

Company Address	KLINGER Kempchen Dichtungstechnik - 46147 Oberhausen - Im Waldteich 21	according to <b>DIN EN 13555</b> 2014-07
Gasket type	<b>grooved gasket B29A-Graphite (1.4541 / 0,5 mm; D = 1,0 gcm³)</b>	
Dimensions e <sub>GO</sub> [mm]	<b>Ø 53 / 69 x 92 x 4,80 mm (DIN 1514-6)</b>	
Remarks:	<i>At higher internal pressures higher initial perssure was selected!</i>	

required minimum stress to gasket <b>Q<sub>min</sub></b> (at assembly), <b>Q<sub>Smin</sub></b> (after off-loading) for p = 10 bar to 160 bar																																				
L [mg/(s·m)]	Q <sub>MINL</sub> [MPa]				Q <sub>SMINL</sub> [MPa]																															
					Q <sub>A</sub> = 20 [MPa]				Q <sub>A</sub> = 30 [MPa]				Q <sub>A</sub> = 40 [MPa]				Q <sub>A</sub> = 60 [MPa]				Q <sub>A</sub> = 80 [MPa]				Q <sub>A</sub> = 100 [MPa]				Q <sub>A</sub> = 120 [MPa]				Q <sub>A</sub> = 160 [MPa]			
	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]				
10 <sup>0</sup>	<5	<5	<20	<40	<5	<5	<40	<5	<5	<40	<5	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40					
10 <sup>-1</sup>	<5	14	<20	<40	<5	5	<40	<5	<5	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40						
10 <sup>-2</sup>	15	31	38	49	7			<5				<5	21	36		5	13	15	<40	<5	9	<10	<40	<5	7	<10	<40	<5	7	<10	<40					
10 <sup>-3</sup>	31	53	59	70								28				14	47			13	29	29	51	7	21	22	<40	7	21	22	<40					
10 <sup>-4</sup>	62	77	84	88												37	71			24	42	46	54	24	42	46	54	15	24	19	<40					
10 <sup>-5</sup>	90	99	105	106																72	98			72	98			34	47	39	41					
10 <sup>-6</sup>	113	126	127	126																								81	102	94	65					
10 <sup>-7</sup>	141	158	154																									139	157	152						
10 <sup>-8</sup>																																				

Relaxation ratio P <sub>OR</sub> for stiffness C = 500 kN/mm												
Flächenpressung	ambient temperature		temperature 1 [100°C]		temperature 2 [200°C]		temperature 3 [300°C]		temperature 4 [400°C]		temperature 5 [500°C]	
	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]
stress level 1 [ 50 MPa]	0,98	0,003	0,88	0,018	0,85	0,023	0,98	0,003	0,47	0,081	0,60	0,061
stress level 2 [ 90 MPa]												
stress level 3 [ 120 MPa]												
stress level 4 [ 180 MPa]	0,87	0,072	0,89	0,061	0,87	72,000	0,87	0,072	0,90	0,055	0,83	0,094

Maximal applicable gasket stress <b>Q<sub>Smax</sub></b>												
PQR for Q <sub>Smax</sub>	0,99	0,015	0,97	0,044	0,94	0,088	0,94	0,088	0,92	0,118	0,89	0,162
Q <sub>Smax</sub> [MPa]	480		480		480		480		480		480	

Sekant unloading modulus of the gasket <b>E<sub>G</sub></b> [MPa] and gasket thickness <b>e<sub>G</sub></b> [mm]												
Gasket stress [MPa]	ambient temperature		temperature 1 [100°C]		temperature 2 [200°C]		temperature 3 [300°C]		temperature 4 [400°C]		temperature 5 [500°C]	
	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]
0		4,8000		4,9000		4,8000		4,8500		4,9000		4,9000
1		4,7330		4,3986		4,7370		4,8340		4,4352		4,6578
20	3204	4,0960	4853	4,0136	1690	4,0730	2344	4,0430	3684	3,9667	3764	3,9649
30	3605	4,0410	9016	3,9923	4444	4,0430	3028	4,0070	6257	3,9352	5666	3,9470
40	4242	4,0100	5764	3,9655	5656	4,0170	5892	3,9880	5982	3,9123	6747	3,9217
50	4250	3,9870	7816	3,9485	6604	3,9950	7715	3,9740	7189	3,8975	7247	3,9042
60	7918	3,7800	10130	3,9379	5854	3,9720	9811	3,9590	5522	3,8768	9544	3,8931
80	9141	3,9530	9020	3,9067	8747	3,9440	9073	3,9220	8185	3,8492	10665	3,8643
100	10863	3,9310	9327	3,8773	11786	3,9130	9180	3,8720	12446	3,8199	11358	3,8329
120	11118	3,9030	13510	3,8561	11050	3,8770	12264	3,8420	12059	3,7849	11634	3,7968
140	12011	3,8680	14641	3,8306	12352	3,8460	13645	3,8130	14516	3,7543	11890	3,7596
160	12776	3,8360	14121	3,8030	13105	3,8140	16829	3,7890	15052	3,7298	14031	3,7345
180	14291	3,8060	19925	3,7830	19784	3,7890	19687	3,7680	12581	3,7004	15637	3,7126
200	12256	3,7750	18991	3,7600	13515	3,7560	15571	3,7410	15667	3,6800	14254	3,6882
220	18873	3,6800	19893	3,6582	21392	3,6360	15351	3,6080	22200	3,5731	16438	3,5732
400	19759	3,5580	23896	3,5366	19687	3,4710	18468	3,4610	19727	3,4389	18225	3,4415
500	20493	3,4560	24221	3,4185	18379	3,3290	15682	3,3250	24742	3,3238	18872	3,3236

Note: the contents of gray-stained cells was not detected or is not necessary

Company Address	KLINGER Kempchen Dichtungstechnik - 46147 Oberhausen - Im Waldteich 21	according to <b>DIN EN 13555</b> 2014-07
Gasket type	<b>grooved gasket B29A-Graphite (1.4541 / 0,5 mm; D = 1,0 gcm³)</b>	
Dimensions e <sub>GO</sub> [mm]	<b>Ø 53 / 69 x 92 x 4,80 mm (DIN 1514-6)</b>	
Remarks:	<i>At higher internal pressures higher initial perssure was selected!</i>	

L [mg/(s·m)]	required minimum stress to gasket <b>Q<sub>min</sub></b> (at assembly), <b>Q<sub>Smin</sub></b> (after off-loading) for p = 10 bar to 160 bar																																			
	Q <sub>Smin</sub> [MPa]																																			
	Q <sub>A</sub> = 20 [MPa]			Q <sub>A</sub> = 30 [MPa]			Q <sub>A</sub> = 40 [MPa]			Q <sub>A</sub> = 60 [MPa]			Q <sub>A</sub> = 80 [MPa]			Q <sub>A</sub> = 100 [MPa]			Q <sub>A</sub> = 120 [MPa]			Q <sub>A</sub> = 160 [MPa]														
	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]								
10 <sup>0</sup>	<5	<5	<20	<40	<5	<5	<40	<5	<5	<40	<5	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40					
10 <sup>-1</sup>	<5	15	<20	<40	<5	7	<40	<5	<5	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40	<5	<5	<20	<40						
10 <sup>-2</sup>	15	38	27	<40	5			<5			<5	33	<20		<5	16	<10	<40	<5	10	<10	<40	<5	8	<10	<40	<5	8	<10	<40	<5	6	<10	<40		
10 <sup>-3</sup>	29	65	43	60							14				7		36			6	31	23	42	<5	24	12	<40	<5	24	12	<40	<5	15	<10	<40	
10 <sup>-4</sup>	49	85	69	82											36					18		46		<13	52	27	43	13	52	27	43	7	30	11	<40	
10 <sup>-5</sup>	75	107	92	102																63				<33		77		33		77			17	70	14	<40
10 <sup>-6</sup>	98	136	116	125																				94				94					37	127	55	62
10 <sup>-7</sup>	127		147																													97		145		
10 <sup>-8</sup>																																				

Flächenpressung	Relaxation ratio P <sub>OR</sub> for stiffness C = 500 kN/mm											
	ambient temperature		temperature 1 [100°C]		temperature 2 [200°C]		temperature 3 [300°C]		temperature 4 [400°C]		temperature 5 [500°C]	
	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]
stress level 1 [ 50 MPa]	0,98	0,003	0,88	0,018	0,85	0,023	0,97	0,004	0,54	0,071	0,59	0,063
stress level 2 [ 90 MPa]												
stress level 3 [ 120 MPa]												
stress level 4 [ 180 MPa]	0,87	0,072	0,91	0,050	0,87	0,072	0,87	0,072	0,97	0,017	0,84	0,088

Maximal applicable gasket stress Q <sub>Smax</sub>												
PQR for Q <sub>Smax</sub>	0,99	0,015	0,97	0,044	0,94	0,088	0,94	0,088	0,93	0,103	0,90	0,147
Q <sub>Smax</sub> [MPa]	480		480		480		480		480		480	

Gasket stress [MPa]	Sekant unloading modulus of the gasket E <sub>G</sub> [MPa] and gasket thickness e <sub>G</sub> [mm]											
	ambient temperature		temperature 1 [100°C]		temperature 2 [200°C]		temperature 3 [300°C]		temperature 4 [400°C]		temperature 5 [500°C]	
	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]
0		4,8000		4,9000		4,8000		4,8500		4,9000		4,9000
1		4,6950		4,4991		4,4930		4,5880		4,4808		4,7175
20	4578	4,1190	6161	4,0439	2696	4,0370	2006	4,0610	4117	3,9819	4268	3,9855
30	2855	4,0530	5370	4,0151	3755	4,0060	4393	4,0250	7258	3,9401	5087	3,9653
40	5996	4,0280	5919	3,9878	5325	3,9810	5616	4,0060	6798	3,9191	6777	3,9419
50	8866	4,0150	8150	3,9704	5696	3,9600	5279	3,9880	8104	3,9057	7910	3,9250
60	7231	3,9980	8850	3,9498	5601	3,9420	8325	3,9750	8567	3,8947	7161	3,9076
80	8137	3,9730	12485	3,9191	12277	3,9270	12301	3,9330	5584	3,8574	8944	3,8793
100	10921	3,9550	13863	3,8961	14413	3,9080	10733	3,8910	12843	3,8366	11469	3,8521
120	10798	3,9300	13458	3,8762	11008	3,8700	11857	3,8670	10646	3,8054	10672	3,8159
140	15815	3,9070	10855	3,8463	11886	3,8310	12801	3,8440	11986	3,7694	11572	3,7831
160	14770	3,8820	11481	3,8142	13971	3,8010	11971	3,8140	13102	3,7377	13018	3,7580
180	11546	3,8450	17056	3,7939	10751	3,7600	18983	3,7930	14527	3,7166	14419	3,7354
200	14952	3,8200	20950	3,7713	16066	3,7410	14304	3,7610	19740	3,7066	13794	3,7140
220	22546	3,7220	31797	3,6867	29260	3,6580	16867	3,6280	20000	3,5986	17698	3,5992
400	18170	3,6130	31456	3,5594	21674	3,4950	19287	3,4730	24400	3,4744	18064	3,4583
500	16972	3,4990	32510	3,4415	20694	3,3610	21875	3,3460	22183	3,3532	17978	3,3405

Note: the contents of gray-stained cells was not detected or is not necessary

Company Address	KLINGER Kempchen Dichtungstechnik - 46147 Oberhausen - Im Waldteich 21	according to <b>DIN EN 13555</b> 2014-07
Gasket type	<b>grooved gasket B29A-Graphite (1.4541 / 0,5 mm; D = 1,0 gcm³)</b>	
Dimensions e <sub>GO</sub> [mm]	<b>Ø 53 / 69 x 92 x 4,80 mm (DIN 1514-6)</b>	
Remarks:	<i>At higher internal pressures higher initial perssure was selected!</i>	

required minimum stress to gasket <b>Q<sub>min</sub></b> (at assembly), <b>Q<sub>Smin</sub></b> (after off-loading) for p = 10 bar to 160 bar																																					
L [mg/(s·m)]	Q <sub>MINL</sub> [MPa]				Q <sub>SMINL</sub> [MPa]																																
					Q <sub>A</sub> = 20 [MPa]				Q <sub>A</sub> = 30 [MPa]				Q <sub>A</sub> = 40 [MPa]				Q <sub>A</sub> = 60 [MPa]				Q <sub>A</sub> = 80 [MPa]				Q <sub>A</sub> = 100 [MPa]				Q <sub>A</sub> = 120 [MPa]				Q <sub>A</sub> = 160 [MPa]				
	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]	p=10 [bar]	p=40 [bar]	p=80 [bar]	p=160 [bar]					
10 <sup>0</sup>	<5	<5	<20	<40	<5	<5			<5	<5			<5	<5	<10		<5	<5	<10	<40	<5	<5	<10	<40	<5	<5	<10	<40	<5	<5	<10	<40	<5	<5	<10	<40	
10 <sup>-1</sup>	<5	15	<20	<40	<5	7			<5	<5			<5	<5	<10		<5	<5	<10	<40	<5	<5	<10	<40	<5	<5	<10	<40	<5	<5	<10	<40	<5	<5	<10	<40	
10 <sup>-2</sup>	15	35	34	43	6				<5				<5	27	24		<5	15	13	<40	<5	10	<10	<40	<5	9	<10	<40	<5	9	<10	<40	<5	6	<10	<40	
10 <sup>-3</sup>	30	62	55	67								23					13	49			9	32	26	47	6	23	17	<40	6	23	17	<40	<5	14	<10	<40	
10 <sup>-4</sup>	56	83	79	85												53					31		77		19	50	38	50	19	50	38	50					
10 <sup>-5</sup>	85	105	101	105																					58				58								
10 <sup>-6</sup>	109	132	123	126																														68	118	86	65
10 <sup>-7</sup>	135		153																															128		149	
10 <sup>-8</sup>																																					

Relaxation ratio P <sub>OR</sub> for stiffness C = 500 kN/mm												
Flächenpressung	ambient temperature		temperature 1 [100°C]		temperature 2 [200°C]		temperature 3 [300°C]		temperature 4 [400°C]		temperature 5 [500°C]	
	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]	P <sub>OR</sub>	Δe <sub>Gc</sub> [mm]
stress level 1 [ 50 MPa]	0,98	0,003	0,88	0,018	0,85	0,023	0,98	0,004	0,51	0,076	0,60	0,062
stress level 2 [ 90 MPa]												
stress level 3 [ 120 MPa]												
stress level 4 [ 180 MPa]	0,87	0,072	0,90	0,055	0,87	0,072	0,87	0,072	0,94	0,036	0,84	0,091

Maximal applicable gasket stress Q <sub>Smax</sub>												
PQR for Q <sub>Smax</sub>	0,99	0,015	0,97	0,044	0,94	0,088	0,94	0,088	0,93	0,110	0,90	0,155
Q <sub>Smax</sub> [MPa]	480		480		480		480		480		480	

Sekant unloading modulus of the gasket E <sub>G</sub> [MPa] and gasket thickness e <sub>G</sub> [mm]													
Gasket stress [MPa]	ambient temperature		temperature 1 [100°C]		temperature 2 [200°C]		temperature 3 [300°C]		temperature 4 [400°C]		temperature 5 [500°C]		
	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	E <sub>G</sub> [MPa]	e <sub>G</sub> [mm]	
0		4,8000		4,9000		4,8000		4,8500		4,9000		4,9000	
1		4,7140		4,4489		4,6150		4,7110		4,4580		4,6877	
20	3891	4,1075	5507	4,0288	2193	4,0550	2175	4,0520	3901	3,9743	4016	3,9752	
30	3230	4,0470	7193	4,0037	4100	4,0245	3711	4,0160	6758	3,9377	5377	3,9562	
40	5119	4,0190	5842	3,9767	5491	3,9990	5754	3,9970	6390	3,9157	6762	3,9318	
50	6558	4,0010	7983	3,9595	6150	3,9775	6497	3,9810	7647	3,9016	7579	3,9146	
60	7575	3,8890	9490	3,9439	5728	3,9570	9068	3,9670	7045	3,8858	8353	3,9004	
80	8639	3,9630	10753	3,9129	10512	3,9355	10687	3,9275	6885	3,8533	9805	3,8718	
100	10892	3,9430	11595	3,8867	13100	3,9105	9957	3,8815	12645	3,8283	11414	3,8425	
120	10958	3,9165	13484	3,8662	11029	3,8735	12061	3,8545	11353	3,7952	11153	3,8064	
140	13913	3,8875	12748	3,8385	12119	3,8385	13223	3,8285	13251	3,7619	11731	3,7714	
160	13773	3,8590	12801	3,8086	13538	3,8075	14400	3,8015	14077	3,7338	13525	3,7463	
180	12919	3,8255	18491	3,7885	15268	3,7745	19335	3,7805	13554	3,7085	15028	3,7240	
200	13604	3,7975	19971	3,7657	14791	3,7485	14938	3,7510	17704	3,6933	14024	3,7011	
220	20710	3,7010	25845	3,6725	25326	3,6470	16109	3,6180	21100	3,5859	17068	3,5862	
400	18965	3,5855	27676	3,5480	20681	3,4830	18878	3,4670	22064	3,4567	18145	3,4499	
500	18733	3,4775	28366	3,4300	19537	3,3450	18779	3,3355	23463	3,3385	18425	3,3321	

Note: the contents of gray-stained cells was not detected or is not necessary