

KLINGERSIL® Type	DIN 28090/DIN 28091							DIN 2505		ASTM	
	thick- ness mm	σ_{V0}	$\sigma_{V0.1}$	σ_{B0} (7.2.2)				k_1 mm	$K_0 \times K_D$ (N/mm)	"m" factor	"y"Stress MPa
		MPa	MPa	MPa	MPa	MPa	MPa				
KLINGERSIL® C-4300	1	158	15	120	63	39		$1.1 \times b_D$	$22 \times b_D$	2.7	15.0
	2	120	18	80	52	33		$1.1 \times b_D$	$22 \times b_D$	3.0	15.0
	3	48	20	40	29	18		$1.1 \times b_D$	$22 \times b_D$	3.3	15.0
KLINGERSIL® C-4400	1	240	18	195	95	50	38	$1.1 \times b_D$	$22 \times b_D$	3.2	20.0
	2	240	23	110	80	42	30	$1.1 \times b_D$	$22 \times b_D$	3.5	20.0
	3	63	24	53	41	24		$1.1 \times b_D$	$22 \times b_D$	3.9	20.0
KLINGERSIL® C-4409	1	240	39	215	176	120	80	$1.1 \times b_D$	$28 \times b_D$	3.2	30.0
	2	240	43	110	80	42	30	$1.1 \times b_D$	$28 \times b_D$	3.5	30.0
KLINGERSIL® C-4430	1	>240	22	260	145	81	65	$1.1 \times b_D$	$22 \times b_D$	4.5	25.0
	2	>240	29	240	120	73	56	$1.1 \times b_D$	$22 \times b_D$	5.0	25.0
	3	133	29	97	65	40	31	$1.1 \times b_D$	$22 \times b_D$	5.5	25.0
KLINGERSIL® C-4500	1	220	23	195	120	68	51	$1.1 \times b_D$	$22 \times b_D$	3.5	25.0
	2	180	26	110	110	59	43	$1.1 \times b_D$	$22 \times b_D$	4.0	25.0
	3	100	28	80	55	33	23	$1.1 \times b_D$	$22 \times b_D$	4.5	25.0
KLINGERSIL® C-4509	1	280	24	195	140	120	97	$1.1 \times b_D$	$28 \times b_D$	3.5	30.0
	2	180	28	110	110	59	43	$1.1 \times b_D$	$28 \times b_D$	4.0	30.0
KLINGERSIL® C-8200	1	225	17	160	70	44		$1.1 \times b_D$	$22 \times b_D$	3.5	22.5
	2	150	19	110	53	34		$1.1 \times b_D$	$22 \times b_D$	4.0	22.5
	3	75	21	55	26	17		$1.1 \times b_D$	$22 \times b_D$	4.5	22.5
KLINGERTop-graph 2000	2	>160	25	120	80	70	60			4.0	25.0
KLINGER®top-sil ML1	1	>240	16	240	150	70	55			1.5	15.0
	2	180	21	150	80	60	50			3.5	15.0
	3	150	23	110	70	50	30			6.3	15.0

KLINGER®Quantum Type	DIN 28090/DIN 28091							ASTM			
	thick- ness mm	σ_{V0}	$\sigma_{V0.1}$	σ_{B0} (7.2.2)				"m" factor	"y"Stress MPa		
		MPa	MPa	MPa	MPa	MPa	MPa			25°C	25°C
KLINGER®Quantum	1	230	19	120	86	62	48			4.0	15.0
	2	158	22	68	56	39	32			5.0	15.0
	3	130	25	55	42	33	27			6.0	15.0

KLINGERTop-chem and top-graph Type	DIN 28090/DIN 28091							DIN 2505		ASTM	
	thick- ness mm	σ_{V0}	$\sigma_{V0.1}$	σ_{B0} (7.2.2)				k_1 mm	$K_0 \times K_D$ (N/mm)	"m" factor	"y"Stress MPa
		MPa	MPa	MPa	MPa	MPa	MPa				
KLINGERTop-chem 2000	2	210	21	185	150	125	75	$1.1 \times b_D$	$25 \times b_D$	3.5	10.0
	3	100	21	87	60	50	33	$1.1 \times b_D$	$25 \times b_D$	5.0	12.0
KLINGERTop-chem 2003	2	>110	13	110	28	15	10	$1.1 \times b_D$	$22 \times b_D$	2.8	5.0
KLINGERTop-chem 2005	2	>110	28	50	35	22	15	$1.1 \times b_D$	$22 \times b_D$	3.5	10.0

The evaluation of these characteristic datas are based on the rules of DIN 28090. The use of this values will not guarantee the performance of the gasket. Application conditions not in the control of the gasket material manufacturer can influence the operation of the gasket. A deduction of liability claims of any nature is therefore not possible. As further investigations are continuously carried out we reserve the right of appropriate updates.

The design factors "m" and "y" according to the ASME Code are based on a maximum leakage rate of 1 ml/min. approx. 0.1 mg/sec x m measured according to DIN 28090 at different gas pressures and different gasket stresses. The DIN 2505 and the "y" and "m" concept itself now being questioned as a valid design tool.

Certified according to DIN EN ISO 9001:2008

Subject to technical alterations.
Issue: September 2012

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

Gasket factor $Q_{min(L)}$

The gasket factor $Q_{min(L)}$ is defined in the EN13555 as the required minimum surface stress on the gasket at installation at room temperature so that the adaptation of the gasket to the flange surface is sufficient to achieve tightness class L for a given internal pressure.

Gasket factor $Q_{Smin(L)}$

The gasket factor $Q_{Smin(L)}$ is defined as the required minimum surface stress under operating conditions, i.e. after release at operating temperature, so that the required tightness class L is achieved for the given internal pressure.

Gasket factor Q_{Smax}

In the EN13555 the gasket factor Q_{Smax} is defined as the maximum surface stress with which the gasket may be loaded at the given temperature without collapsing or failure due to over compression.

Gasket factor P_{QR}

This gasket factor is defined to consider the relaxation of the gasket load after tightening the bolts and the long-term influence of the operating temperature.

Validity of the test result

The validity of the test result for Q_{Smax} is dependant on the factor P_{QR} which is mentioned in the EN 13555 section 8.4.5. This can then be applied to the Q_{Smax} for different gasket materials.

However there is no information in the standard which P_{QR} values confirm a Q_{Smax} value. This means it is not easy for the user to determine which gasket materials will work properly at a given operating temperature and surface pressure or are already overrated as quoted in the standard.

For KLINGER gasket materials KLINGER recommends the use of the values determined with the gasket calculation software KLINGER®expert for the maximum permissible and minimum required surface stress for a given application.

**Certified according to
DIN EN ISO 9001:2008**

Subject to technical alterations.
Issue: September 2012

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

Gasket factors according EN 13555:2005-02

All values for thickness 2.0 mm

Material	Q_{min} [N/mm ²] $p_i = 40 \text{ bar, RT}$		Q_{smin} [N/mm ²], $p_i = 40 \text{ bar}$ Q_A [N/mm ²]				Q_{smax} [N/mm ²] Stiffness 500 kN/mm		P_{OR} Stiffness 500 kN/mm
			20	40	60	80	RT	> 200	
KLINGER®Quantum	$L_{0.1}$	14.0	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	0.99
	$L_{0.01}$	25.0		< 10.0	< 10.0	< 10.0	100°C	> 200	0.77
	$L_{0.001}$	35.0		13	< 10.0	< 10.0	200°C	120	0.72
	$L_{0.0001}$	49.0			< 10.0	< 10.0	300°C	100	0.64
	$L_{0.00001}$	72.0				28			
KLINGERSIL® C-4300	$L_{0.1}$	18.0	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	28.2		< 10.0	< 10.0	< 10.0	100°C	> 200	0.87
	$L_{0.001}$	36.6		30.1	< 10.0	< 10.0	175°C	> 200	0.80
	$L_{0.0001}$	48.5			< 10.0	< 10.0	200°C	> 200	0.78
KLINGERSIL® C-4324	$L_{0.1}$	17.2	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	27.0		< 10.0	< 10.0	< 10.0	100°C	> 200	0.84
	$L_{0.001}$	37.7		27.5	< 10.0	< 10.0	175°C	> 200	0.76
	$L_{0.0001}$	51.2			17.4	< 10.0	200°C	> 200	0.75
KLINGERSIL® C-4400	$L_{0.1}$	18.1	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	29.4		< 10.0	< 10.0	< 10.0	100°C	> 200	0.92
	$L_{0.001}$	41.6			< 10.0	< 10.0	175°C	> 200	0.84
	$L_{0.0001}$	54.8			18.9	< 10.0	200°C	> 200	0.84
	$L_{0.00001}$	71.0				24.9	250°C	> 200	0.83
KLINGERSIL® C-4430	$L_{0.1}$	20.5		< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	32.6		< 10.0	< 10.0	< 10.0	100°C	> 200	0.93
	$L_{0.001}$	44.7			< 10.0	< 10.0	175°C	> 200	0.91
	$L_{0.0001}$	56.8			31.8	< 10.0	200°C	> 200	0.90
	$L_{0.00001}$	73.4				28.0	250°C	> 200	0.88
KLINGERSIL® C-4500	$L_{0.1}$	17.5	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	25.6		< 10.0	< 10.0	< 10.0	100°C	> 200	0.87
	$L_{0.001}$	34.0		13.1	< 10.0	< 10.0	175°C	> 200	0.79
	$L_{0.0001}$	43.7			< 10.0	< 10.0	200°C	> 200	0.80
	$L_{0.00001}$	56.4			34.9	15.7	250°C	> 200	0.77
KLINGERSIL® C-8200	$L_{0.1}$	17.0	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	26.5		< 10.0	< 10.0	< 10.0	100°C	> 200	0.67
	$L_{0.001}$	36.7		16.7	< 10.0	< 10.0	175°C	> 200	0.60
	$L_{0.0001}$	49.3			12.5	< 10.0	200°C	> 200	0.54
	$L_{0.00001}$	93.7					300°C	> 200	0.74
KLINGER®top-graph 2000	$L_{0.1}$	19.3	16.8	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	32.5		10.6	< 10.0	< 10.0	100°C	> 200	0.92
	$L_{0.001}$	47.1			12.6	< 10.0	175°C	> 200	0.84
	$L_{0.0001}$	63.3				16.0	200°C	> 200	0.83
	$L_{0.00001}$	81.9					250°C	> 200	0.77
KLINGER®top-sil-ML1	$L_{0.1}$	19.2	16.4	< 10.0	< 10.0	< 10.0	RT	> 160	
	$L_{0.01}$	32.2		11.0	< 10.0	< 10.0	100°C	> 160	0.87
	$L_{0.001}$	45.7			12.1	< 10.0	175°C	140	0.76
	$L_{0.0001}$	59.3			56.8	15.1	200°C	120	0.78
	$L_{0.00001}$	80.4					250°C	100	0.72
KLINGER®top-chem 2000	$L_{0.1}$	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	RT	> 200	
	$L_{0.01}$	19.7	19.0	< 10.0	< 10.0	< 10.0	100°C	> 180	0.73
	$L_{0.001}$	51.8			39.5	< 10.0	175°C	> 160	0.77
	$L_{0.0001}$	84.8					200°C	140	0.67
	$L_{0.00001}$						250°C	50	0.93
KLINGER®top-chem 2003	$L_{0.1}$	< 10.0	< 10.0	< 10.0	< 10.0		RT	80	
	$L_{0.01}$	14.7	< 10.0	< 10.0	< 10.0		100°C	30	0.65
	$L_{0.001}$	23.7		< 10.0	< 10.0		150°C	20	0.70
	$L_{0.0001}$	38.4		23.9	< 10.0				
KLINGER®top-chem 2005	$L_{0.1}$	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	RT	120	
	$L_{0.01}$	12.0	< 10.0	< 10.0	< 10.0	< 10.0	100°C	40	0.90
	$L_{0.001}$	21.0		< 10.0	< 10.0	< 10.0	175°C	20	0.92
	$L_{0.0001}$	36.0		18.0	10.5	< 10.0	200°C	20	0.90
KLINGER®top-chem 2006	$L_{0.1}$	30.0		< 10.0	< 10.0	< 10.0	RT	100	
	$L_{0.01}$	41.0			< 10.0	< 10.0	100°C	40	0.86
	$L_{0.001}$	51.8			< 10.0	< 10.0	175°C	20	0.82
	$L_{0.0001}$	66.0				< 10.0			