

SIGRAFLEX® FOIL

Flexible Graphite Foil Manufactured
from Expanded Natural Graphite

Expanded Graphite



Broad Base. Best Solutions.



SIGRAFLEX® FOIL

High Performance and Safety in Sealing Systems

SIGRAFLEX flexible graphite foil – manufactured from expanded natural graphite – is a homogeneous material without adhesives or binders. Even after long service periods, SIGRAFLEX displays no noticeable changes in its properties compared with other sealing materials. Inhibitors can be added to enhance the oxidation or corrosion resistance properties of the flexible graphite.

SIGRAFLEX graphite foil is also available with self-adhesive backing. For applications in stuffing box packings, a special PTFE-coated foil is supplied with markedly improved friction and leakage behavior. SIGRAFLEX APX foil offers maximum protection against oxidation and thus ensures greater reliability and longer service lives.

SIGRAFLEX graphite foil is available in various bulk densities, purity levels and dimensions (see Material data table).



Tapes and packings made from SIGRAFLEX® flexible graphite foil

Properties

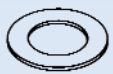
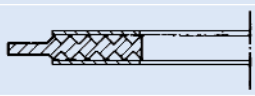
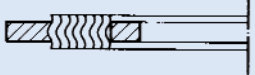

- ▶ Flexible, soft
- ▶ Impermeable to gases and liquids
- ▶ Suitable for a broad range of temperatures from 250°C to approx. 550°C; for applications at more than 450°C, users should request our advice
- ▶ Excellent chemical resistance
- ▶ Asbestos-free, no associated health risks
- ▶ No aging or embrittlement, owing to absence of adhesives or binders
- ▶ Long-term stability of compressibility and recovery
- ▶ No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- ▶ Resistant to radiation
- ▶ High thermal shock resistance
- ▶ High residual stress
- ▶ Easily processable by cutting or punching
- ▶ Can be bonded using commercial adhesives

Approvals

- ▶ Drinking water
- ▶ Foodstuffs
- ▶ KTW
- ▶ BAM

Applications

Semi-finished products for gaskets and packings

Static sealing	Gaskets, exhaust manifold and cylinder head gaskets	
	Graphite top layer for kammprofile gaskets	
	Spiral-wound graphite gaskets	
Dynamic sealing	Stuffing box packings	

Different types of SIGRAFLEX® foils

APX	Outstanding oxidation resistance
D	Automotive quality
C	Industrial quality, ash content ≤ 2%
E	Foil with oxidation inhibitor
Z	Nuclear quality, ash content ≤ 0.15%
CS/ZS	Qualities with self-adhesive backing
ZX	Nuclear quality with corrosion inhibitor
TF	PTFE-coated for stuffing box packings

Material data SIGRAFLEX® FOIL

Foil grade		APX	C	E	D	Z
Standard bulk density	g/cm ³	0.7 - 1.3				
Ash content (DIN 51903)	%	≤ 2.0	≤ 2.0	≤ 1.0	≤ 4.0	≤ 0.15
Total chloride content	ppm	≤ 25	≤ 25	≤ 10	≤ 50	≤ 10
Foil thickness*	mm	0.35 - 1.0				0.15 - 1.0
Roll width*	mm	500 / 1000				
Tape width*	mm	≥ 4				
Roll length*	m	50				

Typical material data of SIGRAFLEX® FOIL grade Z with bulk density of 1.0 g/cm³

Thermal conductivity at 20°C	in plane	W/K·m	180 - 200			
	through plane	W/K·m	4 - 6			
Resistivity at 20°C	in plane	Ω·μm	6 - 8			
	through plane	Ω·μm	650 - 700			
Coefficient of thermal expansion (20 - 1000°C)	in plane	10 ⁻⁶ /K	approx. 1			
	through plane	10 ⁻⁶ /K	approx. 30			
Permeability coefficient for air						
	through plane	cm ² /s	< 5 · 10 ⁻⁵			
Shore hardness (D)			30			
Tensile strength		N/mm ²	≥ 4			
Elongation at break		%	≥ 1			
Max. permissible compressive stress Specimen: 20 mm x 20 mm x thickness						
	0.35 mm	N/mm ²	220			
	0.50 mm	N/mm ²	200			
	1.00 mm	N/mm ²	140			
Residual stress (DIN 52913) σ_D 16 h, 300°C, 50 N/mm ²		N/mm ²	≥ 48			
Coefficient of friction against steel, roughness ≤ 10 μm			0.1			
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

- * Other dimensions on request
- k_0 in mm, factor for gasket assembly stress
- k_1 in mm, factor for gasket stress in service
- K_D in N/mm², max. gasket stress-bearing capacity under assembly conditions

Packaging

The foils are wound onto cardboard cores with an inner diameter of 105 mm. Stable flanges with handles ensure that the wound foil does not come into contact with the floor and is easy to handle. Rolls of this type are supplied in rigid cartons.

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 chemical and petrochemical 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 chemical and petrochemical 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 chemical and petrochemical 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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