STEELS

Carbon Steel: The most commonly used material for manufacturing semi-metallic gaskets. It has poor resistance to corrosion and should not be used in water or diluted acids. The maximum recommended operating temperature is 540°C.

STAINLESS STEELS

Type 304 Stainless Steel: This material is widely used in the manufacture of industrial gasketing due to its low cost and excellent resistance to corrosion. The maximum recommended operating temperature is 650°C.

Type 316 Stainless Steel: This material offers a higher resistance to corrosion than Type 304 SS. The maximum recommended operating temperature is 800°C.

Type 321 Stainless Steel: This alloy is similar to 304 with titanium added. It's widely used in high temperature corrosive applications. The maximum recommended operating temperature is 870°C.

Type 347 Stainless Steel: This alloy is similar to 304 with columbium and titanium added. It has good performance in high temperature corrosive applications. The maximum recommended operating temperature is 870°C.

ALLOY STEELS

Hastelloy "B": A corrosion resistance alloy that resists corrosion of hydrochloric acid under most conditions as well as phosphoric acid, other halogen acids and reducing conditions. The maximum recommended operating temperature is 700°C.

Hastelloy "C": Offers exceptional resistance to severe oxidizing conditions encountered with nitric acid, free chlorine and strong aqueous and acid solutions. The maximum recommended operating temperature is 700°C.

Inconel: Withstands high temperature and has resistance to corrosion by halogen gases and compounds. The maximum recommended operating temperature is 1000°C.

Monel: Excellent resistance to most acid and alkalis except extremely oxidant acids. The maximum recommended operating temperature is 800°C.

OTHER METALS

Nickel: Excellent resistance to caustic. Has a high degree of corrosion resistance to neutral and distilled water. The maximum recommended operating temperature is 600°C.

Titanium: Has good resistance to wet chlorine and chlorine dioxide. The maximum recommended operating temperature is 500°C.

Brass: Copper alloys are generally used with non-oxidizing acids, alkaline and neutral salt solutions. The maximum recommended operating temperature is 260°C.

Copper: Used successfully in acetic acids, nitrates and many organic chemicals. The maximum recommended operating temperature is 316°C.

Lead: Good resistance to sulphuric, chromic and phosphoric acids. Is soft and malleable. The maximum recommended operating temperature is 100°C.

Aluminium: Has excellent corrosion resistance to organic acids except nitric acid. The maximum recommended operating temperature is 472°C.

FILLER AND FACING MATERIALS

Flexible Graphite: Has excellent chemical resistance. The maximum recommended operating temperature is generally 370°C to 450°C, for facing material, and 510°C in spiral wound gaskets. These limits are dependent on the application and the grade of flexible graphite used. In some cases, the maximum service temperature may exceed these limits. Avoid use with oxidizing processes. Contact manufacturer for specific applications.

PTFE, Filled PTFE, and Expanded PTFE: These materials are used for high chemical resistance. They have low permeability and are used in vacuum and oxygen services. The temperature limits are cryogenics to 260°C.

Ceramic: Ceramic materials are used in some corrosive environments. The maximum recommended operating temperature is 1090°C.

PTFE SHEETING PRODUCTS

KLINGERTOP-CHEM 2000



Premium grade, heavy-duty PTFE gasket suitable for a wide range of applications within the chemical and petrochemical industries. The only PTFE based gasket material on the market to hold fire safe approval.

General Properties

- » Excellent sealing at high temperatures and pressures
- » Ideal for aggressive chemicals
- » Easy to handle and cut
- » Firesafe
- » Creep Resistant

KLINGERTOP-CHEM 2003



Highly compressible, modified PTFE material with outstanding chemical resistance. Ideal for applications where bolt load is limited or where flanges are delicate e.g. glass-lined equipment.

General Properties

- » Excellent sealing characteristics at low to medium temperatures and pressures
- » Ideal for aggressive chemicals
- » Excellent gas tightness properties
- » Suitable for glass-lined and enamel flanges

KLINGERTOP-CHEM 2005



Modified PTFE material with excellent chemical resistance and good mechanical properties. Suitable for a wide range of applications with the exception of strong alkaline conditions.

General Properties

- » Ideal for strongly acidic environments
- » Easy to handle and cut
- » Good mechanical properties at low to medium temperatures

KLINGERTOP-CHEM 2006



Modified PTFE material with excellent chemical resistance and good mechanical properties. Suitable for a wide range of applications in the chemical, pharmaceutical and food industries including strong alkaline conditions.

General Properties

- » Ideal for strongly alkaline environments
- » Good mechanical properties at low to medium temperatures
- » Ideal for food and pharmaceutical applications

KLINGER HYGRADE LS



Hygrade LS sheet gasketing is made of 100% expanded P.T.F.E. using a special process that produces a uniform and highly fibrillated multidirectional microstructure. This creates a soft and pliable, yet very tough gasket that has excellent resistance to compression, creep relaxation and cold flow. Suitable for un-even and damaged flanges.

General Properties

- » 100% Pure P.T.F.E.
- » Highly compressible
- » Resistant to creep and cold flow
- » Excellent chemical resistance, pH range 0-14
- » Easy to cut and handle
- » Suitable for glass-lined and enamel flanges

COMPRESSED FIBRE SHEETING

KLINGERSIL® C-4324



An economic grade based on a mixture of aramid and glass fibres with a nitrile rubber binder. Suitable for general industrial service including oils, hydrocarbons, low pressure steam and water.

General Properties

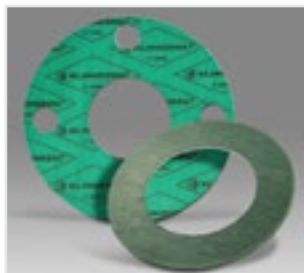
- » Economical
- » Good resistance to oils, fuels, hydrocarbons, steam, etc.
- » Excellent resistance to gas leakage
- » Meets non-asbestos standard BS7531 Grade Y
- » Anti-stick finish on both sides
- » Cuts easily

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size

KLINGERSIL® C-4400



High quality non-asbestos grade based on aramid fibre with nitrile rubber binder. A general purpose material for many industrial sealing applications.

General Properties

- » Good resistance to oils, fuels, hydrocarbons
- » Good creep resistance
- » Low leakage
- » Very successful in internal combustion engine applications
- » 3xA anti-stick finish on both sides

Also available with re-inforcements: **KLINGERSIL® C-4408**, stainless steel mesh

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size

KLINGERSIL® C-4430



Optimised combination of synthetic fibres and glass-fibre bound with NBR. Premium quality jointing with high temperature resistance in steam and water as well as excellent resistance to oils and hydrocarbons.

General Properties

- » Excellent creep resistance
- » Good steam resistance
- » Resistant to oils, fuels, hydrocarbons, etc.
- » WRc approved for use in hot and cold potable water
- » Fire-safe
- » 3xA anti-stick finish on both sides

Also available with re-inforcements: **KLINGERSIL® C-4438**, stainless steel mesh

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size

KLINGERSIL® C-4461 (top-mic)



A combination of specially selected mica, synthetic fibres and fillers to give a sealing material with outstanding flexibility and excellent stability in steam.

General Properties

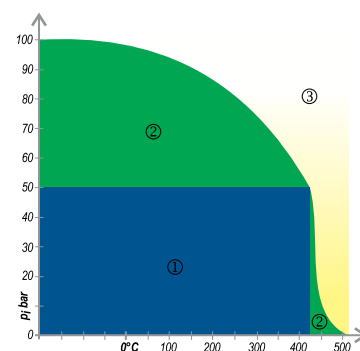
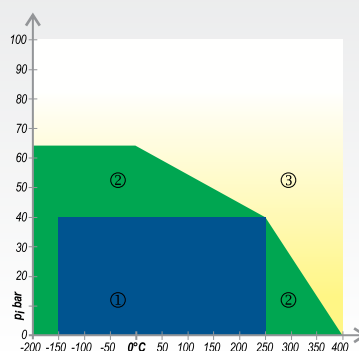
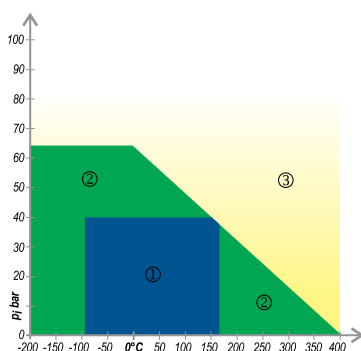
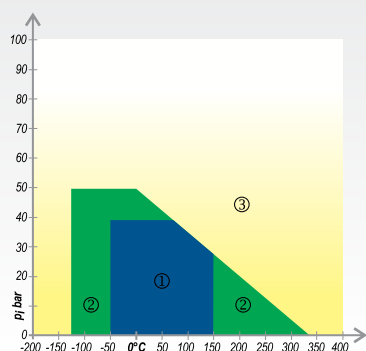
- » Good resistance to steam
- » Resistant to oils, fuels, hydrocarbons, etc.
- » Easy to handle and cut
- » 3xA anti-stick finish on both sides

Also available with re-inforcements: **KLINGERSIL® C-4468 (top-mic wire)**, stainless steel mesh

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size



- ① Usually satisfactory without reference
 ② Usually satisfactory, but suggest you refer to Klinger Mzansi for advice
 ③ Caution: May be suitable but essential that you refer to Klinger Mzansi for advice

COMPRESSED FIBRE SHEETING

KLINGERSIL® C-4500



Top quality KLINGERSIL® grade based on carbon fibre with a nitrile rubber binder. A premium quality sealing material with outstanding resistance to alkaline media and steam.

General Properties

- » Good resistance to steam
- » Good resistance to alkaline applications
- » Excellent load bearing characteristics
- » Good creep resistance
- » Good resistance to oils, fuels, hydrocarbons
- » 3xA anti-stick finish on both sides

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size

KLINGERSIL® C-8200



Specialist grade based on a unique blend of fibres with an acid resisting binder. Specifically designed for aggressive chemical environments.

General Properties

- » Resistant to most mineral acids
- » Resistant to alkalis, ketones, aldehydes
- » Resistant to many refrigerants
- » Resistant to oils, fuels, hydrocarbons, etc.
- » 3xA anti-stick finish on both sides

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size

KLINGERTop-graph-2000



A combination of expanded graphite and synthetic fibres to give a revolutionary sealing material with outstanding flexibility and excellent stability in steam.

General Properties

- » Good resistance to steam
- » Resistant to oils, fuels, hydrocarbons, etc.
- » Easy to handle and cut
- » Good leakage properties
- » 3xA anti-stick finish on both sides

Also available with stainless steel wire reinforcement:
KLINGERTop-graph-2000 S/Wire

Availability

- » Sheet (m): 2.0 x 1.5*, 6.0 x 2.0, 6.0 x 1.5
- » Thickness (mm): 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size

KLINGERSIL® Quantum



Designed for use at high temperatures. Suitable for use with steam, oils, fuels, water, weak inorganic and organic acids, refrigerants and hydrocarbons.

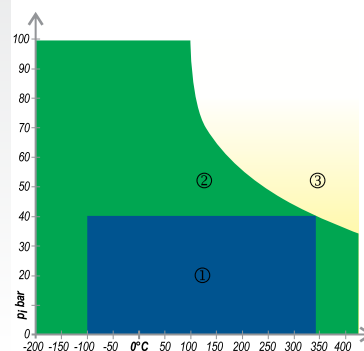
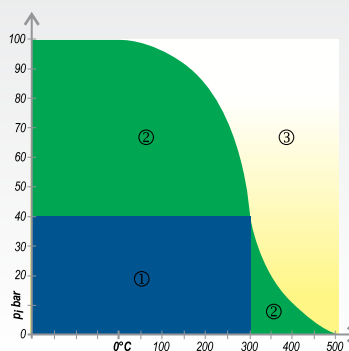
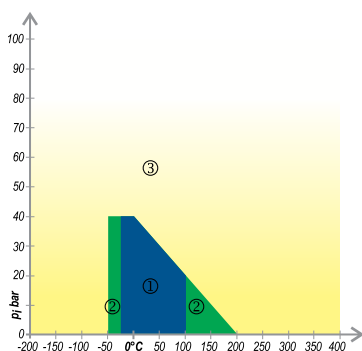
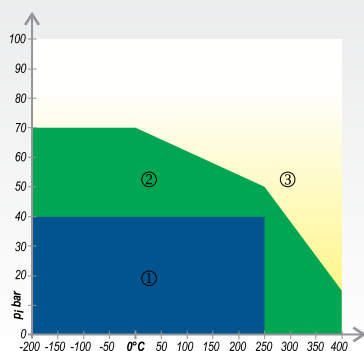
General Properties

- » Unique material bonded with HNBR
- » Outstanding resistance to steam
- » Available in sheet form and as cut gaskets
- » WRAS approved for use in hot and cold potable water
- » 3xA anti-stick finish on both sides

Availability

- » Sheet (m): 1.0 x 1.5*, 2.0 x 1.5
- » Thickness (mm): 0.8, 1.0, 1.5, 2.0, 3.0

* Denotes standard sheet size



- ① Usually satisfactory without reference
 ② Usually satisfactory, but suggest you refer to Klinger Mzansi for advice
 ③ Caution: May be suitable but essential that you refer to Klinger Mzansi for advice

OTHER SHEETING PRODUCTS

GRAPHITE KLINGER SWM



Pure exfoliated graphite with a stainless steel mesh reinforcement for improved blowout resistance and ease of handling. Due to the excellent chemical and thermal capabilities of graphite it is used extensively throughout the petrochemical and chemical industries for process duties and steam applications.

General Properties

- » Excellent resistance to steam
- » Resistant to virtually all media
- » Outstanding resistance to high and low temperature
- » High compressibility
- » Good leakage properties
- » Unlimited storage life
- » Easy to cut

GRAPHITE KLINGER SLS

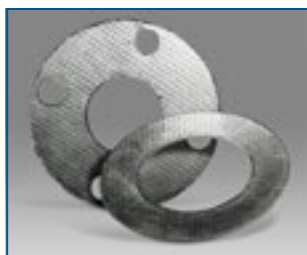


Pure exfoliated graphite with a stainless steel foil reinforcement for improved handling and load-bearing characteristics. The excellent conformability of graphite means that the material is suitable for applications where bolt load is limited or flanges are damaged.

General Properties

- » Excellent resistance to steam
- » Resistant to virtually all media
- » Outstanding resistance to high and low temperature
- » High compressibility
- » Good leakage properties
- » Unlimited storage life

GRAPHITE KLINGER PSM



Pure exfoliated graphite with a tanged stainless steel sheet reinforcement for improved blowout resistance and ease of handling. Due to the excellent chemical and thermal capabilities of graphite it is used extensively throughout the petrochemical and chemical industries for process duties and steam applications.

General Properties

- » Excellent resistance to steam
- » Resistant to virtually all media
- » Outstanding resistance to high and low temperature
- » High compressibility
- » Good leakage properties
- » Unlimited storage life

SIGRAFLEX® HOCHDRUCK

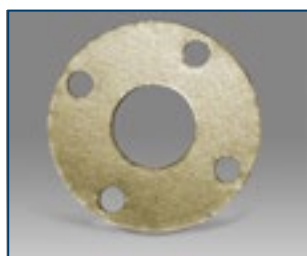


Sigraflex® Hochdruck is a multilayer high-strength sheet material comprising 0.5mm thick layers of high quality graphite foil and 0.05mm thick stainless steel foil. Depending on the sheet thickness required, several layers of graphite and stainless steel foil are laminated together in a special process.

General Properties

- » Very high maximum permissible gasket stresses
- » Suitable for use at temperatures ranging from -250°C up to approx. 500°C.
- » High blow-out resistance
- » High rigidity, resistance to buckling
- » No ageing or embrittlement, owing to absence of adhesives or binders
- » Good scratch resistance, antistick finish due to impregnation
- » Excellent resistance to thermal shock

MICA KLINGERMILAM PSS



KLINGERMilam PSS is an asbestos free sealing material based on mica reinforced with stainless tanged insert. It is specifically designed for hot, dry gas applications up to 900°C and 5 bar. However, the outstanding chemical resistance of mica makes the gasket suitable for a wide range of other applications.

General Properties

- » Asbestos-free gasket material with outstanding resistance to dry heat
- » Pure mica with tanged stainless steel reinforcing insert
- » Good resistance to aggressive acids, bases, solvents, mineral oils
- » Good compressive strength
- » Non-flammable

ELASTOMERS / VEGETABLE FIBRE

RUBBER

Natural Rubber (NR)

The original gum rubber possesses several excellent mechanical properties. It has good tear and abrasion resistance, high resilience and good low temperature flexibility.

Its use is limited in gaskets by very low chemical resistance (especially to solvents and oil which greatly reduce its strength), poor resistance to sunlight and ozone (which causes cracking) and the restricted temperature range.

Neoprene (CR) - Neoprene is the registered trade name of Du Pont.

The oldest of the bulk produced synthetics. More correctly referred to as polychloroprene. It is superior to NR and SBR in resistance to ozone, sunlight and weather. It also has a degree of resistance to attack by petrol, mineral oil and other light hydrocarbons and can be made flame resistant. It only has moderate low temperature flexibility and tends to suffer from poor compression set especially when hot.

Hypalon (CSM) - Hypalon is the registered trade name of Du Pont.

Chlorosulphonated polyethylene. Possesses excellent resistance to ozone and good resistance to flame, mineral oil, heat, weather and acid, making it ideal for use outdoors or near sparking electrical equipment.

Styrene Butadiene (SBR)

A synthetic equivalent to natural rubber. The two are usually compounded together to produce an elastomer with similar mechanical properties to NR but with better high temperature performance, flexibility and a slightly greater resistance to attack from animal and vegetable oils.

Nitrile (NBR)

A copolymer of butadiene and acrylonitrile. Especially resistant to mineral oils and aromatic and aliphatic hydrocarbons and alcohols - depending on the actual nitrile content of the elastomer. High and low temperature performance can be good. Oil resistance can be increased by compounding, at the expense of low temperature flexibility. Ozone, sunlight and weather resistance is poor.

Ethylene Propylene (EP)

Often supplied in a diene modified form (EPDM). It has good mechanical properties and is resistant to ageing, weathering, ozone, oxygen, steam and water. It is especially resistant to phosphate ester based hydraulic fluids but is not recommended for use with petroleum oils or fluids. Good resistance to mineral acids.

Butyl (IIR)

A copolymer of isoprene and isobutylene. Similar to EP in its ability to cope with phosphate ester based hydraulic fluids and mineral oils. It is highly impermeable to gas and moisture and has good general chemical resistance including mineral acids. Resistance to petroleum oils and fluids is low.

Silicone (SI)

Unlike the other elastomers which are based on the carbon atom, silicones are semi-organic and based on silicon-oxygen chains. They are resistant to water, ozone and sunlight and can be made to perform at very low or high temperatures (-100°C to 250°C). Silicone is odourless and tasteless and will not support bacterial life. It should not be used for steam at high pressures or with oils, petrols or other hydrocarbons.

Viton (FPM) - Viton is the registered trade name of Du Pont.

A copolymer of vinylidene fluoride and hexafluoropropylene. It will cope well with petrol, oils, chlorinated solvents, concentrated alkalis and fuming acids. Ozone and weather resistance are excellent and high temperature performance is good. It has poor low temperature flexibility and should not be used with some esters or ketones.

These elastomers can be supplied as either:

- » Cut gaskets to standard specifications, or customer designs.
- » Sheets, supplied per running meter.

STATITE








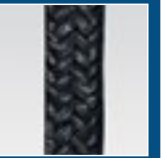

KLINGERSTATITE

KLINGERstatite offers a low cost sealing solution for applications where the additional strength offered by fibre reinforcements such as aramid, glass or carbon is not a requirement. Paper-based materials are often used in low temperature and low pressure applications.

KLINGERstatite is based on cellulose fibre and can be supplied in sheet, roll or gasket form. It is extensively used in the automotive industry where its excellent oil and fuel resistance provides long lasting and reliable sealing at low cost.








GLAND PACKING

PACKING SELECTION GUIDE

	K2168	K2170	K4307	K10	K11	K20	K4313
							
	general purpose and water					slurry	
water	●	●	●	●	●	●	●
steam	○	○	○	○	◐	●	●
mild acid	◐	●	◐	●	●	●	●
mild alkali	◐	●	◐	●	●	●	●
strong acid	○	○	○	○	●	○	●
strong alkali	○	○	○	◐	●	◐	●
solvents	○	○	○	○	●	○	◐
slurry	●	●	◐	●	●	●	●
oil	○	○	○	●	●	●	●
rotary	⊗	⊗	⊗	⊗	⊗	⊗	⊗
reciprocating	⌞	⌞	⌞	⌞	⌞	⌞	⌞
valves	⌞	⌞	⌞	⌞	⌞	⌞	
static					⌞		
pressure (bar)	15	15	15	15	15	15	25
temperature (°C)	90	90	90	175	175	175	260
pH	6-9	5-9	6-9	4-10	4-10	4-10	2-12
velocity (m/s)	6	8	5	10	8	12	20
yarn	cotton	cotton	flax	acrylic & glass	acrylic & glass	acrylic & glass	GFO, aramid
additives	graphite, wax	doulon, lubricants	PTFE, lubricants	PTFE, lubricants	graphite, wax	doulon, lubricants	graphite, PTFE, lubricants

● recommended
 ◐ possible
 ○ not recommended

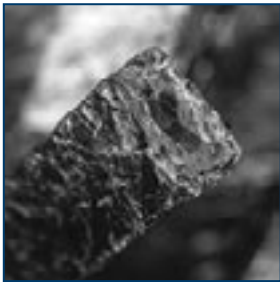
GLAND PACKING

K25	7302DL/ K7302	K49	K54S/ F/ H	K466M	K3222	K7301C	
							
chemicals			high temperature				
●	●	●	●	●	●	●	water
◐	●	●	◐	●	●	●	steam
●	●	●	●	●	●	●	mild acid
●	●	●	●	●	●	●	mild alkali
○	○	●	●	●	◐	○	strong acid
◐	◐	●	●	●	◐	○	strong alkali
●	○	◐	●	○	●	●	solvents
●	●	●	●	○	●	●	slurry
●	●	●	●	●	●	●	oil
⊗	⊗	⊗	⊗	⊗	⊗		rotary
⌞	⌞	⌞	⌞	⌞	⌞		reciprocating
⌞	⌞	⌞	⌞	⌞	⌞		valves
			⌞		⌞	⌞	static
30	36	20	20	34	180	5	pressure (bar)
260	260	260	260	650	650	700	temperature (°C)
2-12	2-12	0-14	0-14	0-14	0-14	3-9	pH
15	11	20	3	20	20	0	velocity (m/s)
aramid	high tech, man made	GFO	PTFE	carbon	exfoliated graphite	ceramic, glass	yarn
PTFE, lubricants	PTFE, DL = doulon	graphite, PTFE	S = PTFE, F = oxygen, H = lubricants	molybdenum- disulphide	graphite, also wire reinforced	graphite, oil, also wire reinforced	additives

● recommended
 ◐ possible
 ○ not recommended

GLAND PACKING

STYLE 396



A dense version of braided flexible graphite with effective placement of high purity carbon/graphite yarns to resist extrusion and aid in bending around tight radii.

Characteristics

Style 396 operates successfully in valves except knife-gate configurations (see Seal Ryt Style 333). Within its established temperature/Pressure/PH parameters, one needs only to add additional rings to allow for 396's ability to fill previous scoring. Style 396 has also been successful in rotary applications where flush free, leak free performance has been desired. May be used with anti-extrusion bull rings (see Seal Ryt 333) for exposed clearances and very high pressures. Most effective at controlling fugitive emissions.

STYLE 396C

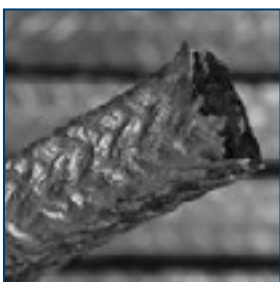


A patented core of internally-sprung high temperature, high pressure graphite Seal Ryt Style 333, with helical braided inconel wire, with an over braid of carbon-inserted exfoliated graphite foil, Seal Ryt Style 396-C is the most effectively designed product on the market today for the sealing of fugitive fuel emissions. Seal Ryt Style 396-C meets or exceeds all requirements of A.P.I. 589 and 607 tests as well as the A.P.I. fire test for soft-seated quarter-turn valves.

Characteristics

Unlike other exfoliated graphite products which offer various other yarn or wire placements to theoretically address extrusion, blow-out prevention, etc., Seal Ryt Style 396-C utilizes its patented Style 333 core, capable of 5800 PSI alone, to provide a highly -sprung internal structure which enables 396-C to conform and re-conform through constant thermal cycling to various stem, bore and clearance conditions in various states of degradation.

STYLE 333



Made entirely with ultra-high purity graphite's and helical braided Inconel wire insertion throughout. The core is extra dense to provide dimensional stability throughout Style 333's working temperature/pressure range. Braid blockage is provided by a unique dispersion containing ultra fine graphite particles locked in place by the Seal Ryt patented process.

Characteristics

Style 333 effectively seals ALL types of valves and soot blowers, even hard to seal ones. It is equally effective on new equipment as well as older, pitted and scored equipment, without the need for bull-rings. It is built to require little or no adjustment through its life and to facilitate ease of removal.



ENGINEERING PLASTICS & PTFE PRODUCTS

PTFE

Polytetrafluoroethylene is perfect as a construction material in the chemical industry. PTFE is very versatile and will not swell or dissolve in any common organic or inorganic solvent.

FILLED PTFE

PTFE can be combined with certain filler materials, i.e. glass, carbon, graphite and bronze materials. These are available in rods, billets and machined components.

PTFE COATED GLASS CLOTH

It's a woven glass cloth that is coated with PTFE, which is temperature and electrical resistant and can also easily be cleaned.

KLINGER SEALEX

Klinger Sealex is composed of specially prepared fluorocarbons with excellent resistance to aggressive chemicals.



ENGINEERING PLASTICS

ACETAL

Acetal is a virtually faultless material. Its benefits are lower part costs, longer service life, improved performance and greater design latitude.

NYLON

Nylons are represented by amide groups and encompass a range of material types. It also provides excellent chemical resistance to most chemicals.

POLYPROPYLENE

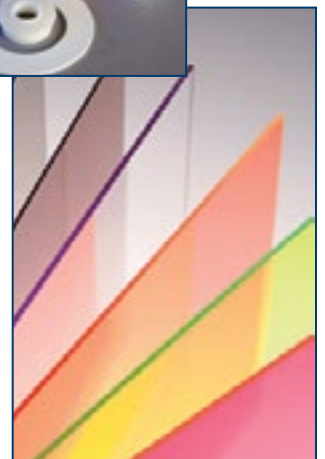
It has a high level of stiffness and toughness at ambient temperature and is available in rods, sheets and machined components.

PVC

PVC is greatly used in the production of tanks and serves as an ideal plastic in the chemical industry.

UHMW POLYETHYLENE

Polyethylene can be used in a range of applications. It is chemical resistant and has a very high resistance to wear and abrasion.



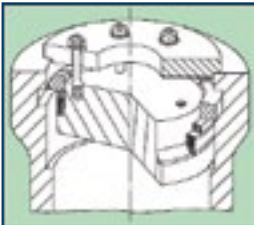
OTHER PRODUCTS

BAFFLE SEALS



Baffle seals are attached between the longitudinal baffle plate and the shell on multi pass heat exchangers, to improve the thermal efficiency of the exchanger. The baffle seal is an all metal seal (typically SS 316Ti) consisting of a package of 0.2 mm thick lamellae, in a 0.5 mm thick lamellae holder. Continuous seal lengths of up to 6 m can be supplied.

COVER PLATE SEALS



Cover plate seals are designed for high pressure applications where the internal pressure within the equipment provides the required compressive forces on the gasket to achieve a positive seal. Flexible graphite is primarily used as a base material which is then compressed in a die to a specific density. Extrusion of the graphite can be prevented by installing formed or machined stainless steel caps to the edges of the seal. These seals are generally rectangular in cross section shape, but can also be manufactured with bevelled edges on either the inside or outside diameters.

DIE FORMED GRAPHITE SEALS



Die formed graphite rings are used in high performance valve applications, where superior performance to that of traditional gland packing is required. Flexible graphite is primarily used as a base material which is then compressed in a die to a specific density. A large range of dies are available to produce these seals in a variety of sizes and cross sectional shapes.

GASKET RING CUTTERS



For easy, convenient self-cutting of circular gaskets, this ring cutter can cut soft material gaskets up to 1200 mm in diameter, and up to 3 mm in thickness.

GLAND PACKING CUTTERS



This gland packing cutter is ideal for accurate cutting of packing rings to fit pumps or valves. Packing sizes of up to 25 mm can be cut to length using a calibrated scale for shafts of up to 150 mm in diameter.

OTHER PRODUCTS

GLAND PACKING EXTRACTORS



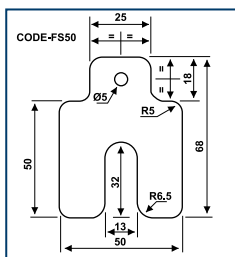
These extractors facilitate the removal of old, used gland packing from stuffing boxes. They are available in three different sizes and can be purchased individually or as a set. Replacement corkscrew tips are also available.

INSULATION KITS



Insulation kits are used in pipelines to electrically isolate two sections of piping where cathodic protection systems are utilised. They are also used to eliminate galvanic corrosion effects when two mating flanges of dissimilar materials are present. The kits comprise a flat gasket (normally full face), with one insulating sleeve, two insulating washers and two steel washers for each bolt. Rubber faced phenolic resin gaskets are used in low pressure applications, but for more stringent applications other gasket and insulating materials, such as glass reinforced epoxy resins, can be used. The kits are manufactured to suit any common or special flange specifications.

SHIMS



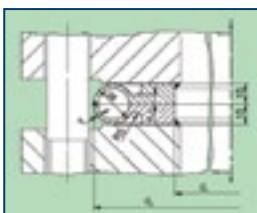
For precision alignment of sensitive equipment, pre-cut stainless steel shims are supplied in five different sizes, and thicknesses ranging from 0.05 mm to 2.0 mm thick. The shims can be purchased individually, in maintenance friendly replacement packs, or in a purpose designed aluminium carry case.

SPRAY SHIELDS



Spray shields are used to contain product leakage from flanges, valves and other equipment. They are primarily used as health and safety devices to reduce the risk of injury to personnel in the vicinity of a product leak. Indicating patches or transparent shield sections provide a visual indication of the presence of a leak. Material selection is application specific, and can range from PVC, polyethylene, polypropylene to PTFE. All standard flange sizes are catered for, and custom designs can be provided to suit any flange, valve or similar type of equipment.

WELD RING GASKETS



Weld ring gaskets are solid metal gaskets that are welded between flanges to produce an absolutely leak free joint. They are best suited to applications of a highly critical nature such as toxic or lethal contained substances, or for applications where a degree of flexibility is required as a result of thermal expansion differentials between the joint components. A variety of styles can be selected from depending on the specific application requirements.

JOINT INTEGRITY MANAGEMENT SERVICES

If you are experiencing joint leakages on your process equipment, Klinger Mzansi's Joint Integrity Management Service could assist you in overcoming these problems by:

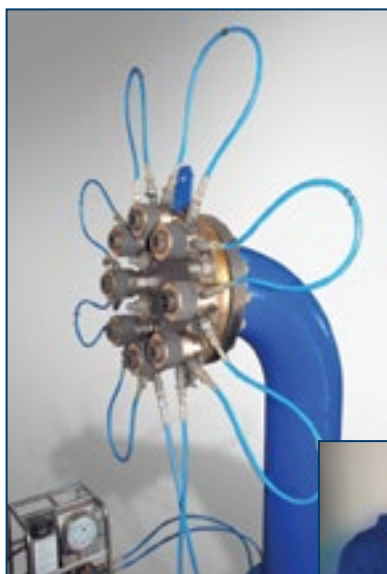
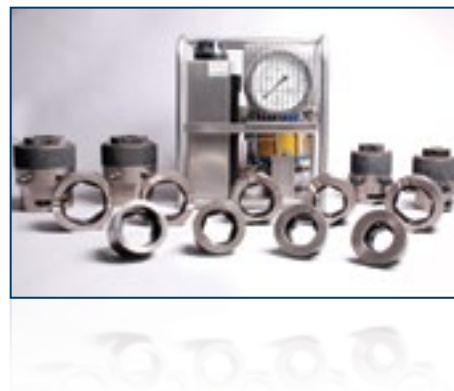
- » Optimising the joint sealing arrangement
- » Supplying and installing the correct gasket
- » Hydraulically tightening the bolts
- » Providing a leak free start-up

Our fully trained technicians and supervisors can be mobilised at short notice to assist with:

- » Planned and unplanned shutdowns
- » Maintenance requirements
- » New plant builds
- » Preparation for pressure testing

The benefits of using our service include:

- » Controlled tightening of joints
- » Reduced leaks on start-up, i.e. no rework
- » Prevention of product losses
- » Reductions in fugitive fuel emissions
- » Improved plant efficiency and reliability
- » Complementary to existing maintenance resources
- » Fully documented joint procedures and records



Services offered:

- » Bolt load calculations
- » Torque calculations
- » Gasket recommendations
- » On-site torque tightening
- » On-site bolt tensioning
- » Training
- » Technical support

Related services:

- » In-situ machining

Typical applications:

- » Bolted joints
- » Standard piping flanges
- » Pump and valve connections
- » Process equipment
- » Safety critical joints
- » Emission critical joints

GASKET INSTALLATION PROCEDURES

Storage



Ideal storage conditions

- » The gasket should be stored horizontal to avoid tensions and permanent warpage.
- » Ideal storage conditions are:
 - » Temperature < 25°C
 - » Air humidity 50 - 60%
- » Darkened storage room. Store the gasket in a clean condition (ideally in a plastic bag).

Handling



Protect the gasket

- » All types of gaskets (metallic gaskets, PTFE gaskets, fibre reinforced gaskets etc.) should be handled with the same care and attention.
- » Avoid carrying small gaskets in a pocket to protect the gasket from damage.
- » Carry ready cut gaskets carefully, ideally in some form of protective cover.



Protect the surface

- » Do not bend the gasket and do not damage the surface.

Gasket installation

The tools

- » At first make sure that the following tools are available and in good condition:
 - » the correct gasket chosen for the specific application
 - » a calibrated torque wrench
 - » a wire brush
 - » lubricants for the bolts.



Cleaning flange surfaces

- » Make sure that the flange surfaces are clean.
- » Check the bolts and the flange surface if they are technically ok and free from any serious defects.
- » Always brush in the direction of the grooves.
- » To avoid damage on the flange surface please use a brass drift.



Flange conditions

- » Make sure that the flanges are parallel and report all irregularities.



Important for the gasket

- » Insert the gasket carefully between the flanges.
- » The gasket has to be centralized in the flange.
- » Ensure that the gasket is installed in a dry state.
- » It is important that the gasket is not pinched or otherwise damaged when bringing the flanges together.

Lubrication of bolts

- » Apply lubricant to the bolt and the nut threads as well as to the face of the nut to reduce friction when tightening
- » Pay attention that the lubricant does not contaminate the gasket or the flange surfaces.
- » The recommended service temperature of the lubricant has to be within the process service temperature limits.



Bolt tightening

- » The required torque value can be calculated with KLINGER®expert 5.1.
- » Perform at least 4 stages to the required torque as follows:
 - » finger tighten bolts
 - » use 30% of the required torque
 - » use 60% of the required torque
 - » use the full torque
- » Complete the torquing with one final pass in a clockwise sequence.



Re-Tightening

- » If re-tightening is considered necessary, this should only be done at ambient temperatures before or during the first start-up.
- » Never re-tighten any compressed fibre gaskets at higher operating temperatures and longer operating times.



Re-use of gaskets

- » For safety reasons never re-use a gasket.
- » The cost of a gasket is minimal compared with the costs which will come into being of a down time of the plant.

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