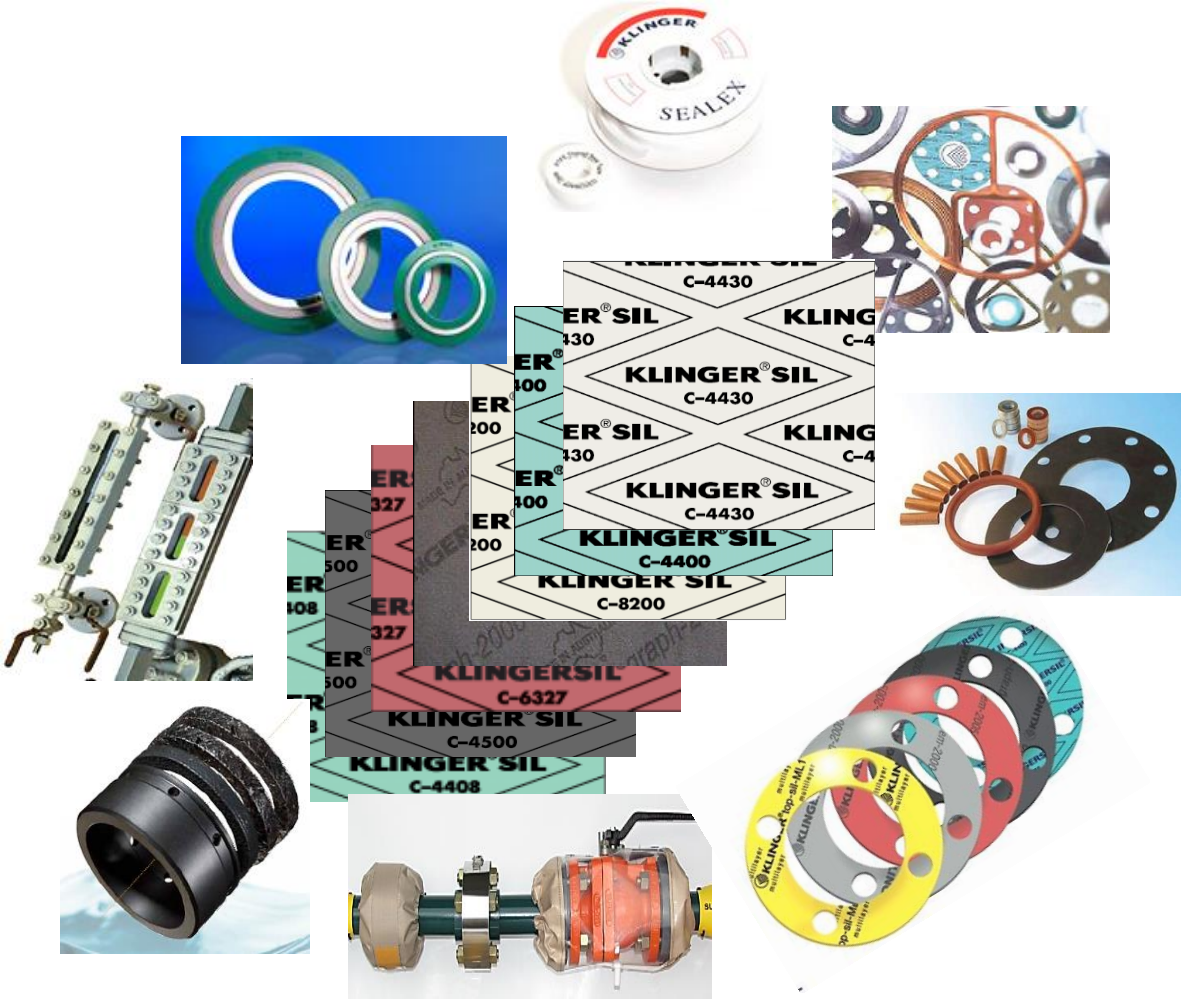
KLINGER trusted. worldwide.

General Product Catalogue



Certified System
Environment
ISO 14001
SAI GLOBAL

Certified System
Health &
Safety
AS 4801
SAI GLOBAL

Certified System
Quality
ISO 9001
SAI GLOBAL

Introduction

Over the past two decades there have been major developments in fluid and gas sealing products and the Klinger Group of Independent Companies have been at the forefront of these changes, constantly improving existing materials whilst at the same time developing new products.
Klinger Limited is the largest manufacturer of sealing products within in its chosen field of operation in Australia and prides itself on producing high quality, effective solutions to fit the broadest range of applications
It is no coincidence that the Klinger brand is acknowledged by process and plant engineer's as a quality product.
It is our commitment to high standards of manufacture and supply that encourages specifiers from many diverse industries around the world to call on KLINGER to supply their fluid and gas sealing requirements
It is a reliability record built on international and local knowledge that allows our team of product specialists to offer the best and most practicable solution for any sealing application.
Klinger Australia operates its own unique testing and development facilities but also has access to the products and developments which grow out of the state of the art Research and Development facilities within the group.
The innovation and adaptability of Klinger enables the company to meet the sealing challenges of today and into the future.

Certification

Klinger limited has the following certification for its manufacturing facilities in Australia:
ISO 9001:2008
AS/NZS ISO 14001:2004
AS/NZS 4801:2001

Contents

This catalogue has been designed to give you the customer an overview of the broad but industry focused range of products and services which are available from Klinger within Australia as well as our internationally operated branches and distributors within the Asia Pacific region.
The information given in this brochure gives guidelines on the product characteristics, make up and application of the of various materials .
Care must always be taken when using any of the performance indicators given as in some cases they cannot be used at their maximums without doing a full technical evaluation of the application in which they are to be used.
Should more detailed information or assistance be required please contact our technical department at technical_service@klinger.com.au
Whilst every care has been taken in the preparation hereof, it does not substitute for the proper supervision of a qualified engineer and does not constitute any form of contractual representation.

Index

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

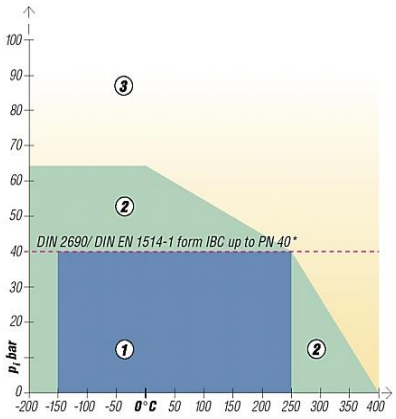
Klinger is a world leader in the manufacture of non asbestos calendared sheet materials. The reputation for supplying reliable high quality sheet gasket materials has been built up over many generations and Klinger has been at the forefront, leading by example, with the development of an entire range 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.



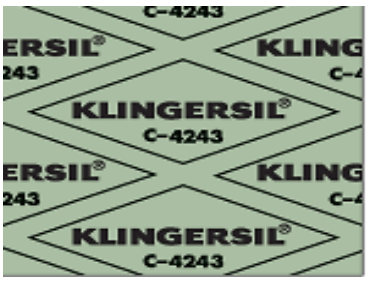
1. In area one, the gasket material is normally suitable subject to chemical compatibility. **2.** In area two, the gasket materials may be suitable but a technical evaluation is recommended. **3.** In area three, do not install the gasket without a technical evaluation.

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

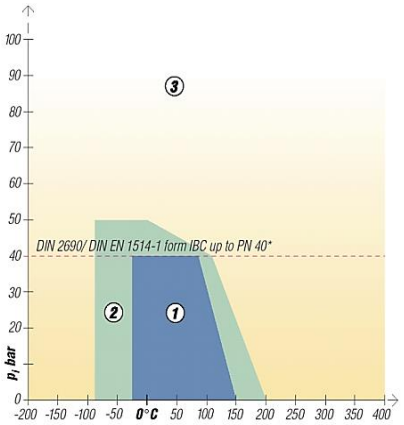


Characteristic & main applications

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.



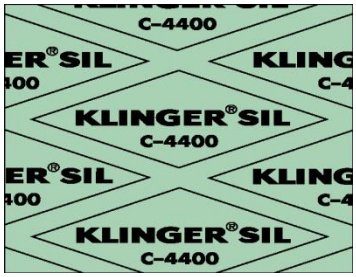
Technical Data - Typical values

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

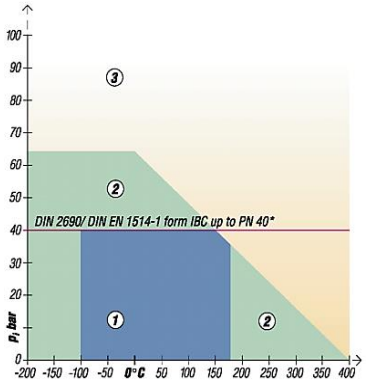


Characteristic & main applications

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

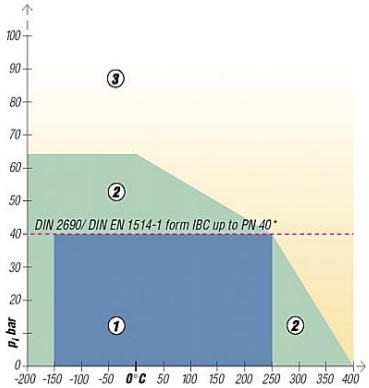
KLINGERSIL® C-4430

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.

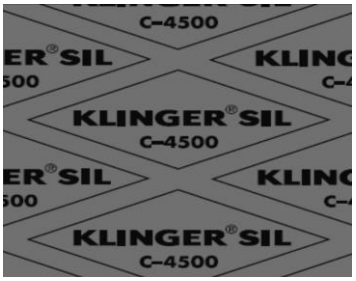


Technical Data - Typical values for 2 mm thickness

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

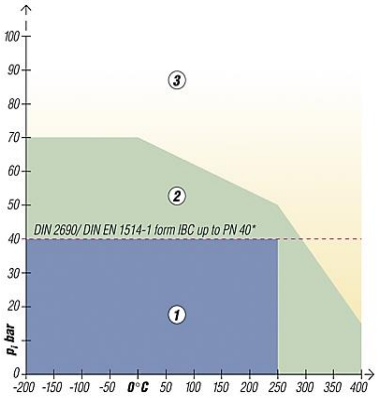


Characteristic & main applications

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

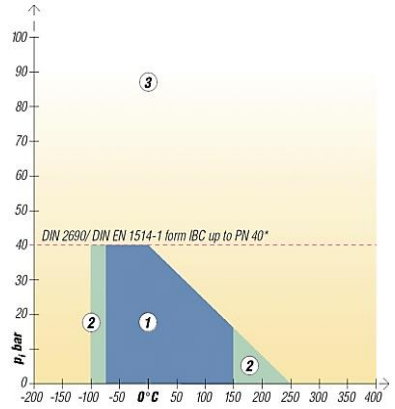
KLINGERSIL® C-6327

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

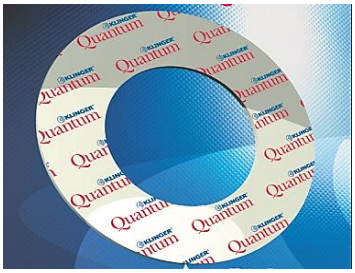
Gasket material based on SBR-bound aramid fibres and anorganic fibres.



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

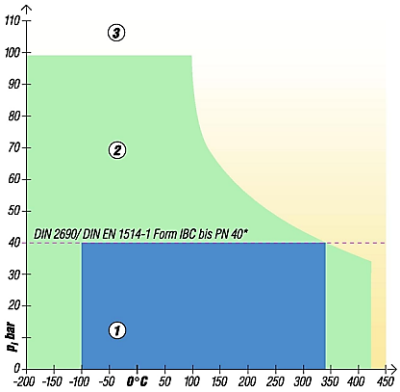


Characteristic & main applications

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

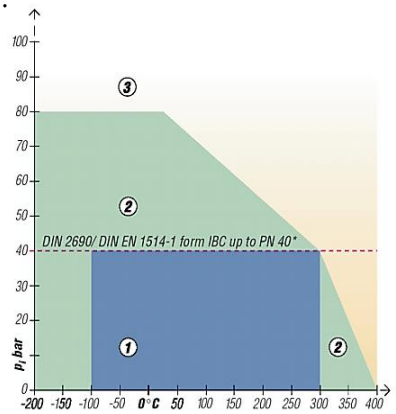
KLINGER® top-sil-ML1

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.



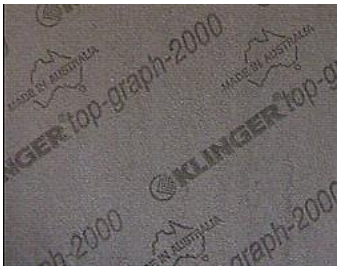
Technical Data - Typical values for 2 mm thickness

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

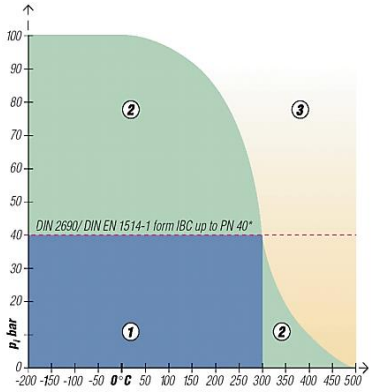


Characteristic & main applications

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.

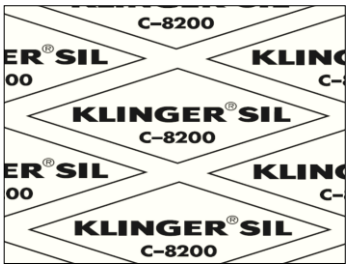


Technical Data - Typical values for 1.5 mm thickness

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

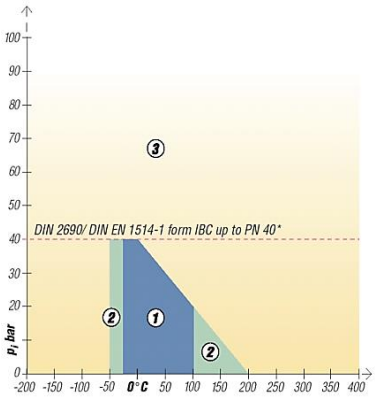


Characteristic & main applications

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		25MPa
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

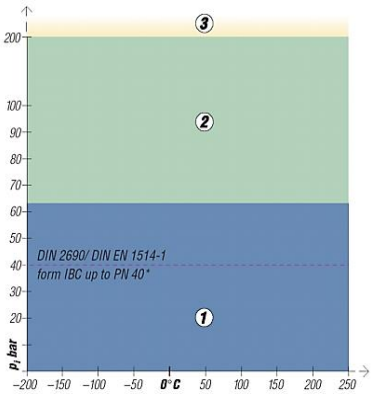
With KLINGER ® top-chem 2000 the high relaxation typical of standard filled PTFE gaskets is not observed. At a load of 50 MPa and a temperature
of 200°C the relaxation of this material is only just 2%.
This ensures that bolt forces are maintained even under severe conditions.
Therefore it is not necessary 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

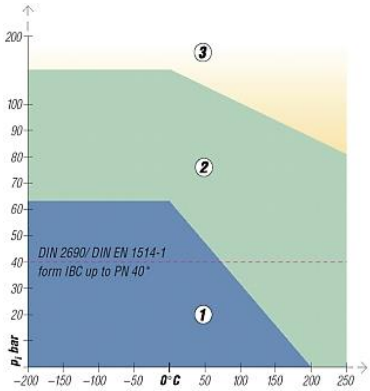
KLINGER® top-chem 2003

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 for2 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

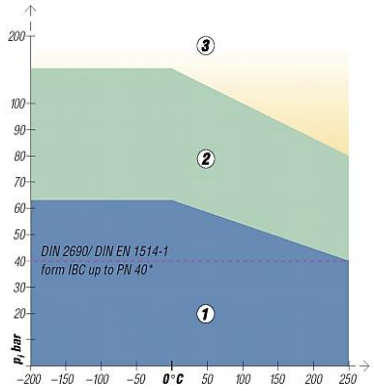
KLINGER® top-chem 2005

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 for1.5 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.

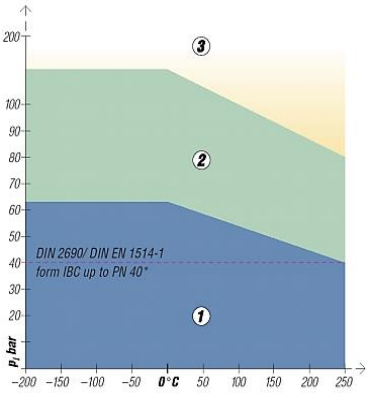
KLINGER® top-chem 2006

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 for1.5 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

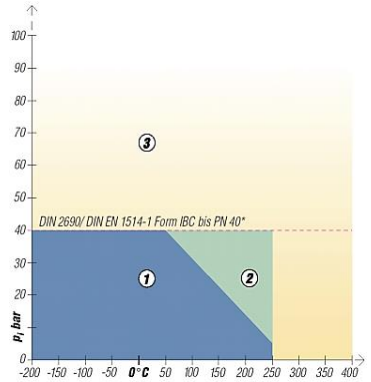
KLINGER® soft-chem

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

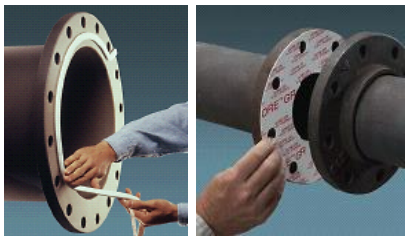
KLINGER®soft-chem materials are available in 1500 mm x 1500 mm sheets in thicknesses 1.5mm and 3mm.
Other sizes available on request.

Sealant Technologies – PTFE gasketing

Klinger Limited Australia is an appointed distributor of the Gore range of innovative and top-performing gaskets, seals and other fluid-handling products.
Following is a range of products which are available from Klinger.

Products that Seal

Because of its unique combination of properties, GORE® expanded PTFE virtually eliminates the drawbacks of conventional PTFE sealing and fluid handling products. Their gasket configurations provide solutions for flanges that are fragile, warped or misaligned. The GORE® product also enable users to standardize on one gasket material across a wide range of process piping systems. Their compression packing products are amongst the highest-performing, most universal products on the market today. Their pump diaphragms deliver longer-lasting service.



Most Reliable Seal

Gore sealants are among the world's tightest, most reliable and chemically resistant gaskets. They withstand temperatures from -450˚F to +600˚F (- 268˚C to +315˚C), making them ideal for high-temperature as well as cryogenic applications.
They are also resistant to the most challenging chemicals.
Gore gaskets are proven effective against every performance measure. They seal at low bolt loads, conform to flange deviations, exhibit high dimensional stability, resist creep and cold flow, and are highly resistant to blow out.
Gore gaskets are designed to meet the many needs of process piping materials, making them ideal for lowering total sealing system costs. They solve special sealing problems, and provide the ability to standardize with one gasket material across steel, glass-lined and FRP systems wherever non-metallic gaskets are used. Whether it's a standard piping or vessel application, or a difficult and unusual sealing problem, chances are one of Gore's gasket material products can provide a highly effective solution.

Sealing with Certainty®

GORE® Universal Pipe Gasket (style 800)

Finally, a universal gasket for all standard flanges on chemical process piping.
Designed to meet the needs of different
piping materials, it is ideal for standardizing across steel, glass-lined steel, and fibre reinforced plastic (FRP) systems. It delivers long-life performance, lowers total system sealing costs and simplifies inventory stocking requirements, while also protecting against the use of the wrong gasket.

GORE® Gr sheet Gasketing

Unmatched in sealing reliability, this unique product is ideal for sealing steel pipe and equipment flanges across a range of aggressive fluids. gain the benefits of a PTFe gasket without the problems of creep and cold flow – along with a level of high-temperature and blow out resistance that is superior to any other PTFe sheet gasket. highly conformable, it compresses into an extremely tough gasket that seals
tight, even on irregular flanges.

GORE® Joint sealant*

The original form-in-place gasket material,
It is the most versatile and cost-effective
alternative to sheet gasket materials for large equipment flanges. Ideal for sealing
complex surfaces, it conforms extremely
well to rough or pitted surfaces.
It is easy to install as well, just peel off the backing, apply to the surface, and overlap the ends for a remarkably tight seal. For materials above a thickness of 3 mm please consult Klinger for advice on the joining method.
For sizes available and the spool lengths please contact Klinger customer service.

Sealant Technologies – PTFE gasketing

GORE® series 500 Gasket tape

Series 500 Gasket Tape represents the latest advancement in worry-free sealing performance and efficiencies for steel piping and equipment. This cutting-edge product delivers dramatically improved creep resistance to maximize the operational reliability of large steel flanged applications.
Series 500 Gasket Tape fits any shape instantly. The highly compressible tape forms a very tight seal that is long-lasting while also handling the rigors of virtually any chemical process.
Unlike traditional large gaskets, Series 500 Gasket Tape is formed in place quickly and easily.
Customization at the time of installation eliminates the long lead times for ordering pre-cut gaskets and minimizes the need for extensive gasket inventories.

Technical Data

Material
100% expanded PTFE, with multi directionally oriented fibril structure

Temperature Range of the Material
-268°C to +315°C (-450°F to +600°F)

Chemical Resistance
Resistant to all media (pH 0-14), except for molten or dissolved alkali metals and elemental fluorine particularly at high temperatures.

Operating Pressure
In general, vacuum to 40 bar (580 psi).The specific application governs the operating range of the installed gasket due to the strong influence of many factors, such as operating temperature, flange size, gasket stress, and installation

GORE® Gasket tape*

This versatile, thin-profile, form-in-place gasket material features a full-face strip-type construction under 2 inches (50.8 mm) wide for smooth, flat, rectangular sealing surfaces or for narrow sealing surfaces.
It compresses easily to an extremely thin profile, while requiring only minimal compression to seal.
Because of its easy installation and removal, it is ideal for equipment with tight tolerances.

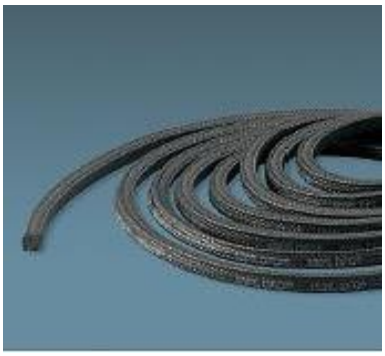
GORE® valve stem Packing*

A pliable, self-lubricating packing that eliminates stem wear and lasts longer. This continuous-length packing is easy to install and forms a cohesive cylinder when compressed, eliminating the need to cut and form rings.

* Indicates for Industrial use only.

Not for use in food, drug, cosmetic or medical device manufacturing, processing, or packaging operations.

GORE® GFO® Packing*



Proven High Performance

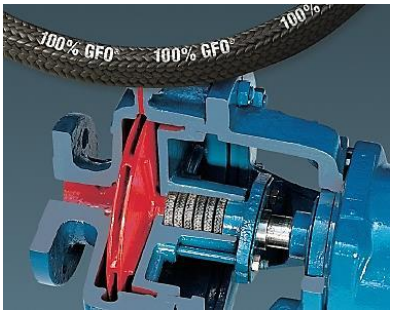
You will benefit from a full line of high-performance compression packing. These materials are chemically inert, highly abrasion-resistant, plus they're able to withstand temperatures up to 550˚F (280˚C). Extremely long-lasting, they guard against unexpected packing failure and help reduce plant downtime.

Seal of Assurance

With a 30+ year history of trouble-free performance, 100% GORE® GFO® fiber packing delivers an unmatched level of assurance and confidence.
Easy to install and remove, it never gets hard or brittle in normal operation.
It dissipates frictional heat and runs cool, even after extended periods of continuous operation. It saves money and labor, including downtime from repacking pumps or resurfacing shafts.

Klinger reference is Style K49.

Minimum temperature: - 240 ˚C
Maximum temperature: + 280 ˚C
pH range : 0 to 14
Max static pressure : 250 bar
Max rotary pressure: 20 bar
Max rotary speed : 18 m/s
Max reciprocating pressure : 200 bar
Max reciprocating speed 2 m/s



PTFE gasket materials

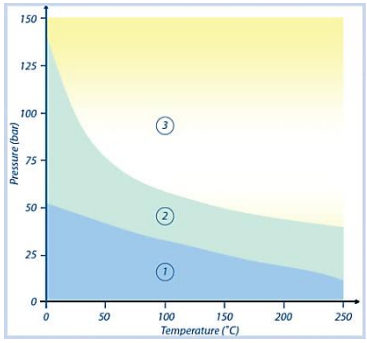
KLINGER® sealex

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

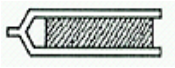
PTFE Envelope with insert

Characteristic & main applications

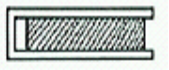
Excellent chemical resistance.
PTFE envelope gaskets consist of a suitable filler material insert with a PTFE envelope. The PTFE envelope protects the gasket from chemical attack. The insert provides the strength and resilience needed for demanding sealing operation. In some cases a steel insert can 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:

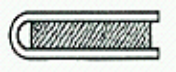
Klinger PTFE envelope gaskets are available in 3 different style as below.
Slit Type – 0-500 mm
U-Type – 0-500 mm
Welded Type – 500 to 3000 mm



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.

Site Services and Hydraulic Tensioning

Hydraulic Bolt Tensioning

In line with Klinger Australia's continuing search for products to improve the quality of service to clients and to increase the cost effectiveness of maintenance by facilitating a complete jointing solution for critical flanges, we have added a **New** division to Klinger to promote a complete Sealing Solutions Package.
Klinger now offers a full package of Site Services in order to provide for a **"Leak Free Start Up"**, offering savings in labour costs and machinery or plant downtime.
The goal with all shutdowns involving flanges and joints is a leak free start up.

The Klinger Site Services Division offers a:

"ONE STOP SHOP"

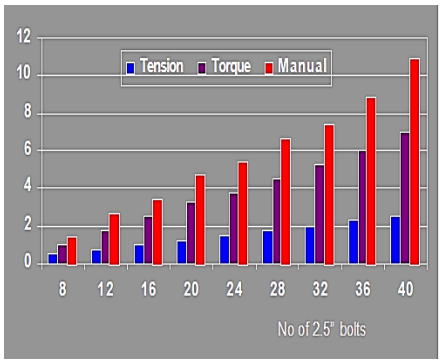
With services such as:-

- On site in situ Flange Facing
- Hydraulic Bolt Tensioning
- Hydraulic Bolt Torquing
- Complete Flange Management
- Flange Management Database Entry

Hydraulic tensioning has many advantages over traditional torque wrenches. This method is suitable for use in extremely confined spaces and only requires access to the job with a hydraulic jack to apply or release a bolt load without costly and time consuming stripping out of surrounding obstructions.

Figure 1 illustrates the huge time saving which can be made when using Hydraulic Tensioning (**Blue**) rather than traditional methods such as Flogging Spanners (**Red**) or Hydraulic Wrenches (**Purple**)

Fig 1



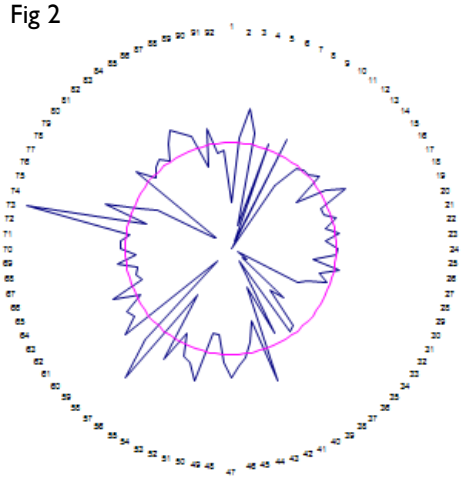
Tensioning Times Comparison

Hydraulic tensioning stretches the stud bolt, utilizing the elasticity of the metal. This eliminates the frictional forces associated with toque tightening, ensures the correct tension is applied, and improves the longevity of the stud. This closure technique has been successfully used in many heavy industrial applications.

Case Study: Aluminium Processing Plant

The Graph below in Fig 2 is an indication of the variations of bolt load applied to 92 x M64 bolts 356 mm long using Torque to apply bolt load, indicating the potential difference of pressure being applied to the gasket.

Fig 2



Directory of Site Services

Our Goal:

To provide a "One Stop" shop for all Fluid Sealing Products & Services

Our Objective:

To supply the best gasket solutions to provide for a "Leak Free Start UP"

Our Expanded Range of Services include:

- Gasket Selection & Guide using our unique "KLINGERexpert" Software Program
- Fugitive Emission – LDAR
- On Site Flange Facing & Flange Face Inspection Services
- Hydraulic Tensioning Services
- Hydraulic Torquing Services
- Flange Management & Database Entry

Flange Recording:

- Flange data base entry
- Flange ID and tagging

Flange Management

- Hydraulic tensioning
- Hydraulic and manual torquing
- Flange flatness testing
- Flange facing
- Supervision of additional skilled and semi skilled labour supplied by others
- Mechanical Fitting
- Controlled Tightening Records

Load Calculations

- Pressure calculations for hydraulic torque tools
- Pressure calculations for hydraulic tensioning tools
- Torque calculations for manual torque tools

Accreditations

- Working at heights
- BMS
- Environmental Package

Klinger also supply a comprehensive range of hydraulic tensioners, jacks, nuts and purpose built gland followers.

Flange machining

Pump Gland Follower

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 (FKM)

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.

Rubber Metal Gaskets

Rubber-metal gaskets have secured a fixed application range in the world of gasket technology. Wherever safe sealing of media with an extremely low leakage rate and low joint loads at relatively low temperatures is required, rubber-metal gaskets provide the best possible solution.
Klinger has a range of flange gaskets which it manufactures made from a combination of rubber and steel as well as the patented variable wedge type rubber seal that consists of two interlocking parts connected through a tongue and groove joint.
The application that these gaskets can be used on are:

- Water
- Gas
- Waste water
- Chemicals subject to compatibility

The flange types that they can be used on are:

- Plain steel, stainless steel
- Cast iron
- GFK (Glass fibre reinforced plastics)
- PP/PVC/PE
- Coated Flanges.

The gaskets are available in various grades of rubber. Consult Klinger.

NR – Natural rubber
NBR – Nitrile
EPDM – Ethylene Propylene
CSM – Hypalon
FKM – Viton

Styles available are as follows:

Style KGS

s = gasket thickness
d_1 = inner diameter
d_2 = outer diameter

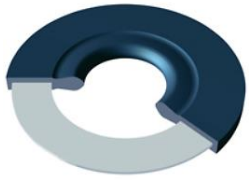
Vulcanized rubber mixture, lens-form, rounded at the edges, vulcanized steel ring inside, therefore good reception on the surface load. Outer diameter self centering at the inner bolt circle.

Style KGS/S

s_1 = thickness of the "spear tip"
s_2 = gasket thickness
d_1 = inner diameter
d_2 = outer diameter

Vulcanized rubber mixture, lens-form with moulded spear tip (cross section view) at the inner rim, rounded at the edges. This shape offers more safety against corrosion instead of an inner moulded O-ring. Also very good in applications with flanges made of thermoplastic materials.
Vulcanized steel ring inside, therefore good reception on the surface load. Outer diameter self centering at the inner bolt circle.

Style KGS/TK



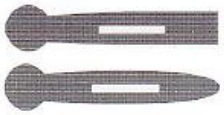
Similar to KGS/S except it has square section on outside dimension. Also very good in applications with flanges made of thermoplastic materials.
Vulcanized steel ring inside, therefore good reception on the surface load. Outer diameter self centering at the inner bolt circle.

Style KGS/VD

The first adjustable seal

This special design allows the new seal to act as a simple and economic sealing device for obliquely positioned flanges. Elaborate and thus expensive structural measures can thus be avoided.
Oblique positions can be infinitely aligned up to approximately 8° vertically or horizontally.
Installation instructions supplied with gaskets

Style G-ST-P/S



The G-ST- P profile gasket combines the advantages of its individual parts. High surface pressures transmitted from the main force of the flow are absorbed by the rigid body of the G-ST gasket. The flat steel-ring, corrosion protected by being vulcanized in, absorbs with ease the required test pressure.

Style G-ST-P/KN

The G-ST profile gasket exhibits deforming and moulding characteristics with minimum surface pressure.
When extreme stresses occur during installation, the G-ST-P/KN offers the best solution.
The outer steel ring on the outside boxes in the surface lip and protects it fully.
High surface pressures on the rubber lip or blow-outs under high operating pressures are not possible.
n the case of part coated flanges the sensitive faces are protected.
Typical applications are therefore: Systems operating at high pressure or Rubber-coated sub-assemblies in chemical works and power stations.

Klinger is also able to supply the full range of Kroll & Ziller gaskets which are also manufactured from combinations of rubber and metal.

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

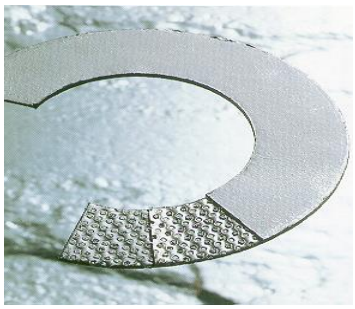
Tests and Certifications

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

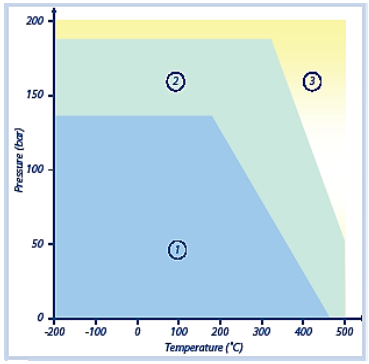


Characteristic & main applications

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

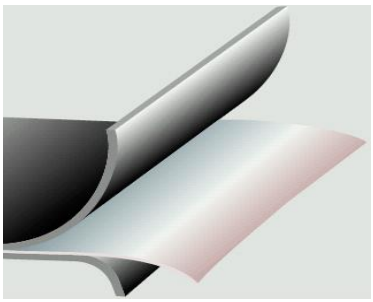
Pure exfoliated graphite with a tanged stainless steel sheet reinforcement



Technical Data - Typical values for1.5 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

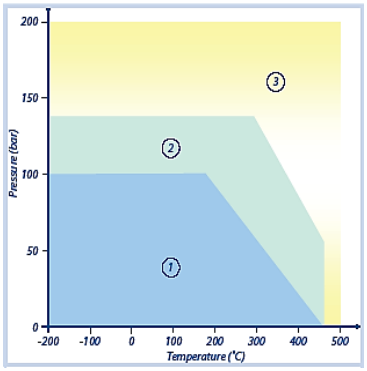


Characteristic & main applications

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 for1.5 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

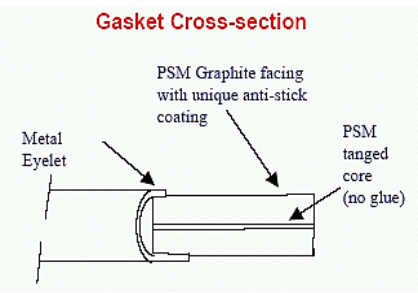
PSM Eyelet Gasket

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.



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 CNAF gaskets or for corrugated gaskets with non asbestos cord rope layers.

General properties:

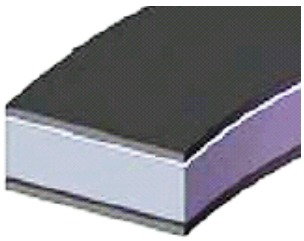
Temperatures from -200 to +450°C.
General use to 600 psi. For pressures up to 1450 psi please contact Klinger.

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

Also available with expanded PTFE (104P) and Mica (104M) layers

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

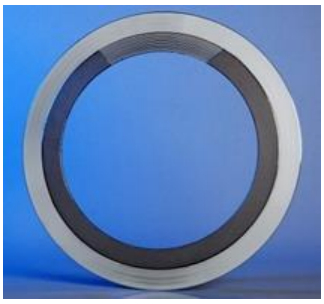
Pure exfoliated graphite with a solid steel core. For PTFE lamination consult Klinger.

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.

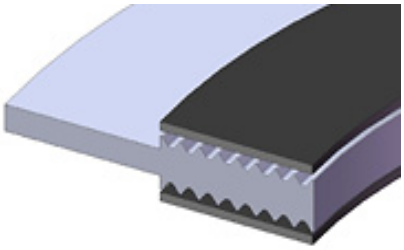
Applications of Maxiprofile Gaskets:

- 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.

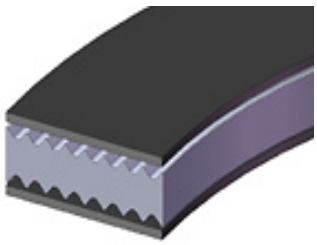
All can be supplied with bars to suit Heat exchanger configurations.
CA1,2 & 3 Convex profiled joints in the same style as LA 1, 2 and 3. The convex profile is designed to assist sealing in low bolt load applications.

STYLE LA1



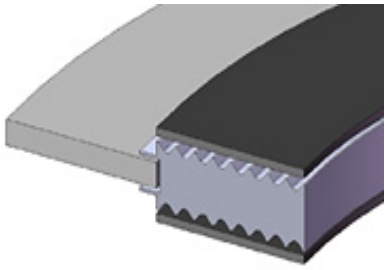
Lateral profiled joint with guide ring for raised and flat face applications

STYLE LA 2



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

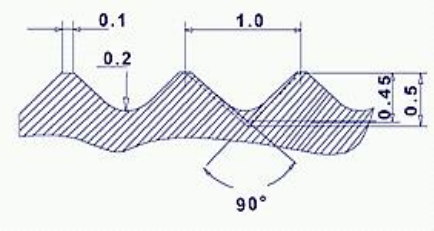
STYLE LA 3



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 500°C
PTFE	-200 to 260°C
Mica	to1000°C
KLINGERSIL® C-4430,	-196 to 250°C

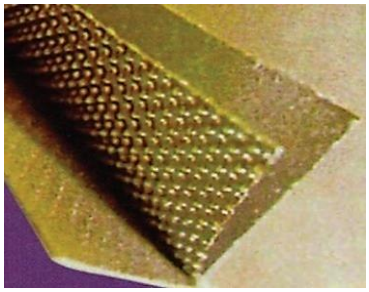
Core Material Maximum Temperature

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.

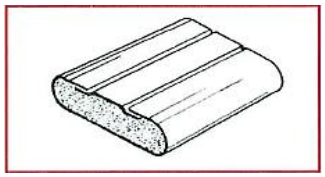
General Properties

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.

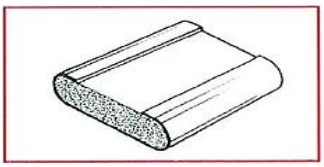
Style 100



Double Jacketed Gasket

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

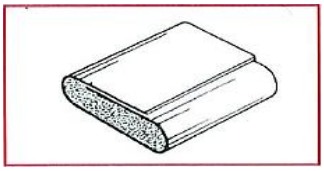
Style 101



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

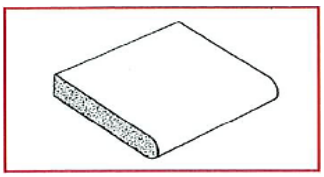
Style 102



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.

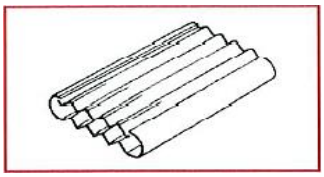
Style 103



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 3µm	125-250µ"
Critical	3 2µm	125µ"
Vacuum	2.0µm	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 temperatures

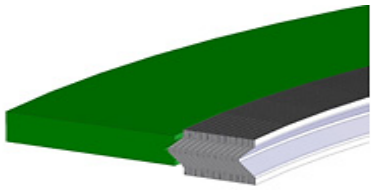
Graphite	-200 to 500°C
PTFE	-196 to 260°C
Mica	1000°C
Mica and Graphite	900°C
Ceramic	1200°C

Following are the most common Spiral Wound gasket configurations

Maxiflex Style R

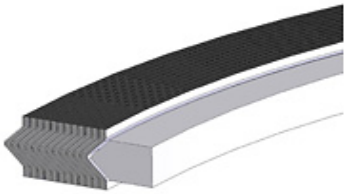
- Maxiflex spiral wound sealing element
- Wide choice of materials for filler and metal strip
- Suitable for high pressure and temperature applications
- Recommended flanges - tongue & groove, male to female and flat face to recess
- General and critical duties

Maxiflex Style CR



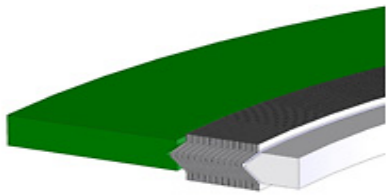
- Maxiflex spiral wound sealing element
- Solid metal outer ring used as a centering device and compression stop.
- Used mainly on raised face and flat face flanges
- Wide choice of materials for filler and metal strip
- General Duties

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

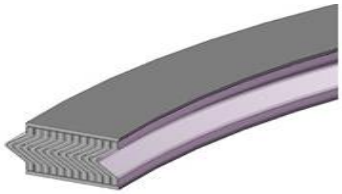
Maxiflex Style CRIR



- 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

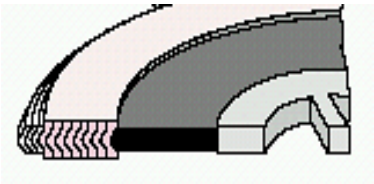
Semi Metallic gaskets – Spiral Wounds

Maxiflex Style R (Graphite faced)



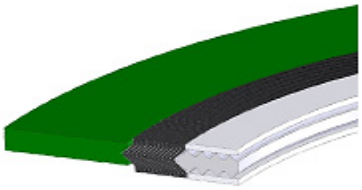
- Maxiflex spiral wound sealing element
- Covered with 0.5mm Graflex facings
- Used on manhole covers
- Low bolt load applications
- Uneven sealing faces
- Used in tongue & groove, male to female and flat face to recess flanges
- Also available in PTFE version.

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



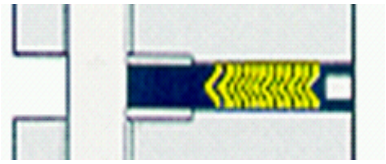
- Maxiflex spiral wound sealing element •A combination of inner and outer rings
- The inner ring could have pass bars or could carry either a metal clad or soft gasket with pass bars
- Manufactured to customer designs
- Wide choice of materials for filler and metal strip
- Manufactured with thin outer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

Maxiflex Pro



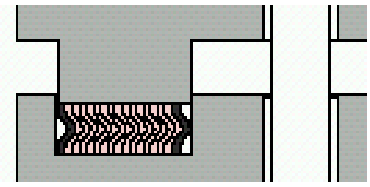
- A high-integrity, dual-seal gasket specially designed for service in high-criticality, corrosive applications where sealing performance is of paramount importance.
- The Klinger Maxiflex Pro gasket is designed for use in highly aggressive chemical applications.
- The inner ring of a standard Maxiflex 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



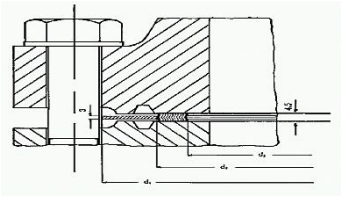
The Klinger maxiflex CRIR–108 gasket has been specifically developed for use on HF Alkylation Units and other similar applications where corrosion of the flanges presents a real problem. Traditional Spiral Wound gaskets use either a Monel or Carbon steel inner ring, which sometimes does not create a 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^{0}C	D
Low carbon steel	120	-40 to +500^{0}C	S
4%-6% Cr 1/2% Mo: F5	130	-125 to +500^{0}C	F5
Stainless steel 304 /304L	160	-250 to +650^{0}C	S304 or 304L
Stainless steel 316 /316L	160	-196 to +800^{0}C	S316 or 316L
Stainless steel 321	160	-250 to +870^{0}C	S321
Stainless steel 347	160	-250 to +870^{0}C	S347
Stainless steel 410	170	-20 to +500^{0}C	S410
Inconel 625	-	1000^{0}C	625
Incoloy 825	-	1000^{0}C	825
Hastelloy C-276	-	1000^{0}C	C-276
Duplex	-	800^{0}C	S31803
Titanium	-	540^{0}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.

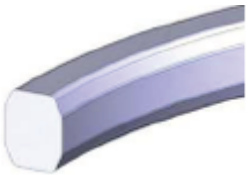
The following Ring Type Joint styles are available:

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:

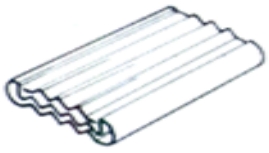
- High integrity seal at high pressures
- PTFE coating improves corrosion resistance and provides easy identification
- Designed to create a high integrity joint with primary and secondary seals Typical Specifications:
- For use up to Class 2500 Manufactured to ASME B16 20 Also available in a range of 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.

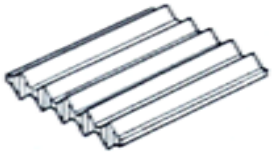
Style 106



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.

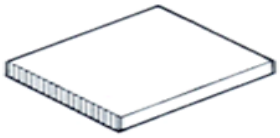
Style 181



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.

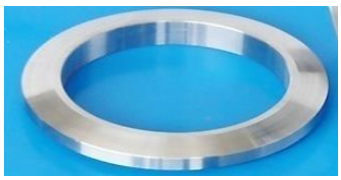
Style 180



Solid Metal Gasket

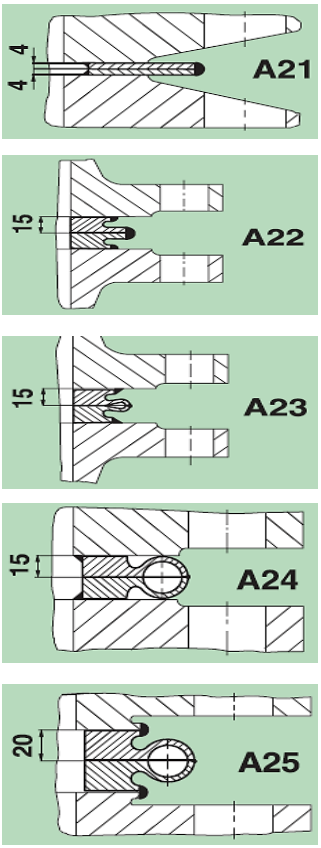
Primarily used on heat exchangers or as shims. Can also be used for washers.
The gasket material ideally needs to be roughly 30 Brinell less than the flange material to ensure sufficient deformation of the gasket without damaging the flange facing. Flange surface finish is critical.
Common metals are 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

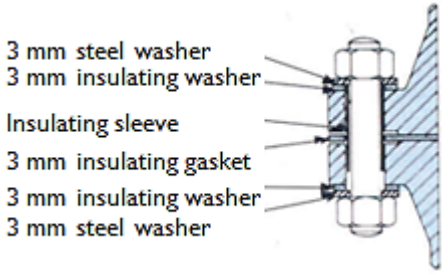
Insulation sets are used to limit corrosion in pipeline systems. Where dissimilar metals are present, the sets remove the possibility of the system acting as a galvanic cell and reduce the risk of galvanic corrosion of the pipe work. Insulation sets are also used to isolate cathodically protected piping 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 stainless steel washers per bolt. The sets are individually packed and clearly labelled with the flange rating, size, type and material combination.

Note: Klinger has a range of gasket materials which are both highly suited and more cost effective that the PGE and VCS gaskets for use in class 150 lb and 300 lb applications.
These materials are C4430, TC2003 and TC2000.

Key function of Insulating gaskets:

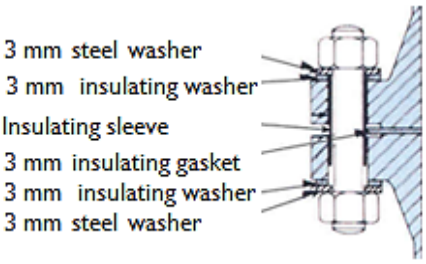
•Used to electrically isolate sections of pipe work
•Designed to minimise electro-chemical erosion
•Comprising materials with high dielectric strength
•Manufactured to suit flanged joints to ASME, BS, DIN and customer designs.

Style E - Full face gasket insulating set assembly.



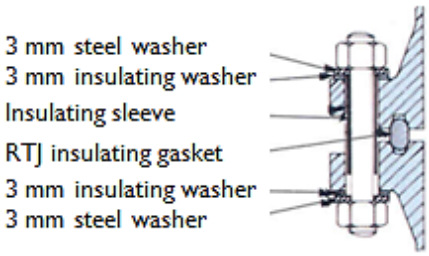
Suitable for flat and raised face flanges. This style minimises the ingress of conductive foreign matter and reduces the risk of bridging.
Typically used on oil and hydrocarbons where flange insulation is a requirement.
Manufactured from materials with high dielectric strength to ensure minimum electrical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

Style PGE

The PGE insulation set uses a machined, glass-reinforced epoxy (GRE) resin with an o-ring or spring energised seal. Suitable for flange ratings from class 150 to 600 offering greatly improved compressive strength.
PGE can be constructed from standard G10 or high-temperature G11 resin with a seal ring which can be manufactured from a range of rubbers or PTFE.
Available in Type E (full-face)and Type F (RF) styles.

Technical Specifications for Klinger manufactured Insulating gaskets sets

Component	1	2	3	4	5	6
Dielectric Strength1 kV/mm	19.8	31.5	157.5	21.3	3.6*	16.7*
Water Absorption %	1.6	0.05	0.8	10.6	0.5	0.5
Max. Operating Temp. °C	107	150	145	400	260	260

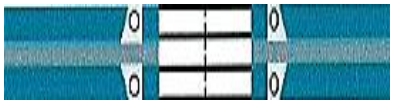
1. Test according to ASTM D149 in transformer oil. To convert from kV/mm to V/mil multiply by 25.4. * Test according to ASTM D149 in air.
2. Recommended maximum temperature in air for electrical isolation purposes.

Component Material

1 Type E and F Flat Gasket 3.0mm thick neoprene faced phenolic
2 Insulating Washer 3.0 mm thick G10
3 Insulating Sleeve Mylar
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

Insulation gaskets and Monolithic Isolation Joints

VCS 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.

General Properties

- Flange insulation in conjunction with cathodic protection
- Mitigates galvanic corrosion in dissimilar metal flange joints
- Mating mismatched ring-joint to raised-face flanges (VCS will seal in ring joint, raised-face and flat face/slip-on flanges)
- Withstands corrosive environments including high CO_2, H_2S and produced water
- Matched bore construction protects flange faces from media-induced corrosion and flow-induced erosion
- Pressure energised seal reduces the flange makeup stress
- Easy installation and removal
- Reusable seal retainer and seals
- Suitable for all ANSI and API rated flanges
- High strength laminate material resists failure due to over compression

Also available in style ***VCFS*** which is fire safe according to API 6FB.

The VCFS insulation gasket is a development of the VCS design to make a fire-safe insulation set. The VCFS includes an additional coated metallic seal to retain the internal pressure along with the spring energised PTFE seal used in the VCS. VCFS uses coated metallic insulating washers to maintain compressive strength after being exposed to fire. The development of the high-strength coated steel washers removes the need for the use of an additional insulating washer.
VCSF can be used on both raised face and RTJ flanges.

Monolithic Isolation Joints

Monolithic Isolation Joints are boltless structures that provides electrical resistance between the pipeline sections and adjoining structures, thus providing the effectiveness of the Cathodic Protection System (CP systems).

The insulation joints are superior to insulation kit gasket assemblies. These joints are preassembled at the factory and are ready to be welded into the pipe line at site

Monolithic Insulation Joints are manufactured from 1" to 48" for different ratings as per ANSI standards.

Monolithic Insulation Joints are designed for temperatures ranging from -20°C to 170°C.

Monolithic Insulation Joints are designed as per ANSI 16.25 and are tested at 1.5 times the design pressure.

Standard Features:

Seals : Fluid Compatible seals
Insulating Ring : G10/G11
Coating : Epoxy Resin (Min 200µ)
Service : Sweet / Sour
Location : Onshore / Offshore

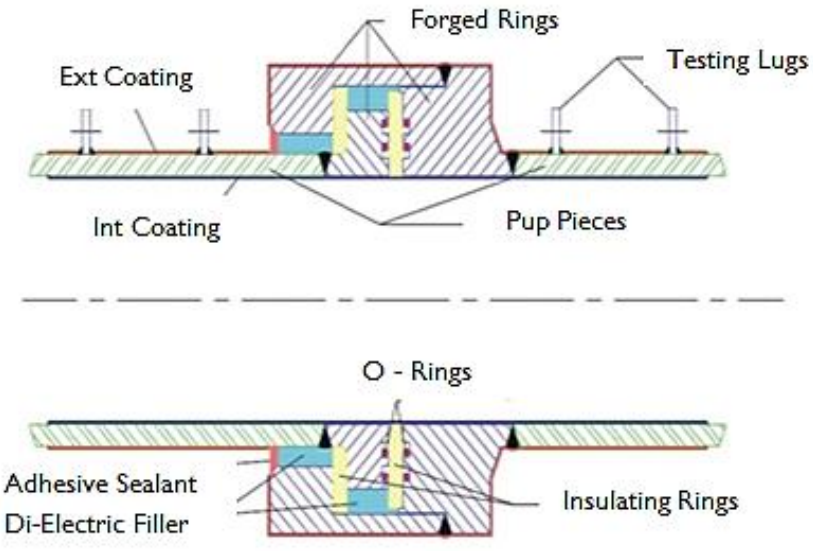
Metallic Parts

Forged Rings : Carbon Steel / Stainless Steel
Pup Pieces : Carbon Steel / Stainless Steel

Standards :

Calculations : As per ASME Sec VIII
Welding Procedure : As per ASME Sec IX

Special Features :
Non Standard Wall Thickness can be manufactured as per the customer's requirements.



Compression Packing

Klinger has a comprehensive range of compression packing's which are suitable for centrifugal or reciprocating pumps and valves. Klinger's range includes patented specialised compression packing and concepts which assist our customers to meet, and in most cases exceed the stringent fugitive emission targets set by various environmental bodies such as the EPA and customers themselves. Klinger's large braiding facilities produce packing in square, round or rectangular profiles, with or without specialised cores in various materials such as rubber and steel.
Certain grades of materials can be produced in sections up to 130mm square.
Klinger styles of braiding are Klingerlock, Plaited, Braid over Braid and Braid over core.
Klinger are also the sole appointed distributor for the Asia Pacific region for the SealRyt Corporation of the USA and for Robco Inc of Canada for Australia and New Zealand as well as certain designated Asian countries.

Klinger are able to provide:

- A reliable and effective range of compression packing's that have universal application throughout industry
- Utilising the most modern production techniques and materials
- To give the user predictable life expectancy
- Provide a complete range of packing to replace traditional products.
- To aid in the correct selection of the most appropriate packing for any given application
- To provide the user with the full technical support from full installation documentation through chemical compatibility and past application success
- To reduce inventory and stock holding costs through product rationalisation.

- A full range of packing extractors with replaceable tips is also available.

Note: Packing's should not be subjected to the maximums of temperature, pressure and speed simultaneously. For further advice contact Klinger.

Style K10

Material:

Acrylic yarn and PTFE

Application:

Water, mild acids and alkalis, mild slurries.

Service Capabilities

Temperature Degree C	–100 to 260
pH capability	2 – 12
Max rotary Pressure	30 bar
Max static Pressure	100 bar
Max rotary Speed	10 m/sec
Max reciprocating pressure	20 bar
Max reciprocating speed	2 m/sec

Style K11

Material:

Acrylic yarn and graphite dispersion

Application:

Water, mild acids and alkalis, mild slurries. Suitable where the use of a non contaminating packing is not important.

Service Capabilities

Temperature Degree C	–100 to 300
pH capability	4 – 10
Max rotary Pressure	40 bar
Max static Pressure	100 bar
Max rotary Speed	15 m/sec
Max reciprocating pressure	25 bar
Max reciprocating speed	2 m/sec

Style K13DL

Material:

Flax yarn and Doulon Lubricant

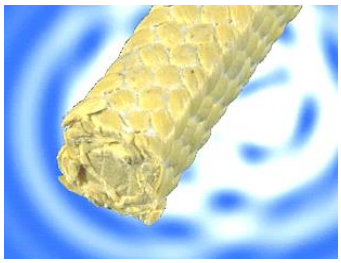
Application:

Water, mild acids and alkalis, slimes and slurries, stern tubes. Resistant to water rot especially salt water.

Service Capabilities

Temperature Degree C	0 to 90
pH capability	4 – 9
Max rotary Pressure	20 bar
Max static Pressure	70 bar
Max rotary Speed	15 m/sec
Max reciprocating pressure	30 bar
Max reciprocating speed	4 m/sec

Style K25



Material:

Aramid yarn and PTFE lubrication

Application:

Suitable for a wide range of chemicals and heavy slurry applications.
Excellent as a bull ring material and in combination with other fibres. Ensure that the packing is well lubricated if used in moderate and high speed pumps due to its hard wearing properties.

Service Capabilities

Temperature Degree C	–100 to 260
pH capability	2 – 12
Max rotary Pressure	30 bar
Max static Pressure	200 bar
Max rotary Speed	15 m/sec
Max reciprocating pressure	100 bar
Max reciprocating speed	2 m/sec

Compression Packing

Style K54F

Material:
Virgin PTFE yarn

Application:
Can be used in virtually all media including strong acids and alkalis.
Also suitable for use on Oxygen valve applications.
Water and food compatible.

Service Capabilities

Temperature Degree C	–240 to 260
pH capability	0 – 14
Max rotary Pressure	20 bar
Max static Pressure	200 bar
Max rotary Speed	3 m/sec
Max reciprocating pressure	100 bar
Max reciprocating speed	2 m/sec

Style K54S

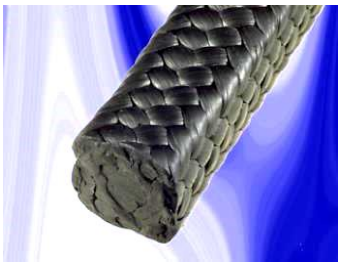
Material:
PTFE yarn and lubricants

Application:
Can be used in virtually all media including strong acids and alkalis.
Suitable for use in potable water and food applications.
Most glands packed with this packing requires little adjustment after the initial installation.

Service Capabilities

Temperature Degree C	–240 to 260
pH capability	0 – 14
Max rotary Pressure	20 bar
Max static Pressure	200 bar
Max rotary Speed	5 m/sec

Style K55



Material:
Graphite encapsulated PTFE yarn

Application:
Can be used in virtually all media including strong acids and alkalis.
K55 has very good heat dissipating properties and is easy on sleeves and shafts. Very good in mild slurries and on feed pumps

Service Capabilities

Temperature Degree C	–200 to 280
pH capability	0 – 14
Max rotary Pressure	30 bar
Max static Pressure	200 bar
Max rotary Speed	20 m/sec
Max reciprocating pressure	100 bar
Max reciprocating speed	3 m/sec

Style K3222 / K3222W

Material:
Exfoliated graphite ribbon packing

Application:
K3222 is a cost effective general purpose packing for use in non abrasive applications on pumps and valves within all industries.
It is also available in a wire reinforced version designated **K3222W** for high pressure valve applications. Not suitable for pumps.

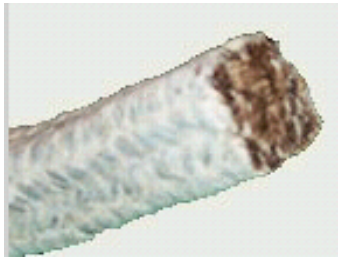
Service Capabilities

Temperature Degree C	–200 to 430
In saturated steam Deg C	650
pH capability	0 – 14
Max rotary Pressure K3222	20 bar
Max static Pressure K3222	100 bar

(For use up to 280 bar for K3222 consult Klinger)

Max static Pressure K3222W	300 bar
Max rotary Speed K3222	20 m/sec

Style K4307



Material:
Flax fibre with PTFE/mineral lubricants.

Application:
Water, mild acids and alkalis, slimes and slurries, stern tubes. Resistant to water rot

Service Capabilities

Temperature Degree C	0 to 120
pH capability	4 – 9
Max rotary Pressure	20 bar
Max static Pressure	70 bar
Max rotary Speed	10 m/sec
Max reciprocating pressure	20 bar
Max reciprocating speed	3 m/sec

Style K4313

Material:
A hybrid packing that combines Aramid fibre and Expanded graphite PTFE.

Application:
Suitable for a wide range of chemicals and heavy slurry application pumps.
Reduced shaft wear to pure aramid packing.

Service Capabilities

Temperature Degree C	–100 to 280
pH capability	2– 12
Max rotary Pressure	25 bar
Max static Pressure	250 bar
Max rotary Speed	20 m/sec
Max reciprocating pressure	150 bar
Max reciprocating speed	2 m/sec

Compression Packing

Style K4322

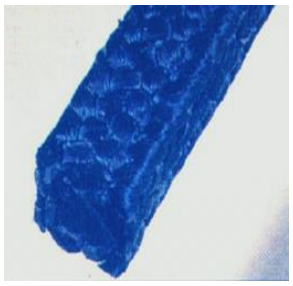
Material:
PTFE yarn with graphite lubricant

Application:
Can be used in virtually all media including strong acids and alkalis. Long lasting performance in pumps and valves.

Service Capabilities

Temperature Degree C	–200 to 280
pH capability	0– 14
Max rotary Pressure	25 bar
Max static Pressure	300 bar
Max rotary Speed	22 m/sec
Max reciprocating pressure	230 bar
Max reciprocating speed	2 m/sec

Style K4333



Material:
Polyimide fibre with PTFE lubricant

Application:
Suitable for water, oils , hydrocarbons, mild acids and alkalis. A good slurry packing in the Pulp and Paper and Sugar Industries.

Service Capabilities

Temperature Degree C	–80 to 260
pH capability	1 – 12
Max rotary Pressure	35 bar
Max static Pressure	200 bar
Max rotary Speed	15 m/sec
Max reciprocating pressure	100 bar
Max reciprocating speed	2 m/sec

Style K7302DL

Material:
Virgin texturized continuous filament man-made fibres and Doulon® lubricant.

Application:
Highly abrasion resistant it is well suited for heavy duty applications pumping slurries and abrasives in the mining industry. A very durable and conforming packing with good chemical resistance .It is used within mining, chemical, power generation, pulp and paper feed stock, waste water and sewerage, sugar mills and refineries and general service applications.

Service Capabilities

Temperature Degree C	–100 to 280
pH capability	2– 12
Max rotary Pressure	36 bar
Max static Pressure	200 bar
Max rotary Speed	16 m/sec
Max reciprocating pressure	100 bar
Max reciprocating speed	3 m/sec

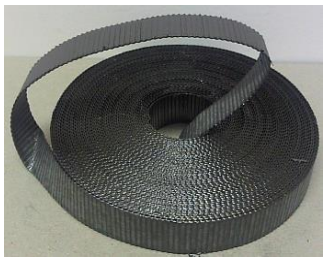
Style K123P, K123SI,K123GL

Material:
Style K123P is a ceramic fibre packing .. Each yarn is reinforced with E-glass filament.
Style K123SI is as per the construction above but is reinforced with Inconel wire.
Style K123GL is as per K123P but lubricated with high temperature graphite.

Service Capabilities

Temperature resistance	: 1260°C
Melting point	: 1760°C
Thermal conductivity	: 0.18WMK at 1000°C

Style K35 Tape



Material:
Exfoliated graphite riffled tape

Application:
Virtually resistant to all media with the exception of strong oxidisers. Can be fitted directly into the valve stuffing box and compressed to create a packing suitable for high temperature and pressure applications. Can be supplied plain or with adhesive backing

Service Capabilities

Temperature Degree C	–200 to 450
pH capability	0 – 14
Density :	1.0g/cm³
Purity	>98%

Sizes available
6mm x 0.5mm x 12 metres
10mm x 0.5mm x 12 metres
12mm x 0.5mm x 12 metres
15mm x 0.5mm x 12 metres
20mm x 0.5mm x 12 metres
25mm x 0.5mm x 12metres

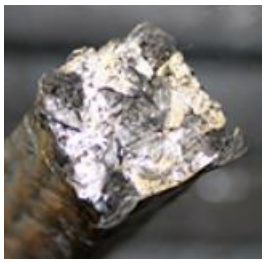
Style K35 Die formed rings

Material:
Manufactured from exfoliated graphite tape.

Application:
Virtually resistant to all media with the exception of strong oxidisers
We are able to manufacture most sizes, section or density of ring to suit the customers requirements.
For pressure seals refer to other products section of catalogue.

Compression Packing

Style 357



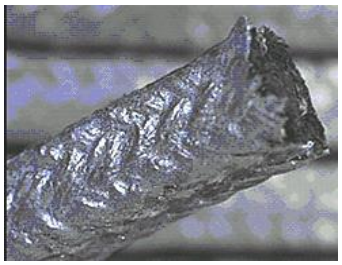
Material:
"Springy" unique carbon centre, exfoliated carbon-inserted foil, high strength carbon yarn in the corners

Application:
Highly chemical resistant and heat conductive. A very anti frictional packing. Dimensionally stable. Meets the requirements of API 622, Process Valve Packing for Fugitive Emissions.

Service Capabilities

Temperature Degree C	–196 to 454
In saturated steam Deg C	650
pH capability	1 – 14
Max rotary Pressure	35 bar
Max static Pressure	310 bar
Max rotary Speed	22 m/sec

Style 390



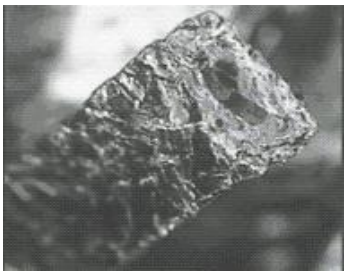
Material:
High purity graphite yarns densely impregnated with micron size graphite

Application:
Highly chemical resistant and heat conductive. A very anti frictional packing effective on a wide variety of services. Permits operation at minimal leakage. Non hardening.

Service Capabilities

Temperature Degree C	–196 to 400
In saturated steam Deg C	650
pH capability	1 – 14
Max rotary Pressure	35 bar
Max static Pressure	170 bar
Max rotary Speed	25 m/sec

Style 396



Material:
A dense flexible graphite with carbon/graphite yarns to resist extrusion

Application:
Operates successfully on pumps and valves. Very conformable packing and can be run drip free in certain applications. Excellent on feed water, caustic and condensate pumps.

Service Capabilities

Temperature Degree C	-196 to 454
In saturated steam Deg C	650
pH capability	0 –14
Max rotary Pressure	35 bar
Max static Pressure	175 bar
Max rotary Speed	22 m/sec

Style 396C

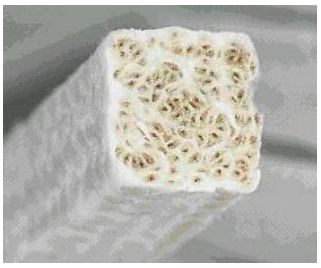
Material:
A patented inner graphite core internally sprung with helical braided Inconel wire , over braided with carbon inserted exfoliated graphite foil.

Application:
Excellent on pumps and valves especially caustic applications. Meets the requirements of API 589, 607 and 622. Klinger's Fugitive Emission packing.

Service Capabilities

Temperature Degree C	-196 to 454
In saturated steam Deg C	650
pH capability	0 –14
Max rotary Pressure	56 bar
Max static Pressure	345 bar
Max rotary Speed	22 m/sec

Style 2000



Material:
Fibre X impregnated with PTFE dispersion.

Application:
An excellent replacement for asbestos PTFE packing. It is much stronger, more chemically resistant and much easier on shafts. A clean packing for acids and alkalis and any application needing non contamination of products. Excellent on slurries..

Service Capabilities

Temperature Degree C	232
pH capability	1 – 14
Max rotary Pressure	30 bar
Max static Pressure	100 bar
Max rotary Speed	11 m/sec
Max reciprocating pressure	35 bar
Max reciprocating speed	2 m/sec

Style 2001

Material:
Fibre X monofilament impregnated with PTFE dispersion.

Application:
A medium soft strong packing, chemically resistant and easy on shafts. A clean packing for acids and alkalis and non contamination of products. Ideally suited to the Pulp & Paper industry.

Service Capabilities

Temperature Degree C	232
pH capability	1 – 14
Max rotary Pressure	30 bar
Max static Pressure	100 bar
Max rotary Speed	1 m/sec

Compression Packing

Style 2017

Material:

High performance mono filament pre twisted with 99.6% carbon yarn.

Application:

A highly acid and caustic resistant packing which is very suitable for both high and low speed equipment, aggressive chemicals and abrasive service at elevated temperatures.

Highly suitable for high temperature abrasive black liquor pumps in the Alumina Refining industry.

Service Capabilities

Temperature Degree C	232
pH capability	1 – 14
Max rotary Pressure	30 bar
Max static Pressure	100 bar
Max rotary Speed	14 m/sec

Style 7413

Material:

Manufactured from 7 different textiles utilizing core to outside surface technology. Super dense

Application:

Unique packing designed for use on heavy slurries, slow moving, large and small shaft applications being affected by eccentric shaft movement. An excellent packing for the pulp and paper industry.

The rigors of many process industries such as Pulp and Paper, Fertilizer, Corn and Sugar Processing, Mining and Food, have recently become exacerbated with increased requirements of running without flush or purging and cooling, minimal if any adjustment, and zero leak. The height of difficulty is reached through large, low RPM equipment which often displays eccentric shaft movement. As no flush is allowed, the packing must also withstand the full force of aggressive chemicals, high percentage solids, often at elevated temperatures.
Density, resilience, and dimensions are all important characteristics, and no packing displays these better than Style 7413. Resistance to "bunching" or "snaking" requires both high tensile strength as well as a high compressive strength final product. Also, heat conductivity must be continual while contact friction is minimized. And finally, maintenance personnel require removal in complete rings.

Service Capabilities

Temperature Degree C	287
pH capability	1 – 14
Max rotary Pressure	*120 bar
*subject to speed. Consult Klinger	
Max static Pressure	345 bar
Max rotary Speed	6 m/sec
Max reciprocating pressure	241 bar
Max reciprocating speed	2 m/sec

Flexible Packing Extractors

Klinger has a high quality range of packing extractors and tamping tools for use on pumps, valves and other static applications which have been designed for hard to remove packing which requires a strong pulling action.
The total removal of gland packing from stuffing boxes without damaging the shaft or the stuffing box is important for a successful repack.
Typically stuffing boxes are in awkward positions and the Klinger flexible extractors make the job easier.
The construction features include a strong flexible shaft for ease of bending to access small and difficult recesses, strong replaceable extracting worm shaped tips which are sharp and designed for easy penetration into the packing within the stuffing box as well as a strong sturdy handle for easy gripping at the time of extraction.

We offer four sizes of extractors.

Size No 1: Klinger part number 191001. For packing 6.5 mm to 9.5 mm.
Size No 2: Klinger part number 191002. For packing 9.5 mm to 12.5 mm.
Size No 3: Klinger part number 191003. For packing 12.5 mm to 16 mm.
Size No 4: Klinger part number 191004. For packing over 16 mm.

Packing Tamping tools in two sizes.

Size TP-1 178 mm x 7.9mm. Klinger part number K14600164/1
Size TP-2 279 mm x 10.3 mm. Klinger part number K14600164/2

Also available is a fitters pump and valve packing maintenance kit in a robust plastic tool box. Klinger part number 191000
A comprehensive data sheet on the kit is available on request.

PTFE Linear Lantern Ring

- Manufactured from Pure Teflon for chemical resistance
- Cuts and installs just like packing
- A few sizes will cover all your needs
- Up to 60% savings over O.E.M. part cost
- Greatly reduces inventory dollars – No more need to stock individual lantern rings
- Eliminate shutting down flush flow from packing extrusion
- Maximum Temperature: 260°C
- PH: 0 - 14

Pack Ryt and Line Shaft Bearings

Pack-RYT

Patent #: 6834862

The Pack-RYT system is a unique stuffing box sealing arrangement that for the first time incorporates a bearing and flush channel system together.
The advantages of this system are numerous and are listed below for easy reference

Shaft Stabilization

Equipment sealing reliability is derived directly from stabilizing shafts. The Pack Ryt sealing system brings shafts into concentricity and keeps them there, significantly increasing sealing reliability. Return on investment improvements with Pack Ryt sealing systems are realized with both difficult to seal and everyday sealing applications.
Examples of equipment types which present shaft movement that benefit from Pack Ryt sealing technology include:
Agitators - overhung shaft design
Vertical Pumps - Long shaft, little support
Split Case Horizontals - Middle shaft sag
Large, Slow equipment - Run-out, spiralling leakage as well as any equipment not running at its best efficiency point.

Water Conservation

Use of the Pack Ryt sealing system guarantees a substantial reduction of flush water used. Due to very close clearances between bearing and sleeve, water entry to the process is severely throttled. This throttling is inherent and automatic.
Pack Ryt's do not require flow meters to reduce flow.

Energy Conservation

The Pack Ryt system draws the same or less amps than a single mechanical seal on the same or identical pump.

- Pack Ryt is a true bearing grade material
- Forces shaft concentric to the bore
- Minimizes shaft deflection
- Drastically reduces water usage
- Maintains lantern ring position
- Designed and machined specific for application minimizing shaft movement within clearances
- Can be used to improve seal life & replace shaft line bearings
- Standard bearing material is compatible with most common industrial chemicals; alternative bearing formulations available as required by application

Pack Ryt BLR

Bearing with integral lantern ring and high quality braided packing for sealing applications where flush media (water, air, etc.) is available to the stuffing box

Pack Ryt BRG

Bearing and high quality braided packing for applications where flush media is not available to the stuffing box

Pack Ryt ORM

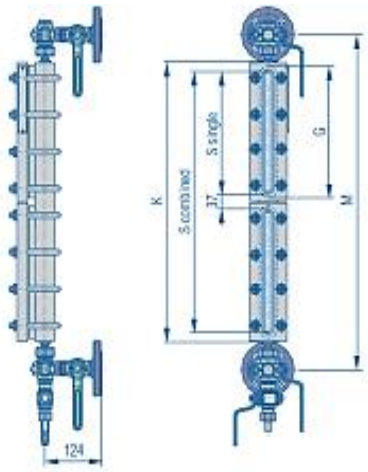
Bearing with O-ring mounted on outside diameter for use with mechanical seals to keep seal face concentric. Optional locking collar available.

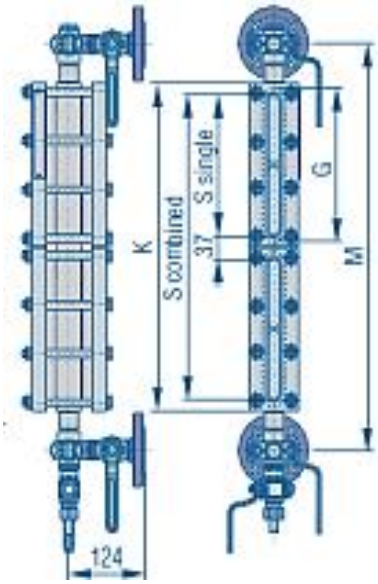
Pack Ryt Line Shaft Bearings

Any shaft utilizing a steady bushing for support, whether vertical or horizontal, is a candidate for a Seal Ryt bearing. These locations can be found inside tanks on agitator shafts, vertical pump columns, auger screw supports, powder blade mixers, marine drive shafts and so on.
The use of SealRyt® Line Shaft Bearings , by centering the shaft and keeping it there, optimizes the delivery end of the equipment, and minimizes wear and tear on the outside roller bearing support systems.
Line Shaft Bearings can be held in place with anti-rotation pins, shrunk or press fit, or end caps.

Liquid and Magnetic Level Gauges

Liquid Level Gauges





Reflex Gauges

Applications:

Saturated steam (up to 32 bar) and for process industry (up to 400 bar)

Indication:

Very clear; steam space = silver white, Water-liquid space = dark

Max. operating-temperature-range:

236 °C (Steam), 400 °C (other media, except steam)

Pressure ratings:

Up to 32 bar (Steam), PN 25 – PN 400
Class 150 – Class 2500

Transparent Gauges

Applications:

Saturated steam (up to 120 bar) and for process industry (up to 340 bar and 120°C)

Indication:

The indication with coloured liquids appears as a dark column of liquid corresponding to the colour of the medium.

Max. operating-temperature-range:

323°C (steam), 400 °C (other media, except steam)

Pressure ratings:

Up to 120 bar (steam), PN 25 – PN 250 (other media except steam)
Class 150 – Class 1500

Bi-Colour Gauges

Applications:

For steam services

Indication:

Water space – green, steam space – red

Max. operating-temperature-range:

356°C (steam)

Pressure ratings:

PN40 - PN 315 (steam)

Accessories available:

Reflex and transparent gauge glasses
Mica shields, sealing and cushion gaskets
Shut-off fittings (gauge valves, gauge cocks) Illuminators (also explosion proof available)
Drain valves, double arm lever, non-frosting blocks

Magnetic Level Gauges

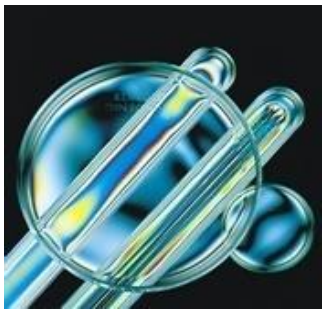
The well proven TC Klinger Magnetic Level is particularly suitable for duties where dangerous and toxic liquids or gases are involved and where the following features, benefits and options are required:

- Immediate and accurate response to level changes, giving clear and sharp legibility
- Continuous indication of a liquid level
- Local and remote display
- Point switching facilities
- Robust, shock proof and completely sealed for safety
- No leakage to atmosphere
- Particularly suitable for dangerous or toxic fluids
- Ideal for liquid interface applications
- Powerful omni-direction magnet system guide-free float
- Display can be rotated through 360° irrespective of float position
- Automatic float warning
- High-pressure capability -- up to 200 bar un vented
- High temperature capability -- standard up to 400° C
- Standard SG range 0.4 - 2.2
- Unlimited length
- Top Mount options
- Chamber materials : Austenitic stainless steels PTFE/PFA lined, PP, PVDF and uPVC
- Floats Austenitic stainless steel, Titanium, PTFE and carbon coated, PP, PVDF and uPVC
- Display unit protection of IP 67
- Designed to ASME B31.3

Transmitters: Magnetostrictive, Reed type EEx ia and EEx d – ATEX and IECEx
Switches: Reed Contact – Safe area, EEx ia and EEx d

Level Gauge Glasses and Piston Valves

Borosilicate Gauge Glasses



Circular Sight Glasses
moulded - ground - polished - thermally pre-stressed

Diameter [mm]:
from 31.75 up to 200

Thickness [mm]:
from 12.7 up to 20

Range of Working Pressure [bar]:
Up to 175 bar

Range of Operating Temperature:
from -273°C up to 356°C

Chemical Resistance:
Alkali resistance:
Class 2 (tested to ISO 675)
Water resistance:
Class 1 (tested to ISO 719)
Acid resistance:
Class 1 (tested to ISO 12116)
Gasket set and micas available for application in high-pressure steam gauges
Gauge glasses, which are operated at steam pressures above 35 bar or with media causing rapid wear of glass, have to be protected with a mica shield

Reflex and Transparent Glasses

Manufacturing according to following standards:
OENORM M 7354, DIN 70810, JIS B 8211, OMV-Spez. H2009, MIL-G-16356 D, Esso Eng. Spec. 123, S.O.D. Spec. 123 and BS 3463

Packing:
KLINGER gauge glasses are packed in individual cardboard boxes, including a KLINGER sealing gasket and cushion gasket, forming a complete unit for installation

Length [mm]:
from 115 (I) up to 340 (IX)

Range of Operating Pressure [bar]:
Up to 400

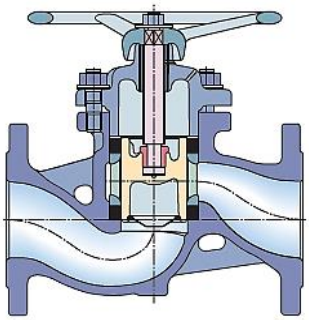
Operating Temperature:
Up to 430°C

Chemical Resistance:
Alkali resistance:
Class 2 (tested to ISO 675)
Water resistance:
Class 1 (tested to ISO 719)
Acid resistance:
Class 1 (tested to ISO 12116)

Reflex Glasses
Types A, B and H
The medium facing side is provided with moulded grooves

Transparent Glasses
Types A, B, H and TA28
The surfaces on both sides are finely ground and polished to ensure optimal transparency

KLINGER KVN



The Piston Valves for a General Field of Applications

Nominal Sizes:
DN 10 –200 (NPS 1/2" – 8")

Pressure Range:
PN 6, PN 16, PN 40 and PN 63
Class 150, Class 300 and CWP 900

Temperature Range:
from -196°C up to 400°C

Materials of Body:
Cast iron, spheroidal iron, carbon steel and stainless steel

Connections:
Flanges acc. to EN 1092-1 and EN1092-2,
ANSI 150/300
Female Screwed Ends acc. to ISO 228-1 and NPT-thread ANSI B 2.1
Socket welding ends acc. to EN 12 760 and butt welding ends acc. to EN 12627

Accessory:
Actuators (electro mechanical, pneumatic), heating jacket, etc.

Special Types:
- Piston valve for Fire-Safe application
- Piston valve for TA-Luft (clean air regulation) and EPA application
- Piston valve for heat transfer media
- Piston valve for liquid gas
- Piston valve for steam
- Regulating piston valve DN 10 – 50 with regulation piston (KVRKN)
- Regulating piston valve DN 65 – 200 with regulation lantern bush (KVRLN)

Certificates and Approvals:
- Fire safety according to API 6FA
- Type approval acc. to VdTÜV 1065
- Type approval for tankers (RID/ADR+TRT)
- Release for oxygen service
- Conforms to TA-Luft requirements

Other Fluid Instrumentation Products

Tubular Gauge Glass
Diameter: - 1/2", 5/8" and 3/4"
Length: - Maximum 2000 mm
Compliant to BS3463

Sight Flow Indicators
Connections :- Flanged 1/2" to 4" ANSI 150# and 300#
Threaded and socket weld up to 2"
Materials:- Carbon Steel and Stainless Steel

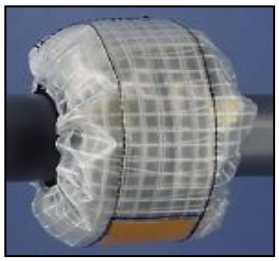
Sleeve Packed Cocks
Connections :- Threaded and socket weld 1/4" to 3/4"
Materials:- Carbon Steel and Stainless Steel

Safety Spray Shields and Flange Protectors

Safety Spray Shields are designed to prevent a catastrophe by temporarily containing hazardous leaks and sprays. Leaks can occur on piping systems conveying chemicals, high temperature fluids, and steam, which can harm workers, nearby equipment, and the environment.
Leaks of flammables, such as fuel or oil, can create fire and explosion hazards.
• Safety Spray Shields help meet regulatory standards set by agencies such as OSHA, EPA, MSHA, SOLAS, ABS, and DNV, and are now required by some insurance companies.
• Constructed of durable fabrics that are chemical, UV, and weather resistant, our Shields are available in Teflon®, Polypropylene, PVC, and Polyethylene. Solid styles contain a pH indicating patch which signals a leak by immediately changing colour towards red if acidic or towards green if an alkali. The patch is replaceable which allows reuse of the shield.
• Our Shields are ready to install quickly and simply by one person with the equipped hook and loop fasteners and draw cord.
• We offer Shields for all sizes and ratings, both standard, non-standard, and metric(DN).
• We are able to provide problem solving solutions by designing and manufacturing customs for special sizes and applications.
Available in the same fabrics and styles as Flange Shields

FLANGE SHIELDS

Polyethylene



- Transparent, reinforced polyethylene fabric.
- Multi-layered construction.
- Tough poly thread and draw cord.
- Maximum operating temperature of 76°C

Polypropylene

- Solid woven polypropylene fabric.
- Multi-layered construction.
- Insert in centre provides 4th protective layer.
- Polypropylene thread and draw cord.
- Maximum operating temperature of 93°C
- Available with FEP Teflon clear window

PVC

- Reinforced polyvinyl chloride fabric.
- Multi-layered construction.
- Tough poly thread and draw cord.
- Standard colour is safety orange. Yellow and other colours available upon request.
- Maximum operating temperature of 76°C
- Available with clear PVC window
- Entire clear PVC model available

Standard Teflon®

- Teflon® coated glass cloth.
- Reinforced, multi-layered construction.
- Teflon® coated fibre glass or Nomex® thread and draw cord.
- Fire resistant.
- Maximum operating temperature of 232°C

Premium Teflon®

- Maximum Teflon® content fabric for extreme service and long life.
- Multi-layered construction.
- Teflon® coated fibre glass or Nomex® thread and draw cord.
- Fire and tear resistant.
- Max operating temperature of 232°C
- Also available in 100% Teflon for maximum life in demanding applications.

Clear Teflon ®

- Clear Teflon® centre strip allows for complete visual inspection.
- Sides constructed of Premium Teflon® coated glass cloth.
- Teflon® coated fibre glass or Nomex® thread and draw cord.
- Fire and tear resistant.
- Teflon® drain nipple optional.
- Max operating temperature 204°C

EXPANSION JOINT SHIELDS

- Available in same fabrics and styles as Flange Shields.
- Clear Teflon is recommended for viewing of bellows.
- Allows for lateral movement, while maintaining fit and Protection.

Safety Spray Shields and Flange Protectors

- Available for all styles and types of Rubber, Stainless, and Teflon bellowed expansion joints, regardless of manufacturer.
- Recommended by most manufacturers of expansion joints.

VALVE SHIELDS

- Available in same fabrics and styles as Flange Shields.
- Allows for operation of valve handle or hand wheel.
- Bonnet Shields allow for travel and opening and closing of gate or globe valve.
- Manufactured to fit all styles and types of valves:
- Ball ,Check, Butterfly, Gate, Plug Diaphragm , Control, Globe.

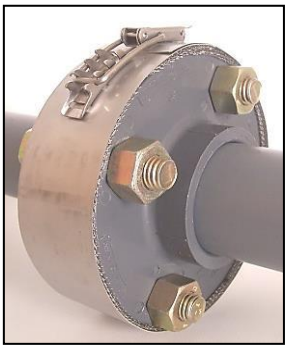
I & E COVERS

- Designed to fit instrumentation, electronics, controls, expensive and delicate equipment.
- Increases life and protects from corrosive environments.
- Clear Styles allow for viewing of positioner and actuator.
- Custom fit, regardless of length and size.

STAINLESS STEEL

- Available in two styles

Style 1 Band Type



- 316 stainless steel construction.
- Layers of stainless netting absorb and dissipate pressurized spray.
- No tools required, installs quickly via adjustable quick latch.
- No sharp edges.
- Excellent for high temperature and pressure.
- Recommended for steam, flammables, and fire protection.
- Max temperature 1093°C, max pressure 3000 psi.

Style 2

- Slotted overlapped edges prevent lateral spray out.
- Spacer rods raise shield off flange to dissipate pressure.
- Excellent for high temperature and pressure.
- Recommended for steam, flammables, and fire protection.
- Max temperature 1093°C, max pressure 3000 psi.

Speciality shields and covers

- Pipe end covers.
- Actuator covers.
- Hose shields.
- Pipe shields.
- Flow indicator shields.
- Sight glass shields.
- Pump shields.
- Hose shields.

Flange Band Protectors

- Designed to cover flanges to protect flange faces, stud bolts, and gaskets from corrosion.
- Keeps out moisture, chemicals, salt water, acid rain, etc.
- Keeps out foreign matter, which is critical on systems that are cathodically protected.
- Available in 316 stainless steel and Kydex plastic.
- 316 stainless steel worm gear clamp.
- 316 stainless steel injection fitting
- Gasket liner of closed cell neoprene, maximum operating temperature of 82°C.
- Optional EPDM rubber gasket liner, maximum operating temperature of 132°C.
- Safety relief valve optional, bleeds at 5 psi.
- Available for all size flanges.
- Optional liner of Teflon® or silicone for chemical and high temperature applications.
- Custom engineered designs available per application.

Nut and Bolt Caps

- Designed to protect hex nuts and stud bolt ends from corrosion, thus allowing easy unbolting.
- Eliminates need of a torch for nut removal.
- Keeps out moisture, chemicals, salt spray, and paint build up.
- Moulded from UV, chemical, and weather resistant polyethylene plastic.
- Simple and easy to install.
- Economical and reusable.
- Constant temperature of 77°C.
- Standard & custom sizes available.

Alumina & Metal Smelting Products

Klinger are able to offer a comprehensive range of high temperature gaskets, packing and insulating materials specifically engineered for the Alumina metal smelting industries through our in house manufacturing capabilities as well as through our exclusive distribution agreement with Robco Inc of Canada.

Crucible Lid Seals

Style 290 HTVS Lid Seal

Crucible lid seals are not always completely effective…

- They get compacted very quickly causing metal to metal contact
- They sometimes do not maintain vacuum
- Aluminium sticks and unravels the seal
- They have a short service life
- They melt in direct contact with molten aluminium
- They are chemically attacked by the "bath" solution

We have the solution for you.

Benefits: Continuous to 750°C. Thermal resistance coated to 1050°C, (Designated 290 HTVS)
Aluminium does not adhere to seal
Good seal ability with No Shrinkage, Unaffected by molten metal Resilient plus Excellent Abrasion Resistance

Why is our Crucible Lid Seal your best solution?

- Inconel wire reinforcement available to provide tear and abrasion resistance.
- Coating improves seal ability and prevents sticking.
- Unaffected by molten aluminium.
- Chemically treated glass has improved thermal & shrinkage resistance over regular glass fibre.
- Available high temperature polymer core provides resilience to the assembly.

Economical:1600 Lid Seal

Special braiding method provides extended life over standard braided glass seals · High density braid to prevent over-compressing ·
Mineral treatment to prevent sticking · Class III IARC: All materials are safe and free of asbestos or refractory ceramic fibres Temperature 500°C

Style 1500GSC

"E" glass fiber yarn braided over a silicon core and finished with red silicon rubber. A good static seal for horizontal or vertical applications in the alumina and metal melting industry.
Construction: Braid over braid. (2+jackets)
Service: Static door or pot lid seals
Temperature 400°C

Sealing Cathodes and Collector bars

Style 280

Braided from high-temperature yarns and treated with a high-temperature coating, this seal will resist molten cast iron at 1600°C until it solidifies. ·
Safe and bio-soluble ·
Specific density to provide a good seal, yet pliable enough to immediately conform to the collector bar · Will not fray

Silica Fibre Seals

Style 552 Silica fibre braided high temperature insulation rope and packing

- Withstands up to1260°C continuous temperature!
- More effective than Ceramic & Glass Rope !
- High grade silica fibre resists elevated temperature for longer duration without any thermal degradation
- Good resistance to acids.
- Practically unaffected by direct flame, hot blast, molten metal, welding sparks & flux
- Zero Loss on Ignition
- Saves energy loss, reduces downtimes
- Available in Square as well as Round cross sections in braided or twisted form.. Various densities available.
- Also available with a graphite coating referenced Style 552G.

Applications:
Boiler Doors, Expansion Joints, Coke Ovens, Kiln Cars, Blast Furnaces, Pipe Wrapping, Lagging, etc

Alumina & Metal Smelting Products

Furnace, Electrode and Kiln Seals

Our large seals for furnaces, electrodes and kilns are available in a range of high temperature textiles such as Treated Glass, E Glass (plain or graphite coated), Ceramic, Aramid fibre and a combination of any of the above. They can also be wire reinforced for additional strength and wear resistance. The seals can be manufactured to totally close off the entry or exit on a kiln by including a bellows type arrangement. Please consult our technical department for more information.
Sizes available up to 130 mm square in continuous lengths to suit the application.

TREO ™

Treo™ is the latest inorganic, high temperature, needled blanket alternative to ceramic fibre from Robco. With a 1000°C maximum temperature rating, this bio-soluble, vitreous silicate fibre mat can give you the thermal performance you require, without the health and safety concerns that come with other high temp insulations. Along with its excellent thermal capabilities, its improved handling will enhance your fabrication and installation procedures, which will help lower overall labour costs.

Typical Applications

- Furnace lining
- Thermal insulation
- Acoustic insulation
- Fire protection
- Heat shields
- Turbine wrap

Start up Kits for Electrolysis cells with TREO™

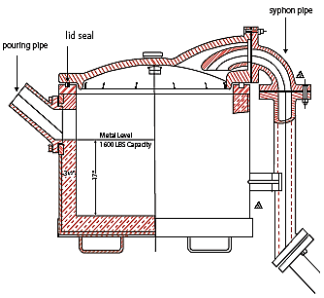
The two most common methods used in start-up production of electrolysis cells are:
- Electrical resistance
- Preheating with gas

With this in mind Robco and its partners have developed insulation kits with **Treo**™ a patented blanket which can be installed rapidly and efficiently.

TREO ™ Insulation blanket is the safest fibre insulation material on the market:
- CLASS 111 by IARC (International Agency of Research on Cancer)
- 100% mineral
- Will not produce any toxic fumes when heated, unlike commercial rock wool
- Large, long non-respirable fibres
- Will not crystobalite (crystalline silica) after heating
- All materials are free of asbestos or refractory ceramic fibres

Provides maximum insulation per inch
Low Iron oxide content (0.01% nominal)
Strongest blanket on the market
1000°C working temperature 1150°C melting temperature
Pre-cut kits reduce employee handling to a minimum.
Quick and easy to install.
Only need a shadow of pots or drawing to be able to quote.

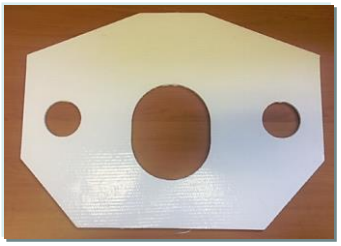
Tapping Crucible Gaskets



Style 1201 Gasket

An affordable and functional way to seal siphon tubes
- Maximum Temperature: 950°C
- Colour: Brown
- Requires minimal compressive load
- High temperature resistance
- 100% mineral: will not shrink or lose volume under heat, preventing loose gaskets
- Class III IARC: All materials are safe and free of asbestos or refractory ceramic fibres
- Easy to install: stiff enough to put in place, soft enough to adjust to all surfaces
- Resists most acids and alkalis
- Highly flexible and conformable

Silicone coated glass gaskets



Textured "E" Glass fabric coated with flame retardant white silicone fully cured coated on both sides. Two plies of fabric sandwiched between 3 layers of silicone.
An economical gasket material for siphon tubes.
Continuous: 260° C (coating)
Short Term: 360° C (coating)

Other Gasket and Sealing Products

Klinger has an additional range of gaskets and products which it manufactures or distributes and some of these are follows.

KLINGERstatite

AS80.090

Basis
Asbestos free beater addition product based on cellulose fibre bound with protein. Good adaptation properties. Available either in continuous lengths or as cut gaskets.
Colour: Light Brown
For Applications at Lower Temperatures, with Oil, Water and Fuel, e.g. Gearboxes and Pumps.
Sizes available : material on rolls 1000 mm wide
Thickness:0.15 - 3.0 mm
Certified according to ISO9002 & QS9000

Cover Plate Gaskets

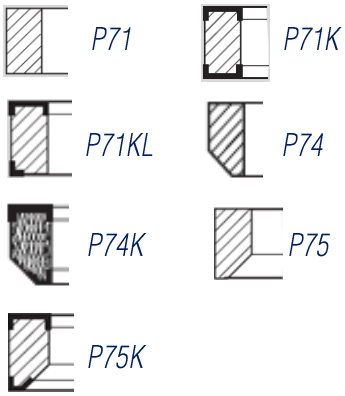
Self sealing cover plate gaskets are used in high pressure, large diameter apparatus where flanged connection are impractical. The internal pressure of the vessel creates the forces that are necessary to provide an effective seal at operating conditions. A primary seal is created by applying a certain bolt force which ensures that the start up and hydro testing can be performed without leakages.

The most common styles of graphite seals are Klinger P71, P74 and 75 as shown. The seals can be manufactured in sizes up to 1200 mm OD.

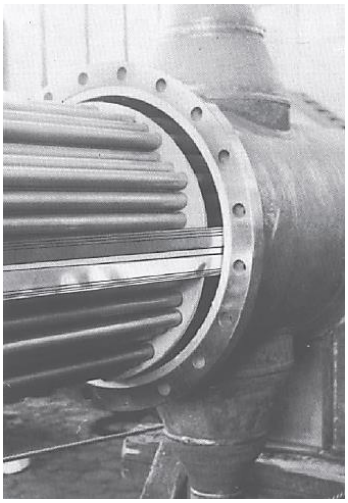
They are manufactured from a minimum 98 % pure chemically expanded graphite with a density of 1 g/cm³.

The density of the final gasket is usually 1.6 g/cm³, but for very high pressures this can be increased to 1.8 g/cm³.
Also available in profile series P80, chemically pure expanded graphite, reinforced with stainless steel lamellae

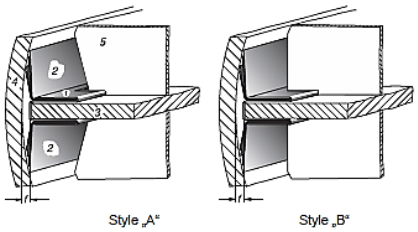
For details on the steel capping of self sealing cover plate gaskets contact Klinger



Baffle Seals



Baffle seals Profile T4 is a full metal seal. It is generally made from 1.4571 steel for the lamellae supports and for the lamellas themselves. Other materials available on request.
The baffle seal plays an important role in effectively sealing the gap between the longitudinal baffle and the heat exchanger shell in high-performance heat exchangers. In particular, where there are small differences in temperature, even low short-circuit currents can cause a significant loss of function. This can largely be avoided by using the baffle seal T4.
The T4 seal is easily assembled directly onto the longitudinal baffle.
No screws are needed to hold the seals in place. When using Baffle seals T4 the drilling of holes and screwing-up work is not required.
The lamellae of baffle seal T4 and the lamellae holder are joined together by spot-welding, thus forming one unit that can be supplied in any required length. However, in order to avoid transportation difficulties, the length should not exceed 6 m. Specified dimensions are supplied exact to the millimetre and avoid the difficult crosscutting of the thin lamellae during assembly of the heat exchanger.



Part 1) lamellae holder
Part 2) package of lamellae
Part 3) longitudinal baffle
part 4) heat-exchanger shell
part 5) transverse baffle
Part 1. can be supplied in any required length.

Style „A":
For this finish a lamellae holder with recesses is necessary.
The recesses for the transverse baffles must be ground out into the lamella holder during assembling. They should not be ground out deeper than necessary for taking up the transverse baffles

Style „B":
When a larger number of transverse baffles has to be installed, it is more convenient to have a continuous baffle seal T4, without recesses. The necessary openings should then be cut into the transverse baffles. In this case the first section of the lamella holder - the one at the far end - can be fixed to the longitudinal baffle using a screw or a slotted pin to ensure that the baffle seal will be withdrawn together with the tube bundle. With arrangement "A" this is not necessary.

Baffle seal T4 is not absolutely leak proof especially for gases. However, the results obtained by this simple method are far better than those obtained previously.
Two sizes of lamellae widths are available. The lamellae width is 30 mm for the holder T4.30 and 20 mm for the holder T4.20. The holders are available for thicknesses from 4 mm up to 25 mm of the longitudinal baffle.

Other Gasket and Sealing Products

Textile Cloth, Ropes, Seals and Gaskets

Klinger is able to supply a broad and comprehensive range of high temperature textile cloths, braided or twisted ropes, laggings, ladder and webbing tapes as well as other specialised high temperature seals for applications such as Rotary Kiln's, Homogenizer Doors, Tadpole door seals, Boiler doors seals and many other applications where textile seals are required.

Tadpole seals and Textile Sleeving

Klinger through our inter group manufacturing capabilities are able to supply Tadpole and high temperature resistant sleeving for use in the metal melting industry and other high temperature application.
They are available in a range of high temperature materials
The Tadpole seals are used to seal oven doors or furnaces where temperatures are elevated and pressures are minimal.
Where doors are opened and closed on a regular basis a steel core can be added which will give it resilience and a spring effect.
The high temperature sleeving is used to protect pipes, electrical cables, hydraulic hoses and glass handling equipment from radiated heat.
Klinger has the ability to braid the covers directly onto the hoses if required.

Textile Cloth

The cloth textiles are available in E glass, treated glass, Aramid, Aluminised backed glass, rubber coated glass, Ceramic, Silica, Glass fabrics treated with graphite or Vermiculite, Carbon and many other variations. Thicknesses are available from 0.4mm up to 3 mm thick with a standard width of 1000 mm

Textile Tapes and Ropes

The textiles tapes and ropes are available in E or C glass, treated glass, Ceramic and Silica (tapes only). Sections or thicknesses available from 0.4mm up to 6 mm thick for tapes and from 6 mm to 50 mm for ropes twisted or braided.

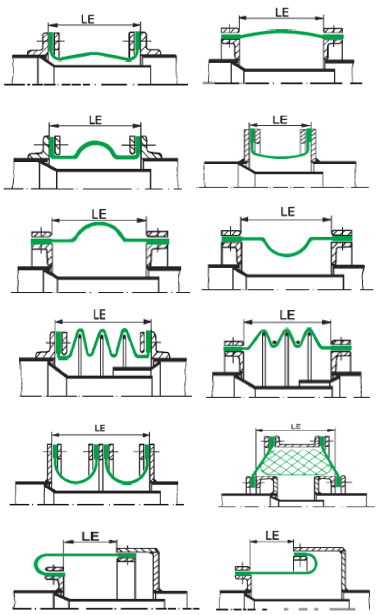
Ladder tape ***Webbing tape***

Twisted rope ***Rope Lagging***

Braided packing round and square

Fabric Compensators

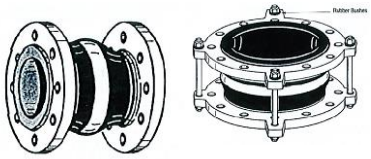
Fabric compensators are available in a wide range of high temperature textiles such as Glass, Aramid and Ceramic and can be used in combination with materials which could include PTFE, Nitrile, Viton, EPDM, PVC, Hypalon, Aluminium, Stainless Steel, etc
Suitable for vacuum and pressures up to 0.5 bar.
Below is a Waste Gas Boot for Aluminium Smelting industry



Note: the dimension LE is restricted and should be discussed with Klinger at time of enquiry

Rubber Compensators

Klinger are able to also supply a comprehensive range of Rubber Compensators
Standard type with floating flanges both sides as well those with tie rods, fitted with rubber bushes. Suitable for use up to 16 bar subject to operating temperature



Metal Bellows

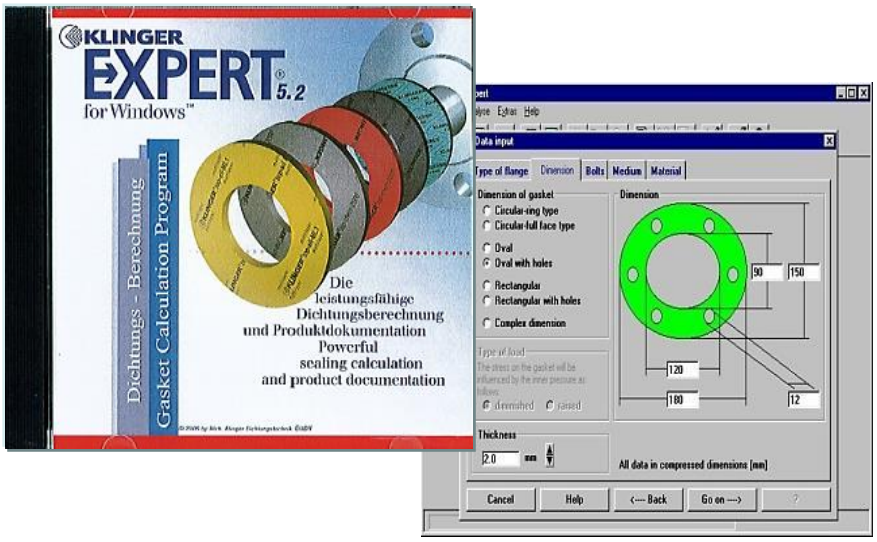
Above is a flanged assembly with tie rods and internal sleeve

Klinger are able to supply a wide range of metal bellows which are available in a large selection of steel grades such as Carbon Steel, 304SS, 316SS, Inconel, Monel, Hasteloy, etc

Styles available are Hydroformed Bellows, Rolled Bellows, Spun/Knuckle Bellows, Punch Formed Bellows and Welded Metal Bellows

KLINGERexpert

KLINGERexpert is a software package that contains data on many Klinger materials and carries out sealing calculations for new plants, new equipment and maintenance work - it is an excellent problem solver.
The user-friendly screen management is supplemented by an easy to understand on-line manual allowing you to access the most up to date information immediately on your PC.
Please ask the technical department for a copy of the software.
For any other technical assistance, please contact the technical department at our head office in Perth, Western Australia or your nearest Klinger Branch or Distributor.



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Klinger On Site Manufacturing Facilities

On-site service van…
Fast, effective and professional maintenance. Only available within Australia at present

Testing facilities

Klinger has its own testing facilities based in Perth in which various gasket types can be evaluated.
We also have access to the specialised testing facilities within the Klinger Group of Independent Companies.

Distributor/Agent