SCHEDA TECNICA(Revisione Gennaio 2018)

KLINGER TOPCHEM

(Particolari/Guarnizioni realizzate con processo di taglio da lastra con queste caratteristiche)

KLINGER®top-chem offer 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.

As an example, a comparison of the load bearing performance of KLINGER®top-chem-2000 with that of rival products is shown in the diagram below. With KLINGER®top-chem-2000, the high relaxation typical of standard PTFE gaskets is not observed. The results demonstrate that at a load of 50 MPa and temperature of 200°C, the relaxation of this material is only 1.6%, ensuring that bolt forces are maintained even under severe conditions.

The two new grades KLINGER® top-chem-2005 and -2006 now offer a solution for PTFE-standard applications. They differ in respect to their chemical resistance:
KLINGER®top-chem-2005 is particularly suited for general chemical and strongly acidic applications.
KLINGER®top-chem-2006 is the better choice for caustic medias.

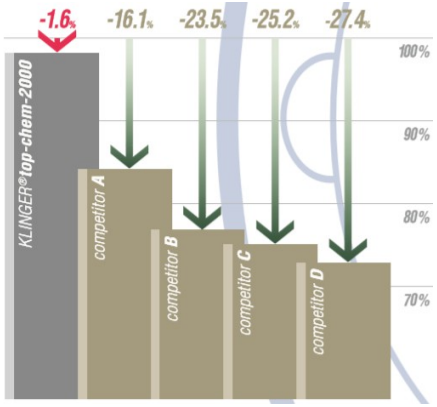
By way of an introduction to the properties of the KLINGER®top-chem range, the matrix on the following page presents the attributes of the individual grades. The table illustrates that for all PTFE applications a suitable material can be selected from the KLINGER®top-chem range.

The detailed performance data on the following pages will help you to choose the correct material for your application, ensuring the safe performance of the gasket. The following short description of the four grades provides a general overview of properties and is the first step towards making this choice.

KLINGER®top-chem-2000

The universal heavy-duty gasket for an extremely wide range of applications in the chemical and petrochemical industries as well as in the ship building 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).

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.



KLINGER®top-chem-2003

As regards media, the range of applications is comparable to that of KLINGER®top-chem-2000. However, KLINGER®top-chem-2003 has greater compressibility and is ideal for maintaining a tight seal even at low surface loads and temperatures.

KLINGER®top-chem-2003 has excellent chemical resistance in strongly acidic and alkaline applications and excellent mechanical properties at medium and low tempera-tures and loads. Special mention should be given to its high gas tightness at even low surface loads (TA-Luft certification).

KLINGER®top-chem-2005

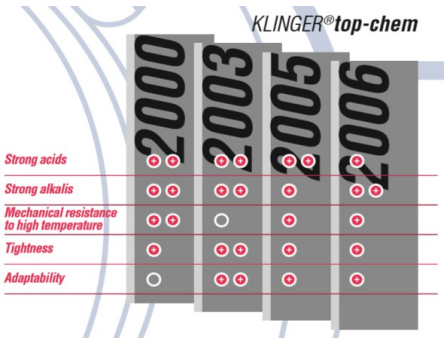
KLINGER®top-chem-2005 has excellent chemical resistance in strongly acidic applications and is suitable for a wide range of applications in the chemical industrie.
It has good mechanical properties at medium and low temperatures and loads.

As regards media, the range of applications approaches that of KLINGER®top-chem-2000.
The material is an economical alternative where requirements less stringent.

KLINGER®top-chem-2006

KLINGER®top-chem-2006 has good chemical resistance in strongly alkaline conditions and good mechanical properties at medium and low temperatures and loads.

KLINGER®top-chem-2006 is optimised for alkaline conditions and also suitable for a wide range of applications in the chemical industry. Because it is free from pigments, this material is especially suited to food and pharmaceutical applications.



Stability according to Klinger

The load bearing capacity of a gasket can be assessed at ambient and high temperature using the hot compression test developed by Klinger.

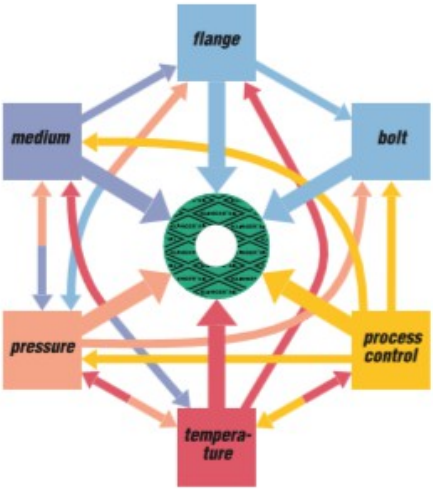
In contrast to the test method according to DIN 52913 and BS 7531, the gasket stress is kept constant throughout the entire test. The gasket is thus exposed to significantly severer conditions.

The thickness decrease as a result of a constant load is measured at a temperature of 23°C and also after heating up to 250°C.

The value of the thickness decrease at 250°C relates to the thickness after compression at 23°C.

The Complex Demands on a Gasket

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 gaskets 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 ad pressures to go on.

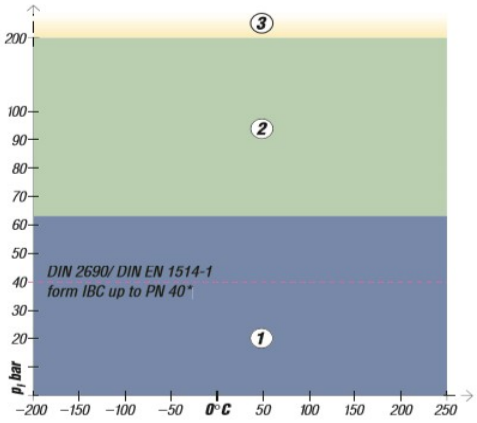
Additional stresses such as greatly fluctuating load may significantly affect whether a gasket is suitable for the application.

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

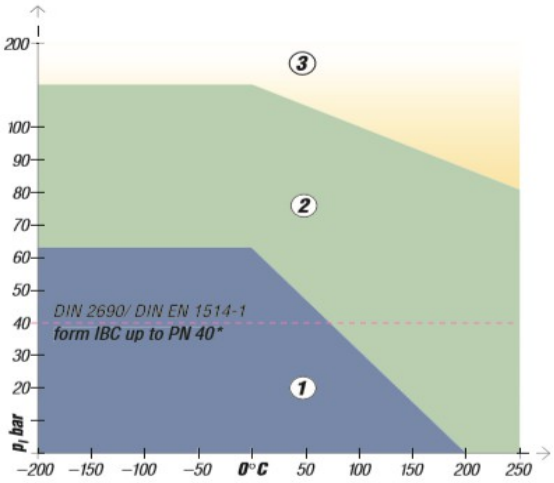
① If your operating temperatures and pressures fall within this field, it is not usually necessary to conduct a technical examination.

② If your operating temperatures and pressures are within this field we recommend a technical examination.

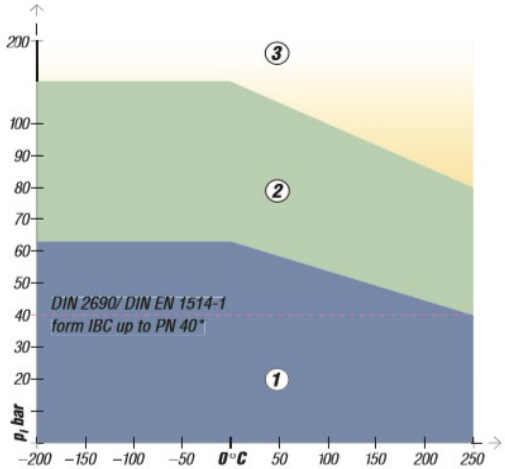
③ If your operating temperatures and pressures are within this blank field, a technical examination should be carried out.

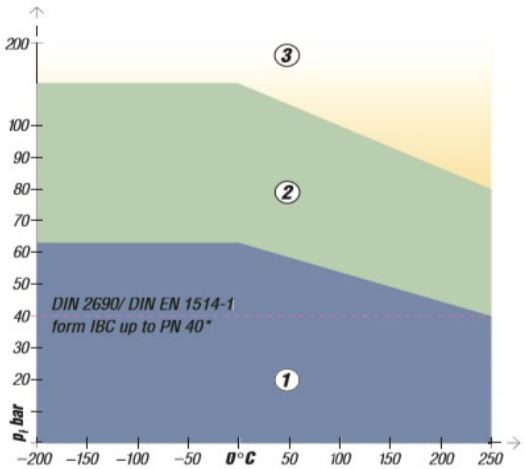


KLINGER® **top-chem-2000**



KLINGER® **top-chem-2003**





KLINGER® **top-chem-2006**

KLINGER® **top-chem**	**2000**	**2003**	**2005**	**2006**
Ref. thickness of measured values, mm	1.5	2	1.5	1.5
Density, g/cm³	2.5	1.7	2.2	3.0
Compressibility ASTM F 36 J, %	2	16	3	4
Recovery ASTM F 36 J, %	55	35	40	40
Stress relaxation				
DIN 52913, 16h, 50MPa, 300 °C	35	–	–	–
DIN 52913, 16h, 30MPa, 150 °C	30	13	25	18
Klinger cold/hot compression				
23°C/ 50MPa, %	2	–	10	10
250°C/ 50MPa, %	5	–	30	40
23°C/ 25MPa, %	–	9	–	–
250°C/ 25MPa, %	–	38	–	–
Tightness				
DIN 3535/6, ml/min	0.5	0.1	0.2	0.1
DIN 28090-2, mg/s m	0.05	0.01	0.02	0.01
Thickness/weight increase				
H_2SO_4, 100%: 18h/ 23°C,%	1/ 1	1/ 1	1/ 1	–
HNO_3,100%: 18h/ 23°C, %	1/ 2	0/ 5	1/ 2	1/ 2
NaOH, 33%, 72h/110°C, %	1/ 3	1/ 5	–	1/ 1
Permits/certifications				
BAM certification	yes	yes	–	yes
KTW proposal	yes	yes	yes	yes
DIN-DVGW permit	yes	yes	yes	yes
Fire Safe	yes	–	–	–
FDA conformity	yes	yes	yes	yes
TA-Luft certification	yes	yes	yes	yes
Germanischer Lloyd	yes	yes	yes	yes
United States Cost Guard	yes	–	–	–
Registro Italiano Navale	yes	–	–	–
Det Norske Veritas AS	yes	–	–	–
W 270	yes	yes	–	–
Standard sizes (other sizes on request)				
Sheet sizes mm	1,500 / 1,500	1,500 / 1,500	1,500 / 1,500	1,500 / 1,500
Thickness mm	1.0/ 1.5/ 2.0/ 3.0	1.0/ 1.5/ 2.0/ 3.0	1.0/ 1.5/ 2.0/ 3.0	1.0/ 1.5/ 2.0/ 3.0
Tolerances	thickness ± 10 %, length ± 50 mm, width ± 50 mm			

Typical values
Subject to technical alterations.
Status: March 2012

Chemical resistances

Medium	KLINGER®top-chem 2000	2003	2005	2006
Acetaldehyde	● 260°C	● 260°C	● 260°C	● 260°C
Acetamide	● 260°C	● 260°C	● 260°C	● 260°C
Acetic acid	● 260°C	● 260°C	● 260°C	● 260°C
Acetic acid ester	● 260°C	● 260°C	● 260°C	● 260°C
Acetone	● 260°C	● 260°C	● 260°C	● 260°C
Acetylene	● 260°C	● 260°C	● 260°C	● 260°C
Adipic acid	● 260°C	● 260°C	● 260°C	● 260°C
Air	● 260°C	● 260°C	● 260°C	● 260°C
Alum	● 260°C	● 260°C	● 260°C	● 260°C
Aluminium acetate	● 260°C	● 260°C	● 260°C	● 260°C
Aluminium chlorate	● 260°C	● 260°C	● 260°C	● 260°C
Aluminium chloride	● 260°C	● 260°C	● 260°C	● 260°C
Ammonia	● 260°C	● 260°C	■ 100°C	● 260°C
Ammonium carbonate	● 260°C	● 260°C	● 260°C	● 260°C
Ammonium chloride	● 260°C	● 260°C	● 260°C	● 260°C
Ammonium diphosphate	● 260°C	● 260°C	● 260°C	● 260°C
Ammonium hydroxide	● 260°C	● 260°C	● 260°C	● 260°C
Amyl acetate	● 260°C	● 260°C	● 260°C	● 260°C
Aniline	● 260°C	● 260°C	● 260°C	● 260°C
Anon cyclohexanone	● 260°C	● 260°C	● 260°C	● 260°C
Arcton 12	● 260°C	● 260°C	● 260°C	● 260°C
Arcton 22	● 260°C	● 260°C	● 260°C	● 260°C
Asphalt	● 260°C	● 260°C	● 260°C	● 260°C
Aviation fuel	● 260°C	● 260°C	● 260°C	● 260°C
Barium chloride	● 260°C	● 260°C	● 260°C	● 260°C
Benzene	● 260°C	● 260°C	● 260°C	● 260°C
Benzoic acid	● 260°C	● 260°C	● 260°C	● 260°C
Blast furnace gas	● 260°C	● 260°C	● 260°C	● 260°C
Bleaching solution	● 260°C	● 260°C	● 260°C	● 260°C
Boiler feed water	● 260°C	● 260°C	● 260°C	● 260°C
Borax	● 260°C	● 260°C	● 260°C	● 260°C
Boric acid	● 260°C	● 260°C	● 260°C	● 260°C
Brine	● 260°C	● 260°C	● 260°C	● 260°C
Butane	● 260°C	● 260°C	● 260°C	● 260°C
Butanol	● 260°C	● 260°C	● 260°C	● 260°C
Butanone	● 260°C	● 260°C	● 260°C	● 260°C
Butyl acetate	● 260°C	● 260°C	● 260°C	● 260°C
Butylamine	● 260°C	● 260°C	● 260°C	● 260°C
Butyle alcohol	● 260°C	● 260°C	● 260°C	● 260°C
Butyric acid	● 260°C	● 260°C	● 260°C	● 260°C
Caesium melt	▲ –	▲ –	▲ –	▲ –
Calcium chloride	● 260°C	● 260°C	● 260°C	● 260°C
Calcium hydroxide	● 260°C	● 260°C	■ 260°C	● 260°C
Calcium hypochlorite	● 260°C	● 260°C	● 260°C	● 260°C
Calcium sulphate	● 260°C	● 260°C	● 260°C	● 260°C
Carbolic acid	● 260°C	● 260°C	● 260°C	● 260°C
Carbon dioxide	● 260°C	● 260°C	● 260°C	● 260°C
Carbon disulphide	● 260°C	● 260°C	● 260°C	● 260°C
Carbon tetrachloride	● 260°C	● 260°C	● 260°C	● 260°C
Castor oil	● 260°C	● 260°C	● 260°C	● 260°C
Chlorine water	● 260°C	● 260°C	● 260°C	● 260°C
Chlorine, dry	● 260°C	● 260°C	● 260°C	● 260°C
Chlorine, moist	● 260°C	● 260°C	● 260°C	● 260°C

Medium	KLINGER®top-chem 2000	2003	2005	2006
Chloroform	● 260°C	● 260°C	● 260°C	● 260°C
Chromic acid	● 260°C	● 260°C	● 260°C	● 260°C
Citric acid	● 260°C	● 260°C	● 260°C	● 260°C
Chlorotrifluoride	▲ –	▲ –	▲ –	▲ –
Condensation water	● 260°C	● 260°C	● 260°C	● 260°C
Copper acetate	● 260°C	● 260°C	● 260°C	● 260°C
Copper sulphate	● 260°C	● 260°C	● 260°C	● 260°C
Creosote	● 260°C	● 260°C	● 260°C	● 260°C
Cresol	● 260°C	● 260°C	● 260°C	● 260°C
Crude oil	● 260°C	● 260°C	● 260°C	● 260°C
Cyclohexanol	● 260°C	● 260°C	● 260°C	● 260°C
Decahydronaphthalene	● 260°C	● 260°C	● 260°C	● 260°C
Dibenzyl ether	● 260°C	● 260°C	● 260°C	● 260°C
Dibutyl phthalate	● 260°C	● 260°C	● 260°C	● 260°C
Diesel oil	● 260°C	● 260°C	● 260°C	● 260°C
Dimethyl formamide	● 260°C	● 260°C	● 260°C	● 260°C
Diphyl	● 260°C	● 260°C	● 260°C	● 260°C
Dye bath	● 260°C	● 260°C	● 260°C	● 260°C
Ethane	● 260°C	● 260°C	● 260°C	● 260°C
Ethanol	● 260°C	● 260°C	● 260°C	● 260°C
Ethyl acetate	● 260°C	● 260°C	● 260°C	● 260°C
Ethyl alcohol	● 260°C	● 260°C	● 260°C	● 260°C
Ethyl chloride	● 260°C	● 260°C	● 260°C	● 260°C
Ethyl ether	● 260°C	● 260°C	● 260°C	● 260°C
Ethylendiamine	● 260°C	● 260°C	● 260°C	● 260°C
Ethylene	● 260°C	● 260°C	● 260°C	● 260°C
Ethylene chloride	● 260°C	● 260°C	● 260°C	● 260°C
Ethylene glycol	● 260°C	● 260°C	● 260°C	● 260°C
Fluorine dioxide	▲ –	▲ –	▲ –	▲ –
Fluorine gaseous	▲ –	▲ –	▲ –	▲ –
Fluorine liquid	▲ –	▲ –	▲ –	▲ –
Fluorosilicic acid	▲ –	▲ –	▲ –	▲ –
Formaldehyde	● 260°C	● 260°C	● 260°C	● 260°C
Formamide	● 260°C	● 260°C	● 260°C	● 260°C
Formic acid	● 260°C	● 260°C	● 260°C	● 260°C
Freon 12	● 260°C	● 260°C	● 260°C	● 260°C
Freon 22	● 260°C	● 260°C	● 260°C	● 260°C
Generator gas	● 260°C	● 260°C	● 260°C	● 260°C
Glacial acetic acid	● 260°C	● 260°C	● 260°C	● 260°C
Glycerine	● 260°C	● 260°C	● 260°C	● 260°C
Heating oil	● 260°C	● 260°C	● 260°C	● 260°C
Heptane	● 260°C	● 260°C	● 260°C	● 260°C
Hydraulic oil	● 260°C	● 260°C	● 260°C	● 260°C
Hydraulic oil 2	● 260°C	● 260°C	● 260°C	● 260°C
Hydraulic oil 3	● 260°C	● 260°C	● 260°C	● 260°C
Hydrazine hydrate	● 260°C	● 260°C	● 260°C	● 260°C
Hydrochloric acid	● 260°C	● 260°C	● 260°C	● 260°C
Hydrofluoric acid	■ 100°C	■ 100°C	▲ –	● 100°C
Hydrofluosilic acid	▲ –	▲ –	▲ –	▲ –
Hydrogen	● 260°C	● 260°C	● 260°C	● 260°C
Hydrogen chloride	● 260°C	● 260°C	● 260°C	● 260°C
Hydrogen peroxide	● 260°C	● 260°C	● 260°C	● 260°C
Isooctane	● 260°C	● 260°C	● 260°C	● 260°C

Medium	KLINGER®top-chem 2000	2003	2005	2006
Isopropyl alcohol	●260°C	●260°C	●260°C	●260°C
Kerosene	●260°C	●260°C	●260°C	●260°C
Lactic acid	●260°C	●260°C	●260°C	●260°C
Lead acetate	●260°C	●260°C	●260°C	●260°C
Lead arsenate	●260°C	●260°C	●260°C	●260°C
Linseed oil	●260°C	●260°C	●260°C	●260°C
Lithium melt	▲ –	▲ –	▲ –	▲ –
Magnesium sulphate	●260°C	●260°C	●260°C	●260°C
Malic acid	●260°C	●260°C	●260°C	●260°C
MEK butanone	●260°C	●260°C	●260°C	●260°C
Methane	●260°C	●260°C	●260°C	●260°C
Methyl alcohol	●260°C	●260°C	●260°C	●260°C
Methyl chloride	●260°C	●260°C	●260°C	●260°C
Methylene chloride	●260°C	●260°C	●260°C	●260°C
Mineral oil no. 1	●260°C	●260°C	●260°C	●260°C
Mineral oil no. 2	●260°C	●260°C	●260°C	●260°C
Monochlorethane	●260°C	●260°C	●260°C	●260°C
Naphtha	●260°C	●260°C	●260°C	●260°C
Natural gas	●260°C	●260°C	●260°C	●260°C
Nitric acid	●260°C	●260°C	●260°C	●260°C
Nitrobenzene	●260°C	●260°C	●260°C	●260°C
Nitrogen	●260°C	●260°C	●260°C	●260°C
Octane	●260°C	●260°C	●260°C	●260°C
Oil	●260°C	●260°C	●260°C	●260°C
Oleanolic acid	●260°C	●260°C	●260°C	▲ –
Oleic acid	●260°C	●260°C	●260°C	●260°C
Oxalic acid	●260°C	●260°C	●260°C	●260°C
Oxygen	●260°C	●260°C	●260°C	●260°C
Palmitic acid	●260°C	●260°C	●260°C	●260°C
Pentane	●260°C	●260°C	●260°C	●260°C
Perchlorethylene	●260°C	●260°C	●260°C	●260°C
Petroleum	●260°C	●260°C	●260°C	●260°C
Petroleum benzin	●260°C	●260°C	●260°C	●260°C
Petroleum ether	●260°C	●260°C	●260°C	●260°C
Phenol	●260°C	●260°C	●260°C	●260°C
Phosphoric acid	●260°C	●260°C	●260°C	●260°C
Phthalic acid	●260°C	●260°C	●260°C	●260°C
Polychl. biphenyls.	●260°C	●260°C	●260°C	●260°C
Potassium acetate	●260°C	●260°C	●260°C	●260°C
Potassium carbonate	●260°C	●260°C	■260°C	●260°C
Potassium chlorate	●260°C	●260°C	●260°C	●260°C
Potassium chloride	●260°C	●260°C	●260°C	●260°C
Potass. chrom.sulph.	●260°C	●260°C	●260°C	●260°C
Potassium cyanide	●260°C	●260°C	●260°C	●260°C
Potassium dichrom.	●260°C	●260°C	●260°C	●260°C
Potassium hydroxide	●260°C	●260°C	▲ –	●260°C
Potassium hypochl.	●260°C	●260°C	●260°C	●260°C
Potassium iodide	●260°C	●260°C	●260°C	●260°C
Potassium melt	▲ –	▲ –	▲ –	▲ –
Potassium nitrate	●260°C	●260°C	●260°C	●260°C
Potassium nitrite	●260°C	●260°C	●260°C	●260°C
Potassium permang.	●260°C	●260°C	●260°C	●260°C
Propane	●260°C	●260°C	●260°C	●260°C

Medium	KLINGER®top-chem 2000	2003	2005	2006
Pydraul	●260°C	●260°C	●260°C	●260°C
Pyridine	●260°C	●260°C	●260°C	●260°C
Rape seed oil	●260°C	●260°C	●260°C	●260°C
Rubidium melt	▲ –	▲ –	▲ –	▲ –
Salicylic acid	●260°C	●260°C	●260°C	●260°C
Sea water	●260°C	●260°C	●260°C	●260°C
Silicon oil	●260°C	●260°C	●260°C	●260°C
Skydrol 500	●260°C	●260°C	●260°C	●260°C
Soap	●260°C	●260°C	●260°C	●260°C
Soda	●260°C	●260°C	▲ –	●260°C
Sodium aluminate	●260°C	●260°C	●260°C	●260°C
Sodium bicarbonate	●260°C	●260°C	●260°C	●260°C
Sodium bisulphite	●260°C	●260°C	●260°C	●260°C
Sodium chloride	●260°C	●260°C	●260°C	●260°C
Sodium cyanide	●260°C	●260°C	●260°C	●260°C
Sodium hydroxide	●260°C	●260°C	▲ –	●260°C
Sodium melt	▲ –	▲ –	▲ –	▲ –
Sodium silicate	●260°C	●260°C	●260°C	●260°C
Sodium sulphide	●260°C	●260°C	●260°C	●260°C
Sodium sulphate	●260°C	●260°C	●260°C	●260°C
Spinning baths	●260°C	●260°C	●260°C	●260°C
Spirit	●260°C	●260°C	●260°C	●260°C
Starch	●260°C	●260°C	●260°C	●260°C
Steam	●260°C	●260°C	●260°C	●260°C
Stearic acid	●260°C	●260°C	●260°C	●260°C
Sugar	●260°C	●260°C	●260°C	●260°C
Sulphur dioxide	●260°C	●260°C	●260°C	●260°C
Sulphuric acid	●260°C	●260°C	●260°C	▲ –
Sulphurous acid	●260°C	●260°C	●260°C	●260°C
Table salt	●260°C	●260°C	●260°C	●260°C
Tannic acid	●260°C	●260°C	●260°C	●260°C
Tannin	●260°C	●260°C	●260°C	●260°C
Tar	●260°C	●260°C	●260°C	●260°C
Tartaric acid	●260°C	●260°C	●260°C	●260°C
Tetrachloroethane	●260°C	●260°C	●260°C	●260°C
Tetrahydronaphthale	●260°C	●260°C	●260°C	●260°C
Toluene	●260°C	●260°C	●260°C	●260°C
Town gas	●260°C	●260°C	●260°C	●260°C
Transformer oil	●260°C	●260°C	●260°C	●260°C
Trichloroethylene	●260°C	●260°C	●260°C	●260°C
Triethanolamine	●260°C	●260°C	●260°C	●260°C
Turpentine	●260°C	●260°C	●260°C	●260°C
Urea	●260°C	●260°C	●260°C	●260°C
Vinyl acetate	●260°C	●260°C	●260°C	●260°C
Water	●260°C	●260°C	●260°C	●260°C
Water flask	●260°C	●260°C	●260°C	●260°C
Water vapour	●260°C	●260°C	●260°C	●260°C
White spirit	●260°C	●260°C	●260°C	●260°C
Xylene	●260°C	●260°C	●260°C	●260°C

● resistant
(Suitable for the appropriate use as a compressed gasket between flange areas)
■ suitable with sufficient surface stress
▲ do not use without contacting manufacturer

Temperatures are max. values