

# SIGRAFLEX®

## Flexible graphite foil for industrial sealing [metric]

SIGRAFLEX flexible graphite foil is manufactured from high quality expanded natural graphite free of adhesives and binders. Inhibitors can be added to enhance the performance. Advanced grades like SIGRAFLEX APX2® foil offer maximum protection against oxidation for greater reliability and longer service life.

### Properties

- Soft and flexible, inert and highly impermeable to gases and liquids, fire safe
- Asbestos-free, no associated health risks
- Free of any polymers or organic binders
- No aging or fatigue under dynamic load even at elevated temperatures

- Even in long term services, no noticeable changes in properties
- No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- Electrically conductive, no static charge
- Excellent chemical resistance and high thermal shock capability
- Operating temperatures range from –250 °C up to 550 °C depending on chemical resistance. Life time might be limited at high temperatures. Consult the manufacturer when application temperatures exceed 450 °C. Please refer to our technical guideline regarding thermal stability.
- Easy handling and processability during assembly or punching

### Material data of SIGRAFLEX® Foil<sup>1)</sup>

Typical properties	Units	APX2	APX	E	C	Z
Bulk density	g/cm <sup>3</sup>	Standard 1.0 (capability of 0.7 – 1.3)				
Ash content (DIN 51903)	%	≤ 2.0	≤ 2.0	≤ 1.0	≤ 2.0	≤ 0.15
Carbon content	%	≥ 98	≥ 98	≥ 99	≥ 98	≥ 99.85
Total chloride content	ppm	≤ 25	≤ 25	≤ 10	≤ 25	≤ 10
Total fluoride content	ppm	≤ 10 <sup>2)</sup>	≤ 10	≤ 10	≤ 25	≤ 10
Total halogen content (Cl, F, Br, I)	ppm	≤ 70	≤ 70	≤ 40	≤ 100	≤ 40
Total sulfur content	ppm	< 300	< 300	< 300	< 300	< 10 ... < 300 <sup>3)</sup>
Oxidation rate in air at 670 °C [TGA] <sup>4)</sup>	%/hour	≤ 1	≤ 3	< 4	≤ 5	< 4
Oxidation inhibitor		yes	yes	yes	yes	yes
Passive corrosion inhibitor (ASTM F 2168-13)		yes	yes	yes	yes	yes
Material thickness [supplied as sheets, 1000 x 1000 mm, bulk density 1.0 g/cm <sup>3</sup> under the label SIGRAFLEX BASIS]	mm				1.0/1.5 2.0/3.0	1.0/1.5 2.0/3.0
Material thickness [supplied on rolls]	mm	0.2 – 1	0.35 – 1	0.35 – 1	0.35 – 1	0.15 – 1
Roll width	mm	750/1500	500/1000/1500	500/1000/1500	500/1000/1500	500/1000/1500
Tape width	mm	≥ 4	≥ 4	≥ 4	≥ 4	≥ 4
Standard roll length	m	50	50	50	50	50

<sup>1)</sup> Data are valid for the bigger part of the product range. Other values or dimensions on request.

<sup>2)</sup> On request

<sup>3)</sup> Sulphur < 300 ppm as standard, < 200 ppm for the nuclear industry (low sulphur nuclear grade), but also < 10 ppm on request

<sup>4)</sup> Based on a thickness of ≥ 0.5 mm and a density of ≥ 1.0 g/cm<sup>3</sup>

## Material data of SIGRAFLEX® grade Z with bulk density of 1.0 g/cm<sup>3</sup>

Typical properties		Units	Values
Thermal conductivity at 20 °C	in plane		220
	through plane	Wm <sup>-1</sup> K <sup>-1</sup>	5
Resistivity at 20 °C	in plane		11
	through plane	μΩm	700
Coefficient of thermal expansion (20 – 1000 °C)	in plane		approx. 1
	through plane	10 <sup>-6</sup> K <sup>-1</sup>	approx. 50
Permeability coefficient for air	through plane	cm <sup>2</sup> /s	< 2 x 10 <sup>-5</sup>
Shore hardness (D)			30
Tensile strength		N/mm <sup>2</sup>	≥4
Elongation at break		%	≥1
Compression factors (DIN 28090-2)			
Compressibility	ε <sub>KSW</sub>		45
Recovery at 20 °C	ε <sub>KRW</sub>		5
Hot creep	ε <sub>WSW</sub>		< 3
Recovery at 300 °C	ε <sub>WRW</sub>	%	4
Young's modulus at 20 N/mm <sup>2</sup> (DIN 28090-1)		N/mm <sup>2</sup>	700
ASTM	"m"-factor		2
	"y"-factor	psi	1000
Compressibility (ASTM F36)			45
Recovery (ASTM F36)		%	11
Residual stress (DIN 52913) σ <sub>D16 h, 300 °C, 50 N/mm<sup>2</sup></sub>		N/mm <sup>2</sup>	48
Coefficient of friction against steel, roughness ≤ 10 μm			0.1

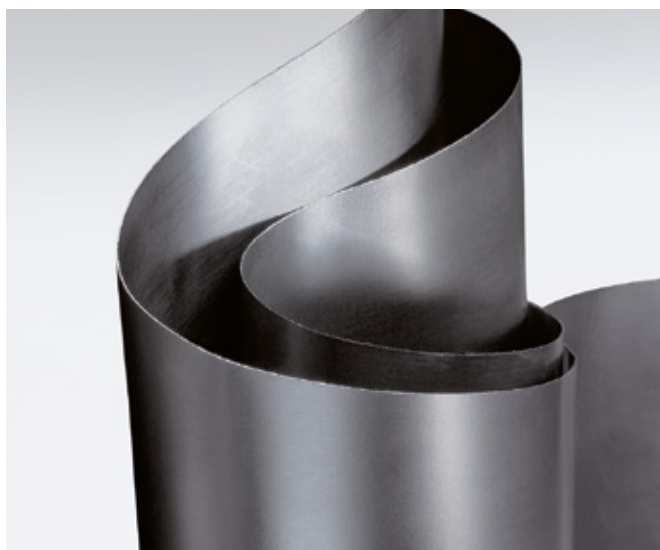
Unless stated otherwise, all values are valid at room temperature, typical, non-binding and subject to change. For engineering or design purposes please contact our technical sales team.

### Applications

- Sheet products such as SIGRAFLEX HOCHDRUCK
- Metallic gaskets such as spiral wound gaskets, corrugated metal gaskets and kammprofile gaskets
- Compression packing for stuffing boxes
- Low sulphur Z grade also for sealing products in nuclear power plants and in other sensitive applications

### Compressive strength of SIGRAFLEX® grade Z with bulk density of 1 g/cm<sup>3</sup> and material width 20 mm (DIN 28090-1)

Material thickness	mm	0.35	0.5	1	1.5	2	3
20 °C (σ <sub>V0</sub> )	N/mm <sup>2</sup>	> 300	300	180	140	120	70
300 °C (σ <sub>B0</sub> )	N/mm <sup>2</sup>	> 300	250	160	120	100	70



### Different types of SIGRAFLEX flexible graphite

**E, C, Z, APX, APX2:** Homogeneous flexible graphite grades

**CS, ZS:** Pressure sensitive adhesive backing

**TF<sup>1)</sup>:** PTFE-coated for stuffing box packing (maximum 300 °C)

**ZX<sup>1)</sup>:** Highly effective corrosion inhibitor (maximum 350 °C)

<sup>1)</sup> See separate technical informations

### Approvals/Test reports

Please see [www.sigraflex.com/downloads](http://www.sigraflex.com/downloads) for details.

- BAM oxygen
- DVGW (DIN 3535-6)
- Proof of drinking water hygiene suitability (former KTW) (HY)
- WRAS
- Evaluation for compliance with food legislation requirements (TÜV Rheinland and Fraunhofer IVV)
- FDA (SGS Institut Fresenius)



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