KLINGER®

KLINGERSIL®

Optimum flange security

This folder presents the essential data on the gasket materials used in our KLINGERSIL® range. The pT diagrams are of particular value as an aid to selecting the right gasket for your application. Detailed information permitting selection of the optimum gasket material is provided inside.

KLINGER – The global leader in static sealing

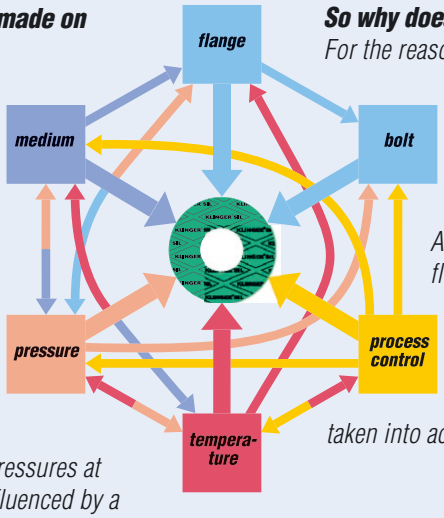
Why does Klinger supply pT diagrams?

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.

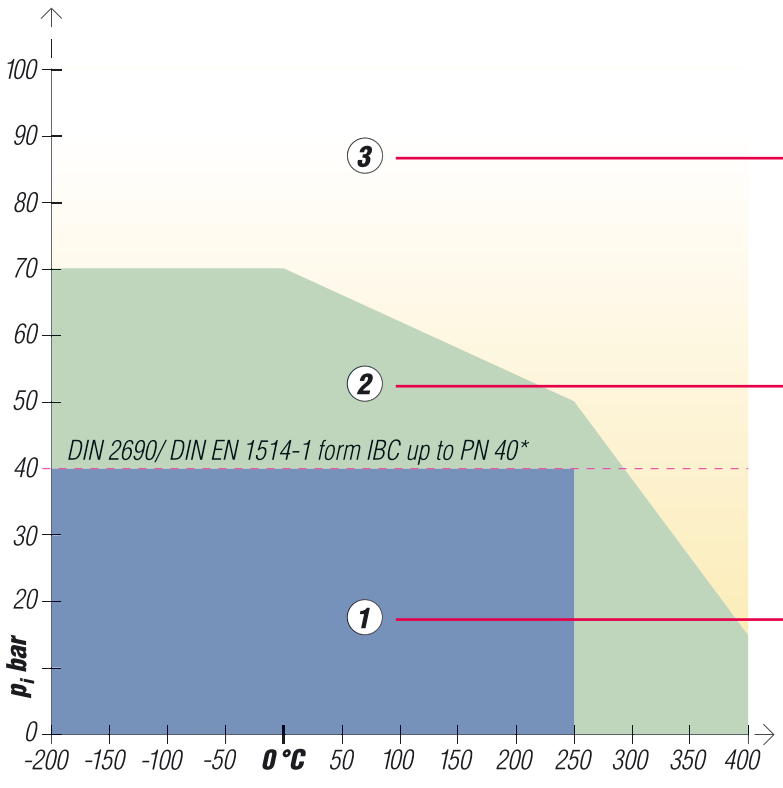
Therefore a definite statement of these values for gasket material is not possible.



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

The fields of decision

(3) If your operating temperatures and pressures are within this "open" field, a technical examination is always necessary.

(2) If your operating temperatures and pressures are within this field a technical examination is recommended.

(1) If your operating temperatures and pressures fall within this field, a technical examination is normally unnecessary.

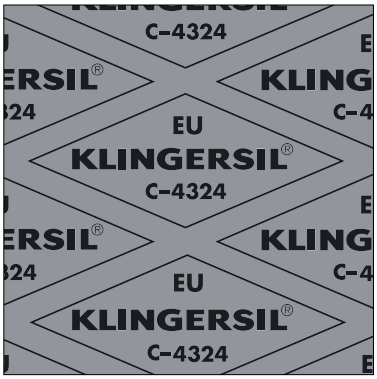
The three fields of decision do not indicate limits for the use of our material but they indicate a way to select the right gasket material.

If there are any doubts, use the knowledge of Klinger. You can use our FAX-service, the KLINGERexpert® calculation program or talk to us.

Subject to technical alterations.
Issue: June 2008

C–4324

KLINGERSIL® high-pressure gasket materials



Universal gasket material for general applications. Gasket material for liquids and steam at lower pressure and temperature, good chemical resistance against water and oil, low gas leakage.

Basis

Gasket material bound with NBR, based on a combination of synthetic high-tech fibres.

Tests and approvals

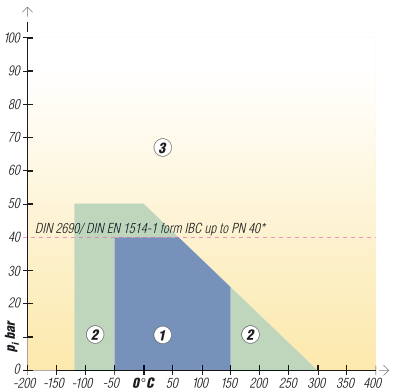
KTW recommended
DIN-DVGW permit
WRc/WRAS
Germanischer Lloyd

Typical values

Compressibility ASTM F 36 J		%	10
Recovery ASTM F 36 J	min	%	55
Stress relaxation DIN 52913	50 MPa, 16 h/300 °C	MPa	20
	50 MPa, 16 h/175°C	MPa	–
Stress relaxation BS 7531	40 MPa, 16 h/300°C	MPa	–
Klinger cold/hot compression	thickness decrease at 23 °C	%	10
50 MPa	thickness decrease at 300 °C	%	25
Gas leakage according to DIN 3535/6		mg/s x m	< 0.1
Thickness increase after fluid	Oil JRM 903: 5 h/150 °C	%	0-5
immersion ASTM F 146	Fuel B: 5 h/23 °C	%	0-10
Density		g/cm³	1.85
Reference thickness		mm	2.0

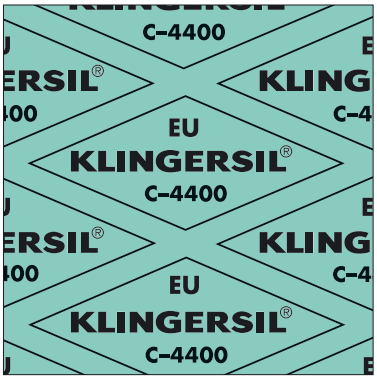
The pT diagram

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.*



KLINGER®

C–4400

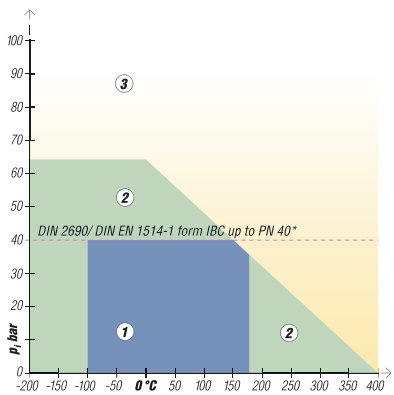


Universal high-pressure gasket suitable for use in many branches of the chemical industry, the food industry and the water supply ind. Very high standard of performance.

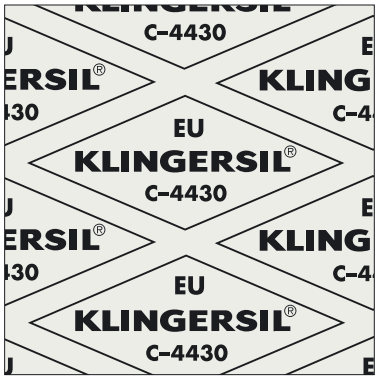
Aramid fibres bonded with NBR. Resistant to oils, water, steam, gases, salt solutions, fuels, alcohols, organic and inorganic acids, hydrocarbons, lubricants and refrigerants.

DIN-DVGW permit, BAM tested, VP-401 tested, KTW recommended, Germanischer Lloyd, "TA-Luft"-certification (Clean Air Act).

	%	11
	%	55
50 MPa, 16 h/300 °C	MPa	25
50 MPa, 16 h/175°C	MPa	32
40 MPa, 16 h/300°C	MPa	23
thickness decrease at 23 °C	%	10
thickness decrease at 300 °C	%	20
	mg/s x m	0.02
Oil JRM 903: 5 h/150 °C	%	3
Fuel B: 5 h/23 °C	%	5
	g/cm³	1.6
	mm	2.0



C–4430

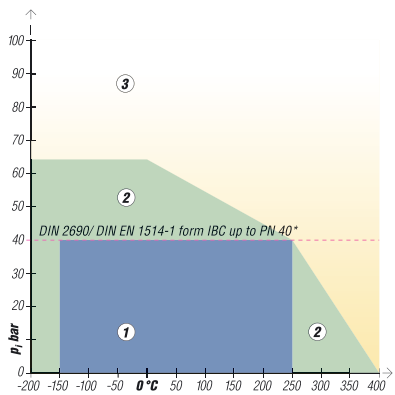


Premium quality, high-pressure gasket with outstanding stress relaxation and outstanding resistance to hot water and steam.

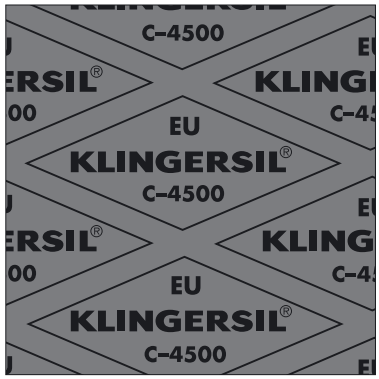
Optimum combination of synthetic and glass fibres bonded with NBR. Resistant to steam and water at high temperatures as well as to oils and hydrocarbons.

DIN-DVGW permit, BAM tested, VP-401 tested, KTW recommended, WRC approved, "TA-Luft"-certification (Clean Air Act).

	%	9
	%	50
50 MPa, 16 h/300 °C	MPa	35
50 MPa, 16 h/175°C	MPa	39
40 MPa, 16 h/300°C	MPa	31
thickness decrease at 23 °C	%	8
thickness decrease at 300 °C	%	11
	mg/s x m	0.1
Oil JRM 903: 5 h/150 °C	%	3
Fuel B: 5 h/23 °C	%	5
	g/cm³	1.75
	mm	2.0



C–4500

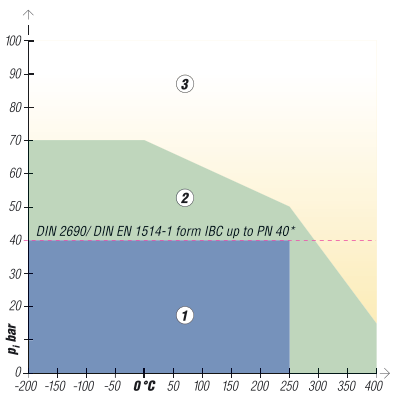


Premium quality high-pressure gasket especially suitable for use with high temperature alkaline media and superheated steam.

Carbon fibres and special heat resistant additives bonded with NBR. A superior performance product designed for use with strongly alkaline media and steam in the chemical industry.

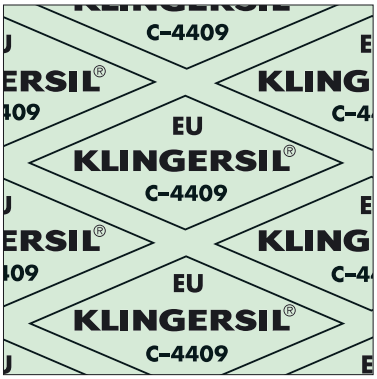
Fire safe according to EN ISO 10497. DIN-DVGW permit, BAM tested, KTW recommended, "TA-Luft"-certification (Clean Air Act).

	%	11
	%	60
50 MPa, 16 h/300 °C	MPa	32
50 MPa, 16 h/175°C	MPa	35
40 MPa, 16 h/300°C	MPa	30
thickness decrease at 23 °C	%	10
thickness decrease at 300 °C	%	15
	mg/s x m	0.1
Oil JRM 903: 5 h/150 °C	%	3
Fuel B: 5 h/23 °C	%	5
	g/cm³	1.6
	mm	2.0



KLINGER®

C–4409

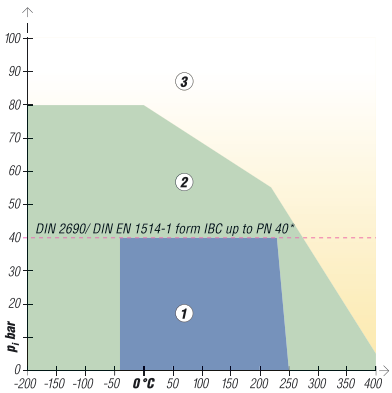


Premium high-pressure gasket for exacting operations with water, steam and liquid and gaseous chemicals.

Synthetic fibres bonded with NBR. High-pressure capability due to expanded metal reinforcement. Resistant to oils, hydrocarbons, water, steam and gases.

"TA-Luft"-certification (Clean Air Act).

	%	7
	%	50
50 MPa, 16 h/300 °C	MPa	35
50 MPa, 16 h/175°C	MPa	–
40 MPa, 16 h/300°C	MPa	–
thickness decrease at 23 °C	%	10
thickness decrease at 300 °C	%	10
	mg/s x m	0.2
Oil JRM 903: 5 h/150 °C	%	3
Fuel B: 5 h/23 °C	%	5
	g/cm³	2.0
	mm	1.5

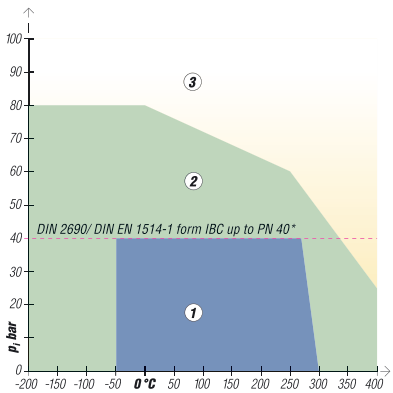


C–4509

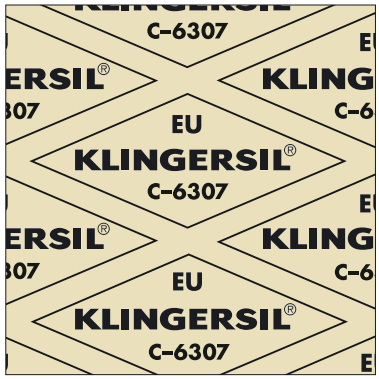
Premium high-pressure gasket able to withstand very high thermal and mechanical stresses.

Carbon fibres and special heat resistant additives bonded with NBR. Able to withstand high stresses and heavy bolt loads due to expanded metal reinforcement. Made from high-tech materials it offers excellent service in many sectors of the chemical industry. Main fields of application: strongly alkaline media and operations involving steam.

	%	12
	%	70
50 MPa, 16 h/300 °C	MPa	39
50 MPa, 16 h/175°C	MPa	–
40 MPa, 16 h/300°C	MPa	–
thickness decrease at 23 °C	%	9
thickness decrease at 300 °C	%	7
	mg/s x m	–
Oil JRM 903: 5 h/150 °C	%	3
Fuel B: 5 h/23 °C	%	5
	g/cm³	2.0
	mm	2.0



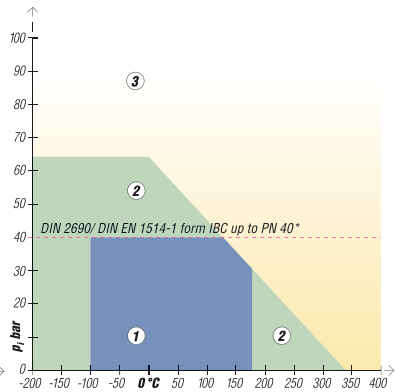
C–6307



Premium high-pressure gasket rendered self-sealing by controlled swelling in oil. Good resistance to oils and water.

Aramid fibres bonded with NR and SBR.

	%	8-10
	%	>55
50 MPa, 16 h/300 °C	MPa	25
50 MPa, 16 h/175°C	MPa	–
40 MPa, 16 h/300°C	MPa	–
thickness decrease at 23 °C	%	10
thickness decrease at 300 °C	%	18
	mg/s x m	0.05
Oil JRM 903: 5 h/150 °C	%	20
Fuel B: 5 h/23 °C	%	20
	g/cm³	1.7
	mm	2.0



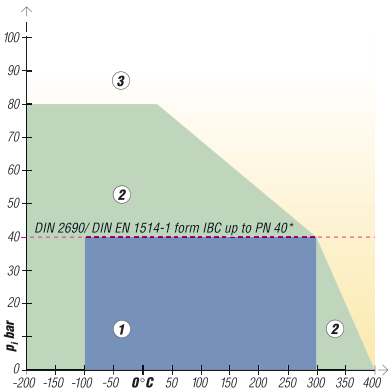
Top-sil ML1

Suitable for use with oils, water, steam, gases, salt solutions, fuels, alcohols, moderate organic and inorganic acids, hydrocarbons, lubricants and refrigerants, food industry. Outstanding performance.

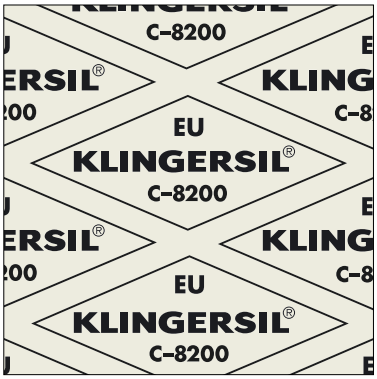
Unique Multi-Layer material concept. Revolutionary combination of synthetic fibres and different elastomers bound in a Multi-layer structure.

BAM certificate,
KTW recommended,
DIN-DVGW permit,
"TA-Luft"-certification (Clean Air Act),
WRc/WRAS.

	%	9
	%	50
50 MPa, 16 h/300 °C	MPa	28
50 MPa, 16 h/175°C	MPa	34
40 MPa, 16 h/300°C	MPa	–
thickness decrease at 23 °C	%	8
thickness decrease at 300 °C	%	15
	mg/s x m	0.1
Oil JRM 903: 5 h/150 °C	%	4
Fuel B: 5 h/23 °C	%	8
	g/cm³	1.7
	mm	2.0



C–8200

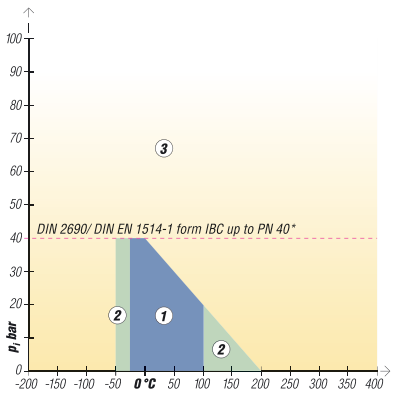


Premium high-pressure gasket for use with acids. Resistant to a wide variety of media.

Glass fibres bonded with special acid-resistant elastomers.

"TA-Luft"-certification (Clean Air Act)

Compressibility ASTM F 36 J		%	9
Recovery ASTM F 36 J		min %	55
Klinger cold/hot compression			
25 MPa min.	thickness decrease at 23 °C	%	7
25 MPa max.	thickness decrease at 300 °C	%	17
Density		g/cm³	1.7
Reference thickness		mm	2
Acid tests	HNO_3, 96%: 18 h/23 °C		unsuitable
	H_2SO_4, 96%: 18 h/23 °C	%	10
	H_2SO_4, 65%: 48 h/23 °C	%	8



* *Gaskets according to DIN 2690 are only standardised up to PN 40*

KLINGERSIL®
high-pressure gasket materials

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.

Dimensions of the standard sheets

Sizes:
1,000 x 1,500 mm, 1,500 x 2,000 mm
Thicknesses:
0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm, 3.0 mm.
Other Thicknesses available on request.
Tolerances:
Thickness ± 10%; length ± 50 mm; width ± 50 mm

Variants

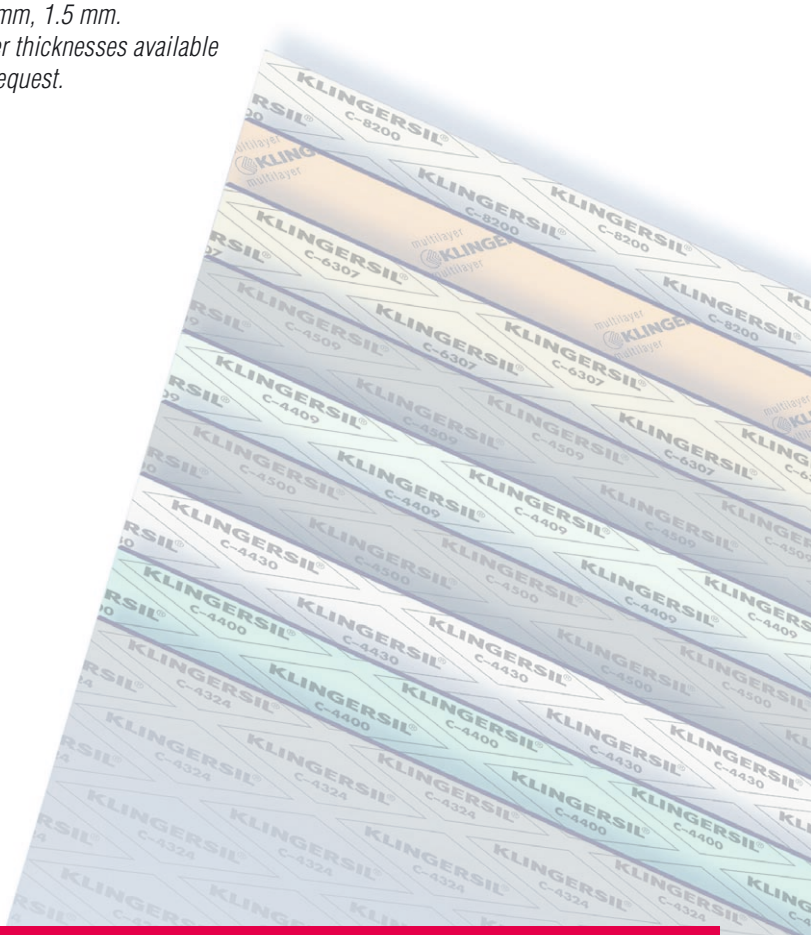
KLINGERSIL® C-4409 and C-4509 are reinforced with expanded metal made from carbon steel.
Gaskets reinforced with stainless steel C-4409 L and C-4509 L are also available. Their specifications are the same but the stainless steel reinforced grades are available in the sheet sizes:
1,000 mm x 1,250 mm and 1,250 mm x 2,000 mm respectively.

Thicknesses C-4409 L:
0.8 mm, 1.0 mm, 1.5 mm.
Thicknesses C-4509 L:
1.0 mm, 1.5 mm.
Other thicknesses available on request.

Surfaces

The gasket materials as they leave the production line have excellent anti-stick properties. However, if so desired, they can be supplied with an anti-stick graphite or other finish on one or both surfaces.

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



Subject to technical alterations.
Issue: June 2008

KLINGER®

We have devised
a tried and tested method,
to guide you step by step to the right gasket
for your needs.

1. Applications overview:
The gasket characteristics compared with the criteria to be met in typical application.

2. Product documentation:
A separate data sheet is supplied for each gasket in our range.
The pT diagrams are an invaluable aid to selecting the gasket most suitable for a particular application.

3. Data on chemical resistance:
This section indicates the resistance of the individual Klinger gaskets to over 200 chemicals in common use.

4. Technical information by Fax:
Let us have the details of your particular gasket requirements and you will receive a prompt reply, in some cases within 24 hours.

5. Sealing calculations on your PC:
For the experienced specialist we have developed a powerful program which will answer all your questions on gasket construction, design and maintenance. We supply the software with on-line help.

6. Ideally you should run your own tests:
We will supply the materials you need to carry out tests under your own operating conditions.

7. On-sit advice:
With particularly difficult problems we shall be glad to advice you on-site. We can supply products adapted from our existing range or custom-formulated products.

KLINGER EXPERT®

Powerful sealing calculation with online help on CD-ROM

Certified according to DIN EN ISO 9001:2000

Subject to technical alterations.
Issue: June 2008

Rich. Klinger Dichtungstechnik GmbH & Co KG
Am Kanal 8-10
A-2352 Gumpoldskirchen, Austria
Tel ++43 (0) 2252/62599-137
Fax ++43 (0) 2252/62599-296
e-mail: marketing@klinger.co.at
http://www.klinger.co.at