



# EGRAFLEX STEELFLON WAVELINE WLP®

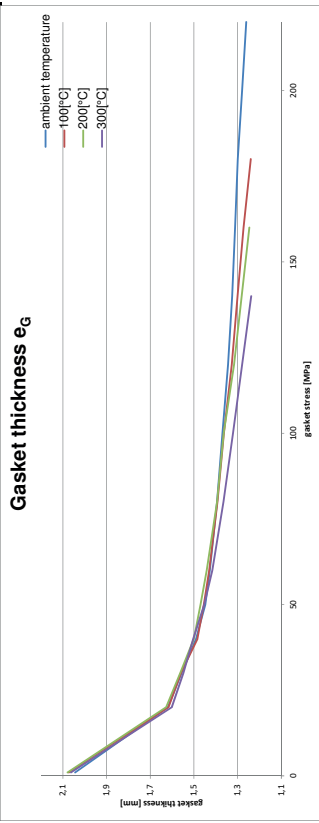
Multilayer flat gasket with huge potential



Company Address A.W.Schulze GmbH, Meranostr. 10, 21522 Geesthacht, Germany		According to DIN EN 13555 2014-07	
Gasket Type Egraflex Steifflon Waveflange WLP			
Sealing element dimensions (mm) 92 x 49 x 2.3			

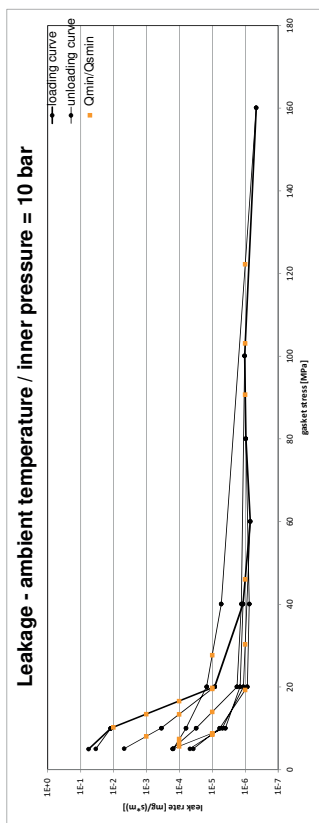
Gasket stress	Relaxation ratio $P_{rel}$ (at stiffness $C = 500$ N/mm)											
	temperature 1 [25 °C]		temperature 2 [100 °C]		temperature 3 [200 °C]		temperature 4 [300 °C]		temperature 5 [400 °C]		temperature 6 [500 °C]	
Stress level 1 [50 MPa]	$P_{rel}$	$\Delta e_g$ [mm]	$P_{rel}$	$\Delta e_g$ [mm]	$P_{rel}$	$\Delta e_g$ [mm]	$P_{rel}$	$\Delta e_g$ [mm]	$P_{rel}$	$\Delta e_g$ [mm]	$P_{rel}$	$\Delta e_g$ [mm]
Stress level 2 [50 MPa]	0.99	0.003	0.92	0.020	0.88	0.030	0.84	0.046	0.81	0.064	0.79	0.091
Stress level 2 [50 MPa]	1.00	0.002	0.99	0.004	0.97	0.015	0.96	0.019				
$P_{rel}$ at $Q_{min}$	0.99	0.018	0.98	0.038	0.95	0.074	0.91	0.106				
$Q_{min}$			180 MPa		180 MPa		140 MPa					

Gasket stress [MPa]	Swiken unloading modulus of the gasket $E_g$ [MPa] and gasket thickness $e_g$ [mm]											
	ambient temperature		temperature 1 [100 °C]		temperature 2 [200 °C]		temperature 3 [300 °C]		temperature 4 [400 °C]		temperature 5 [500 °C]	
0	$E_g$ [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]	$E_g$ [MPa]	$e_g$ [mm]
1	2044	2.073	2079	2.032	2079	2.032	2079	2.032	2079	2.032	2079	2.032
2	559	1.619	596	1.617	646	1.628	599	1.601	646	1.628	599	1.601
3	853	1.557	894	1.559	841	1.564	820	1.548	841	1.564	820	1.548
4	1250	1.490	1275	1.484	1323	1.500	1176	1.503	1323	1.500	1176	1.503
5	1445	1.448	1469	1.454	1495	1.470	1454	1.453	1495	1.470	1454	1.453
6	1839	1.427	1886	1.430	1781	1.441	1632	1.416	1781	1.441	1632	1.416
8	2919	1.394	2859	1.392	2807	1.394	2839	1.384	2807	1.394	2839	1.384
10	3549	1.369	4016	1.363	4961	1.363	2910	1.321	4961	1.363	2910	1.321
12	3908	1.343	3184	1.327	3056	1.317	3843	1.279	3056	1.317	3843	1.279
14	4283	1.324	4809	1.300	5765	1.281	4879	1.258	5765	1.281	4879	1.258
16	6182	1.312	5719	1.272	6665	1.246			6665	1.246		
18	7443	1.289	6504									
20	9772	1.280										
22	5971	1.261										

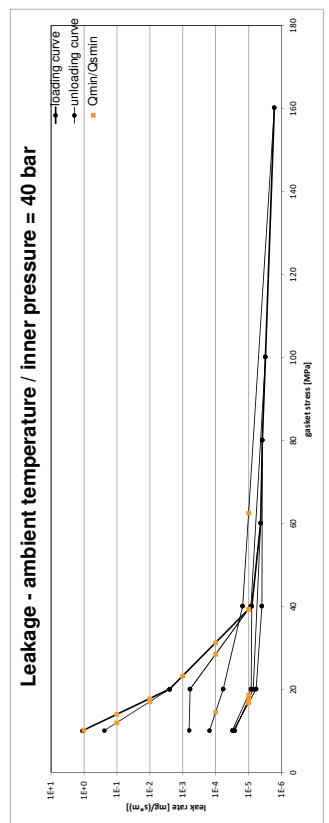


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L [mg/(s*cm)]	Minimum stress to seal $Q_{min}$ (at assembly), $Q_{min}$ (after of loading) for $p = 10$ bar											
	$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]	
$10^0$	5	5	5	5	5	5	5	5	5	5	5	5
$10^1$	5	5	5	5	5	5	5	5	5	5	5	5
$10^2$	5	5	5	5	5	5	5	5	5	5	5	5
$10^3$	10	5	5	5	5	5	5	5	5	5	5	5
$10^4$	13	8	5	5	5	5	5	5	5	5	5	5
$10^5$	17	13	6	5	5	5	7	7	7	7	7	7
$10^6$	20	20	9	9	9	14	28					
$10^7$	46		30	19		122						
$10^8$												



L [mg/(s*cm)]	Minimum stress to seal $Q_{min}$ (at assembly), $Q_{min}$ (after of loading) for $p = 40$ bar											
	$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]		$Q_{min}$ [MPa]	
$10^0$	10	10	10	10	10	10	10	10	10	10	10	10
$10^1$	14	12	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td>	10 <td>10 <td>10 <td>10 </td></td></td>	10 <td>10 <td>10 </td></td>	10 <td>10 </td>	10
$10^2$	18	17	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td>	10 <td>10 <td>10 <td>10 </td></td></td>	10 <td>10 <td>10 </td></td>	10 <td>10 </td>	10
$10^3$	23	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td></td>	10 <td>10 <td>10 <td>10 <td>10 </td></td></td></td>	10 <td>10 <td>10 <td>10 </td></td></td>	10 <td>10 <td>10 </td></td>	10 <td>10 </td>	10
$10^4$	31	10 <td>10 <td>10 <td>10 <td>29</td> <td>15</td> <td></td> <td></td> <td></td> <td></td> <td></td> </td></td></td>	10 <td>10 <td>10 <td>29</td> <td>15</td> <td></td> <td></td> <td></td> <td></td> <td></td> </td></td>	10 <td>10 <td>29</td> <td>15</td> <td></td> <td></td> <td></td> <td></td> <td></td> </td>	10 <td>29</td> <td>15</td> <td></td> <td></td> <td></td> <td></td> <td></td>	29	15					
$10^5$	39	19	18	17	39	63						
$10^6$												
$10^7$												
$10^8$												



# EGRAFLEX STEELFLON WAVELINE WLP®

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 Steel	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

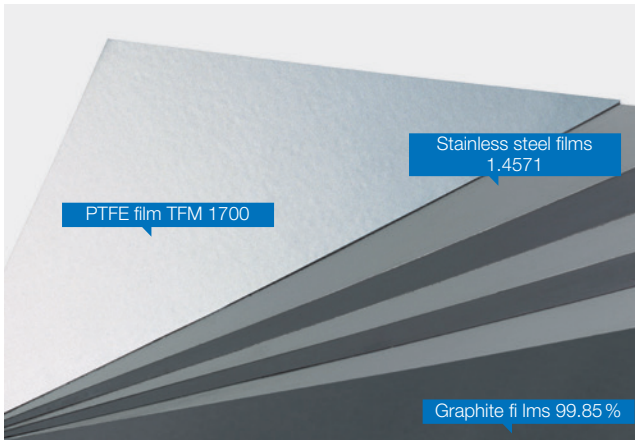


Photo: Multilayerplatte Sigraflex MF®



## SOLUTION TO THE PROBLEM

Egraflex Steelflon Waveline WLP® is a solution developed by A.W.Schultze that fulfils these requirements. Based on the known multilayer sealing plate “Sigraflex® MF”, made by SGL, this product has been manufactured as Egraflex Steelflon since 1995 and is used very successfully in prominent industrial companies.

Laminate thicknesses are chosen corresponding to the target objective. A.W.Schultze GmbH punches gaskets from the plate material and provides these with an internal enclosure made from VA. Finally, the gasket is pre-pressed with very precisely defined force with the aim of attaining an effective, corrugated cross-section geometry.



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

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 the flange having to apply the normal deformation work. The following values result correspondingly according to EN 13555. (Please find the values in the diagrams on the rear.)



## EGRAFLEX STEELFLON WAVELINE WLP® APPROVALS

- TA-Luft
- FDA
- BAM
- DVGW
- VCI Guidelines
- Leak tightness and strength validations according to DIN EN 1591

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

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 installation safety and precise, reliable assignment of the gasket, Egraflex Steelflon Waveline WLP® gaskets can also be supplied with part marking.

This typically includes information on the installation torque, nominal width and nominal pressure, manufacturer, customer parts number and material data.

The gasket is available in thicknesses from 2.0 to 4.0 mm.

Standard dimensions in stock.

Special sizes:

any geometry up to diameter 4,500 mm available!

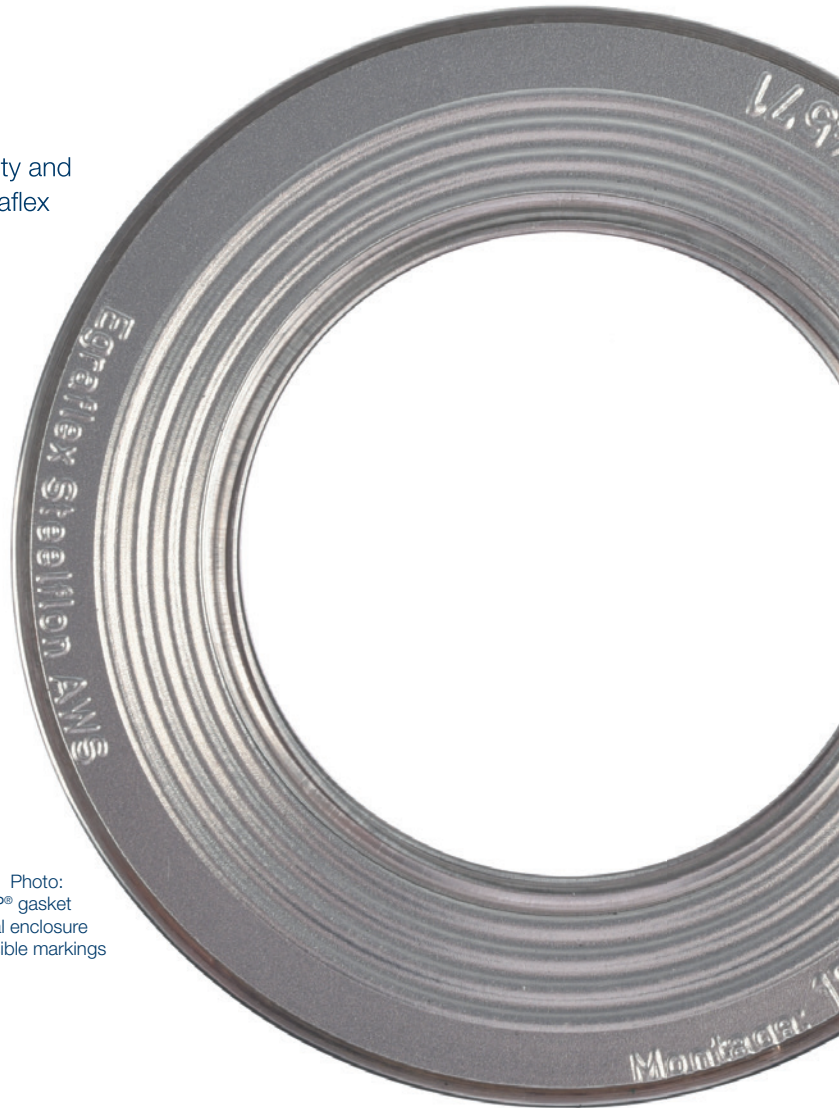
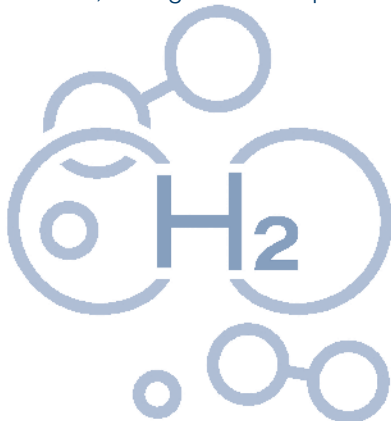


Photo:  
Egraflex Steelflon Waveline WLP® gasket  
with internal and external enclosure  
and possible markings

## EGRAFLEX STEELFLON WAVELINE-WLP® & H2

Our EGRAFLEX STEELFLON WAVELINE-WLP® recorded exceptionally low leak rates in the test procedure according to DIN EN 13555 and in the H2 leak test. This means it is suitable for applications relating to the production, storage and transport of hydrogen.



Information:  
Download test report



### EGRAFLEX STEELFLON WAVELINE WLP® BENEFITS AT A GLANCE:

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

