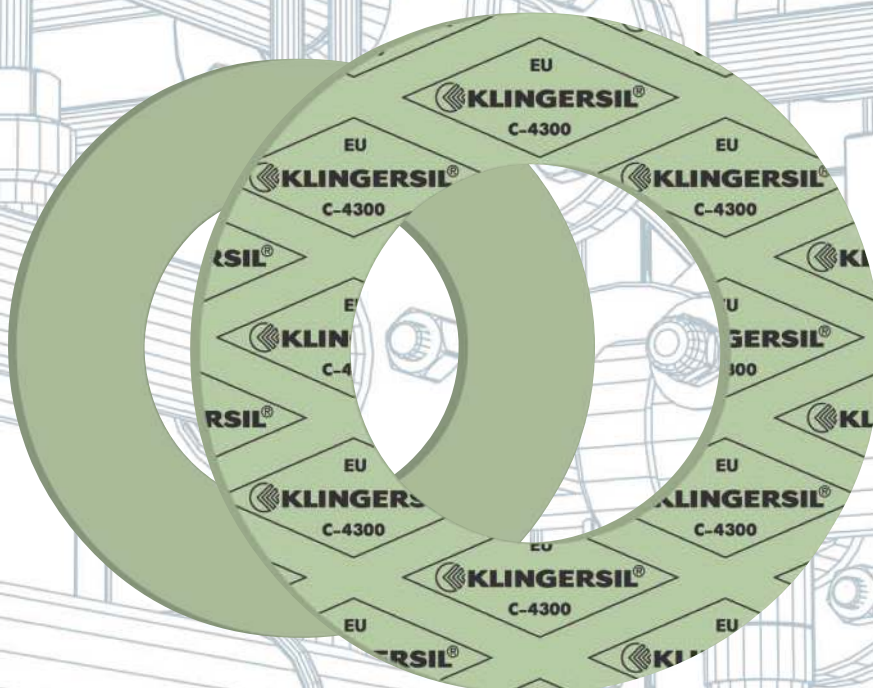


KLINGERSIL® C-4300

More safety in a wide range
of applications



KLINGERSIL® C-4300
Aramid Fibres bonded
with NBR.
Resistant to hot water, steam,
oils, hydrocarbons and many
other chemicals.
Universal high-pressure gasket
for a wide range of suitable
applications.

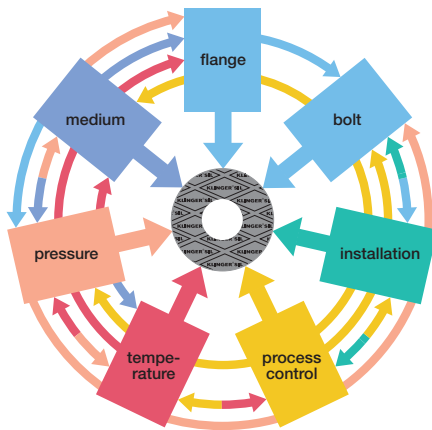
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Flanged joint integrity

The many and varied demands made on gaskets

A common perception is that the suitability and tightness of a gasket for any given application depends upon the maximum temperature and pressure conditions. This is not the case.

Maximum temperature and pressure values alone can not define a material's suitability for an application. These limits are dependent upon a multiplicity of factors as shown in the picture below. It is always advisable to consider these factors when selecting a material for a given application.



A statement about the expected tightness of the flange connection is only possible if a qualified and defined installation of the gasket has been executed.

In facilities, for which limited emission requirements acc. to TA-Luft are specified, the guideline VDI 2290 for the evaluation of the technical tightness of flange connections has to be considered.

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.

Selecting gaskets with pT diagrams

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.

Additional stresses such as fluctuating load may significantly affect the suitability of a gasket in the application and must be considered separately.

Areas of Application

- 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.

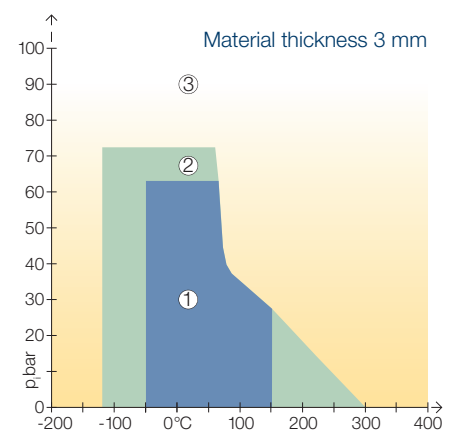
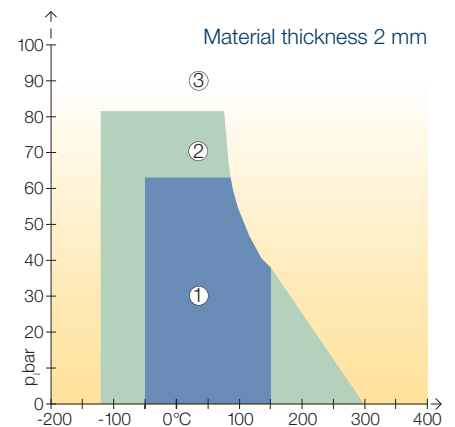
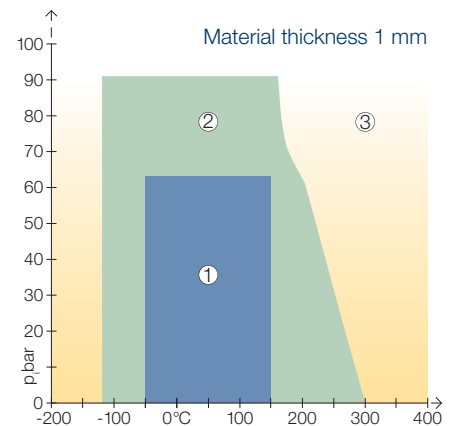
Always refer to the chemical resistance of the gasket to the fluid.

As the maximum operating pressure and load bearing capability are both depending on the gasket thickness, KLINGER provides thickness related pT diagrams.

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 hot compression test. This subjects the gasket to more severe conditions.



This test method is specified in DIN 28090-2:2014 in short-term test.

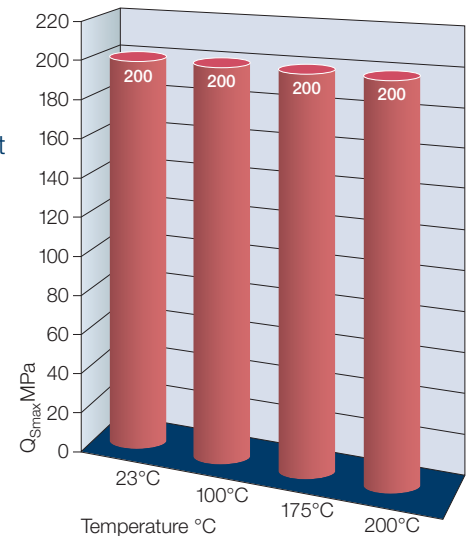
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Gasket factors acc. to EN 13555

Maximum permissible surface pressure under operating condition Q_{Smax} acc. to EN 13555

The maximum surface pressure in operating condition is the maximum permissible surface pressure the gasket can be loaded at the specified temperatures.

To validate the test result of Q_{Smax} , P_{QR} values are provided. An evaluation of the tested gasket regarding unacceptable extrusion in the bore or damage of the gasket is also required.



The diagram shows these values for the various temperature ratings.

Creep relaxation factor P_{QR} acc. to EN 13555

This factor considers the relaxation influence on the gasket load between the tightening of the bolts and the long-term effect of the service temperature.

P _{QR} values for stiffness 500 kN/mm, gasket thickness 2 mm				
Temperature	Gasket stress		P _{QR} at	Q _{Smax}
	30 MPa	50 MPa	Q _{Smax}	(MPa)
23°C	0.95	0.97	0.98	200
100°C	0.86	0.86	0.88	200
175°C	0.80	0.79	0.81	200
200°C	0.79	0.74	0.83	200

Secant unloading modulus of the gasket E_G and gasket thickness e_G acc. to EN 13555

Secant unloading modulus of the gasket E_G (MPa) and gasket thickness e_G (mm)								
Gasket stress	Ambient temperature		Temperature 100°C		Temperature 175°C		Temperature 200°C	
MPa	E_G MPa	e_G mm	E_G MPa	e_G mm	E_G MPa	e_G mm	E_G MPa	e_G mm
0								
1		1.927		1.963		1.898		1.938
20	1009	1.719	1260	1.727	2106	1.682	2060	1.696
30	2253	1.683	1962	1.703	3260	1.669	3035	1.684
40	3735	1.661	2615	1.677	8424	1.658	3268	1.668
50	4295	1.642	3085	1.651	9373	1.639	4054	1.650
60	5173	1.625	3806	1.627	4387	1.610	4679	1.620
80	7294	1.600	3846	1.574	4277	1.545	5033	1.553
100	5954	1.576	6356	1.523	4334	1.479	4548	1.482
120	8701	1.557	5184	1.471	4667	1.422	5198	1.420
140	7555	1.538	6959	1.430	4142	1.371	5285	1.351
160	6452	1.519	7103	1.393	5876	1.337	4777	1.298
180	7616	1.505	7493	1.361	4915	1.289	5604	1.251
200	9767	1.493	6202	1.330	3085	1.256	6528	1.213

KLINGERSIL® C-4300

Gasket factors acc. to EN 13555

Minimum surface pressure $Q_{\min(L)}$ acc. to EN13555 (Installation)

The minimum surface pressure during installation is the minimum required surface pressure, which has to be applied on the gasket surface during assembly at room temperature.

This is to assure that the gasket can adjust to the roughness of the flange surfaces, that internal leakage paths can be tightened and that the required tightness class L for the specified internal pressure will be achieved.

Minimum surface pressure $Q_{Smin(L)}$ acc. to EN13555 (Operating condition)

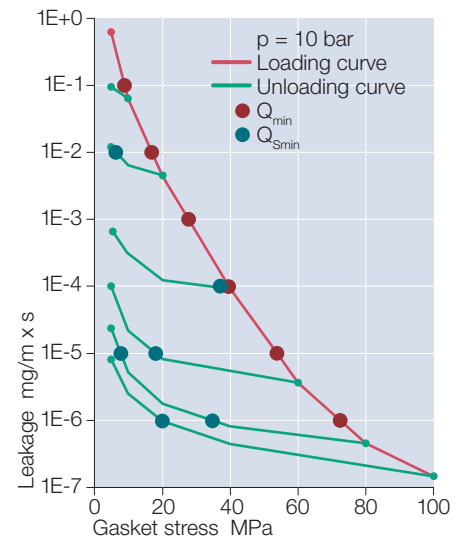
The minimum surface pressure in service is the minimum required surface pressure, which has to be applied on the gasket surface under operating conditions, i.e. after unloading during service, in order to keep the required tightness class L for the specified internal pressure.

Minimum stress to seal for tightness class L

$Q_{\min(L)}$ at assembly/ $Q_{Smin(L)}$ after off-loading 10 bar

L	$Q_{\min(L)}$	$Q_{Smin(L)}$ MPa					
mg/s x m	MPa	$Q_A=10$ MPa	$Q_A=20$ MPa	$Q_A=40$ MPa	$Q_A=60$ MPa	$Q_A=80$ MPa	$Q_A=100$ MPa
10^{-0}	5	5	5	5	5	5	5
10^{-1}	9	5	5	5	5	5	5
10^{-2}	17		6	5	5	5	5
10^{-3}	28			5	5	5	5
10^{-4}	40			37	5	5	5
10^{-5}	54				18	8	5
10^{-6}	73					35	20

Q_A = Stress on the gasket during installation before unloading

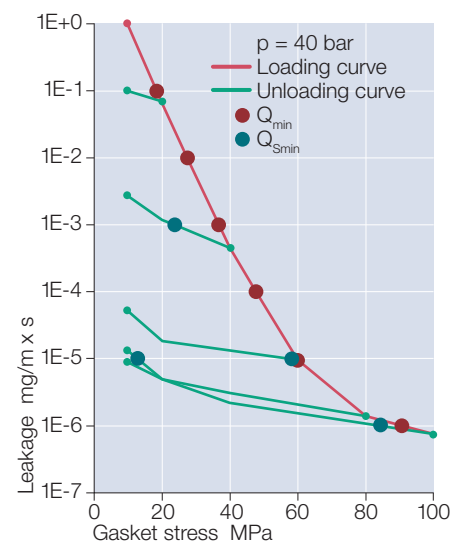


Minimum stress to seal for tightness class L

$Q_{\min(L)}$ at assembly/ $Q_{Smin(L)}$ after off-loading 40 bar

L	$Q_{\min(L)}$	$Q_{Smin(L)}$ MPa				
mg/s x m	MPa	$Q_A=20$ MPa	$Q_A=40$ MPa	$Q_A=60$ MPa	$Q_A=80$ MPa	$Q_A=100$ MPa
10^{-0}	10	10	10	10	10	10
10^{-1}	18	10	10	10	10	10
10^{-2}	27		10	10	10	10
10^{-3}	37		24	10	10	10
10^{-4}	48			10	10	10
10^{-5}	60			58	13	10
10^{-6}	91					84

Q_A = Stress on the gasket during installation before unloading



KLINGERSIL® C-4300

Technical values

Resistant to hot water, steam, oils, hydrocarbons and many other chemicals.
Universal high-pressure gasket for a wide range of suitable applications.

■ Basis

Aramid Fibres bonded with NBR.

■ Dimensions of the standard sheets

Sizes:

1,000 x 1,500 mm,

2,000 x 1,500 mm.

Thicknesses:

0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm,

3.0 mm

Tolerances:

Thickness acc. DIN 28091-1,
length ± 50 mm, width ± 50 mm.

Other thicknesses, sizes and tolerances on request.

■ Surfaces

KLINGERSIL® gasket materials are generally furnished with surfaces of low adhesion.

On request, graphite facings and other surface finishes on one or both sides are also available.

■ Function and durability

The performance and service 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.

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

Typical values for thickness 2.0 mm

Compressibility ASTM F 36 J		%	14
Recovery ASTM F 36 J		%	50
Stress relaxation DIN 52913	50 MPa, 16 h/175°C	MPa	32
	50 MPa, 16 h/300°C	MPa	20
Stress relaxation BS 7531	40 MPa, 16 h/300°C	MPa	23
KLINGER cold/hot compression	thickness decrease at 23°C	%	10
50 MPa	thickness decrease at 300°C	%	22
Tightness	DIN 28090-2	mg/s x m	0.03
Thickness increase after fluid immersion ASTM F 146	oil IRM 903: 5 h/150°C	%	5
	fuel B: 5 h/23°C	%	10
Density		g/cm³	1.6
Average surface resistance	ρ_O	Ω	2.2x10E12
Average specific volume resistance	ρ_D	Ω cm	1.2x10E12
Average dielectric strength	E_d	kV/mm	10
Average power factor	50 Hz	tan δ	0.082
Average dielectric coefficient	50 Hz	ϵ_r	7.4
Thermal conductivity	λ	W/mK	0.39
ASME-Code sealing factors		Leakage DIN 28090	
for gasket thickness 1.0 mm	tightness class 0.1 mg/s x m	MPa	y 15 m 1.3
for gasket thickness 2.0 mm	tightness class 0.1 mg/s x m	MPa	y 15 m 3.0
for gasket thickness 3.0 mm	tightness class 0.1 mg/s x m	MPa	y 15 m 4.0

Classification acc. to BS 7531:2006 Grade Y

■ Tests and approvals

DIN-DVGW

DIN-DVGW W 270

Elastomer-Guideline

German Lloyd

SVGW approval