

SIGRAFLEX® SELECT

High-Integrity Gasket Made from
Natural Graphite with Inner Eyelet

Expanded Graphite



Broad Base. Best Solutions.

SIGRAFLEX® SELECT

Our Contribution to Environmental Protection

SIGRAFLEX® SELECT

is our graphite gasket comprising several graphite foils of various thicknesses and 0.05 mm thick stainless steel foils, as well as a stainless steel inner eyelet. This laminate is produced without any adhesives and impregnated to reduce leakage and improve handling.

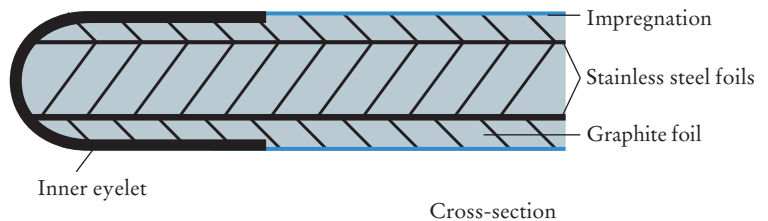
SIGRAFLEX SELECT is designed for applications requiring TA Luft approval.

Applications

- ▶ For raised-face flanges meeting DIN EN 1514, DIN 2690 and ANSI
- ▶ For internal pressures ranging from vacuum to 100 bar
- ▶ For corrosive media
- ▶ Suitable for a broad range of temperatures from -250°C to approx. 550°C; for applications at more than 450°C, users should request our advice
- ▶ Gaskets for the chemical, petrochemical and refinery industries
- ▶ Steam pipework in power stations
- ▶ Heat transfer oil and heating facilities
- ▶ Existing plants

Approvals

- ▶ TA Luft (VDI 2440/ VDI 2200)
- ▶ Fire safety according to API 607
- ▶ Blow-out resistance (TÜV Süd at 2.5 times the nominal pressure)
- ▶ BAM oxygen
- ▶ DVGW (DIN 3535-6)



Properties

- ▶ Reduction in fugitive emissions due to very high leak-tightness
- ▶ High operational reliability and excellent oxidation resistance
- ▶ High blow-out resistance and high mechanical strength
- ▶ High fault tolerance during assembly and operation
- ▶ Good chemical resistance
- ▶ Long-term stability of compressibility and recovery, even under fluctuating temperatures
- ▶ Good scratch resistance; antistick finish due to special impregnation
- ▶ No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- ▶ No aging or embrittlement, owing to the absence of adhesives or binders
- ▶ Asbestos-free, no associated health risks



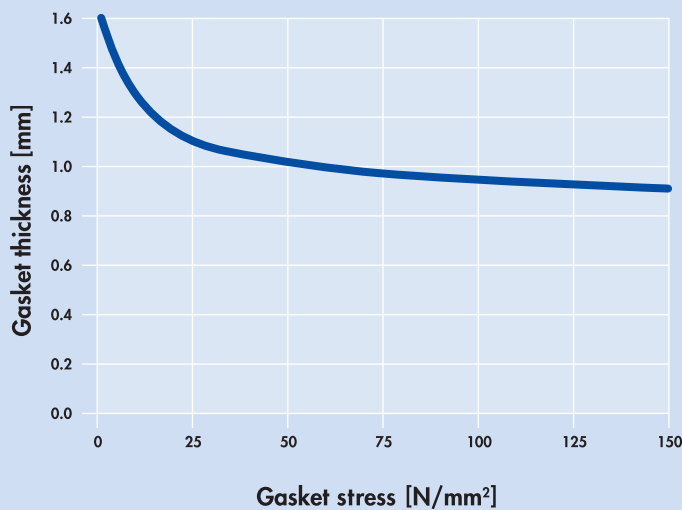
Assembly instructions

For assembly, use dry and undamaged gaskets only. Wet graphite gaskets must not be fitted unless first dried completely. The sealing faces must be clean, dry and free from grease. Do not use release agents! Position the gasket centrally and avoid mechanical stresses during assembly. An assembly aid can be used if necessary. To facilitate assembly in difficult positions, the gasket may be fixed by using a commercially available adhesive. However, the adhesive should be applied sparingly at a few points only.

Align the flanges as plane-parallel as possible. First hand-tighten the bolts and then tighten the bolts in a crosswise order to about 50% of the maximum torque value, in the second stage to about 80% and to the full value in the third stage. All bolts must be tightened to the specified bolt load, so the torque must be checked repeatedly. Our detailed assembly instructions are available on request.



Compressibility of SIGRAFLEX® SELECT



■ V16010C3I

Forms supplied

SIGRAFLEX SELECT gaskets with 0.1 mm thick inner eyelets are available in all dimensions meeting DIN EN 1514 and DIN 2690 up to and including DN 800, and in corresponding ANSI dimensions.

For special dimensions, applications in process equipment and tongue-and-groove flanges, we recommend using our well-established SIGRAFLEX HOCHDRUCK or SIGRAFLEX HOCHDRUCK PRO gaskets.

Dimensions

DN 10 up to DN 200
DN 200 up to DN 300
DN 300 up to DN 800

Packaging units

50 items per carton
25 items per carton
5 items per package

Material data of SIGRAFLEX® SELECT

Material type		V16010C3I	
Thickness	mm	1.6	
Bulk density of graphite	g/cm ³	1.0	
Ash content of graphite (DIN 51903)	%	≤ 2.0	
Total chloride content	ppm	≤ 25	
Reinforcing steel foil details		Flat stainless steel foil	
ASTM material number		316 (L)	
Thickness	mm	0.05	
Number of foils		2	
Stainless steel eyelet	ASTM material number	316 Ti	
Residual stress (DIN 52913) σ_D 16 h, 300°C, 50 N/mm ²	N/mm ²	≥ 47	
Gasket factors (DIN E 2505/DIN 28090-1)			
Gasket width $b_D = 20$ mm			
$\sigma_{VU/0.1}$ at an internal pressure of			
10 bar	N/mm ²	10	
16 bar	N/mm ²	12	
25 bar	N/mm ²	15	
40 bar	N/mm ²	17	
m		1.3	
σ_{VO}	N/mm ²	160	
σ_{BO} at 300°C	N/mm ²	140	
Compression factors (DIN 28090-2)			
Compressibility	ϵ_{KSW}	%	30 - 40
Recovery at 20°C	ϵ_{KRW}	%	3 - 5
Hot creep	ϵ_{WSW}	%	< 2
Recovery at 300°C	ϵ_{WRW}	%	2 - 4
Young's modulus at 20 N/mm ² (DIN 28090-1)	N/mm ²	750	
ASTM	"m" factor	2	
	"y" factor	psi	2000
Compressibility		%	30 - 40
Recovery	ASTM F36	%	20 - 30
The gasket factor conversion formulas as per AD Merkblatt B7 are as follows:		$k_0 \cdot K_D = \sigma_{VU} \cdot b_D$ $k_1 = m \cdot b_D$	

Definitions

$\sigma_{VU/0.1}$	Minimum gasket assembly stress needed to comply with leakage class L 0.1 (according to DIN 28090-1) Recommended gasket assembly stress: ≥ 20 N/mm ² up to σ_{BO}
σ_{BU}	Minimum gasket assembly stress in service, where σ_{BU} is the product of internal pressure p and gasket factor m for test and in service ($\sigma_{BU} = p \cdot m$)
σ_{VO}	Maximum permissible gasket stress at 20°C
$\sigma_{BO, 300°C}$	Maximum permissible gasket stress in service
m	σ_{BU} / p_i
"m" factor	Similar to m, but defined according to ASTM, hence different value
"y" factor	Minimum gasket stress in psi

k_0	In mm, factor for gasket assembly stress
k_1	In mm, factor for gasket stress in service
K_D	In N/mm ² , max. gasket stress-bearing capacity under assembly conditions
ϵ_{KSW}	Compression set under a gasket stress of 35 N/mm ²
ϵ_{KRW}	Gasket recovery after reduction in gasket stress from 35 N/mm ² to 1 N/mm ²
ϵ_{WSW}	Gasket creep compression under a gasket stress of 50 N/mm ² at 300°C after 16 h
ϵ_{WRW}	Recovery after reduction in gasket stress from 50 N/mm ² to 1 N/mm ²

The percentage changes in thickness of ϵ_{KSW} , ϵ_{KRW} , ϵ_{WSW} and ϵ_{WRW} are relative to the initial thickness.

Gasket factors of SIGRAFLEX® SELECT according to DIN EN 13555

L	PN	e _{G0}	Q _{min/L}	Q _{Smin/L}			
				Q _A = 20	Q _A = 40	Q _A = 60	Q _A = 80
10 ⁻¹	10	1.6	< 10	< 10	< 10	< 10	< 10
10 ⁻¹	16	1.6	< 10	< 10	< 10	< 10	< 10
10 ⁻¹	25	1.6	< 10	< 10	< 10	< 10	< 10
10 ⁻¹	40	1.6	< 10	< 10	< 10	< 10	< 10
10 ⁻²	10	1.6	< 10	< 10	< 10	< 10	< 10
10 ⁻²	16	1.6	12	< 10	< 10	< 10	< 10
10 ⁻²	25	1.6	17	< 10	< 10	< 10	< 10
10 ⁻²	40	1.6	21		< 10	< 10	< 10

Relaxation ratio P_{QR}

P _{QR}	RT	150 °C	300 °C
Q _S / e _{G0}	1.6	1.6	1.6
30	0.97	0.96	0.93
50	0.98	0.97	0.96
200/200/200	1.00	0.99	0.99

Max. permissible gasket stress Q_{Smax}

Q _{Smax}	RT	150 °C	300 °C
e _{G0}			
1.6	> 200	> 200	> 200

Secant unloading modulus E_G





E _G	RT	150 °C	300 °C
Q _S / e _{G0}	1.6	1.6	1.6
20	384	242	449
30	666	690	608
40	735	792	934
50	891	1022	1086
60	1077	1079	1156
80	1815	1491	1362
100	1668	1757	1690
120	2022	1795	1754
140	2077	1903	2194
160	2213	2168	2561
180	2361	2741	2500
200	2310	2786	2242



Definitions

E _G	[MPa]	Secant unloading modulus of the gasket
e _{G0}	[mm]	Gasket thickness
L	[mg/(s·m)]	Leakage class
PN	[bar]	Nominal pressure
Q _A	[MPa]	Gasket assembly stress
P _{QR}		Relaxation ratio for stiffness C = 500 kN/mm
Q _{min/L}	[MPa]	Minimum gasket assembly stress
Q _S	[MPa]	Gasket stress
Q _{Smin/L}	[MPa]	Minimum gasket stress in service
Q _{Smax}	[MPa]	Maximum permissible gasket stress before damage occurs
RT		Room temperature
Further values on request.		

Product overview

Product		Characteristics	Recommended applications
SIGRAFLEX® FOIL F....C/Z/APX	▲	Flexible, continuous	-250°C to approx. 550°C; for compressed packings, spiral-wound and kammprofile gaskets
SIGRAFLEX® STANDARD L....CI	■	Unreinforced, impregnated	Raised-face flanges; enamel or glass flanges; highly corrosive media
SIGRAFLEX® ECONOMY V....C4	■ ▲	Reinforced with bonded s/s** foil	Pumps; fittings; gas supply; waste gas pipelines
SIGRAFLEX® UNIVERSAL V....C2I	■	Reinforced with tanged s/s** foil, impregnated	Pipework and vessels in the petro-/chemical industries and in power stations
SIGRAFLEX® UNIVERSAL PRO V....C2I-P 	■	Reinforced with tanged s/s** foil, impregnated	For TA Luft* applications; for pipework and vessels in the petro-/chemical industries and in power stations
SIGRAFLEX® SELECT V16010C3I 	●	High-integrity s/s** foil reinforcement, impregnated	For TA Luft* applications; raised-face flanges; pipework in the chemical and petrochemical industries
SIGRAFLEX® HOCHDRUCK V....Z3I	■	High-integrity multilayer laminate, impregnated	Universal sealing sheet, also for solving sealing problems in pipework, process equipment, tongue- and-groove flanges and non-standard joints in the petro-/chemical industries and in power stations
SIGRAFLEX® HOCHDRUCK PRO V....Z3I-P 	■	High-integrity multilayer laminate, impregnated	Universal sealing sheet for TA Luft* applications, also for solving sealing problems in pipework, process equipment, tongue-and-groove flanges and non-standard joints in the petro-/chemical industries and in power stations
SIGRAFLEX® MF V....Z2MF 	●	High-integrity laminate made of graphite, s/s** and PTFE	Maximum requirements for sealability (TA Luft*), safety, chemical resistance and process hygiene; sealed joints in the chemical and petrochemical, pharmaceutical and food industries
SIGRAFLEX® EMAIL V....Z3E	■	High-integrity s/s** foil reinforcement	PTFE-envelope gaskets in enameled pipework, vessels, stub connections, etc.

Forms supplied: ▲ roll or tape ■ sheet material ● gasket with inner eyelet, for applications requiring TA Luft approval

* TA Luft: German Clean Air Act ** s/s: stainless steel

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This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should therefore not be construed as guaranteeing specific properties of the products described or their suitability for a particular application. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our "General Conditions of Sale".

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