

# SIGRAFLEX®

## Flexible graphite foil for engine technology applications

SIGRAFLEX flexible graphite foil manufactured from expanded natural graphite is a homogeneous but highly anisotropic material free of adhesives and binders.

SIGRAFLEX is the choice of sealing material to meet low emission standards (EPA). Inhibitors are added in some grades to enhance the oxidation resistance. Advanced materials, like SIGRAFLEX APX2® flexible graphite, offer maximum protection against oxidation and therefore ensure greater reliability and longer service life.

SIGRAFLEX flexible graphite is available in various densities and can be adapted to a wide variety of sealing applications with great versatility.

SIGRAFLEX is suitable for highly automated manufacturing of engine technology gaskets and seals and mass production.

### Properties

- Soft and flexible, easy to adapt to uneven flanges and surfaces
- Micro sealing properties will not degrade over time
- Chemically resistant to oils and coolants and highly impermeable to gases and liquids
- Asbestos-free, no associated health risks, free of any polymers or organic binders
- No aging or fatigue under dynamic load even at elevated temperatures
- High spring back capability
- Excellent thermal conductivity
- No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- Operating temperatures up to 550 °C (1022 °F) when encapsulated (exhaust pipe ring gaskets)



↑ SIGRAFLEX APX2 products for a wide range of engine technology applications

### Applications

- **Cylinder head gaskets** – SIGRAFLEX flexible graphite is used for cylinder head applications. Especially in passenger car maintenance and aftermarket repair, large Diesel engines (construction & mining), in small engines for landscaping and recreational vehicles, flexible graphite can adapt to higher surface roughness and scratches.
- **Exhaust systems – manifold exhaust, exhaust pipe, exhaust gas recirculation, lambda sensor, turbo diesel and natural gas engines** – SIGRAFLEX is used extensively in passenger car exhaust gas recirculation assemblies. Close to the catalytic converter, the most demanding section of the system APX2 graphite excels with its oxidation resistance.
- **Diesel particulate filter/afterburner chambers** – Modern diesel trucks incorporate APX2 die formed rings and flat gaskets to guarantee low emissions and to ease maintenance of such systems.
- **Thermal heat shields** – SIGRAFLEX is used as a heat dissipation and shielding material. Sandwiched between aluminum alloy layers heat shields can reflect heat or absorb to protect polymer based components from heat under the hood.
- **Airbag assemblies** – SIGRAFLEX is used in long life passenger protection applications such as air bag assemblies.

## Common grades of SIGRAFLEX® foil for engine technology applications

A (generic engine technology grade)  
 AP  
 APX, APX2®

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

Typical properties	Units	APX2	APX	AP	A
Thickness for rolls (ASTM F104)	in	0.010 – 0.060	0.014 – 0.039	0.010 – 0.080	0.010 – 0.080
Thickness for rolls (ASTM F104)	mm	0.25 – 1.52	0.35 – 1.0	0.25 – 2.03	0.25 – 2.03
Density (ASTM F1315)	lb/ft <sup>3</sup>	62.4/70.0	62.4	62.4/70.0	62.4/70.0
Density	g/cm <sup>3</sup>	1.0/1.12	1.0	1.0/1.12	1.0/1.12
Area weight for thickness > 0.030" (0.76 mm)	(g/m <sup>2</sup> )	± 5 %	± 5 %	± 5 %	± 5 %
Area weight for thickness < 0.020" (0.51 mm)	(g/m <sup>2</sup> )	± 10 %	± 10 %	± 10 %	± 10 %
Ash content (ASTM C561)	%	≤ 2.0	≤ 2.0	≤ 2.0	≤ 5.0
Carbon content (ASTM D5373)	%	≥ 98.0	≥ 98.0	≥ 98.0	≥ 95.0
Moisture content (ASTM C562)	%	< 0.5	< 0.5	< 0.5	< 0.5
Leachable chloride (ASTM D4327/D5542)	ppm	≤ 25	≤ 25	≤ 50	≤ 50
Total sulfur content (ASTM D4239)	ppm	< 300	< 300	< 300	
Oxidation rate in air at 670 °C or 1238 °F (TGA) <sup>2)</sup>	%/hour	≤ 1	≤ 3	≤ 2	
Oxidation inhibitor		yes	yes	yes	no
Roll width	in/mm	Customized rolls on 3" core	Customized rolls on 105 mm core	Customized rolls on 3" core	Customized rolls on 3" core
Standard roll length	ft/m	up to 4000 ft or 1200 m	up to 650 ft or 200 m	up to 4000 ft or 1200 m	up to 4000 ft or 1200 m

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

<sup>2)</sup> Based on a thickness of ≥ 0.02" and a density of ≥ 62.4 lb/ft<sup>3</sup>

### Specific material data of SIGRAFLEX® grade A, AP and SIGRAFLEX® APX2® [density of 70 lb/ft<sup>3</sup> or 1.12 g/cm<sup>3</sup>]

Typical properties	Units	Values
Tensile strength (ASTM F152)	psi	500
Sealability (DIN 3535)	ml/min	< 1.0
Compressibility (ASTM F36)		40
Recovery (ASTM F36)	%	14
Creep relaxation (ASTM F38)	%	< 4

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.



Additional information on our SIGRAFLEX sealing materials can be found under "Download Center" on our homepage.  
[www.sigraflex.com/downloads](http://www.sigraflex.com/downloads)



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TDS APX2-APX-AP-A-Foil-US.02

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