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KLINGER

GENERAL PRODUCT CATALOGUE

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Gasket Selection

Klinger gasket selection guide:

With a heightened awareness of safety and environmental issues, reducing leaks from flanged assemblies has become a major priority for industry. It is therefore important for companies who use gaskets to choose the correct material for the job and to install and maintain it correctly to ensure optimum performance.
A gasket must be suitable for the application and be able to work in specific chemical or product environments, in cryogenic or high temperatures and be capable of withstanding the internal pressure being sealed.
Generally, as the internal pressure rises, the assembly stress required to seal the application increases and therefore higher pressure applications require a gasket material capable of withstanding high assembly loads. This is the major reason why semi-metallic and metallic gaskets are selected for high pressure applications.

Limitations in Steam

Steam duty is perhaps the most common and one of the most arduous gasket applications. It is very difficult for many reasons including:
1.Steam is a powerful hydrolyser capable of changing the nature of many polymers and fibres.
2. Saturated steam has a distinct temperature/pressure relationship. The higher the steam temperature the higher the steam pressure. The higher the pressure the higher is the required gasket stress. The higher the gasket stress the lower is the maximum recommended temperature.
3. Many materials harden in steam leading in some cases to embrittlement. This is particularly true for most asbestos free calendared materials.

When discussing temperature limits in steam only approximate guide lines can be offered because of considerations such as:
Flange design
Gasket thickness
The service life required.
Assembly techniques
Maintenance procedures.
The degree of acceptable embrittlement of the gasket

If the gasket is to be subjected to non-static loading and stress fluctuations due to temperature and pressure cycling, it is advisable to select a gasket material which is not prone to embrittlement with increasing temperature (e.g. Graphite Laminates or top-chem-2000). In cyclic loading conditions we recommend a minimum surface stress of 30MPa.
Bearing this in mind we suggest the following guidelines for maximum steam temperatures for Klinger materials:

Material Type	Material	Recommended maximum Steam temperature
Semi Metallic	Metallic element/graphite	500 C
Graphite laminates	Graphite laminate PSM-AS, SLS	450 C
Premium Modified PTFE	top-chem-2000	260 °C
Multilayer Compressed Fibre	top-sil-ML1	250 °C
Premium Compressed Fibre	KLINGERSIL C-4430, C-4500, top-graph-2000	200 °C
Standard Compressed Fibre	KLINGERSIL C-4400, C-4243, C-6327	150 °C

The above values are for guidance only. Higher temperatures can be accommodated if the service is static or the gasket is highly loaded. Conversely, the temperatures should be reduced if the conditions are highly cyclic or if sufficient load cannot be guaranteed. If in doubt please consult Klinger Technical Department.

Low temperature duty.

Elastomers undergo a glass transition at low temperatures. For standard rubber grades such as NBR and SBR, this point is reached between -30°C to -40°C. As the rubber passes through the glass transition, it becomes brittle and any additional stress on the material may cause cracking. KLINGERSIL grades, which contain only a small proportion of rubber and have a protective network of fibres, may be used at temperatures below the glass transition point of the rubber.
The minimum temperature at which the materials will operate successfully is dependent on the application and method of assembly.
For successful service at low temperatures the following points must be observed:
• The gasket is completely dry when installed • The flange is assembled at ambient temperature • The flange material and bolt material are capable of functioning at the low temperature • The gasket is not retorqued at low temperature
Provided the above practices are adopted the following general guidelines for minimum gasket service temperature apply:-

- *Natural rubber -70 °C • Neoprene rubber -40 °C • Nitrile rubber -40 °C*
- *Viton rubber -15 °C • Klinger Quantum –196 °C • KLINGERSIL C4400 -196 °C*
- *KLINGERSIL C4430 -196 °C • KLINGERSIL – C4500 -196 °C • TG 2000 -196 °C*
- *Klinger PSM & SLS -200 °C • Softchem & Sealex -196 °C*
- *Topchem grades -200 °C • Maxiflex or Maxiprofile graphite laminations -200 °C*
- *Maxiflex or Maxiprofile PTFE laminations -200 °C*

KLINGERSIL Jointing Material

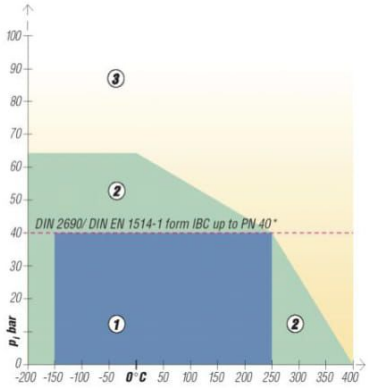
Klinger is a world leader in the manufacture of non asbestos calendered sheet materials. The reputation for supplying reliable high quality sheet gasket materials has been built up over many generations and Klinger has been at the forefront, leading by example, with the development of an entire range of non asbestos Klingersil and unique propriety sheet gasket materials to suit all gasket applications.
Klinger applies its patented 3XA finish to the majority of the grades of material it manufactures and supplies, which give the customer the peace of mind that the gaskets used will not result in flange corrosion or adhere to the flange face.
Attention to detail provides the Klingersil range with unsurpassed consistency and performance levels. Testing is performed with a certified system according to International and Australian Quality Assurance Standards. This testing compares results within and across batches, and between Klinger manufacturing companies world wide.
This attention to detail does not only consist of product testing, but also includes continuous R&D, and control of raw materials.
When specifying a jointing material do not settle for inferior quality, specify Klinger.

The many and varied demands made on gaskets

The successful operation of a gasket depends upon a multiplicity of factors. Many who use static gaskets believe that the values quoted for maximum admissible temperature and maximum operating pressure are inherent properties or characteristics of gaskets and gasket materials.
Unfortunately, this is not the case. The maximum temperatures and pressures at which gaskets may be used are influenced by a large number of factors. Therefore a definite statement of these values for gasket material is not possible.

pT diagram

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. Always refer to the chemical resistance of the gasket to the fluid.



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.

Pre cut gaskets

Klinger sheet jointing can be converted into Ring Face or Full Face gaskets to meet the requirements of all known international standards or customer specific profiles in material thicknesses from 0.25 mm to 6mm.

The standard available sheet sizes for Klinger Jointing materials in various grades are 1500 x 2000 mm, 1500mm x 4000mm, 2000 mm x 2000 mm and 2000mm x 6000 mm.

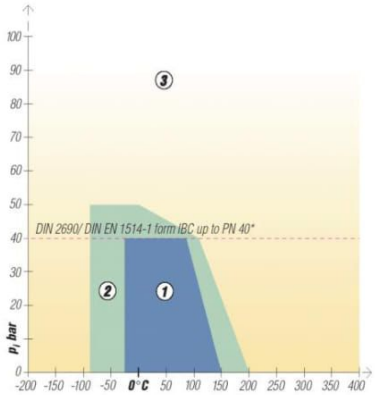
KLINGERSIL® C-4243

Characteristic & main applications

Universal gasket material for general industrial applications. Suitable as a gasket material for water, oils , hydrocarbons ,liquids and gases at lower pressure and temperatures.

Material

Based on organic fibres bound with NBR.



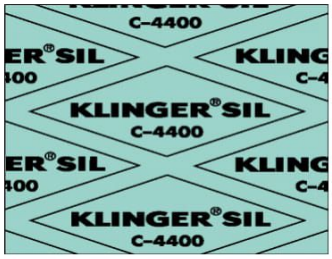
Technical Data - Typical values

Compressibility ASTM F 36 J	8%
Recovery ASTM F 36 J min.	55%
Stress relaxation DIN 52913, 50 MPa, 16 h/175 °C,	MPa 24
Klinger cold/hot compression, 50 MPa	
thickness decrease at 23°C	10%
thickness decrease at 200°C	25%
Tightness acc.DIN 3535/6	mg/s x m <0,1
Thickness increase ASTM F 146	
oil JRM 903: 5 h/150 °C	5%
fuel B: 5 h/20 °C	7%
Density	g/cm3 1,75

For International approvals and certification on all materials please contact Klinger. Certain grades are available with wire or expanded metal reinforcement.

KLINGERSIL Jointing Material

KLINGERSIL® C-4400

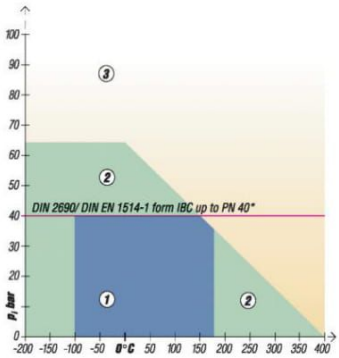


Characteristic & main applications

Universal high-pressure gasket material suitable for use in many branches of the chemical, food and the water supply industry. Very high standard of performance.
Resistant to oils, water, steam, gases, salt solutions, fuels, alcohols, organic and inorganic acids, hydrocarbons, lubricants and refrigerants.

Material

Aramid fibres bonded with NBR.



Technical Data - Typical values for 2 mm thickness.

Compressibility ASTM F 36 J	11%
Recovery ASTM F 36 J min.	55%
Stress relaxation DIN 52913,	
50 MPa, 16 h/175 °C,	MPa 32
50 MPa, 16 h/300 °C,	MPa 25
Stress relaxation BS 7531	
40 Mpa,16 h/300 °C	MPa 23
Klinger cold/hot compression,	50 MPa
thickness decrease at 23°C	10%
thickness decrease at 300°C	20%
Tightness accDIN 3535/6 mg/sm	0.02
Thickness increase ASTM F 146	
oil JRM 903: 5 h/150 °C	3%
fuel B: 5 h/23 °C	5%
Density g/cm3	1,60

Meets the technical requirements of BS 7531:2006 Grade AY

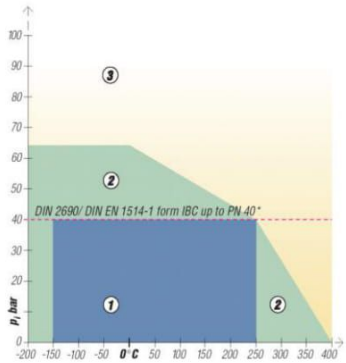
KLINGERSIL® C-4430

Characteristic & main applications

Premium quality, high-pressure gasket material with outstanding stress relaxation and outstanding resistance to hot water and steam as well as to oils and hydrocarbons. Has AS4020 potable water certification. Is fire safe and AGA approved

Material

Optimum combination of synthetic and glass fibres bonded with NBR.

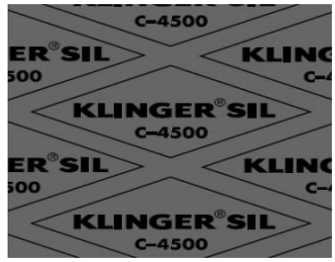


Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J	9%
Recovery ASTM F 36 J min.	50%
Stress relaxation DIN 52913	
50 MPa, 16 h/300 °C	MPa 35
50 MPa, 16 h/175 °C	MPa 39
Stress relaxation BS 7531	
40 MPa, 16 h/300 °C	MPa 31
Klinger cold/hot compression	50 MPa
thickness decrease at 23 °C	8%
thickness decrease at 300°C	11%
Tightness accDIN 3535/6 mg/sm	0.1
Thickness increase ASTM F 146	
oil JRM 903: 5 h/150 °C	3%
fuel B: 5 h/23 °C	5%
Density g/cm3	1,75

Meets the technical requirements of BS 7531:2006 Grade AX

KLINGERSIL® C-4500

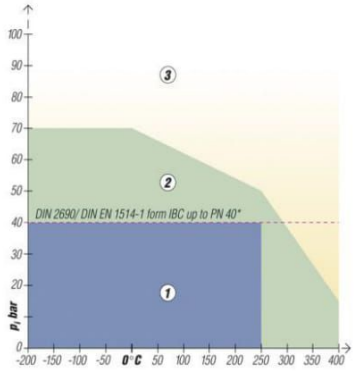


Characteristic & main applications

Premium quality high-pressure gasket especially suitable for use with high temperature alkaline media and superheated steam.
A superior performance product designed for use in the chemical industry.

Material

Carbon fibres and special heat resistant additives bonded with NBR.



Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J	11%
Recovery ASTM F 36 J min.	60%
Stress relaxation DIN 52913	
50 MPa, 16 h/300 °C	MPa 32
50 MPa, 16 h/175 °C	MPa 35
Stress relaxation BS 7531	
40 MPa, 16 h/300 °C	MPa 30
Klinger cold/hot compression	50 MPa
thickness decrease at 23 °C	10%
thickness decrease at 300 °C	15%
Tightness accDIN 3535/6 mg/sm	0.1
Thickness increase ASTM F 146	
oil JRM 903: 5 h/150 °C	3%
fuel B: 5 h/23 °C	5%
Density g/cm3	1,6

Meets the technical requirements of BS 7531:2006 Grade AX

KLINGERSIL Jointing Material

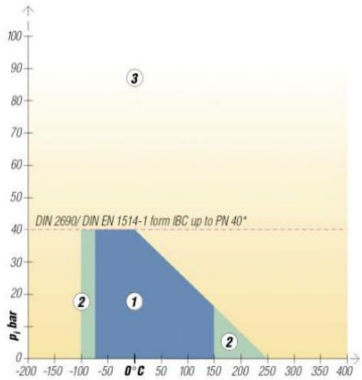
KLINGERSIL® C-6327

Characteristic & main applications

Body gaskets for liquids and steam at lower pressures and temperatures and low bolt loads, e.g. transformer gaskets. Thanks to the swelling in oil and fuels, it offers an excellent conformity with the flange at low surface loads. Has AS4020 potable water certification.

Material

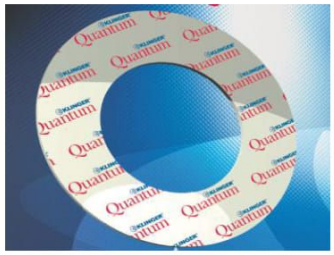
Gasket material based on SBR-bound aramid fibres and anorganic fibres.



Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J		25%
Recovery ASTM F 36 J min.		>45%
Stress relaxation DIN 52913		
50 MPa, 16 h/175 °C		MPa 25
Thickness increase ASTM F 146		
oil IRM 903: 5 h/150 °C		45%
fuel B: 5 h/23 °C		30%
Weight increase ASTM F 146		
oil JRM 903: 5 h/150 °C		45%
fuel B: 5 h/23 °C		30%
Density	g/cm 3	1,7

KLINGER® Quantum

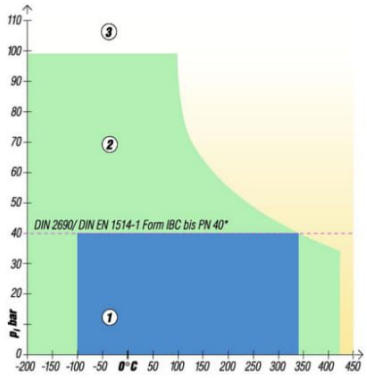


Characteristic & main applications

A unique gasket material using a high temperature-resistant HNBR matrix Suitable for use in oils, water, steam, gases, salt solutions, fuels, alcohols, weak organic and inorganic acids, hydrocarbons, lubricants and refrigerants.

Material

Optimum combination of synthetic fibres bound in a high temperature-resistant HNBR matrix.



Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J		10%
Recovery ASTM F 36 J min.		60%
Stress relaxation DIN 52913		
50 MPa, 16 h/175 °C		MPa 32
50 MPa, 16 h/300 °C		MPa 28
Stress relaxation BS 7531; 1,5 mm		
40 MPa, 16 h/300 °C		MPa 27
Klinger cold/hot compression		50 MPa
thickness decrease at 23 °C		10%
thickness decrease at 300 °C		14%
thickness decrease at 400 °C		20%
Tightness acc DIN 28090-2 mg/s x m		<0,02
Thickness increase ASTM F 146		
oil JRM 903:5 h/150 °C		3%
fuel B: 5 h/23 °C		5%
Density	g/cm3	1,7

Meets the technical requirements of BS 7531:2006 Grade AX

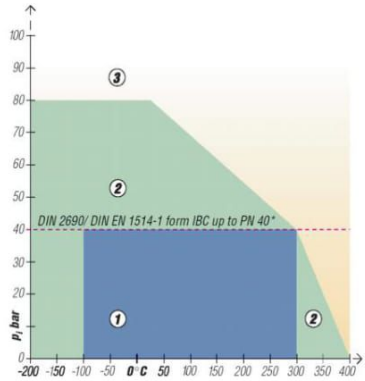
KLINGER®top-sil-ML1

Characteristic & main applications

Unique Multi-Layer material concept Suitable for use with oils, water, steam, gases, salt solutions, fuels, alcohols, moderate organic and inorganic acids, hydrocarbons, lubricants and refrigerants, food industry.

Material

Revolutionary combination of synthetic fibres and different elastomers bound in a Multi-layer structure.



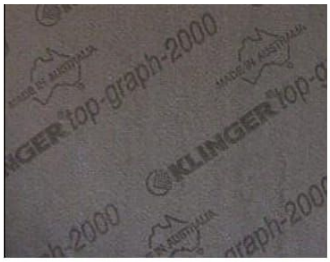
Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J		9%
Recovery ASTM F 36 J min.		50%
Stress relaxation DIN 52913		
50 MPa, 16 h/175 °C		MPa 34
50 MPa, 16 h/300 °C		MPa 28
Klinger cold/hot compression		50 MPa
thickness decrease at 23 °C		8%
thickness decrease at 300 °C		15%
Tightness according DIN 3535/6 mg/s x m		<0,1
Thickness increase ASTM F 146		
oil JRM 903: 5 h/150 °C		4 %
fuel B: 5 h/23 °C		8%
Density	g/cm3	1,7

Meets the technical requirements of BS 7531:2006 Grade AX

KLINGERSIL Jointing Material

KLINGER®top-graph 2000

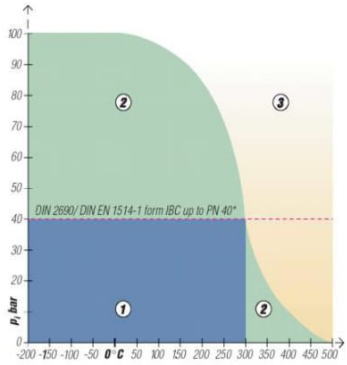


Characteristic & main applications

The flexible graphite sealing material with a high degree of inherent stability. It has high load bearing capacity combined with high seal ability. It is Ideally suited for use with steam and other critical applications.

Material

Based on graphite and synthetic fibres. Manufactured using a process which provides the graphite gaskets with totally new, previously unachievable properties.



Technical Data - Typical values for 1.5 mm thickness

Compressibility ASTM F 36 J		10%
Recovery ASTM F 36 J min.		60%
Stress relaxation DIN 52913		
50 MPa, 16 h/300 °C	MPa	32
Klinger cold/hot compression 50 MPa		
thickness decrease at 23 °C		10%
thickness decrease at 300 °C		10%
Tightness accDIN 3535/6	ml/min	0,5
Thickness increase ASTM F 146		
water: 5 h/100 °C		5%
fuel B: 5 h/23 °C		7%
Density	g/cm³	1,75

Meets the technical requirements of BS 7531:2006 Grade AX

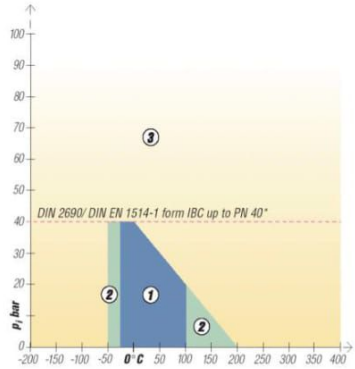
KLINGERSIL® C-8200

Characteristic & main applications

Premium high-pressure gasket for use with acids. Resistant to a wide variety of media.

Material

Glass fibres bonded with special acid-resistant elastomers.



Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J		9%
Recovery ASTM F 36 J min.		55%
Klinger cold/hot compression 25 MPa		
thickness decrease at 23 °C		7%
thickness decrease at 200 °C		17%
% Density	g/cm 3	1,7

Certain grades of Klinger sheet jointing materials can be supplied with either a wire mesh or expanded metal reinforcing.

For information on fire safe materials in accordance with API or ISO as well as the international application approvals to which Klinger materials have been tested, please contact our technical department.

Klinger Hot and Cold Compression Test Method

The Klinger Hot Compression Test was developed by Klinger as a method to test the load bearing capabilities of gasket materials under hot and cold conditions. In contrast to the BS 7531 and DIN 52913 tests, the Klinger Compression test maintains a constant gasket stress throughout the entire test. This subjects the gasket to more severe conditions. The thickness decrease is measured at an ambient temperature of 23°C after applying the gasket load. This simulates assembly. Temperatures up to 300°C are then applied and the additional thickness decrease is measured. This simulates the first start up phase.

High temperature tightness

High temperature tightness is measured by means of the Klinger Hot Compression test under defined constant gasket load and temperature with increasing internal pressures using nitrogen as test fluid.
Stabilisation time for each reading is two hours and a new test specimen is used for every gasket load and temperature. The tightness is analysed with a mass flow meter. The pressure is controlled by pressure controller.

Shelf Life of KLINGERSIL®gasket material

KLINGERSIL®gasket materials, as are all elastomeres and elastomere containing material, subject to a natural ageing process. This process depends on the kind of elastomer, its vulcanisation system and the storage conditions.

As an ideal storage condition we propose:

- *Temperature < 25°C*
- *relative humidity 50 - 60%*
- *darkened storage room if possible.*

Under these conditions a period of storage of approx. 5 years is possible.. At temperatures higher than 30°C over a long period, a reduction of the material properties can occur within 2 to 3 years.

KLINGER® top-chem – PTFE gasketing

KLINGER® top-chem 2000

Universal gasket material for high surface pressures at simultaneous high temperatures

KLINGER® top-chem 2000 offers the advantages of PTFE gaskets without the disadvantages commonly associated with PTFE materials. This allows you to use these materials in applications where traditionally they are unsuitable, saving you maintenance time and improving plant safety.

Advantages in the use of KLINGER® top-chem 2000

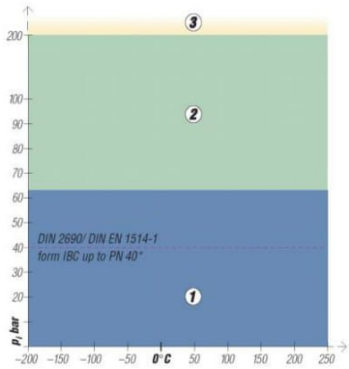
With KLINGER® top-chem 2000 the high relaxation typical of standard filled PTFE gaskets is not observed. At a load of 50 MPa and a temperature of 200°C the relaxation of this material is only just 2%. This ensures that bolt forces are maintained even under severe conditions. Therefore it is not necessary to retighten the bolts and the risk of increasing the leakage through loss in surface pressure is minimized. This behaviour is unique in the world of PTFE gaskets and can only be achieved with the use of KLINGER® top-chem 2000. KLINGER® top-chem 2000 has excellent chemical resistance in strongly acidic and alkaline applications and offers exceptional performance in applications with high mechanical requirements at high temperatures.

Material characteristics

The universal heavy-duty gasket for an extremely wide range of applications in the chemical and petrochemical industries as well as in the shipbuilding industry for chemical tanker applications. Due to its unique load bearing properties it is able to withstand high temperatures and pressures and it is the only PTFE gasket with a Fire Safe Certificate . It is also the first choice in the food sector and in the pharmaceutical industry, for steam applications and in oxygen pipes and where special requirements are made acc. to TA Luft (German Clean Air regulation).

Material

PTFE filled with silicon-carbide.



Technical Data - Typical values for 1.5 mm thickness

Compressibility ASTM F 36 J		*2%*
Recovery ASTM F 36 J		*55%*
Stress relaxation DIN 52913		
50 MPa, 16 h/260 °C		*MPa 35*
30 MPa, 16 h/150 °C		*MPa 28*
cold/hot compression		
23 °C / 50 MPa		*2%*
260 °C / 50 MPa		*5%*
Tightness DIN 3535/6		*ml/min 0,5*
DIN 28090-2		*mg/s m 0,05*
Tightness/weight increase		
H_2SO_4: 100%, 18 h/23 °C		*1/1%*
HNO_3: 100%, 18 h/23 °C		*1/2%*
NaOH: 33%, 72 h/110 °C		*1/3%*
Density	*g/cm³*	*2,5*

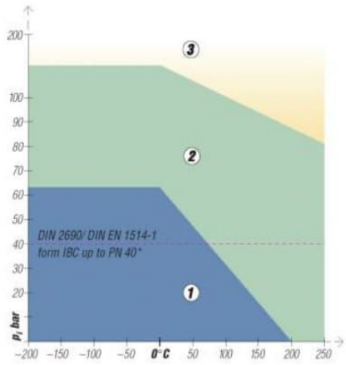
KLINGER® top-chem 2003

Characteristic & main applications

KLINGER® top-chem 2003 has a high compressibility and is ideal for maintaining a tight gas seal even at low surface loads and temperatures. Excellent chemical resistance in strongly acidic and alkaline applications and excellent mechanical properties at medium temperatures and loads. BAM certificate (60°C/ 20 bar) also approved for liquid oxygen service,

Material

PTFE filled with hollow glass micro spheres



Technical Data - Typical values for 2 mm thickness

Compressibility ASTM F 36 J		*17%*
Recovery ASTM F 36 J		*35%*
Stress relaxation DIN 52913		
30 MPa, 16 h/150 °C		*14MPa*
cold/hot compression		
23 °C / 25 MPa		*9%*
260 °C / 25 MPa		*38%*
Tightness DIN 3535/6		*ml/min 0,1*
DIN 28090-2		*mg/s m 0,01*
Tightness/weight increase		
H_2SO_4: 100%, 18 h/23 °C		*1/1%*
HNO_3: 100%, 18 h/23 °C		*0/5%*
NaOH: 33%, 72 h/110 °C		*1/5%*
Density	*g/cm³*	*1,5*

KLINGER® top-chem – PTFE gasketing

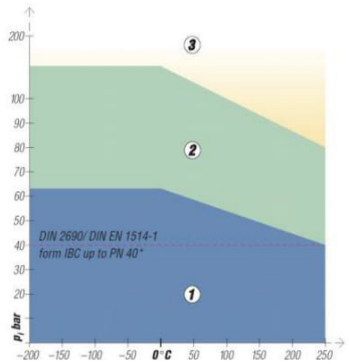
KLINGER® top-chem 2005

Characteristic & main applications

KLINGER® top-chem-2005 has excellent chemical resistance in strongly acidic applications and is suitable for a wide range of applications in the chemical industry. It has good mechanical properties at medium temperatures and loads. It is the economical alternative when using modified PTFE gaskets.

Material

PTFE with inorganic fillers



Technical Data - Typical values for 1.5 mm thickness

Compressibility ASTM F 36 J		3%
Recovery ASTM F 36 J		40%
Stress relaxation DIN 52913		
30 MPa, 16 h/150 °C		MPa 25
cold/hot compression		
23 °C / 50 Mpa		10%
260 °C / 50 MPa		30%
Tightness DIN 3535/6	ml/min	0.1
DIN 28090-2	mg/s m	0.01
Tightness/weight increase		
H_2SO_4: 100%, 18 h/23 °C		1/1%
HNO_3: 100%, 18 h/23 °C		1/2%
Density	g/cm³	2,2

KLINGER® top-chem materials are available in 1500 mm x 1500 mm sheets in thicknesses 1.0mm, 1.5mm, 2.0mm and 3mm.

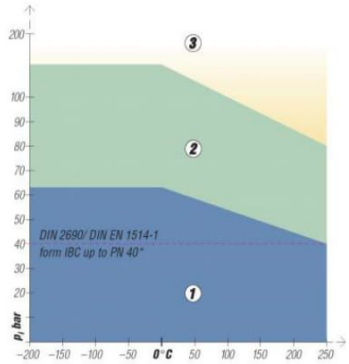
KLINGER® top-chem 2006

Characteristic & main applications

KLINGER® top-chem-2006 has good chemical resistance in strongly alkaline conditions and good mechanical properties at medium and low temperatures and loads.
It is optimised for caustic conditions and suitable for a wide range of applications in the chemical industry. It is free from pigments and is suited to food and pharmaceutical applications.

Material

PTFE filled with Barium Sulphate



Technical Data - Typical values for 1.5 mm thickness

Compressibility ASTM F 36 J		4%
Recovery ASTM F 36 J		40%
Stress relaxation DIN 52913		
30 MPa, 16 h/150 °C		MPa 18
cold/hot compression		
23 °C / 50 MPa		10%
260 °C / 50 MPa		40%
Tightness DIN 3535/6	ml/min	0,1
DIN 28090-2	mg/s m	0,01
Tightness/weight increase		
HNO_3: 100%, 18 h/23 °C		1/2%
NaOH: 33%, 72 h/110 °C		1/1%
Density	g/cm³	3,0

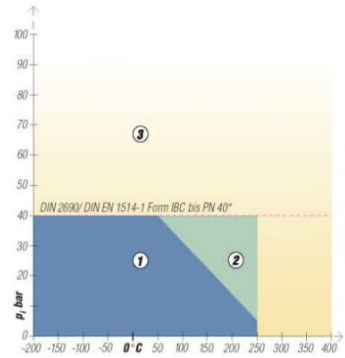
KLINGER® soft-chem

Characteristic & main applications

Excellent corrosion resistance together with superior creep resistance and seal ability create a high-grade gasket material for a wide application field. The best choice for economical plant-wide use on services to 260°C and pressures up to 200 bar subject to application details.
Also available in KLINGER® soft-chem Rigid form.

Material

Expanded PTFE



Technical Data - Typical values for 2 mm thickness.

Compressibility ASTM F 36 J		50-60 %
Recovery ASTM F 36 J min.		13-17%
Stress relaxation DIN 52913		
30 MPa, 16 h/150 °C		MPa 12
Klinger cold/hot compression		25 MPa
thickness decrease at 23°C		35%
thickness decrease at 150°C		30%
Tightness according DIN 28090		
mg/s x m		0,01
Chemical resistance		pH 0-14
Density	g/cm3	0.9

KLINGER® soft-chem materials are available in 1500 mm x 1500 mm sheets in thicknesses 1.5mm and 3mm.
Other sizes available on request.

PTFE gasket materials

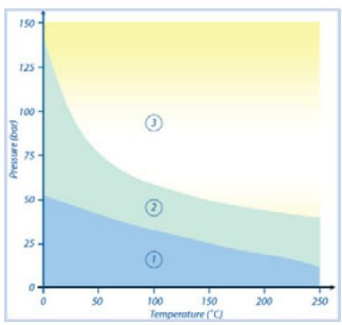
KLINGER® sealex

Characteristic & main applications

Klinger Sealex is a joint sealant material manufactured from specially processed 100% pure PTFE in a unique process.. It is composed of specially prepared fluorocarbons with excellent resistance to aggressive chemicals as well as offering secure sealing under high internal pressures. The high compressibility of Sealex® enables it to effectively fill flange imperfections for a tight, leak-free seal. Unlike conventional PTFE which is prone to cold flow, Sealex has good creep resistance and bolt torque retention properties. Its form-in-place versatility also cuts maintenance and storage costs.. It has an adhesive backing to assist installation.

Material

Expanded PTFE



Temperature: -196 to 260 °C .
Pressure: up to 140 bar depending on application

Technical Data *- Based on 7 x 2.5mm thick sample*

Compressibility: ASTM F36L	*75-85%*
Creep relaxation	
ASTM F-38, 3000 psi	*44%*
Gas leakage	
ASTM F37B, 30psi Nitrogen, 3000psi load :	*4.8ml/hour*
Density :	*0.6g/cm³*

Availability:

Dimensions mm	*Roll length metres*
3.2 x 1.5	*30*
4.7 x 2.0	*20*
6.5 x 2.5	*15*
9.5 x 3.0	*8*
12.7 x 6.5	*5*
16 .0 x 6.5	*5*
19.0 x 7.0	*5*
25.4 x 8.0	*5*

PTFE Envelope with insert

Characteristic & main applications

Excellent chemical resistance.
PTFE envelope gaskets consist of a suitable filler 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. In some cases a steel insert can be incorporated into the seal.
This gasket offers excellent chemical resistance under moderate conditions of temperature and pressure in virtually all media or where bolt load is limited .
Well suited to food and pharmaceutical applications.

Styles available:

Klinger PTFE envelope gaskets are available in 3 different style as below.
Slit Type – 0-500 mm
U-Type – 0-500 mm
Welded Type – 500 to 3000 mm

The slit type is the most economic to produce but can suffer from splitting at the V under load and through erosion.

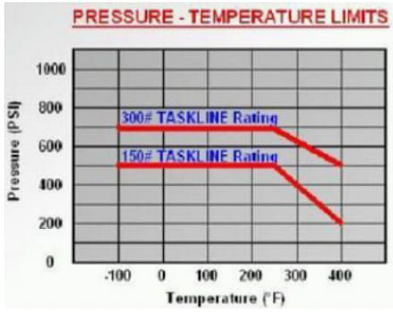
The U type is machined to suit the thickness of the filler. Although more expensive than the V type it does not split under load and therefore a longer service life can be expected.

The Welded type configuration is used to manufacture PTFE envelopes where it is not possible to machine the gaskets in one piece.

PTFE Taskline gaskets

Characteristic & main applications

Taskline gaskets are high performance gaskets made from PTFE and perforated 304 stainless steel inserts. The Stainless steel is encapsulated in the PTFE . This combination adds strength to the PTFE and solves the main problem associated with virgin PTFE gaskets – excessive thermal expansion and creep due to high pressure and gasket loads while at the same time retaining all the favourable properties of PTFE.
Suitable for 150 and 300 lb flanges.



Elastomers and Rubberised Cork

Elastomers

Elastomeric sheet compounds mark the entry level to Klinger's sheet-sealing range of products.
Consisting of base polymers with the insertion of vulcanizing agents, fillers, pigments and various additives, elastomeric gaskets offer effective, low sealing stress seals typically for low temperature, low pressure applications. Elastomeric gaskets have relatively soft compression characteristics requiring relatively low loads to effect a seal, incorporated with excellent recovery properties due to their self-energizing behaviour. Klinger generally recommend the use of rubber gaskets on Raised or Full Face gaskets only up to 10 bar pressure. For use at higher pressures consult Klinger.

NATURAL RUBBER (NR)

Natural rubber exhibits exceptional elongation, tear strength and recovery properties. It has poor resistance to ozone, oxygen and sunlight weathering. Natural rubber has high wear and abrasion resistance. The material is suitable for moderate acids, alkalis, salt solutions, petroleum and solvents. It is considered unsuitable for use with strong acids, fats, greases and most hydrocarbons. Temperature range -50 to 120°C

NITRILE (NBR)

Nitrile is a synthetic rubber offering improved chemical resistance and temperature capabilities to neoprene. The material offers good resistance to oils and solvents, aromatic and aliphatic hydrocarbons, petroleum oils and gasoline, animal fats and lacquer solvents. It offers poor resistance to strong oxidising agents, chlorinated hydrocarbons, ketones and esters. Temperature range -50 to 120°C

VITON (FPM)

Viton (Fluorinated Hydrocarbon) offers excellent resistance to acids, aliphatic hydrocarbons, oils gasoline and many industrial applications. The material offers excellent resistance to temperature, weathering and gas permeability.
It is not suitable for use against amines, esters, ketones, steam or low temperature service. Temperature range -30 to 200°C

ETHYLENE PROPYLENE (EPDM)

EPDM offers good resistance to ozone, heat, steam, strong acids and alkalis. It is not suitable for use in oils, solvents and aromatic hydrocarbons. Temperature range -50 to 150°C

STYRENE BUTADIENE (SBR)

SBR synthetic rubber offers excellent abrasion resistance and is suitable for use with weak organic acids and moderate chemicals. It is unsuitable for use with ozone, strong acids and most hydrocarbons. Temperature range -50 to 120°C

NEOPRENE (CR)

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°C

SILICONE(VMQ)

The silicone 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°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°C

HYPALON (CSM)

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°C

KLINGERLASTIC elastomers are available in a range of thicknesses and sizes. Some elastomer types are available in a range of colours and with reinforcing insertion.

Note the above properties and limits are intended as a guide only and may vary depending on the application conditions.

Rubberised Cork

Cork rubber products offer many of the advantages of rubber compounds along with the added benefit of controlled compressibility and recovery. The addition of cork granules to the compound helps decrease the amount of flow or creep that occurs in compounds that are only made of rubber. This also creates a better distribution of load when compression occurs between bolt spans.
Different densities and grades are available which allows for a wide variety of sealing applications from dust covers to industrial applications..
Cork rubber grades are manufactured with a variety of compounds including Neoprene, Nitrile, Acrylic, SBR and Silicone. This provides the necessary sealing features such as fluid or temperature resistance .
In Electrical Transformers the resistance to the several types of oil commonly used is obviously of primary importance , and the ability to seal small distribution and large power transformers on a long term basis demonstrates the versatility of our materials.
Grades available include:

ACN 60 Plus *- Fuel, Oil, Gas and Transformer Gaskets*

NP 50 Plus *- Marine, Hydraulic, Electrical and Transformer gasket with high ozone resistance.*

MR 31 Plus *– Highly compressible automotive and general purpose gasket material with moderate oil resistance.*

Semi Metallic gaskets - Graphite

GRAPHITE LAMINATES

Introduction

Klinger flexible graphite materials are universal sealing products consisting of pure carbon in which the crystalline structure has been considerably expanded through a special chemical and thermal procedure. The expanded crystals are formed into foil by a multi-stage calendering process. The thin flexible graphite foil can then be laminated into thicker sheets to manufacture a range of sealing products.

Klinger flexible graphite sheet can also be supplied with reinforcing materials to increase the tensile strength, load-bearing capacity and improve handling characteristics. Laminated graphite sheet materials such as PSM-AS are often used as a replacement for asbestos-based materials owing to their excellent chemical resistance and temperature.

Graphite laminate materials are ideal for steam applications as they do not contain a rubber binder and are not subjected to hardening of the material.

Temperature range -200 to +450 °C

General Properties

Outstanding resistance to high and low temperature
Chemically resistant to virtually all media
High compressibility
Low creep under temperature or pressure
Seals gases and liquids effectively at low bolt loadings
Unlimited storage life

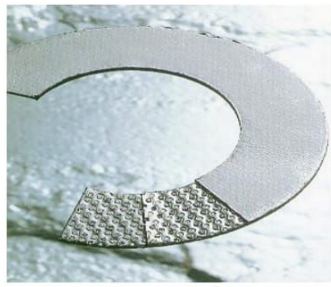
Tests and Certifications

Please contact our customer services department for the above information

Availability

Sheeting (m): 1.0 x 1.0
Depending on grade and thickness, can also be supplied in 1.5m x 1.5m
Thickness (mm): 1.0, 1.5, 2.0, 3.0.
Other thicknesses available on request.
Also available in 99.85% pure nuclear grade

KLINGER®PSM



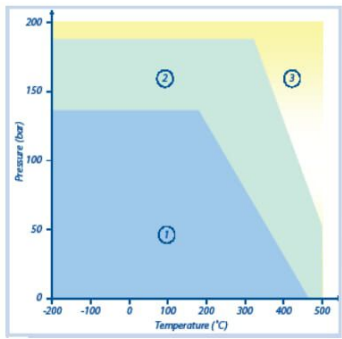
Characteristic & main applications

KLINGER® PSM is available in the unique AS (anti stick) or G configuration. A tanged steel insert is included for improved blow out 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.

Fire safe certified API 6FB.

Material

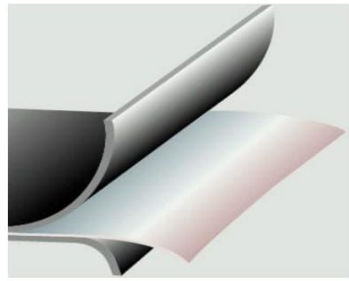
Pure exfoliated graphite with a tanged stainless steel sheet reinforcement



Technical Data - Typical values for 1.5 mm thickness

Compressibility (ASTM F36J) :	35%
Recovery (ASTM F36J) :	20%
Stress relaxation DIN 52913: 50MPa, 16h/300°C :	48 N/mm²
BS 7531: 40MPa, 16h/300°C :	38 N/mm²
Leachable chloride :	<40ppm
Graphite purity :	>98%
Gas leakage (DIN 3535/6) :	<1.0ml/min
Thickness increase after immersion in Oil JRM 903, 5h/150°C :	<2%
Density :	1.0g/cm³
Standard Insert : 316,	0.1mm

KLINGER®SLS

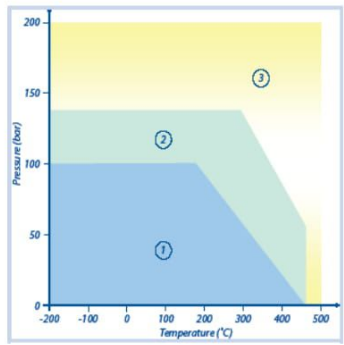


Characteristic & main applications

KLINGER®SLS is available in the unique AS (anti stick) or G configuration. The steel foil gives 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. It is ideal for use in the Pulp and Paper, Chemical and Steam industries

Material

Pure exfoliated graphite with a stainless steel foil reinforcement.



Technical Data - Typical values for 1.5 mm thickness

Compressibility (ASTM F36J) :	40%
Recovery (ASTM F36J) :	15%
Stress relaxation DIN 52913: 50MPa, 16h/300°C :	48 N/mm²
BS 7531: 40MPa, 16h/300°C :	38 N/mm²
Leachable chloride :	<40ppm
Graphite purity :	>98%
Gas leakage (DIN 3535/6) :	<1.0ml/min
Thickness increase after immersion in Oil JRM 903, 5h/150°C :	<2%
Density :	1.0g/cm³
Standard insert : 316,	0.05mm

Also available with wire or expanded metal reinforcement.

Semi Metallic gaskets - Graphite

PSM Eyelet Gasket

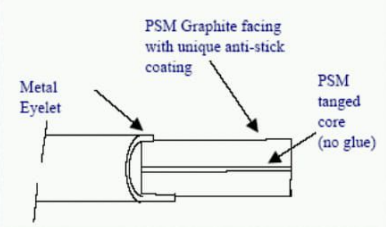
Characteristic & main applications

Unique Anti-stick coating – no unnecessary cleaning of flanges.
High blow out resistance compared to non-metallic gaskets.
No possible leakage through gasket body.
Excellent high temperature vacuum seal.
Tanged graphite combined with metal eyelet provides a high resistance to graphite extrusion preventing contamination of the line.
Broad chemical resistance.
Low emission seal
Maximum temperature 450°C when exposed to air /oxygen – higher temperatures possible in oxygen-free or reducing environments.
Seals poor condition flanges due to graphite sealing while the eyelet material can be suited to the process media.
316 and galvanised carbon steel are standard eyelet grades.
Tanged insert prevents excessive graphite relaxation under high temperatures / pressures.

Material

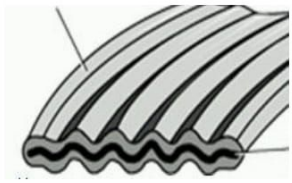
Combines the advantages of PSM with a metallic eyelet at the gasket's inner diameter.

Gasket Cross-section



KLINGER®Maxigraph 104G

Compressible sealing element



Characteristic & main applications

Maxigraph Style 104G gaskets are manufactured from corrugated metallic rings with a lamination of graphite on both sides, thus giving an initial soft seal gasket enabling an effective seal to be obtained at low initial stress levels.
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.
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.

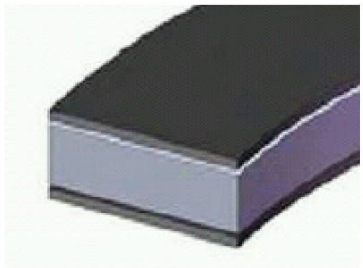
General properties:

Temperatures from -200 to +450°C.
General use to 600 psi. For pressures up to 1450 psi please contact Klinger.

Physical properties:

Metal core nominal thickness: 0.5mm (standard), 0.6mm and 0.7mm, before corrugating
In the delivery condition, the total thickness of a gasket with graphite layers amounts to app. 2.3mm, resulting from the 1.3mm corrugated ring and one layer 0.5 graphite each side
Nominal pitch of corrugations: max. 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.
Graphite standard purity, >98% graphite, density 1.0 g. cm³

KLINGER®108



Characteristic & main applications

The Klinger Style 108 is a rigid laminated gasket consisting of graphite layers bonded to each face of a solid steel core.
The Klinger graphite Style 108 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. The core of the Style108 has the ability to be re used if manufactured from a suitable quality material for the application.
Can be laser cut into many configurations to suit various gasket profiles for heat exchangers.

Benefits of Klinger graphite type 108 gasket:

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

Material

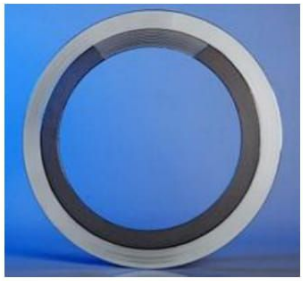
Pure exfoliated graphite with a solid steel core. For PTFE lamination consult Klinger.

Typical Specifications:

Material : Typical, 316L / Graphite. Various core grades available.
Temperature : -200 to +450°C.
Pressure : To 900 psi(62 bar). For pressures up to 1450 psi(100 bar) please consult Klinger.
For higher pressure service, refer to the Klinger Maxiprofile 109 gasket.
Thickness: Core: 3.0mm (standard) or as specified by customer. Facing: 0.5mm.
Graphite standard purity, >98% graphite, density 1.0 g. cm³

Semi Metallic gaskets

KLINGER® Maxiprofile 109



Characteristic & main applications

The 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 to a specific profile which provide high pressure areas, ensuring that the soft coating flows into any imperfections in the flange even at relatively low bolt loads. Standard core design is parallel which offers the advantage of even stress distribution across the gasket face. Convex Maxiprofiles are also available which have a reduced depth of grooves towards the profile centre.

This type of profile ensures a high seating stress in the middle of the profile and is effective for low bolt load applications.

The result is a gasket, which combines the benefits of soft cut materials with the advantages of seal integrity associated with metallic gaskets.

The Maxiprofile type 109 exhibit excellent results, particularly where high pressures, temperatures and therefore, high bolt loads are to be controlled.

A variety of surface coatings can be applied to service high temperature, pressure or corrosive media applications.

Temperatures range from cryogenic to 1000°C with a wide chemical resistance.

Applications of Maxiprofile Gaskets:

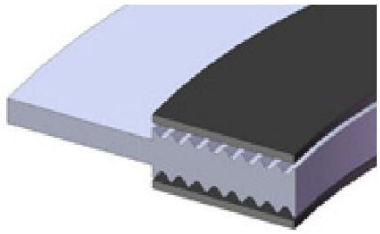
- *Standard flanges, Heat exchanger and vessel applications*
- *High and low temperatures*
- *Pressures of up to 400 bar*
- *Low bolt loads*
- *Narrow flange widths*
- *Damaged flanges*
- *Have a wide range of seating stresses under which the seal is effected and maintained.*
- *Can be used when there 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 in thermo cycling and shock loading conditions.*
- *Can be refurbished with a new facing layer and reused.*
- *Can be manufactured in a very wide variety of sizes and shapes according to customer design*

Styles of Maxiprofile's available.

All can be supplied with bars to suit Heat exchanger configurations.

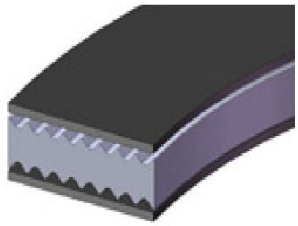
CA1,2&3 Convex profiled joints in the same style as LA 1, 2 and 3. The convex profile is designed to assist sealing in low bolt load applications.

STYLE LA1



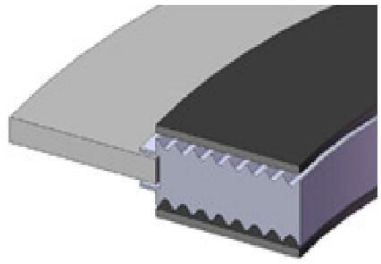
Lateral profiled joint with guide ring for raised and flat face applications

STYLE LA 2



Lateral profiled joint without guide ring for male and female, tongue and groove and grooved flanges

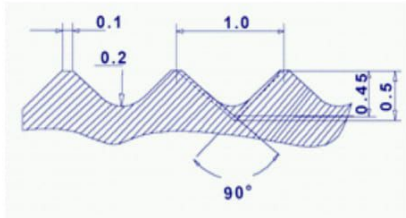
STYLE LA 3



Lateral profiled joint with floating guide ring for raised and flat face applications.

Standard core design

The core design for the standard style Maxifrofile style 109 is parallel and shown below.



Facing materials

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.

Facing Materials Minimum and Maximum Operating Temperatures

Graphite	*-200 to 500ºC*
PTFE	*-200 to 260ºC*
Mica	*to1000ºC*

KLINGERSIL®C-4430, -196 to 250°C

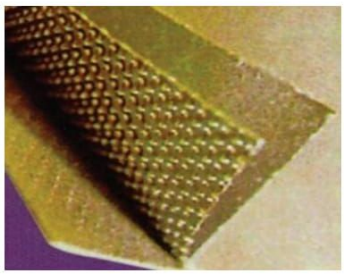
Core Material Maximum Temperature

316L Stainless Steel	*800°C*
304 Stainless Steel	*650°C*
Duplex UN S31803	*800°C*
347 Stainless Steel	*870°C*
321 Stainless Steel	*870°C*
Super Duplex	*600°C*
Inconel 600 & 625	*1000°C*
Incoloy 825	*600°C*
Monel 400	*800°C*
Nickel 200	*600°C*
Titanium Gr7 & Gr2	*500°C*
Hastelloy B-2/B-3	*700°C*
Hastelloy C-276	*700°C*
Alloy 20	*600°C*

For all other core materials please consult Klinger.

Semi Metallic gaskets

KLINGERmilam PSS



Characteristic & main applications
KLINGERmilam is a high temperature gasket material which is asbestos free . KLINGERmilam is specifically suitable for use in aggressive acids and high temperatures applications.
It is also suitable above the typical application temperatures of Graphite.

- Used for high temperature applications such as exhaust manifolds, turbines, turbochargers and burner ducting.
- Outstanding resistance to dry heat.
- Good resistance to aggressive acids, bases, solvents, mineral oils
- Good compressive strength
- Non-flammable
- Does not give off fumes
- Non toxic

Material
Mica with Perforated Stainless Steel reinforcement

Typical Specifications based on 1.3 mm thick:
Colour : Gold/Green
Compressibility (ASTM F36J) : 12-16%
Recovery (ASTM F36J) : 35-45%
Ignition loss (DIN 52911): <5%
Maximum continuous service temperature: 900°C
Maximum pressure at 900°C is 72.5 psi (5 bar)
Stress relaxation DIN 52913:
50MPa, 16h/300°C 33 N/mm²
BS 7531:
40MPa, 16h/300°C : 28 N/mm²

Tests and Certifications:
Germanischer Lloyd

- Availability: Thickness(mm): 1.3 & 3.0
- Sheeting (m): 1.2 x 1.0

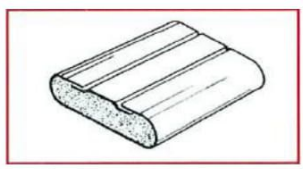
Metal Jacketed Gaskets

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 and configurations, making them a good option for heat exchangers.
Corrugated gaskets are a highly versatile family of products, available in wide variety of configurations and suited to a wide range of applications. For improved sealing performance the corrugated gaskets can be partially or completely covered.
Metal Jacketed and corrugated gaskets can be manufactured to suit a range of chemical environments by the selection of a suitable alloy jacket or core.
The fillers can be non asbestos mill board , non asbestos sheet material, Ceramic, Graphite, Mica or PTFE.
Standard thickness is 3.0mm but thickness can vary to suit customer requirements.

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

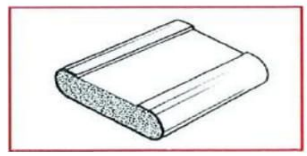
Applications
Heat exchangers
Exhaust gases
Valve bonnet gaskets
Narrow flanges.

Style 100



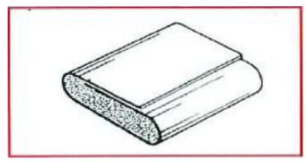
Double Jacketed Gasket
Constructed of soft filler encapsulated by a metal jacket and insert. Designed for use on high temperature and pressure applications

Style 101



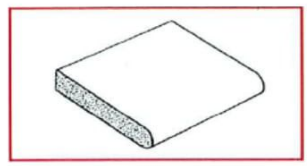
Single Jacketed Gasket
Constructed of soft filler covered by a metal jacket on both sides and one face. The gasket is ideal for narrow applications or moderate service conditions

Style 102



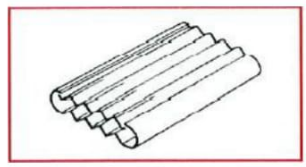
Single Jacketed Gaskets Totally Enclosed
Constructed of soft filler completely enclosed in a single jacket for use in applications where the width does not permit the use of a double jacketed gasket.

Style 103



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 vacuum Seals.

Style 105



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.

Semi Metallic gaskets – Spiral Wounds

KLINGERmaxiflex

The design principle of the KLINGERmaxiflex Spiral-Wound Gaskets

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.
Inner and outer rings can be fitted which are used for centralizing the gaskets on the face of the flange and protecting the inner windings against erosion. They also act as a compression stop.
Maxiflex Spiral Wound gaskets can be manufactured using a range of filler materials according to different service conditions.
Maxiflex gaskets can be manufactured to meet all of the international standards such as ASME B16.20, DIN and customer specific requirements.

Flange Surface Finish
Maxiflex gaskets are capable of giving an excellent seal over a wide range of flange surface finishes, but as a general guide we suggest the following:

Duty	Roughness	
General	3.2-6 3µ m	125-250µ "
Critical	3 2µ m	125µ "
Vacuum	2.0µ m	80µ "

Winding Material - *Maximum Temperatures*

Carbon Steel	500°C
304 Stainless Steel	650°C
316L Stainless Steel	800°C
Duplex UN S31803	800°C
347 Stainless Steel	870°C
321 Stainless Steel	870°C
Monel 400	800°C
Nickel 200	600°C
Titanium Gr2	500°C
Titanium Gr7	500°C
Hastelloy B-2/B-3	700°C
Hastelloy C-276	700°C
Inconel 600	1000°C
Inconel 625	1000°C
Inconel X-750	1000°C
Incoloy 825	600°C
Zirconium	500°C
Super Duplex	600°C
Alloy 20	600°C

Other grades of steel available on request.

Filler materials - *Maximum and minimum temperature s*

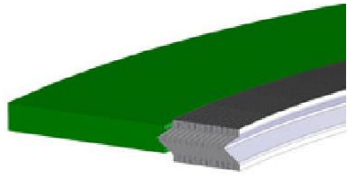
Graphite	-200 to 500°C
PTFE	-196 to 260°C
Mica	1000°C
Mica and Graphite	900°C
Ceramic	1200°C

Following are the most common Spiral Wound gasket configurations

Maxiflex Style R

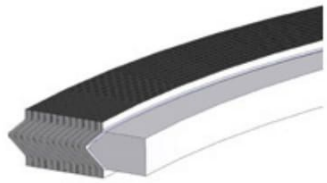
- *Maxiflex spiral wound sealing element*
- *Wide choice of materials for filler and metal strip*
- *Suitable for high pressure and temperature applications*
- *Recommended flanges - tongue & groove, male to female and flat face to recession*
- *General and critical duties*

Maxiflex Style CR



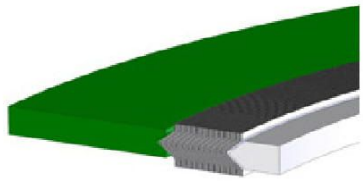
- *Maxiflex spiral wound sealing element*
- *Solid metal outer ring used as a centering device and compression stop.*
- *Used mainly on raised face and flat face flanges*
- *Wide choice of materials for filler and metal strip*
- *General Duties*

Maxiflex Style 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*

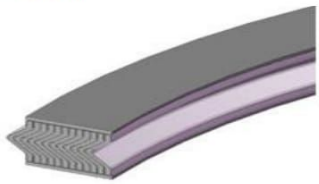
Maxiflex Style CRIR



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

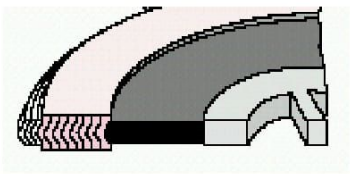
Semi Metallic gaskets – Spiral Wounds

Maxiflex Style R (Graphite faced)



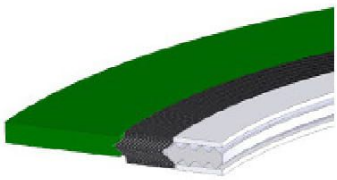
- *Maxiflex spiral wound sealing element*
- *Covered with 0.5mm Graflex facings*
- *Used on manhole covers*
- *Low bolt load applications*
- *Uneven sealing faces*
- *Used in tongue & groove, male to female and flat face to recess flanges*
- *Also available in PTFE version.*

Maxiflex Type HX-RIR (For use on heat exchangers)



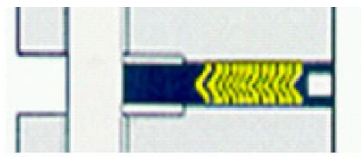
- *Maxiflex spiral wound sealing element*
- *A combination of inner and outer rings*
- *The inner ring could have pass bars or could carry either a metal clad or soft gasket with pass bars*
- *Manufactured to customer designs*
- *Wide choice of materials for filler and metal strip*
- *Manufactured with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

Maxiflex Pro



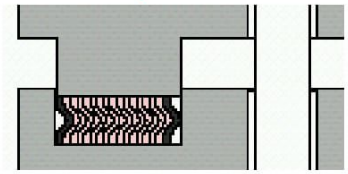
- *A high-integrity, dual-seal gasket specially designed for service in high-criticality, corrosive applications where sealing performance is of paramount importance.*
- *The Klinger Maxiflex Pro gasket is designed for use in highly aggressive chemical applications.*
- *The inner ring of a standard Maxiflex can allow media to accumulate between the flange and inner ring which could promote corrosion. Maxiflex Pro prevents this, the conformable facing material enables the gasket seal at the flange bore to eliminating media build-up.*
- *The incorporation of a Maxiprofile inner ring creates a gasket with two sealing regions. The Maxiprofile also acts as a compression stop needed for high integrity gaskets and also enables a seal to be created inward of the spiral wound sealing element.*

Maxiflex CRIR-108



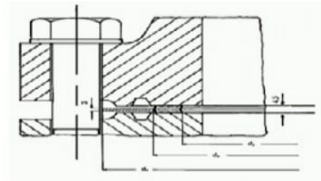
The Klingermaxiflex CRIR–108 gasket has been specifically developed for use on HF Alkylation Units and other similar applications where corrosion of the flanges presents a real problem.
Traditional Spiral Wound gaskets use either a Monel or Carbon steel inner ring, which sometimes does not create a seal tight environment between the inner ring and the face of the flange. This could allow small quantities of product to migrate between the inner ring and the flange, thus enhancing the possibilities for corrosion or embrittlement to take place.
The Klingermaxiflex CRIR –108 gasket offers a additional seal on the inner ring which seals and prevents any build up of product which eliminates any corrosion of the carbon steel flanges.
The Klingermaxiflex CRIR–108 is designed to suit Standard and Non Standard flanges and requires no additional bolt stress to compress and maintain a tight seal.
Please refer to the Klinger technical department for the correct design of these gaskets due to the lamination on the inner ring which can be either expanded graphite or expanded PTFE.

Maxiflex Style RHD



- *Spiral wound sealing element.*
- *Wound high density.*
- *Wide choice of materials for metal strip and filler material.*
- *For use in high-pressure pumps, high-pressure valves and gas applications.*

Maxiflex Style CR-RJ



CR-RJ spiral wound gaskets are designed to be used as a maintenance replacement item for Ring Type Joints were the sealing surface in the groove of the flange, either Oval or Octagonal has been compromised.
These gaskets are available for NPS 1/2 to 24 and pressure classes 150 to 1500. Standard element thickness is 4.5mm and the outer ring thickness is 3.2mm. These gaskets are also available in Style CRIR-RJ which are fitted with an inner ring 3.2mm thick. Please consult Klinger when requiring an inner ring as it must be determined that there is available space to accommodate its inclusion.
Klinger recommends CRIR-RJ gaskets for pressure classes 600 and above
Clearance dimensions between flange faces should be checked on close coupling pipe work prior to installation to ensure that optimum compression can be achieved without over stressing bolts and or flanges.
It is the customers responsibility to ensure that the gasket is suitable for the application and that there is sufficient clearance between the flange bore and ring groove for proper seating of the gasket.
Klinger Maxiflex Spiral Wound also have Fire Safe certification to API 6FB.

Metallic gaskets – Ring Type Joints

Ring Type Joints

Metallic ring joint gaskets are heavy duty, high-pressure gaskets largely used in offshore and onshore 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.

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 or a Maxiflex CR-RJ, can provide a temporary or emergency solution until the flange can be repaired or replaced.

A number of ring joint styles are available designed for specific flange types, these are:

Type R Oval & Octagonal

NB1/2" to 24" Class Rating150 to 2500 ASME B16.20

NB26" to 36" Class 300 to 900 ASME B16.20 Series A

NB1 1/2" to 20" Class API 6A

Type RX

NB1 1/2" to 24" Class Rating 720 to 5000 ASME B16.20

NB26" to 36" Class Rating 300 to 900 ASME B16.20 Series A

NB1 1/2" to 20" Class Rating API 6A

Type BX

NB1 11/16" to 21 1/4" Class Rating 5000 to 20000 ASME B16.20

Common Materials

Material	Brinell Hardness	Temperature limitations	Identification
Soft iron	90	-60 to +400°C	D
Low carbon steel	120	-40 to +500°C	S
4%-6% Cr 1/2% Mo: F5	130	-125 to +500°C	F5
Stainless steel 304 /304L	160	-250 to +650°C	S304 or 304L
Stainless steel 316 /316L	160	-196 to +800°C	S316 or 316L
Stainless steel 321	160	-250 to +870°C	S321
Stainless steel 347	160	-250 to +870°C	S347
Stainless steel 410	170	-20 to +500°C	S410
Inconel 625	-	1000°C	625
Incoloy 825	-	1000°C	825
Hastelloy C-276	-	1000°C	C-276
Duplex	-	800°C	S31803
Titanium	-	540°C	TI

The sealing surfaces on the ring joint grooves must be smoothly finished to 63 Microinches and be free of objectionable ridges, tool or chatter marks.

The following Ring Type Joint styles are available:

Style R Oval

Applications:

- *Used for high pressure applications.*

Typical Properties:

- *High integrity seal at high pressures*
- *Suitable for flat and round bottom groove flanges. Interchangeable on modern octagonal type grooved flanges.*
- *Available in Ring numbers R11 to R105*

Style R Octagonal

Applications:

- *Used for high pressure applications.*

Typical Properties:

- *High integrity seal at high pressures*
- *The octagonal cross section has a higher sealing efficiency than the oval and would be the preferred gasket*
- *Suitable for flat bottom groove flanges*
- *Available in Ring numbers R11 to R105*

Style RX

Applications:

- *Used for high pressure applications.*
- *The Style RX is designed to fit the same groove design as a standard style R making joints interchangeable*
- *The Style RX has an increased height and utilizes the internal system pressure to energize and improve the seal as internal pressure increase*
- *Suitable for flat bottom groove flanges*

Also available in style SRX.

Style BX

Applications:

- *The Style BX energised ring type joint is manufactured in accordance with API 6A for use in high pressures.*
- *Style BX ring type joints incorporate a pressure passage hole to allow for pressure equalization each side of the sealing faces.*
- *Style BX is not interchangeable with any other style, and is only suited for API 6BX flanges .*

Also available in style SBX.

Metallic gaskets

Klinger IX Seal Ring

Applications:
- *Used for high pressure applications*
- *For use in compact flanges*

Typical Properties:
- *High integrity seal at high pressures*
- *PTFE coating improves corrosion resistance and provides easy identification*
- *Designed to create a high integrity joint with primary and secondary seals*

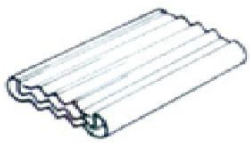
Typical Specifications:
- *For use up to Class 2500*

Manufactured to ASME B16 20
Also available in a range of alloys: Low Carbon Steel, Duplex, and Inconel 625

Style 104

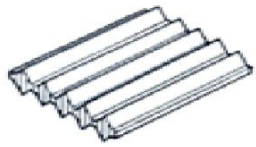
Single Corrugated Gasket– no filler
Used mainly in valve applications and small recess gaps. The gasket is a wholly metal construction and therefore requires a high quality of flange surface finish and flatness
Sometimes referred to as a Taylor ring.

Style 106



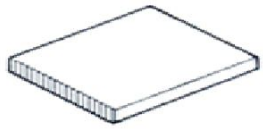
Double Jacketed Corrugated Gasket– metal filler
Usually Stainless Steel outer casing with soft iron filler ring. Designed for applications where the available bolt load is limited but there is a requirement for the type of high integrity joint associated with an all-metal gasket.
Core material available – Stainless Steel 304, 316L, 321, Soft Iron, Monel and Inconel. Other materials available on request.

Style 181



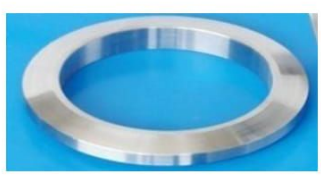
Solid Serrated Gasket
Primarily used on heat exchangers, turbines and valves.
The gasket material ideally needs to be roughly 30 Brinell less than the flange material to ensure sufficient deformation of the gasket without damaging the flange facing. Flange surface finish is critical.
Common metals are Carbon Steel, Stainless Steel 304, 316L, 321, Soft Iron, Monel and Inconel. Other materials available on request.

Style 180



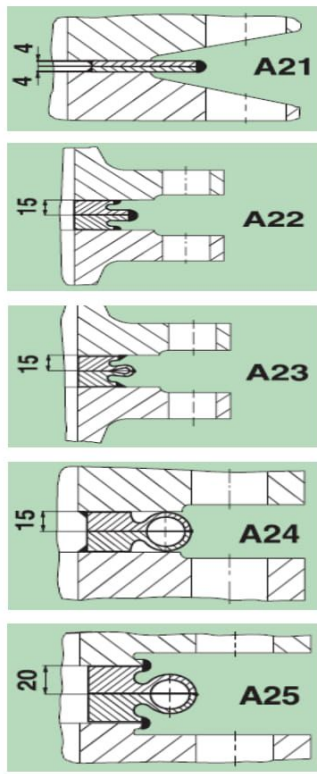
Solid Metal Gasket
Primarily used on heat exchangers or as shims. Can also be used for washers.
The gasket material ideally needs to be roughly 30 Brinell less than the flange material to ensure sufficient deformation of the gasket without damaging the flange facing. Flange surface finish is critical.
Common metals are Carbon Steel, Stainless Steel 304, 316L, 321, Soft Iron, Monel and Inconel. Other materials available on request. Thicknesses available from 0.05mm up.

Lens Rings



Lens Rings have a spherical surface and are used on flanges with conical faces
The gasket material should be softer than the flange material, ensuring that the applied compressive load leads to the elastic or plastic deformation of the gasket and not the flange sealing face.
By applying higher loads on the gasket the contact area between the gasket and the flange increases. This prevents the gasket from being overstressed.
As with all metallic joint's, the re-use of Lens Rings is not recommended.

Weld Ring Gaskets



Above is a sample of the styles of Weld Ring gaskets which are available from Klinger.
Two versions of this gasket exist, Welded Membrane gaskets as per style A21 and Weld Ring gaskets as per A22, A23 , A24 and A25.
***Welded Membrane** gaskets consist of two identical rings and the material must always be the same as the flanges, this ensures material compatibility*
***Weld Ring** gaskets are also utilised in pairs and are manufactured from materials similar to that of the flanges, this ensures material compatibility.*
Used on difficult to seal heat exchanger or pipe flanges which are subject to extreme levels of cycling and temperature fluctuations.

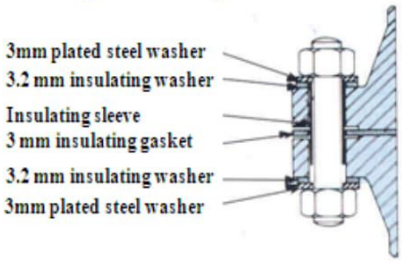
Insulation gaskets

Flange Insulation Sets

Insulation sets are used to limit corrosion in pipeline systems. Where dissimilar metals are present, the sets remove the possibility of the system acting as a galvanic cell and reduce the risk of galvanic corrosion of the pipe work. Insulation sets are also used to isolate cathodically protected piping systems where they prevent the flow of electro-static charge.
Each flange insulation set comprises one central flat or oval section gasket, plus one insulation sleeve , two insulating and two plated steel washers per bolt. The sets are individually packed and clearly labelled with the flange rating, size, type and material combination.

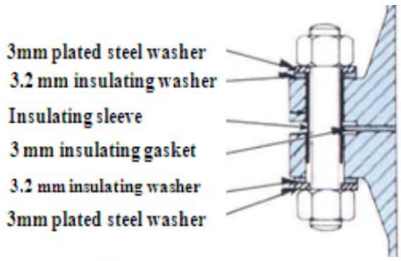
Key function of Insulating gaskets:
- *Used to electrically isolate sections of pipe work*
- *Designed to minimise electro-chemical erosion*
- *Comprising materials with high dielectric strength*
- *Manufactured to suit flanged joints to ASME, BS, DIN and customer designs*

Style E - *Full face gasket insulating set assembly.*



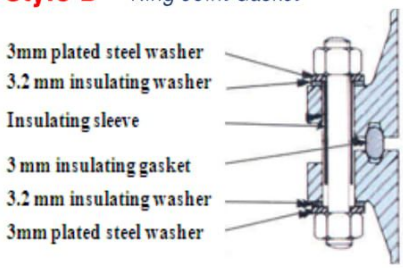
Suitable for flat and raised face flanges. This style minimises the ingress of conductive foreign matter and reduces the risk of bridging.
Typically used on oil and hydrocarbons where flange insulation is a requirement. Manufactured from materials with high dielectric strength to ensure minimum electrical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

Style F – *Inside bolt locating gaskets insulating set assembly*



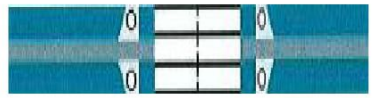
Utilises a RF gasket which centrally locates within the bolts
Typically used on oil and hydrocarbons where flange insulation is a requirement. Manufactured from materials with high dielectric strength to ensure minimum electrical contact between flanges

Style D – *Ring Joint Gasket*



Reinforced phenolic ring type joint gasket.:
Available with a choice of insulating sleeves and washers:
Unless otherwise specified Reinforced phenolic will be supplied.
Other materials on request
Care must be taken during installation of this gasket so that it is not overstressed during bolt up.

High Pressure Spring Energised PTFE Insulation Gasket



This gasket is a high reliability gasket used for both insulating and general sealing purposes in very critical services. The gasket is suitable in all services up to and including ANSI 2500# and API 15,000# classes.
The gasket is manufactured from a machined metallic core with high-strength glass-fibre reinforced epoxy resin insulating faces
Supplied with high-strength G10 insulating washers and sleeving to resist the forces present in high pressure applications and zinc-plated carbon steel washers to spread the load across the insulating washers during installation.
Spring-energised PTFE or Viton sealing elements are available
Corrosion resistant metallic core .
Also available with high-temperature faces manufactured from G-11 epoxy resin.

*Also available in style **VCFS** which is fire safe according to API 6FB.*
Based on the VCS design and is manufactured with a stainless steel core with glass fibre reinforced epoxy facings with a spring energised PTFE seal.
The VCSF gasket features an additional Fire safe coated E ring.
VCSF can be used on both raised face and RTJ flanges.

Technical Specifications for Klinger manufactured Insulating gaskets sets

Component	1	2	3	4	5	6
Dielectric Strength1 kV/mm	19.8	7.8	5.5	16.6	5.87*	13.9*
Water Absorption %	1.6	1.0	1.0	10.6	0.5	0.5
Max. Operating Temp. °C	107	107	107	400	260	260

*1. Test according to ASTM D149 in transformer oil. To convert from kV/mm to V/mil multiply by 25.4. * Test according to ASTM D149 in air.*
2. Recommended maximum temperature in air for electrical isolation purposes.

Component Material
1 Type E and F Flat Gasket 3.2mm thick neoprene faced phenolic
2 Insulating Washer 3.2mm thick reinforced phenolic
3 Insulating Sleeve 0.8mm thick phenolic
4 Type E and F Flat Gasket 3.0mm thick KLINGERSIL®C-4430. Rated fire safe
5 Type E and F Flat Gasket 3.0mm thick KLINGER®top-chem 2000. Rated fire safe
6 Type E and F Flat Gasket 3.0mm thick KLINGER®top-chem 2003