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SEALING TECH

EGRAFLEX STEELFLON WAVELINE XWLP®

Multilayer flat gasket with huge potential

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Multilayer flat gasket with huge potential

System operators and gasket manufacturers are constantly looking for better solutions to seal flange connections efficiently, reliably and safely without harming the environment. For applications in the higher temperature range, graphite composite materials, PTFE-based materials and metal-soft material gaskets are becoming increasingly important.

Teams made up of system operators and lawmakers are contributing towards defining valid specifications for all operators. This aims to ensure that the required claims for environmental protection and plant safety are complied with.

PROBLEM

The aforementioned material combinations continually come up against application limits.

Aim of the product development: Only the positive properties, as shown in the table below, should become effective. The result is a sealing plate from the components graphite and stainless-steel films with PTFE covering films attached on both sides in adhesive-free (!) composite – the multilayer plate "Egraflex Steelflon MF®"

PROPERTIES	PTFE	GRAPHITE	STAINLESS STEAL	EGRAFLEX STEELFLON WAVELINE WLP®
COMPENSATING UNEVENNESS	medium	very good	poor	VERY GOOD
REQUIRED AREA COMPRESSION/CLAMPING FORCE	medium	medium	very high	VERY LOW
HANDLING	very good	poor	good	VERY GOOD
CHEMICAL RESISTANCE	very good	good	good	GOOD
SEALING PERFORMANCE	very good	good	very good	VERY GOOD
RESILIENCE	poor	good	poor	GOOD
INTERNAL PRESSURE RESISTANCE	medium	medium	very good	GOOD
AGING RESISTANCE	good	very good	very good	VERY GOOD
TEMPERATURE RESISTANCE	medium	good	very good	MEDIUM
AVAILABILITY OF SPECIAL GEOMETRIES	good	good	poor	GOOD
DISPOSAL	POOR	GOOD	GOOD	GOOD

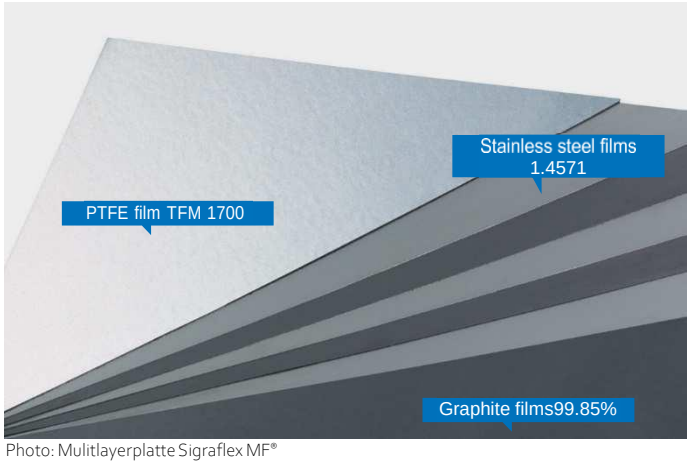


Photo: Mulitlayerplatte Sigraflex MF®


Photo: Grinding pattern of an Egraflex Steelflon Waveline WLP® gasket

Egraflex Steelflon Waveline WLP® isa solution that fulfils these requirements. Based on the known multilayer sealingplate "Sigraflex® MF", made by SGL,this product has been manufactured as Egraflex Steelflon since 1995 andisusedvery successfullyin prominent industrial companies.

Laminate thicknesses are chosen corresponding to the target objective.We punch gaskets from the plate material and provides these with an internalenclosure made from VA. Finally, the gasket is pre-pressed with very precisely defined force with the aim of attaininganeffective, corrugatedcross-sectiongeometry.

The corrugated geometry clearly visible in the above grinding pattern forms a sine curve. A strong pre-compression over all material layers is achieved. As graphite does not undergo any noteworthy change in thickness from approx. 50 MPa, the settling behaviour of the gasket is significantly improved in practice with the Waveline WLP® process. The VA internal enclosure also receives this pre-compression, thereby closing off the sealing cross-section without theflange havingtoapplythenormaldeformationwork.Thefollowingvaluesresultcorrespondinglyaccordingto EN 13555. (Please find the values in the diagrams on the rear.)

WAVELINE WLP ® APPROVALS

TA-Luft

FDA

BAM

DVGW

VCI Guidelines

Leaktightnessandstrengthvalidationsaccording to DIN EN 1591

The PTFE cover films applied on both sides ensure short installation times when changing thegaskets.

Adhesion to the flange is prevented – the gasket can be removed without leaving any residues. Further spreading or disassembly of the flange for cleaning the sealing surfaces is no longer necessary, which means the flange cleaning can be carried out without fault.

The pre-compression and structure of the gasket prevents the absorption of water and hence failure of the gasket, which can result from the installation of wet graphite gaskets.

Installation safety
For a clear improvement in the in tallation safety and precise,
reliableassignmentofthegasket,EgraflexSteelflonWaveline WLP® gaskets can also be supplied with part marking.
This typically includes information on theinstallation torque, nominal width and nominal pressure, manufacturer, customerparts number and material data.

Thegasket isavailable inthickne sesfrom 2.0 to 4.0 mm.
Standard dimensions in stock.Special sizes:
any geometry up todiameter 4,5 omm available!

BENEFITS AT AGLANCE:

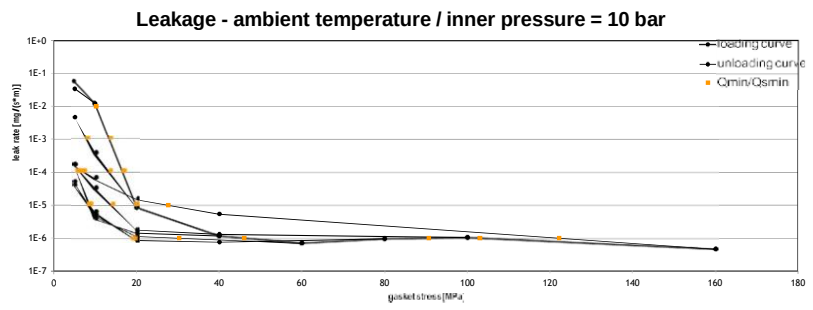
- minimum settling behaviour extremely
- high leak tightnessno sticking to the
- flange
- no contamination of the gasket/medium
- rapid installation times thanks to good handlinguniversal
- use = reduced warehousing
- relevant approvals available

Values according to EN 13555:

Company Address		According to DIN EN 13555 2014-07
Gasket Type	*Egraflex Steelflon Waveline WLP*	
Sealing element dimensions [mm]	*92 x 49 x 2.3*	

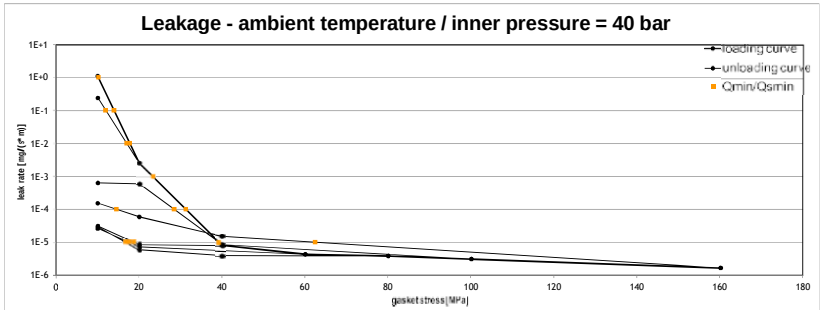
Minimum stress to seal Q_{min} (at assembly), Q_{Smin} (after off-loading) for p = 10 bar

L [mg/(s*m)]	Q_{min} [MPa]	Q_{Smin} [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	Q_A= 160 MPa			
10^{-0}	5	5	5	5	5	5	5	5			
10^{-1}	5	5	5	5	5	5	5	5			
10^{-2}	10		5	5	5	5	5	5			
10^{-3}	13		8	5	5	5	5	5			
10^{-4}	17		13	6	5	5	7	7			
10^{-5}	20		20	9	9	9	14	28			
10^{-6}	46				30	19		122			
10^{-7}											
10^{-8}											



Minimum stress to seal Q_{min} (at assembly), Q_{Smin} (after off-loading) for p = Q_{Smin} [MPa]

L [mg/(s*m)]	Q_{min} [MPa]										
		Q_A= 20 MPa	Q_A= 40 MPa	Q_A= 60 MPa	Q_A= 80 MPa	Q_A= 100 MPa	Q_A= 160 MPa				
10^{-0}	10	10	10	10	10	10	10				
10^{-1}	14	12	10	10	10	10	10				
10^{-2}	18	17	10	10	10	10	10				
10^{-3}	23		10	10	10	10	10				
10^{-4}	31		10	10	10	29	15				
10^{-5}	39		19	18	17	39	63				



Note: the content of darkened cells was not determined respectively is unnecessary	Rev - No: **1**	Creation date of this sheet: **2017-05-19**

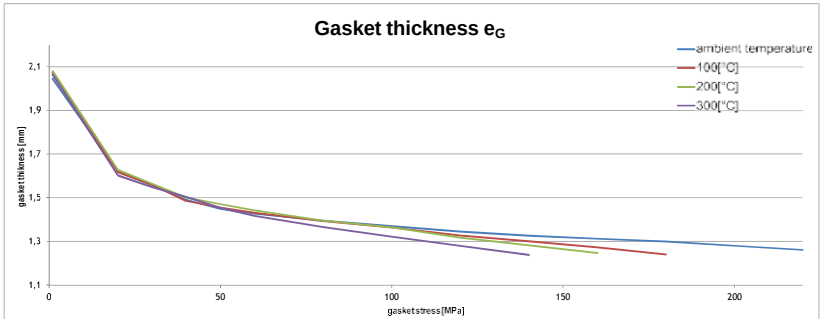
Company Address		According to DIN EN 13555 2014-07
Gasket Type	*Egraflex Steelflon Waveline WLP*	
Sealing element dimensions [mm]	*92 x 49 x 2.3*	

Relaxation ratio P_{QR} for stiffness **C** = 500 kN/mm

Gasket stress	temperature 1 [25 °C]		temperature 2 [100 °C]		temperature 3 [200 °C]		temperature 4 [300 °C]			
	P_{QR}	Δe_{SC} [mm]	P_{QR}	Δe_{SC} [mm]	P_{QR}	Δe_{SC} [mm]	P_{QR}	Δe_{SC} [mm]	P_{QR}	Δe_{SC} [mm]
Stress level 1 [30 MPa]	0,99	0,003	0,92	0,020	0,88	0,030	0,94	0,016		
Stress level 2 [50 MPa]	1,00	0,002	0,99	0,004	0,97	0,015	0,96	0,019		
P_{QR} and Δe_{SC} at maximal applicable gasket stress Q_{max}										
P_{QR} at Q_{max}	0,99	0,018	0,98	0,038	0,95	0,074	0,91	0,106		
Q_{max}	220 MPa		180 MPa		160 MPa		140 MPa			

Sekant unloading modulus of the gasket E_G [MPa] and gasket thickness e_G [mm]

Gasket stress [MPa]	ambient temperature		temperature 1 [100 °C]		temperature 2 [200 °C]		temperature 3 [300 °C]			
	E_G [MPa]	e_G [mm]	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		2,044		2,073		2,079		2,063		
20	559	1,619	596	1,617	646	1,628	539	1,601		
30	853	1,557	894	1,559	841	1,564	820	1,548		
40	1250	1,490	1275	1,484	1323	1,500	1176	1,503		
50	1445	1,448	1609	1,454	1805	1,470	1545	1,453		
60	1939	1,427	1886	1,430	1781	1,441	1632	1,416		
80	2919	1,394	2659	1,392	2387	1,394	2839	1,364		
100	3549	1,369	4016	1,363	4361	1,363	2930	1,321		
120	3908	1,343	3184	1,327	3058	1,317	3843	1,279		
140	4283	1,324	4809	1,300	5765	1,281	4379	1,238		
160	6167	1,312	5719	1,272	6665	1,246				
180	7443	1,299	6504	1,240						
200	5772	1,280								
220	5971	1,261								



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