## The Klingeran Gasket Manufacturing Co.

was established after signing a cooperation agreement between "Petroleum Equipment Industries Co." and "Klinger U.K." so as to supply different types of gaskets to Oil, Gas, Petrochemical and Power Plant industries.
This company by using full automatic machinery and employing highly skilled personnel that have been trained in Klinger Co., has successfully been able to produce and supply its customers with high quality products.

### PRODUCTION STANDARDS

Klingeran Co. is producing and supplying following items in accordance with international standards under licence of Klinger U.K.:

1- Spiral Wound Gaskets based on standards of ASME B16.20, API 601, BS 3381.
2- Double Jacketed Gaskets based on standards of ASME B16.20 and API 601.
3- Ring Joint Gaskets based on standard of ASME B16.20.
4- Non-Metallic Gaskets based on standard of ASME B16.21.

### FEATURES

- Ability to supply different types of Jointing Sheets, packings and other sealants through Klinger U.K. as Klingeran Co. is exclusive representative of Klinger U.K. in Iran.
- Capability of manufacturing Non-Standard gaskets in various designs and sizes.

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# Spiral Wound

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.

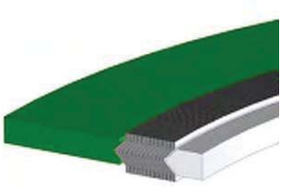
Maxiflex gaskets can be manufactured from a range of filler materials according to different service conditions


| Filler Material | Maximum Temperature | ASME B16.20 Colour Coding |
|---|---|---|
| Graphite | 550 °C | Grey Stripe |
| PTFE | 260 °C | White Stripe |
| Mica | 1000 °C | Light Green Strip |
| Mica & Graphite | 900 °C | N/A |

| Winding Material | Maximum Temperature | ASME B16.20 Colour Coding |
|---|---|---|
| Carbon Steel | 500°C | Silver |
| 304 Stainless Steel | 650°C | Yellow |
| 316L Stainless Steel | 800°C | Green |
| Duplex UN S31803 | 800°C | N/A |
| 347 Stainless Steel | 870°C | Blue |
| 321 Stainless Steel | 870°C | Turquoise |
| Monel 400 | 800°C | Orange |
| Nickel 200 | 600°C | Red |
| Titanium Gr 2 | 500°C | Purple |
| Hastelloy B-2/B-3 | 700°C | Brown |
| Hastelloy C-276 | 700°C | Beige |
| Inconel 600 | 1000°C | Gold |
| Inconel 625 | 1000°C | Gold |
| Inconel X-750 | 1000°C | N/A |
| Incoloy 825 | 600°C | N/A |
| Zirconium | 500°C | N/A |
| Super Duplex | 600°C | N/A |
| 254 SMO | 600°C | N/A |
| Titanium Gr7 | 500°C | N/A |
| Hastelloy C-22 | 700°C | N/A |
| Hastelloy G-31 | 800°C | N/A |
| Alloy 20 | 600°C | N/A |

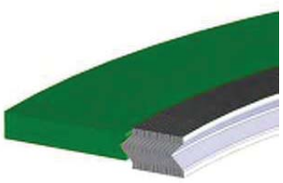
# Spiral Wound

Maxiflex Spiral Wound Gaskets are available in a range of configurations and materials. Below are the most common gasket types.



## Type 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
- Inner ring acts as a heat shield
- Inner ring acts as a corrosion barrier
- Wide choice of materials for filler and metal strip
- General and critical duties



## Type CR

- Maxiflex spiral wound sealing element
- Solid metal outer ring used as a centering device and compression stop.
- Used mainly on raised face and flat face flanges
- Wide choice of materials for filler and metal strip
- General Duties

## Type RIR

- Maxiflex spiral wound sealing element
- Solid metal inner ring
- High pressure & high temperature capability
- Male to female flanges
- Wide choice of materials for filler and metal strip
- General and critical duties

## Type 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 & groove, male to female and flat face to recess
- General and critical duties

## Type R Graflex Faced

- Maxiflex spiral wound sealing element
- Covered with 0.5mm Graflex facings
- Used on manhole covers
- Low bolt load applications
- Uneven sealing faces
- Used in tongue & groove, male to female and flat face to recess flanges

## Type HTX (for heat exchanger applications)

- Maxiflex spiral wound sealing element
- A combination of inner and outer rings
- The inner ring could have pass bars or could carry either a metal clad or soft gasket with pass bars
- Manufactured to customer designs
- Wide choice of materials for filler and metal strip
- Manufactured with thin outer windings to create stable, large diameter gaskets for narrow heat exchanger applications



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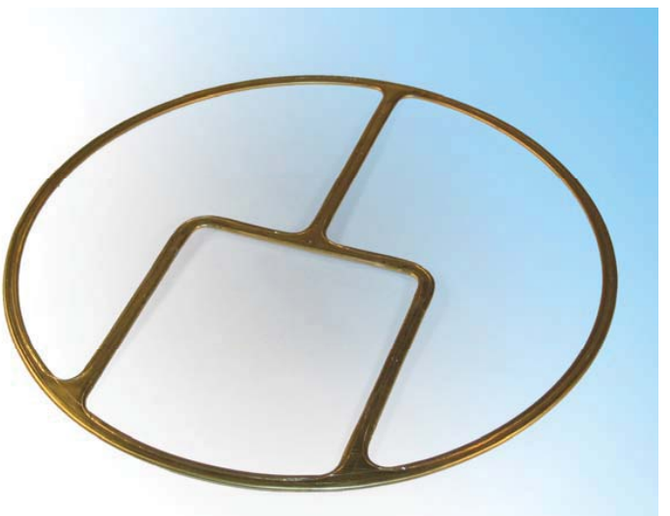
# Metal Jacket Gaskets

Metal Jacketed Gaskets are the most basic type of semi-metallic gaskets combing 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.



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

**Applications**
- Heat exchangers
- Exhaust gases
- Valve bonnet gaskets
- Narrow flanges

## Types of Metal Jacketed Gasket

**Double Jacketed Gasket**
Constructed of soft filler encapsulated by a metal jacket and insert. Designed for use on high temperature and pressure applications

**Single Jacketed Gasket**
Constructed of soft filler covered by a metal jacket on both sides and one face. The gasket is ideal for narrow applications or moderate service conditons.

**Double Jacketed Corrugated (Soft Filler)**
The reduced contact area of the construction enhances compressive characteristics making it more suited to applications of lower bolt load or where flanges are uneven.

**Single Jacketed Gasket Open on Outer Diameter**
Ideal for narrow applications where protection of the soft filler on the inner diameter is a requirement. Used in valve bonnets, sight glasses and vaccum seals.

**Single Corrugated (No Filler)**
Used mainly in valve applications and small recess gaps. The gasket is a wholly metal construction and therefore requires exacting condtions of flange surface finish and flatness

**Single Jacketed Gaskets Totally Enclosed**
Constructed of soft filler completely enclosed in a single jacket for use in applications where the width does not permit the use of a double jacketed gasket.

**Corrugated with Cord Rope Facing Corrugated metal core with a nonabestos rope facing.**
Designed for poor or pitted flanges or wherethe available bolt load is low.

**Double Jacketed with Corrugated Metal Filler**
A corrugated gasket encapsulated with a flat or corrugated jacket. Designed for applications where theavailable bolt load is limited but there is a requirement-for the type of high integrity joint associated with an all-metal gasket.

**Corrugated with Soft Facing Layer**
Comprises a single corrugated core faced with either PTFE or Graphite depedant on application. The soft facing layer provides the gasket with a high level of tightness while the core gives the gasket both resilience and integrity. Used in variety of applications including heat exchangers, valve bonnet applications and small recess gaps.

Metalic

# 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 a number of grounds primarily; chemical compatibility with the media and the hardness of the flange. The gasket material ideally needs to be roughly 30 Brinell less than the flange material to ensure sufficient deformation of the gasket without damaging the flange facing.

| Type | Nominal Pipe Size | Class Ratings |
|---|---|---|
| Type R Oval and Octagonal | 1/2" to 24" | 300 to 900 ASME B16.20 Series A |
| | 26" to 36" | 150 to 2500 ASME B16.20 |
| | 1 ½" to 20" | API 6A |
| Type RX | 1 1/2" to 24" | 720 to 5000 ASME B16.20 |
| | 26" to 36" | 300 to 900 ASME B16.20 Series A |
| | 1 ½ " to 20" | API 6A |
| Type BX | 1 11/16" to 21 1/4" | 5000 to 20000 ASME B16.20 |

## Common Materials

| Material | Brinell Hardness | Temperature Limitation | Identification |
|---|---|---|---|
| Soft Iron | 90 | -60 to 500 °C | D |
| Low Carbon Steel | 120 | -40 to 500 °C | S |
| 4-6% Cr ½% Mo | 130 | -125 to 500 °C | F5 |
| 304 | 160 | -250 to 650 °C | S304 |
| 316 | 160 | -110 to 800 °C | S316 |
| 321 | 160 | -250 to 870 °C | S321 |
| 347 | 160 | -250 to 870 °C | S347 |
| 410 | 170 | -20 to 500 °C | S410 |
| Inconel 625 | - | 1000 °C | 625 |
| Incoloy 825 | - | 1000 °C | 825 |
| Hastelloy C-276 | - | 800 °C | C-276 |
| Titanium | - | 540 °C | TI |



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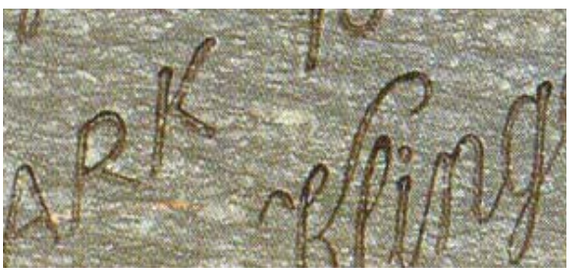
# Asbestos data sheet

## Klinger Mk100

**General Properties**
• Suitable for high temperatures (510°C)
• Supplied with Klinger's 3xA finish
• Suitable for use with steam, water, oils and other nonaggressive amedia.
• Colour: Grey
**Test & Certifications**
• BS 1832 Grades A & O
• DIN 3754 IT 400
• ASTM F104 – F112552
**Availability**
Thickness: 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0
Sheet Size: 2 x 1.5m (4 x 1.5, 2 x 2 and 1.5 x 1 also available)



High quality material for use with steam, water and hydrocarbons service. Composed of styrene-butadiene binder with high-grade longfibre chrysotile asbestos.

## Klingerit 3xA

**General Properties**
• Suitable for high temperatures (550°C)
• Supplied with Klinger's 3xA finish
• Suitable for use with aliphatic alcohols, esters, ketones and amines
• Colour: Red/Brown
**Test & Certifications**
• BS 1832 Grades A & O
• DIN 3754 IT 400
• ASTM F104 F104 – F112452
• NFT 48001 Cat D
**Availability**
Thickness: 0.2, 0.25, 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0
Sheet Size: 2 x 1.5m (4 x 1.5, 2 x 2 and 1.5 x 1 also available)


Top quality sheet material for steam, gas, oil water and non-aggressive services.
Recommended for use for high temperatures and high pressures. Composed of styrenebutadiene binder with high-grade long-fibre chrysotile asbestos.

## Klingerit 1000

**General Properties**
• Suitable for high temperatures (550°C)
• Supplied with Klinger's 3xA finish
• Suitable for use with aliphatic alcohols, esters, ketones and amines
• Colour: Red/Brown
**Test & Certifications**
• BS 1832 Grades A & O
• DIN 3754 IT 400
• ASTM F104 F104 – F112452
• NFT 48001 Cat D
**Availability**
Thickness: 0.2, 0.25, 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0
Sheet Size: 2 x 1.5m (4 x 1.5, 2 x 2 and 1.5 x 1 also available)


Top grade wire-reinforced material for extreme service. Recommended for use for high and fluctuating temperatures and pressures.
Composed of styrene-butadiene binder with high-grade long-fibre chrysotile asbestos and a mild steel reinforcement..

Sheet Material

# Graphite

## Graphite SLS / AS

**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
- Anti-stick finish on both sides
- Easy to cut

**Test & Certifications**
- BAM Approval for use with oxygen 130 bar/2000C
- WRc Approval
- DIN DVGW NG-5124AT0417
- Firesafe according to BS 5146

**Availability**
- Sheeting (m): 1.0 x 1.0*, 1.5 x1.5
- Thickness (mm): 0.45, 0.8, 1.0, 1.5, 2.0, 3.0

*Also available in 99.85% pure nuclear grade*

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.

## Graphite PSM/AS

**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
- Anti-stick finish on both sides

**Tests and Certifications**
- BAM Approval for use with oxygen 130 bar/2000C
- WRc Approval
- DIN DVGW NG-5124AT0417
- Firesafe according to BS 5146

**Availability**
- Sheeting (m): 1.0 x 1.0*, 1.5 x 1.5
- Thickness (mm): 0.8, 1.0, 1.5, 2.0, 3.0

*Denotes standard sheet size*
*Also available in 99.85% pure nuclear grade*

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.

## Top-graph-2000

**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

**Tests and Certifications**
- BAM Approval for use with oxygen 130 bar/2000C
- KTW Approval C303/95/st
- DIN DVGW NG-5123AU0381

**Availability**
- Sheeting (m): 2.0 x 1.5*, 1.5 x 1.0
- Thickness (mm): 0.5, 0.75, 1.0, 1.5, 2.0, 3.0

*Denotes standard sheet size*

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



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# 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 pipework.

• 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 per bolt and 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.

| Component Key | | |
|---|---|---|
| 1 | Type E & F Central Gasket | Neoprene faced phenolic |
| 2 | Insulating Washer, Type D Gasket | Reinforced phenolic |
| 3 | Insulating Sleeve | Polyethylene |
| 4 | Insulating Sleeve | Phenolic |
| 5 | Insulating Sleeve | Mylar |
| 6 | Type E & F Central Gasket | KLINGERsil C-4430 |

| Component | | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Dielectric strength | V/mm | 500 | 200 | 400 | 140 | 4000 | 1500 |
| Compressive Strength | $N/mm^2$ | 270 | 270 | - | - | - | 300 |
| Flexural Strength | $N/mm^2$ | 155 | 155 | - | - | - | - |
| Water Absorption | % | 1.6 | 1.0 | 0.01 | 0.1 | 0.8 | 10.6 |
| Maximum Temperature | °C | 107 | 107 | 66 | 107 | 145 | 400 |

**Type E**
Applications: Oil and Hydrocarbons where flange insulation is arequirement.
• For use in either a flat face or raised face flanges.
• Manufactured from material with high dielectric strength to ensure minimum electrical contact between flanges.
*Max. temperature: 100°C - 200 to 105 core phenolic*
*Max. pressure: 40bar*
*Max. dielectric strength: 500 Volt/mm*

**Type F**
Applications: Oil and Hydrocarbons where flange insulation is a requirement.
• For use in either a flat face or raised face flange.
• Manufactured from material with high dielectric strength to ensure minimum electrical contact between flanges.
*Max. temperature: 100°C - 200 to 105 core phenolic*
*Max. pressure: 40bar*
*Max. dielectric strength: 500 Volt/mm*

**Type D**
Applications: Oil and Hydrocarbons where flange insulation is a requirement.
• For use in RTJ flange arrangements.
• Manufactured from material with high dielectric strength to ensure minimum electrical contact between flanges.
*Max. temperature: 100°C*
*Max. pressure: 40bar*
*Max. dielectric strength: 200 Volt/mm*

# Non-asbestos data sheet

## 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

### Availability

- Sheeting (m): 2.0 x 1.5*, 4.0 x 1.5, 1.5 x 1.0
- Thickness (mm): 0.25, 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 2.5, 3.0

** - Denotes standard sheet size*
*Also available with re-inforcements:*
*KLINGERsil C-4408, mild steel mesh*
*KLINGERsil C-4409, expanded mild steel*


## KLINGERsil C-4408

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

### General Properties

- Good resistance to oils, fuels, hydrocarbons
- Good creep resistance
- Very successful in internal combustion engine applications
- Graphite anti-stick finish on both sides

### Availability

- Sheeting (m): 2.0 x 1.5*, 4.0 x 1.5, 1.5 x 1.0
- Thickness (mm): 0.75, 1.0, 1.5

** - Denotes standard sheet size*
*Other Grades Available:*
*KLINGERsil C-4400, without reinforcement*
*KLINGERsil C-4409, mild steel reinforcement*
*KLINGERsil C-4409-L, with stainless steel reinforcement*

## KLINGERsil C-4430

Top quality Klingersil grade based on carbon fibre with a nitrile rubber binder with an expanded steel reinforcement. A premium quality sealing material with outstanding resistance to alkaline media and steam.

### 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

### Availability

- Sheeting (m): 2.0 x 1.5*, 4.0 x 1.5, 2.0 x 2.0, 1.5 x 1.0
- Thickness (mm): 0.25, 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0

** - Denotes standard sheet size*
*Also available with re-inforcements:*
*KLINGERsil C-4438, mild steel mesh*
*KLINGERsil C-4439, expanded mild steel*


## KLINGERsil C-4409

Top quality Klingersil grade based on carbon fibre with a nitrile rubber binder with an expanded steel reinforcement. 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

- Sheeting (m): 2.0 x 1.5*, 4.0 x 1.5, 1.5 x 1.0
- Thickness (mm):1.0, 1.5, 2.0, 3.0

** - Denotes standard sheet size*
*Also available without re-inforcements:*
*KLINGERsil C-4500*



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# Non-asbestos data sheet

## 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 resistance to oils, fuels, hydrocarbons
- 3xA anti-stick finish on both sides

### Availability

- Sheeting (m): 2.0 x 1.5*, 4.0 x 1.5, 1.5 x 1.0
- Thickness (mm): 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0

** - Denotes standard sheet size*
*Also available with re-inforcements:*
*KLINGERsil C-4509, expanded mild steel*


## 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

Sheeting (m): 2.0 x 1.5*, 1.5 x 1.0*, 4.0 x 1.5,* 2.0 x 2.0
Thickness (mm): 0.5, 0.75, 1.0, 1.5, 2.0, 3.0
** - Denotes standard sheet size*


## KLINGERsil C-4509

Top quality Klingersil grade based on carbon fibre with a nitrile rubber binder with an expanded steel reinforcement. 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 resistance to oils, fuels, hydrocarbons
- 3xA anti-stick finish on both sides

### Availability

- Sheeting (m): 2.0 x 1.5*, 4.0 x 1.5, 1.5 x 1.0
- Thickness (mm):1.0, 1.5, 2.0, 3.0

** - Denotes standard sheet size*
*Also available without re-inforcements:*
*KLINGERsil 4509*


## KLINGERsil C-6307

Specialist controlled swell grade based on aramid fibres with a blend of NR and SBR binders. Specifically designed for automotive applications.

### General Properties

- Premium grade, controlled-swell material.
- Available in sheet form and as cut gaskets
- 3xA anti-stick finish on both sides

### Availability

Sheeting (m): 2.0 x 1.5*, 1.5 x 1.0*, 4.0 x 1.5,* 2.0 x 2.0
Thickness (mm): 0.4, 0.5, 0.75, 1.0, 1.5, 2.0, 3.0
** - Denotes standard sheet size*

## KLINGERmilam-PSS

Klinger Milam 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 1000°C. However, the outstanding chemical resistance of mica makes the gasket suitable for a wide range of applications.

### General Properties

- Suitable for exhaust manifolds, turbines, turbochargers, air heat exchangers and burner ducting
- Low weight loss at high temperatures
- Excellent resistance to embrittlement
- Low thermal conductivity
- Flame retardant
- Good chemical resistance

### Availability

Sheeting (m): 1.2 x 1.0
Thickness (mm): 1.3, 3.0

# PTFE

## 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

### Availability

- Sheeting (m): 1.4 x 1.4*
- Thickness (mm): 1.0, 1.5, 2.0, 3.0

** Can be welded to form gaskets larger than sheet size*

## 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

### Availability

- Sheeting (m): 1.5 x 1.5 *
- Thickness (mm): 1.5, 2.0, 3.0
- Available in light beige both sides also in blue

** Can be welded to form gaskets larger than sheet size*

## 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

- Economical alternative to KLINGERtop-chem-2000
- Ideal for strongly acidic environments
- Good mechanical properties at low to medium temperatures

### Availability

- Sheeting (m): 1.5 x 1.5
- Thickness (mm): 1.5, 2.0, 3.0

** Can be welded to form gaskets larger than sheet size*


## 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

- Economical alternative to KLINGERtop-chem-2000
- Ideal for strongly alkaline environments
- Good mechanical properties at low to medium

### Availability

- Sheeting (m): 1.4 x 1.4 *
- Thickness (mm): 1.5, 2.0, 3.0

** Can be welded to form gaskets larger than sheet size*

## KLINGERsoft-chem

100% expanded PTFE manufactured to produce a soft, highly compressible gasket material with excellent chemical resistance and good creep properties.

### General Properties

- Excellent chemical resistance
- High compressibility
- Suitable for glass-lined and enamel flanges
- Seals worn or damaged flanges
- Low bolt load requirement

### Availability

- Sheeting (m): 1.5 x 1.5
- Thickness (mm): 1.0, 1.5, 2.0, 3.0

## PTFE Envelope

PTFE envelope gaskets comprise a compressed synthetic fibre gasket material insert with a PTFE envelope. The PTFE envelope protects the gasket from chemical attack. The insert provides the strength and resilience needed for demanding sealing operation



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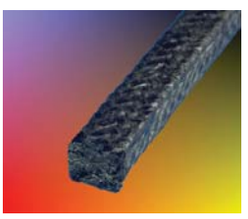
# Graphite

## Klinger 35 Die-Formed Graphite Rings

K35 die-formed rings are a result of industries requirement to find durable products able to offer improved sealing throughout a range of applications. This is the basis of K35 rings



## Klinger 40

An exceptional packing combining carbon and Inconel® to produce a product for sealing valve glands in high pressure and high temperature applications.

## Klinger 44

A high purity, high performance, graphite based packing for both valve and pump applications.

## Klinger 46

A carbon based high performance multiservice packing for both valve and pump applications.

## TopLine Packing 3222

The cost-effective, high performance valve & pump packing. Offering excellent sealing and operational reliability for both Original Equipment Manufacturers and plant users alike.

## TopLine Packing 3222W

High performance valve pump packing for high pressure, high temperature applications. Offering excellent sealing and operational reliability for both Original Equipment Manufacturers and plant users alike.

## Service Capabilities

When used in equipment in good mechanical condition and installed using our product guidelines the undernoted values apply:

| | Klinger 35 Die-Formed Graphite Rings | Klinger 40 | Klinger 44 | Klinger 46 | TopLine PaCking 3222 | TopLine PaCking 3222W |
|---|---|---|---|---|---|---|
| *Minimum operating Temperature* | *-240 °C* | *-100 °C* | *-240 °C* | *-240 °C* | *-200 °C* | *-200 °C* |
| *Maximum operating temperature* | *430 °C* | *430 °C* | *430 °C* | *430 °C* | *430 °C* | *430 °C* |
| *Maximum steam temperature* | *650 °C* | *650 °C* | *650 °C* | *650 °C* | *650 °C* | *650 °C* |
| *pH* | *0-14* | *0-14* | *0-14* | *0-14* | *0-14* | *0-14* |
| *Maximum static pressure* | *350 bar* | *200 bar* | *150bar** | *200 bar* | *280 bar* | *300 bar* |
| *Maximum dynamic pressure* | *20 bar* | - | *8 bar* | *8 bar* | - | - |
| *Maximum running speed* | *5 m/s* | *5 m/s* | *30 m/s* | *20 m/s* | - | - |

The packing should not be subjected to the maximums of temperature, pressure and speed simultaneously. For further advice please contact our technical department.

K35 rings should not be subjected to the maximums of temperature, pressure and speed simultaneously, for further advice please contact our technical department.

K3222 can also be used in pumping applications, please contact Klinger for further advice.

* *150bar (installed as main seal) and 680 bar (as anti-extrusion rings)*

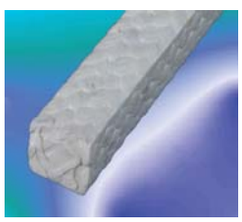
# PTFE

## Klinger 49

High performance multiservice packing for both valves & pumping applications.
Klingerlock braided from Gore GFO® filament yarns.

## Klinger 54S

An excellent choice for plant wide use on services to 2600C and 200 bar, especially when a high level of resistance to chemical attack is required.



## Klinger 54F

An excellent choice for plant wide use especially when a clean, noncontaminating packing is required with a high degree of chemical resistance.

## Klinger 55

New generation, multiservice packing for both valves & pumping applications. Klingerlock braided offering excellent sealing & reliability in high performance duties

## Klinger 54H

• Virtually all media including strong acids and strong alkalis
• PTFE packing for pumping applications requiring a pure, noncontaminating product with a high degree of resistance to chemical attack.

## Klinger 4322

A packing based on graphite enhanced PTFE. Allowing effective, long lasting sealing in both valves and high-speed pumps.

## Service Capabilities

When used in equipment in good mechanical condition and installed using our product guidelines the undernoted values apply:

| | Klinger 49 | Klinger 54F | Klinger 54H | Klinger 54S | Klinger 55 | Klinger 4322 |
|---|---|---|---|---|---|---|
| *Minimum operating Temperature* | *-240 °C* | *-240 °C* | *-240 °C* | *-240 °C* | *-200 °C* | *-240 °C* |
| *Maximum operating temperature* | *280 °C* | *260 °C* | *260 °C* | *280 °C* | *280 °C* | *280 °C* |
| *Maximum steam temperature* | *280 °C* | *260 °C* | *260 °C* | *280 °C* | *280 °C* | *280 °C* |
| *pH* | *0-14* | *0-14* | *0-14* | *0-14* | *0-14* | *0-14* |
| *Maximum static pressure* | *250 bar* | *200 bar* | - | *200 bar* | *250 bar* | *300 bar* |
| *Maximum dynamic pressure* | *20 bar* | - | - | - | *25 bar* | *25 bar* |
| *Maximum rotary pressure* | - | - | *10 bar* | - | - | - |
| *Maximum recip. pressure* | *200 bar* | - | *2 bar* | - | *250 bar* | - |
| *Maximum rotary speed* | - | - | *10 m/s* | *5 m/s* | - | - |
| *Maximum running speed* | *18 m/s* | - | - | - | *20 m/s* | *22 m/s* |

The packing should not be subjected to the maximums of temperature, pressure and speed simultaneously. For further advice please contact our technical department.



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# Synthetic

## Klinger 4330

High performance TopLine packing Manufactured form special synthetic fibers. For use in all rotary applications requiring a resilient, conformable packing grade.

## Klinger 10

A combination of Acrylic yarn and PTFE, producing an economic yet versatile synthetic packing, well suited to general service in valves and pumps.

## Klinger 11

A combination of Acrylic yarn and graphite, producing an economic yet versatile synthetic packing, well suited to general service in valves and pumps.

## Klinger 25

High strength aramid yarns Klingerlock braided to produce a packing for sealing within extreme pumping applications – rotary or reciprocating.

## Klinger 4303

A combination of selected glass fibre yarns and PTFE to produce a general valve and static seal packing.

## Klinger 4310

A combination of selected glass fibre yarns and graphite to produce a general valve and static seal packing.

## Klinger 4333

A universal packing, using lubricated polyimide filaments to produce a TopLine grade able to perform reliably in a wide range of services and equipment.

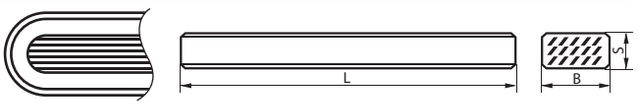
## Service Capabilities

When used in equipment in good mechanical condition and installed using our product guidelines the undernoted values apply:

| | Klinger 4330 | Klinger 10 | Klinger 11 | Klinger 25 | Klinger 4303 | Klinger 4310 | Klinger 4333 |
|---|---|---|---|---|---|---|---|
| *Minimum operating Temperature* | *-100 °C* | *-100 °C* | *-100 °C* | *-100 °C* | *-100 °C* | *-50 °C* | *-80 °C* |
| *Maximum operating temperature* | *280 °C* | *260 °C* | *300 °C* | *280 °C* | *290 °C* | *450 °C* | *260 °C* |
| *Maximum steam temperature* | *280 °C* | *260 °C* | *300 °C* | *280 °C* | *290 °C* | *450 °C* | *260 °C* |
| *pH* | *1-13* | *2-12* | *4-10* | *2-12* | *4-12* | *2-12* | *0-13* |
| *Maximum static pressure* | - | *100 bar* | *100 bar* | - | *80 bar* | *200 bar* | *200 bar* |
| *Maximum dynamic pressure* | - | *30 bar* | *40 bar* | *30 bar* | *10 bar* | - | *50 bar* |
| *Maximum rotary pressure* | *25 bar* | - | - | - | - | *20 bar* | - |
| *Maximum recip. pressure* | - | - | - | *100 bar* | - | *30 bar* | - |
| *Maximum rotary speed* | - | - | - | - | - | *5 m/s* | - |
| *Maximum running speed* | *7 m/s* | *10 m/s* | *15 m/s* | *20 m/s* | *15 m/s* | - | *10 m/s* |

The packing should not be subjected to the maximums of temperature, pressure and speed simultaneously. For further advice please contact our technical department.

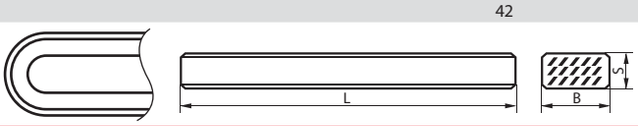

## Reflex Glasses
## A, B, H




| | Type A | | | | Type B | | | | Type H | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | L | B | S | WEIGHT G/PIECE | L | B | S | WEIGHT G/PIECE | L | B | S | WEIGHT G/PIECE |
| 0 | - | - | - | - | 95 | 34 | 17 | 110 | - | - | - | - |
| I | 115 | 30 | 17 | 118 | 115 | 34 | 17 | 132 | 115 | 34 | 22 | 176 |
| II | 140 | 30 | 17 | 146 | 140 | 34 | 17 | 162 | 140 | 34 | 22 | 214 |
| III | 165 | 30 | 17 | 176 | 165 | 34 | 17 | 195 | 165 | 34 | 22 | 254 |
| IV | 190 | 30 | 17 | 200 | 190 | 34 | 17 | 228 | 190 | 34 | 22 | 294 |
| V | 220 | 30 | 17 | 237 | 220 | 34 | 17 | 264 | 220 | 34 | 22 | 344 |
| VI | 250 | 30 | 17 | 265 | 250 | 34 | 17 | 301 | 250 | 34 | 22 | 392 |
| VII | 280 | 30 | 17 | 303 | 280 | 34 | 17 | 338 | 280 | 34 | 22 | 445 |
| VIII | 320 | 30 | 17 | 334 | 320 | 34 | 17 | 387 | 320 | 34 | 22 | 503 |
| IX | 340 | 30 | 17 | 359 | 340 | 34 | 17 | 410 | 340 | 34 | 22 | 536 |
| X | - | - | - | - | 370 | 34 | 17 | 461 | - | - | - | - |

| KLINGER Guage Glass | Type A1 | | Type B1 | | Type H | |
|---|---|---|---|---|---|---|
| Applicational Range Reflex Glasses | Bar | °C | Bar | °C | Bar | °C |
| For Media with no significant glass attack e.g, oil , hydrocarbon | 400 | 120 | 265 | 120 | 300 | 120 |
| | 150 | 400 | 180 | 400 | 200 | 400 |
| | 0-10 | 430 | 0-10 | 430 | 0-10 | 430 |
| For Media with no significant glass attack e.g, saturated steam ,HPHW ,alkalis | 35 | 243 | 35 | 243 | 2 | 253 |
| | | | | | 42 | |

## Transparent glasses
## A, B, H, TA 28




| | Type A | | | | Type B | | | | Type H | | | | TYPE TA 28 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | L | B | S | WEIGHT G/PIECE | L | B | S | WEIGHT G/PIECE | L | B | S | WEIGHT G/PIECE | L | B | S | WEIGHT G/PIECE |
| I | 115 | 30 | 17 | 122 | 115 | 34 | 17 | 137 | - | - | - | - | 113 | 27.6 | 16.8 | 114 |
| II | 140 | 30 | 17 | 152 | 140 | 34 | 17 | 172 | 140 | 34 | 22 | 218 | - | - | - | - |
| III | 165 | 30 | 17 | 176 | 165 | 34 | 17 | 204 | 165 | 34 | 22 | 260 | 163 | 27.6 | 16.8 | 168 |
| IV | 190 | 30 | 17 | 211 | 190 | 34 | 17 | 238 | 190 | 34 | 22 | 302 | 188 | 27.6 | 16.8 | 194 |
| V | 220 | 30 | 17 | 250 | 220 | 34 | 17 | 280 | 220 | 34 | 22 | 357 | 218 | 27.6 | 16.8 | 226 |
| VI | 250 | 30 | 17 | 280 | 250 | 34 | 17 | 317 | 250 | 34 | 22 | 400 | 248 | 27.6 | 16.8 | 258 |
| VII | 280 | 30 | 17 | 314 | 280 | 34 | 17 | 356 | 280 | 34 | 22 | 460 | 278 | 27.6 | 16.8 | 290 |
| VIII | 320 | 30 | 17 | 360 | 320 | 34 | 17 | 407 | 320 | 34 | 22 | 530 | 318 | 27.6 | 16.8 | 334 |
| IX | 340 | 30 | 17 | 387 | 340 | 34 | 17 | 430 | 340 | 34 | 22 | 562 | 338 | 27.6 | 16.8 | 356 |
| X | - | - | - | - | 370 | 34 | 17 | 480 | - | - | - | - | - | - | - | - |

| KLINGER Guage Glass | Type A1 | | Type B1 | | Type H | | Type TA 28 4 | |
|---|---|---|---|---|---|---|---|---|
| Applicational Range Transparent Glasses | Bar | °C | Bar | °C | Bar | °C | Bar | °C |
| For Media with no significant glass attack e.g, oil , hydrocarbon | 240 | 120 | 290 | 120 | 340 | 120 | - | - |
| | 160 | 400 | 200 | 400 | 230 | 400 | - | - |
| | 0-10 | 430 | 0-10 | 430 | 0-10 | 430 | - | - |
| For Media with no significant glass attack e.g, saturated steam ,HPHW ,alkalis | 2 | 243 | 2 | 243 | 2 | 253 | 3 | 324 |
| | 35 | 300 | 35 | 300 | 42 | 300 | 120 | 356 |
| | 70 | | 85 | | 85 | | 80 | |

1)Glass type to OeNORM M 7354 or DIN 7081
2)For steam pressures above 35 bar we recommend the use of transparent glass with mica shields
3)For steam pressures above 120 bar only TA 28 glasses size I may be used.
4)TA Glasses may only be used with mica shields.

*All measurements in mm*



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## NEOPRENE

Neoprene has good resistance to aging, ozone and weathering. It also has good physical properties and resilience. It is resistant to a range of dilute chemicals and mineral oils. Neoprene is not suitable for use with fuels. Temperature range -50 to 110 deg C 160 deg C

## SILICON (VMQ)

The silicon range of rubbers offer excellent high and low temperature properties, far superior to any other grades. They are also unaffected by sunlight and ozone. They are unsuitable for use against steam and many hydrocarbons. Temperature range -70 to 250 deg C

## BUTYL (IIR)

Butyl rubber offers excellent resistance to acidic and alkaline environments. Excellent weathering properties and ozone resistance. Low permeability to gases. Poor resistance to mineral oils. Temperature range - 40 to 130 deg C

## HYPALON

Hypalon is noted for its good resistance to corrosive chemicals, ozone and weathering. It also exhibits good aging, abrasion and heat resistance properties. Hypalon also has low gas permeability. Hypalon offers poor resistance to fuels. Temperature range -50 to 160 deg C

## EPDM Rubber

EPDM is recommended for use where resistance to sunlight, weather, steam, water and ozone attack is important. Suitable for use with phosphate ester-based hydraulic fluids and many mineral acids.

## Natural Rubber

Natural rubber is a good general purpose gasket material. Recommended for use in less demanding situations with air, water, weak acids and alkalis.

## NBR-SBR Rubber

Nitrile based rubbers are recommended for use where resistance to mineral oils, alcohols and petroleum is required. It is not recommended for use in sunlight or near sparking electrical apparatus.

## Nitrile Rubber

Nitrile rubbers are recommended for use where resistance to mineral oils, alcohols and petroleum is required. It is not recommended for use in sunlight or near sparking electrical apparatus.

## VITON® Rubber

Viton® rubber is recommended for use where chemical resistance is required to mineral oils, alcohols and petroleum is required especial under hot conditions. Suitable for hydrocarbon, acids and alkalines and also high temperatures.

## 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 lowtemperature 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.

# Rubber O-ring

## Description

O-Rings offer the designer an efficient and economical-sealing element for a wide range of static or dynamic applications.
Inexpensive production methods and its ease of use have made the O-Ring the most widely used seal.
A wide choice of elastomer materials for both standard and special applications allow the O-Ring to be used to seal practically all liquid and gaseous media.
O-Rings are vulcanised in moulds and are characterised by their circular form with annular cross section. The dimensions of the O-Ring are defined by the inside diameter d1 and the cross section d2.
Cross sections of approx. 0.35 to 40 mm and inside diameters up to 5,000 mm and more are available.

## Applications

O-Rings are used as sealing elements or as energising elements for hydraulic slipper seals and wipers and thus cover a large number of fields of application. There are no fields of industry where the O-Ring is not used. From an individual seal for repairs or maintenance to a quality assured application in aerospace, automotive or generalengineering. The O-Ring is used predominantly for static sealing applications:
• As a radial static seal, e.g. for bushings, covers, pipes, cylinders
• GAs an axial static seal, e.g. for flanges, plates, caps.
O-Rings in dynamic applications are recommended only for moderate service conditions. They are limited by the speed and the pressure against which they are to seal:
• For low duty sealing of reciprocating pistons, rods, plungers, etc.

## General field of application

The various elastomers can be characterised as follows:

### **NBR** (Nitrile Butadiene Rubber)

The properties of the Nitrile Rubber depend mainly on the ACN content which ranges between 18% and 50%. In general they show good mechanical properties. The operating temperatures range between -30°C and +100°C (for a short period of time up to +120°C). Suitable formulated NBR can be used down to -60°C.
NBR is mostly used with mineral based oils and greases.

### **FKM** (Fluorocarbon Rubber, VITON)

Depending on structure and fluorine content FKM materials can differ with regards to their chemical resistance and cold-flexibility. FKM is known especially for its non-flammability, low gas permeability and excellent resistance to ozone, weathering and aging.
The operating temperatures of the Fluorocarbon Rubber range between -20°C and +200°C (for a short period of time up to +230°C). Suitable formulated FKM can be used down to -35°C. FKM is also often used with mineral based oils and greases at high temperatures.

### **EPDM** (Ethylene Propylene Diene Rubber)

EPDM shows good heat, ozone and aging resistance. In addition they also exhibit high levels of elasticity, good low temperature behaviour as well as good insulating properties.
The operating temperatures of applications for EPDM range between -45°C and +150°C (for a short period of time up to +175°C). With sulphur cured types the range is reduced to -45°C and +120°C (for short period of time up to +150°C).
EPDM can often be found in applications with brake fluids (based on glycol) and hot water.

### **Q** (Silicone Rubber)

Silicone rubber shows excellent heat resistance, cold flexibility, dielectric properties and especially good resistance against oxygen and ozone.
Depending on the material the operating temperatures ranges between -60°C and +200°C (for a short period of time even up to +230°C). Special types can be used down to -90°C. There are also some types with narrow temperature ranges. Silicone is often used in the medical- and food industry.

### **CR** (Chloroprene Rubber)

In general the CR materials show relatively good resistances to ozone, weathering, chemicals and aging. Also they show good non-flammability, good mechanical properties and cold flexibility.
The operating temperatures range between -40°C and +100°C (for a short period of time up to +120°C). Special types can be used down to -55°C.
CR materials are found in sealing applications such as refrigerants, for outdoor applications and in the glue industry.

### **FFKM** (Perfluoro Rubber)

Perfluoroelastomers show broad chemical resistance similar to PTFE as well as good heat resistance. They show low swelling with almost all media.
Depending on the material the operating temperatures range between -25°C and +240°C. Special types can be used up to +325°C.



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# Gasket Selection

## Comparing Sheet

## Comparing sheet

| ITEM | KLINGER CAT | MATERIAL | TEMP ( C ) | " PRESSUR(BAR)" | MEDIA |
|---|---|---|---|---|---|
| 1 | SIL C-4500 | CARBON FIBER WITH NBR | -200 TO 400 | 100 | oil- hydrocarbons alkalis- steam |
| 2 | SIL C-4509 | CARBON FIBER WITH NBR-EXPANDED METAL INSERT | -200 TO 400 | 100 | oil- hydrocarbons alkalis- steam |
| 3 | SIL C-4400 | ARAMIDE FIBER WITH NBR | -200 TO 400 | 100 | oils-steam-fules gases, water |
| 4 | SIL C-6307 | ARAMID FIBER WITH NBR&SBR | -200 TO 400 | 80 | OIL, WATER,WHERE BOLT LOAD IS LIMITED |
| 5 | SIL C-4409 | ARAMIDE FIBER WITH NBR-EXPANDED STEEL MESH WITH SS316 | -200 TO 400 | 100 | oils-steam-fules-gases water, high pressure & temprature |
| 6 | SIL C-4408 | ARAMIDE FIBER WITH NBR -WIRE REINFORCED WITH SS316 | -200 TO 400 | 100 | oils-steam-fules gases, water, high pressure & temprature |
| 7 | SIL C-4430 | GLASS FIBER WITH NBR | -200 TO 400 | 100 | oils-steam- hydrocarbons oxygen-potable application |
| 8 | SIL C-8200 | GLASS FIBER WITH HAPLON | -200 TO 400 | 80 | ACIDS & ALKALIS OILS FULES |
| 9 | K1000 | ASBESTIOS FIBER SBR & REINFORCE SS316 | 550 | 200 | HOT OILS THERMAL FULIDES |
| 10 | KLINGER-MARK100 | "CHRYSOTILE ASBESTOSWHIT SBR" | 510 | 100 | OILS -PETROCHEMICAL STATES |
| 11 | KLINGERIT 3*A | "CHRYSOTILE ASBESTOSWHIT SBR" | 550 | 130 | STEAM & COMPREESED AIR OTHER GASES CHEMICALS & ORGANIC COMPOUNDS |
| 12 | TOP-CHEM-2005 | FILLED PTFE | -200-TO -250 | 150 | "FOR WIDE RANGE OF APPLICATION WITH THECHEMICALS INDUSTERY INCLUDE STRONG ACIDS " |
| 13 | SOFT CHEM | EXPANDED PTFE | -200 TO 250 | 200 | VIRTUALLY ALL MEDIA & WHERE FLANGES ARE DELICATE OR BOLT LAOD IS LIMITED |
| 14 | TOP-CHEM-2003 | FILLED PTFE | -200 TO 300 | 200 | VIRTUALLY ALL MEDIA & WHERE FLANGES ARE DELICATE OR BOLT LAOD IS LIMITED |
| 15 | TOP-CHEM-2006 | FILLED PTFE | -200 TO 250 | 150 | "FOR WIDE RANGE OF APPLICATION WITH THECHEMICALS INDUSTERY INCLUDE STRONG ACIDS " |
| 16 | TOP-CHEM-2000 | Premium grade heavy-duty modified PTFE | -200 UP TO 300 | 200 | aggressive chemicals steam and oxygen applications |
| 17 | TOP-GRAPH-2000 | EXPANDED GRAPHITE & SYNTETIC FIBER | -200 TO 400 | 100 | STEAM & HOT WATER OILS & HYDROCARBONS |
| 18 | GRAFITE PSM/AS | GRA WITH A THANGED WITH SS316, ANTI STICK ,FINISH | -200 UP TO 500 | 200 | STEAM,HOT WATER THERMAL OILS & HYDROCARBONS |
| 19 | KLINGER SLS-AS | GRAPHITED WITH SS316 FOLIS REINFORCED | -200 UP TO 500 | 175 | STEAM,HOT WATER THERMAL OILS & HYDROCARBONS |
| 20 | MILAM -PSS | High Temperature Mica Laminate | 900 | - | Used in high temperature application, such as exhaust manifolds and heat shields |
| 21 | STATITE | Impregnated Paper | 120 | 8 | Low pressure applications with oil and fuel |





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| NOM PIPE SIZE (IN) | SEALING ELEMENT | | | | | | | CENTERING RING OUTER DIAMETER | | | | | | | INNER RING INSIDE DIAMETER | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INSIDE DIAMETER | | | | | OUTER DIAMETER | | CLASS RATING | | | | | | | CLASS RATING | | | | |
| | 150 300 | 400 600 | 900 | 1500 | 2500 | 150,300 400,600 | 900,1500 2500 | 150 | 300 | 400 | 600 | 900 | 1500 | 2500 | 150-300 | 400-600 | 900 | 1500 | 2500 |
| 1/2 | 19.10 | 19.10 | - | 19.10 | 19.10 | 31.80 | 31.80 | 47.80 | 54.10 | - | 54.10 | - | 63.50 | 69.90 | 14.20 | 14.20 | - | 14.20 | 14.20 |
| 3/4 | 25.40 | 25.40 | - | 25.40 | 25.40 | 39.60 | 39.60 | 57.20 | 66.80 | - | 66.80 | - | 69.90 | 76.20 | 20.60 | 20.60 | - | 20.60 | 20.60 |
| 1 | 31.80 | 31.80 | - | 31.80 | 31.80 | 47.80 | 47.80 | 66.80 | 73.20 | - | 73.20 | - | 79.50 | 85.90 | 26.90 | 26.90 | - | 26.90 | 26.90 |
| 1-1/4 | 47.80 | 47.80 | - | 39.60 | 39.60 | 60.50 | 60.50 | 76.20 | 82.60 | - | 82.60 | - | 88.90 | 104.90 | 38.10 | 38.10 | - | 38.10 | 38.10 |
| 1-1/2 | 54.10 | 54.10 | - | 47.80 | 47.80 | 69.90 | 69.90 | 85.90 | 95.30 | - | 95.30 | - | 98.60 | 117.60 | 44.50 | 44.50 | - | 44.50 | 44.50 |
| 2 | 69.90 | 69.90 | - | 58.70 | 58.70 | 85.90 | 85.90 | 104.90 | 111.30 | - | 111.30 | - | 143.00 | 146.10 | 55.60 | 55.60 | - | 55.60 | 55.60 |
| 2-1/2 | 82.60 | 82.60 | - | 69.90 | 69.90 | 98.60 | 98.60 | 124.00 | 130.30 | - | 130.30 | - | 165.10 | 168.40 | 66.50 | 66.50 | - | 66.50 | 66.50 |
| 3 | 101.60 | 101.60 | 95.30 | 92.20 | 92.20 | 120.70 | 120.70 | 136.70 | 149.00 | - | 149.00 | 168..4 | 174.80 | 196.90 | 81.00 | 81.00 | - | 81.00 | 81.00 |
| 4 | 127.00 | 120.70 | 120.70 | 117.60 | 117.60 | 149.40 | 149.40 | 174.80 | 181.10 | 177.80 | 193.80 | 206.50 | 209.60 | 235.00 | 106.40 | 106.40 | - | 106.40 | 106.40 |
| 5 | 155.70 | 147.60 | 147.60 | 143.00 | 143.00 | 177.80 | 177.80 | 196.90 | 215.90 | 212.90 | 241.30 | 247.70 | 254.00 | 279.40 | 131.80 | 131.80 | - | 131.80 | 131.80 |
| 6 | 182.60 | 174.80 | 174.80 | 171.50 | 171.50 | 209.60 | 209.60 | 222.30 | 251.00 | 247.70 | 266.70 | 289.10 | 282.70 | 317.50 | 157.20 | 157.20 | 157.20 | 157.20 | 157.20 |
| 8 | 233.40 | 225.60 | 222.30 | 215.90 | 215.90 | 263.70 | 257.30 | 279.40 | 308.10 | 304.80 | 320.80 | 358.90 | 352.60 | 387.40 | 215.90 | 209.60 | 209.60 | 206.20 | 200.20 |
| 10 | 287.30 | 274.60 | 276.40 | 266.70 | 270.00 | 317.50 | 311.20 | 339.90 | 362.00 | 358.90 | 400.10 | 435.10 | 435.10 | 476.30 | 268.20 | 260.40 | 260.40 | 257.80 | 247.70 |
| 12 | 339.90 | 327.20 | 323.90 | 323.90 | 317.50 | 374.70 | 368.30 | 409.70 | 422.40 | 419.10 | 457.20 | 498.60 | 520.70 | 549.40 | 317.50 | 317.50 | 314.50 | 314.50 | 292.10 |
| 14 | 371.60 | 362.00 | 355.60 | 362.00 | - | 406.40 | 400.10 | 450.90 | 485.90 | 482.60 | 492.30 | 520.70 | 57.90 | - | 349.30 | 349.30 | 342.90 | 339.90 | |
| 16 | 422.40 | 412.80 | 412.80 | 406.40 | - | 463.60 | 457.20 | 514.40 | 539.80 | 536.70 | 565.20 | 574.80 | 641.40 | - | 400.10 | 400.10 | 393.70 | 387.40 | |
| 18 | 474.70 | 469.90 | 463.60 | 463.60 | - | 527.10 | 520.70 | 549.40 | 596.90 | 593.90 | 612.90 | 638.30 | 704.90 | - | 449.30 | 449.30 | 444.50 | 438.20 | |
| 20 | 525.50 | 520.70 | 520.70 | 514.40 | - | 577.90 | 571.50 | 606.60 | 654.10 | 647.70 | 682.80 | 698.50 | 755.70 | - | 500.10 | 500.10 | 495.30 | 489.00 | |
| 24 | 628.70 | 628.70 | 628.70 | 616.00 | - | 685.80 | 679.50 | 717.60 | 774.70 | 768.40 | 790.70 | 838.20 | 901.70 | - | 603.30 | 603.30 | 606.30 | 577.90 | |

| NOM PIPE SIZE (IN) | CLASS 150 | | | 300 | | | 400 | | | 600 | | | 900 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GAS KET | | CENTERIN RING | GAS KET | | CENTERIN RING | GAS KET | | CENTERIN RING | GAS KET | | CENTERIN RING | GAS KET | | CENTERIN RING |
| | IN DIA | OUT DIA | OUT DIA | IN DIA | OUT DIA | OUT DIA | IN DIA | OUT DIA | OUT DIA | IN DIA | OUT DIA | OUT DIA | IN DIA | OUT DIA | OUT DIA |
| 26 | 673.1 | 704.9 | 774.7 | 685.8 | 736.6 | 835.2 | 685.8 | 736.6 | 831.9 | 685.8 | 736.6 | 866.9 | 685.8 | 736.6 | 882.7 |
| 28 | 723.9 | 755.7 | 831.9 | 736.6 | 787.4 | 898.7 | 736.6 | 787.4 | 892.3 | 736.6 | 787.4 | 914.4 | 736.6 | 787.4 | 946.2 |
| 30 | 774.7 | 806.5 | 882.7 | 793.8 | 844.6 | 952.5 | 793.8 | 844.6 | 946.2 | 793.8 | 844.6 | 971.6 | 793.8 | 844.6 | 1009.7 |
| 32 | 825.5 | 860.6 | 939.8 | 850.9 | 901.7 | 1006.6 | 850.9 | 901.7 | 1003.3 | 850.9 | 901.7 | 1022.4 | 850.9 | 901.7 | 1073.2 |
| 34 | 876.3 | 911.4 | 990.6 | 901.7 | 952.5 | 1057.4 | 901.7 | 952.5 | 1054.1 | 901.7 | 952.5 | 1073.2 | 901.7 | 952.5 | 1136.7 |
| 36 | 927.1 | 968.5 | 1047.8 | 955.8 | 1006.6 | 1117.6 | 955.8 | 1006.6 | 1117.6 | 955.8 | 1006.6 | 1130.3 | 958.9 | 1009.7 | 1200.2 |
| 38 | 977.9 | 1019.3 | 1111.3 | 977.9 | 1016 | 1054.1 | 971.6 | 1022.4 | 1073.2 | 990.6 | 1041.4 | 1104.9 | 1035.1 | 1085.9 | 1200.2 |
| 40 | 1028.7 | 1070.1 | 1162.1 | 1022.4 | 1070.1 | 1114.6 | 1025.7 | 1076.5 | 1127.3 | 1047.8 | 1098.6 | 1155.7 | 1098.6 | 1149.4 | 1251 |
| 42 | 1079.5 | 1124 | 1219.2 | 1073.2 | 1120.9 | 1165.4 | 1076.5 | 1127.3 | 1178.1 | 1104.9 | 1155.7 | 1219.2 | 1149.4 | 1200.2 | 1301.8 |
| 44 | 1130.3 | 1178.1 | 1276.4 | 1130.3 | 1181.1 | 1219.2 | 1130.3 | 1181.1 | 1231.9 | 1162.1 | 1212.9 | 1270 | 1206.5 | 1257.3 | 1368.6 |
| 46 | 1181.1 | 1228.9 | 1327.2 | 1178.1 | 1228.9 | 1273.3 | 1193.8 | 1244.6 | 1289.1 | 1212.9 | 1263.7 | 1327.2 | 1270 | 1320.8 | 1435.1 |
| 48 | 1231.9 | 1279.7 | 1384.3 | 1235.2 | 1286 | 1324.1 | 1244.6 | 1295.4 | 1346.2 | 1270 | 1320.8 | 1390.7 | 1320.8 | 1371.6 | 1485.9 |
| 50 | 1282.7 | 1333.5 | 1435.1 | 1295.4 | 1346.2 | 1378 | 1295.4 | 1346.2 | 1403.4 | 1320.8 | 1371.6 | 1447.8 | - | - | - |
| 52 | 1333.5 | 1384.3 | 1492.3 | 1346.2 | 1397 | 1428.8 | 1346.2 | 1397 | 1454.2 | 1371.6 | 1422.4 | 1498.6 | - | - | - |
| 54 | 1384.3 | 1435.1 | 1549.4 | 1403.4 | 1454.2 | 1492.3 | 1403.4 | 1454.2 | 1517.7 | 1428.8 | 1479.6 | 1555.8 | - | - | - |
| 56 | 1435.1 | 1485.9 | 1606.6 | 1454.2 | 1505 | 1543.1 | 1454.2 | 1505 | 1568.5 | 1479.6 | 1530.4 | 1612.9 | - | - | - |
| 58 | 1485.9 | 1536.7 | 1663.7 | 1511.3 | 1562.1 | 1593.9 | 1505 | 1555.8 | 1619.3 | 1536.7 | 1587.5 | 1663.7 | - | - | - |
| 60 | 1536.7 | 1587.5 | 1714.5 | 1562.1 | 1612.9 | 1644.7 | 1568.5 | 1619.3 | 1682.8 | 1593.9 | 1644.7 | 1733.6 | - | - | - |