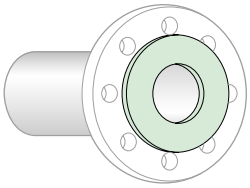
KLINGER

KLINGERSIL® C-4409

Greater security by high thermal and mechanical stress



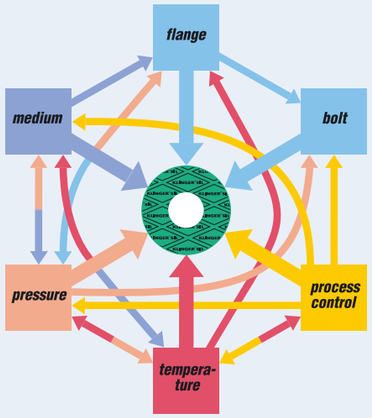
KLINGERSIL® C-4409
High-pressure gasket,
synthetic fibres bonded with NBR.
High mechanical resistance by expanded metal.
Chemical resistance against oil, hydrocarbons,
water and steam as well as liquid
and gaseous chemicals.

KLINGER – The global leader in static sealing

KLINGERSIL® C-4409
Information for your safety

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.

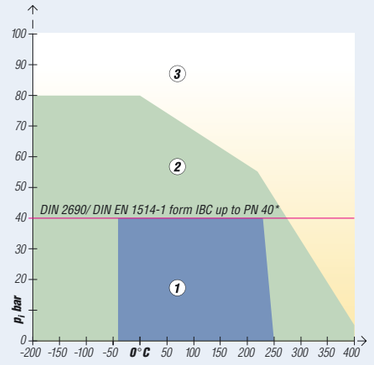
Therefore a definite statement of these values for gasket material is not possible.

So why does Klinger provide pT diagrams?

For the reasons given the pT diagram is not infallible: it serves as a rough guide for the end user who often has only the operating temperatures and pressures to go on.

Additional stresses such as greatly fluctuating load may significantly affect whether a gasket is suitable for the application.

Resistance to media must be taken into account in every case.



*Gaskets according to DIN 2690 are only standardised up to PN 40 and gasket thickness 2 mm.

The fields of decision

① If your operating temperatures and pressures fall within this field, a technical examination is normally unnecessary.
② If your operating temperatures and pressures are within this field, a technical examination is recommended.
③ If your operating temperatures and pressures are within this "open" field, a technical examination is always necessary.

Important points to be observed

The selection of gaskets requires expertise and know-how since ever greater reliability coupled with the lowest possible leakage rates are demanded of gasket materials.

The exacting demands made on the tightness of gasket materials (e.g. Tightness class $L_{0.01}$) mean that with increasing internal pressure higher surface pressures must be applied to the gasket.

It must be shown that the flange joint will tolerate the demands made on it without being mechanically overloaded. Furthermore, the surface pressure applied to create the seal should never fall below the required minimum value since this will reduce the life of the gasket. Highly stressed, but not overstressed gaskets have a longer life than understressed gaskets.

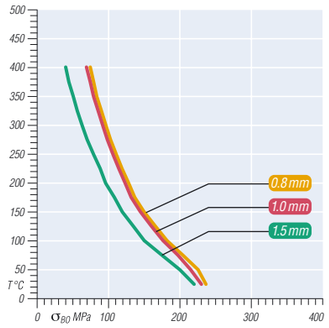
If the gasket fitted will be subjected to non-static loading, or will suffer stress fluctuations during discontinuous operation, it is advisable to choose a gasket which is not prone to embrittlement with increasing temperature (e.g. KLINGERgraphite laminate or KLINGERtop-chem), especially for steam and/or water applications.
For discontinuous operations in water and/or steam applications, we recommend as a general guide a surface pressure of about 30 MPa. In such cases the gasket should be as thin as is practicable.

For reasons of safety, we advise against the re-use of gaskets.

KLINGER EXPERT®
Powerful sealing calculation with online help on CD-ROM

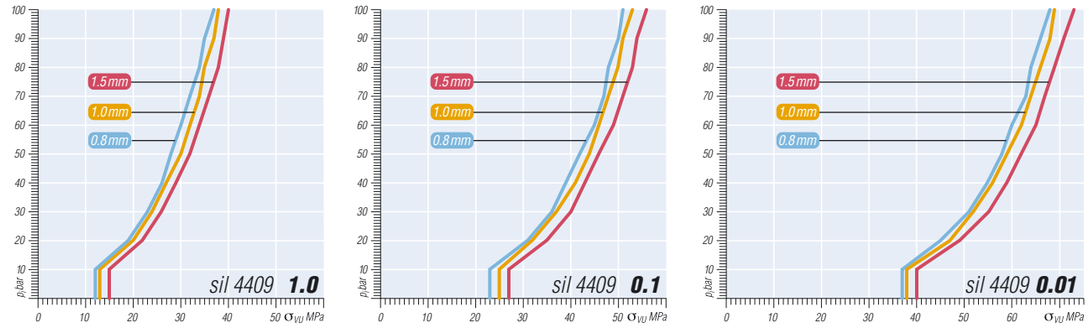
Maximum gasket pressure in operating condition σ_{BO} in accordance with DIN 28090

This diagram shows the max. permissible gasket pressure in MPa to be applied as a function of the service temperature. The values apply to the stated gasket thicknesses.



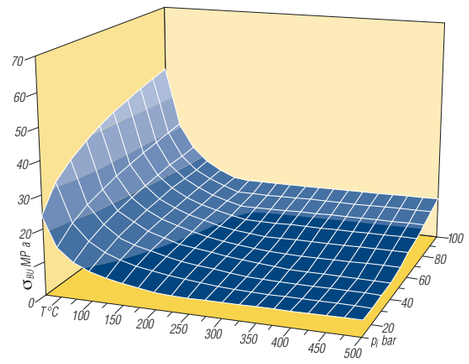
Min. gasket pressure σ_{VU} for tightness classes L = 1.0, L = 0.1 and L = 0.01 in accordance with DIN 28090

This diagram shows the min. gasket pressure necessary to achieve the tightness for the above tightness classes at room temperature. Tightness class L = 0.1 allows a max. leakage of 1 mg nitrogen per second per meter of gasket length (mg/s·m).
The curves are shown for the standard thickness material.



Minimum gasket pressure σ_{BU} for tightness class L = 0.1

This three-dimensional diagram describes the behaviour of the gasket material with respect to the required minimum gasket pressure for a complete temperature range at 1,5 mm thickness. It clearly shows that the required minimum load decreases at medium and higher temperatures – the gasket will seal at lower surface loads under these conditions.



KLINGERSIL® C-4409
Technical data

Typical values for 1,5 mm thickness				
Compressibility ASTM F 36 J		%		7
Recovery ASTM F 36 J	min	%		50
Stress relaxation DIN 52913	50 MPa, 16 h/300 °C	MPa		35
Klinger cold/hot compression	thickness decrease at 23°C	%		10
50 MPa	thickness decrease at 300°C	%		10
Tightness according to DIN 3535/6		ml/min		2.0
Specific Leak rate λ	VDI 2440	mbar x l/ s x m		5.2E-5
Thickness increase after fluid	oil JRM 903: 5 h/150 °C	%		3
immersion ASTM F 146	fuel B: 5 h/23 °C	%		5
Density		g/cm³		2.0
ASME-Code sealing factors				
for gasket thickness 1,5 mm	tightness class 1.0 mg/s x m	MPa	y	15
and tightness classes		MPa	m	4
DIN 28090	tightness class 0.1 mg/s x m	MPa	y	20
		MPa	m	14
	tightness class 0.01 mg/s x m	MPa	y	30
		MPa	m	100

Klinger cold/hot compression

With this test method developed by Klinger you can evaluate the cold/hot compression of a gasket in cold and hot condition.

Unlike the method acc. to DIN 52913 and BS 7531, the surface load is kept constant during the complete test so that the gasket is exposed to much tougher conditions.

The thickness decrease at an ambient temperature of 23°C and at heating up to 300°C is measured.

The indicated thickness decrease at 300°C refers to the thickness obtained after loading at 23°C.

Dimensions of the standard sheets

Sizes KLINGERSIL® C-4409:
1,000 x 1,500 mm, 1,500 x 2,000 mm
Sizes KLINGERSIL® C-4409 L:
1,000 x 1,250 mm and
1,250 x 2,000 mm
Thicknesses:
0.8 mm, 1.0 mm, 1.5 mm
other thicknesses on request.
Tolerances:
thickness ± 10%, length ± 50 mm,
width ± 50 mm.

Reinforcement with stainless steel

KLINGERSIL® C-4409 is reinforced with expanded metal made from carbon steel.
Also available is a version reinforced with stainless steel named KLINGERSIL® C-4409 L.
The specification are the same but the stainless steel reinforced grades are available in the sheet sizes:
1,000 x 1,250 mm and
1,250 x 2,000 mm respectively.

Rings and other finished gaskets

These gaskets are available in any size and corresponding sheet thicknesses, also edged and PTFE-covered.

Optimal thickness

The specifically technical advantages of this gasket material are optimal used in the thickness of 1.5 mm.

Surfaces

The standard surface finish of the material is such that the surface has an extremely low adhesion. On request, graphite facings and other surface finishes on one or both sides are also available.

Function and durability

The performance and life of KLINGER gaskets depend in large measure on proper storage and fitting, factors beyond the manufactor's control. We can, however, vouch for the excellent quality of our products.

With this in mind, please also observe our installation instructions.

Tests and approvals

Germanischer Lloyd.
TA-Luft (Clean Air) approval,
tested in accordance with VDI 2440 at 250°C.

Certified according to DIN EN ISO 9001:2000

Subject to technical alterations.
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