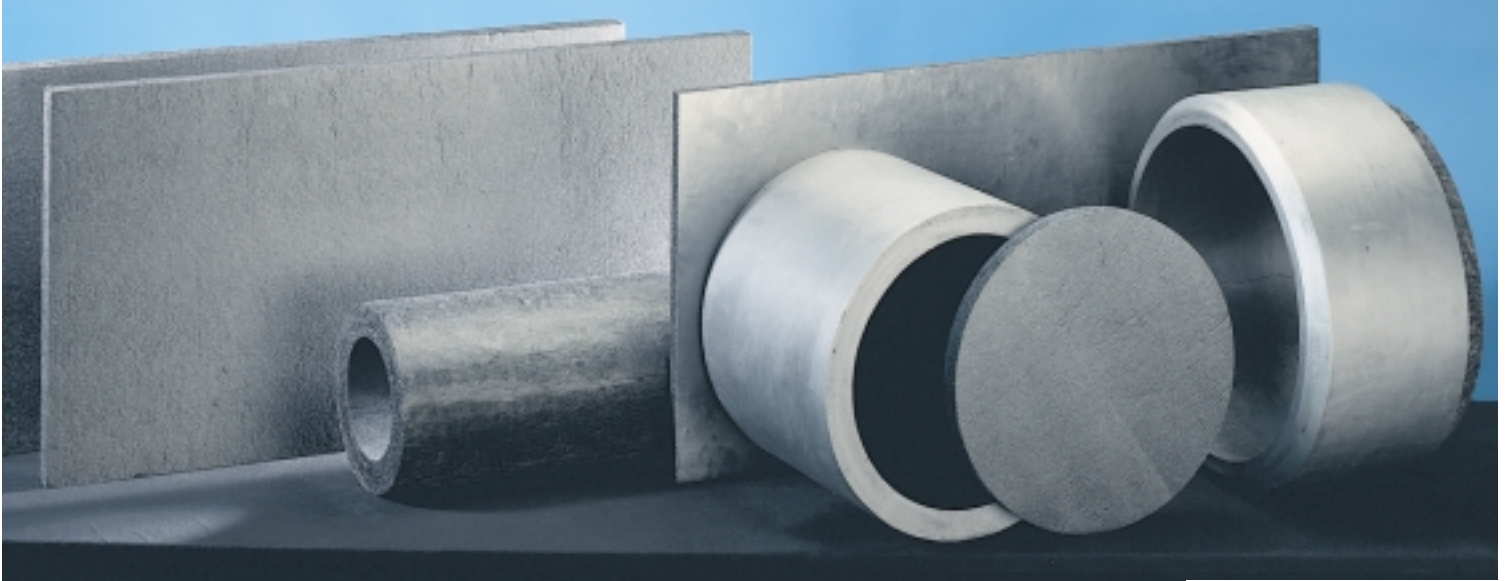


Rigid Graphite Felts

for the Thermal Insulation of High-Temperature Furnaces



SGL CARBON GROUP

Graphite Specialties

SIGRATHERM rigid felt is a shape-retentive insulating material made from graphite fibres and a carbon binder. The properties of the material are governed by the starting fibre, type and amount of binder, degree of densification and thermal treatment. The material is coked and graphitized. SIGRATHERM is suitable for temperatures up to 3000 °C and used in the form of self-supporting sheets, cylinders and other components, mainly in high-temperature furnace construction.

- **Low thermal conductivity**

This property allows high-temperature plants to be designed and built with small wall thicknesses. Furthermore, graphite foil-faced felts ensure heat reflection to the furnace interior and the foil acts as a convection barrier.

- **Low heat capacity**

The low mass of the heat insulating layer – as a result of its low density – allows rapid heating and cooling of the furnace.

- **High thermal stability**

SIGRATHERM rigid felts are stable in oxidizing atmospheres up to 400 °C, in vacuum up to 2500 °C and under inert atmospheres up to 3000 °C.

- **Shape retentivity**

The felt does not undergo compression under normal operating conditions. The bulk density thus remains unchanged throughout the entire insulating layer. The insulating properties are constant and no voids, channels or hot spots occur.

- **Low adsorption of gases or vapours**

Because of their small specific surface area, rigid graphite felts scarcely adsorb any moisture. This makes brief pumping times in vacuum furnaces possible.

- **Erosion resistance**

Thanks to the carbon binder, the rigid felt fibres are so securely anchored, that they do not tear off even at high gas velocities. Felts with a carbon coating, carbon paper covering or graphite foil facing perform even better.

Physical and mechanical properties

The main properties are shown in the table and graphs on the following page. The self-supporting, shape-retentive components such as sheets, hollow cylinders and other shaped articles can be easily machined by such conventional methods as sawing, cutting, drilling or milling.

Material type PR-202-16 is faced on one side with a graphite foil not exceeding 0.5 mm in thickness, which further improves the rigid felt properties as far as erosion resistance, reflection of radiation and gas convection are concerned.

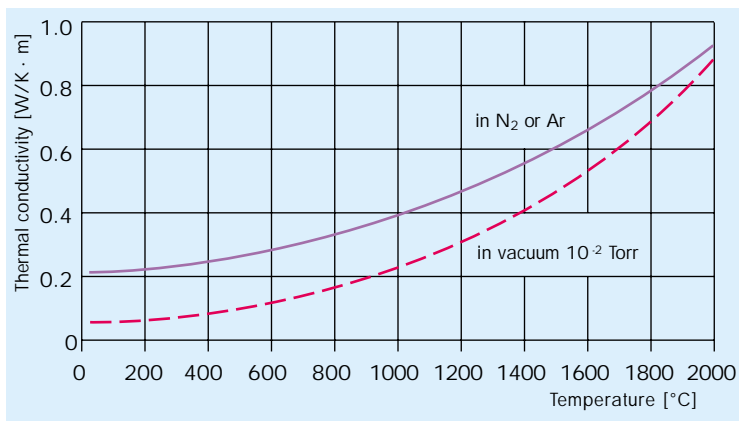
Material data of SIGRATHERM PR-201-16 and PR-202-16

Material type		PR-201-16 without coating/facing	PR-202-16 faced on one side with graphite foil ≤ 0.5 mm
Bulk density	g/cm ³	≤ 0.2	≤ 0.2
Carbon content	%	≥ 99	≥ 99
Ash content	%	≤ 0.1	≤ 0.1
Thermal conductivity at 1200 °C *)	W/(K·m)	0.33	0.33
Specific heat capacity	J/(g·K)	0.7	0.7
Flexural strength II	MPa	0.7	0.7
Flexural strength \perp	MPa	0.9	0.9
Compressive stress at 5% compression	MPa	0.2	0.2
Compressive stress at 50% compression	MPa	0.5	0.5
Maximum service temp.			
in air	°C	400	400
in vacuum	°C	2500	2500
under inert atmosphere	°C	3000	3000
Moisture adsorption meeting DIN 53802	%	0.03	0.03

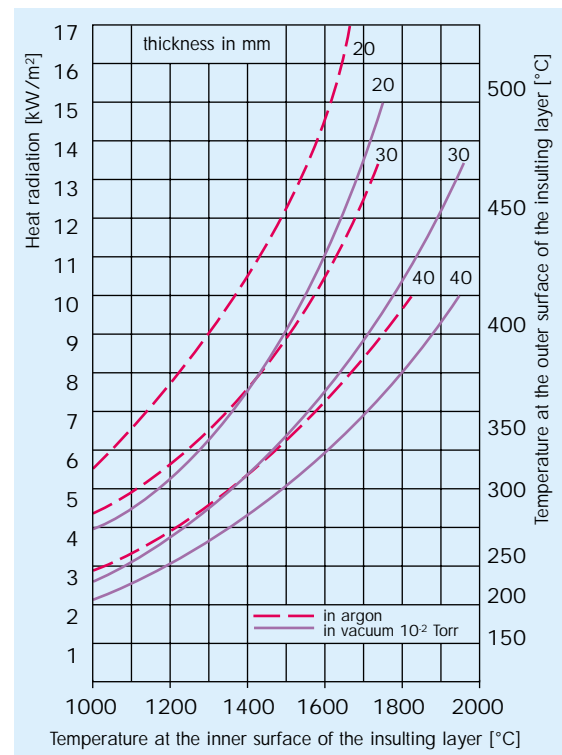
*)measured in a vacuum of 10^{-2} Torr

II parallel to surface \perp perpendicular to surface

Thermal conductivity of SIGRATHERM PR-201-16 and PR-202-16
as a function of temperature, measured in N₂, Ar or in vacuum



Insulating property of SIGRATHERM rigid felt type PR



Applications

- **Insulating material**

Insulating material in high-temperature furnaces operating at temperatures above 1800 °C under inert gas or in vacuum of 10^{-3} to 10^{-5} mbar. Sheets with tongue-and-groove edges can be used to build large-format structures. Damaged components are quickly and easily replaced. Cylinders are often supplied ready-to-use and mostly with a carbon coating. Our SC coating (see separate Technical Information sheet) is suitable for partial surface coverings.

- **Filters**

Filters for aggressive media, such as strong alkaline solutions, hot corrosive gases or metal melts.

- **Catalyst supports**

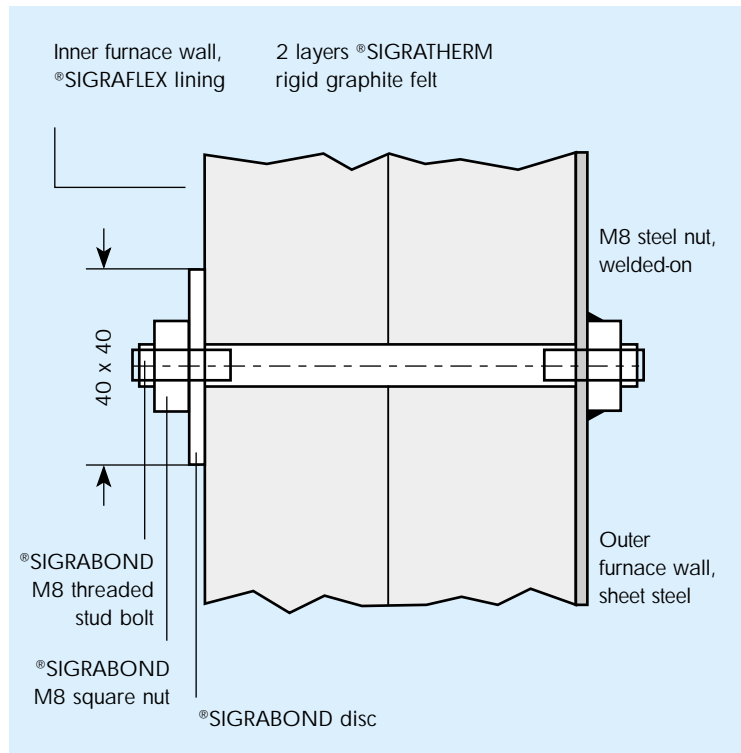
High-grade catalyst materials can be recovered by the simple process of combusting the felt.

- **Porous electrodes**

Porous electrodes for electrochemical processes.

- **Heat shields or insulating claddings**

E.g. for chimneys or incineration plants.



Forms supplied of SIGRATHERM rigid felt

Material type		PR-201-16	PR-202-16
Type of coating/facing		without coating/facing	faced on one side with graphite foil ≤ 0.5 mm
Standard sheets			
Width	mm	500 ± 2	500 ± 2
Length	mm	1000 ± 3	1000 ± 3
Thickness	mm	$20/30/40 \pm 2$	$30/40 \pm 2$
Width	mm	1000 ± 3	1000 ± 3
Length	mm	1500 ± 3	1500 ± 3
Thickness	mm	$30/40 \pm 2$	$30/40/60 \pm 2$
Maximum sheet dimensions			
Width	mm	1200 ± 3	1200 ± 3
Length	mm	1700 ± 3	1700 ± 3
Thickness	mm	300 ± 2	300 ± 2
Other forms			
Discs up to	diam.	mm	1000 ± 3
Hollow cylinders			
up to	diam.	mm	1000 ¹⁾
up to	height	mm	1000 ± 2
Thickness		mm	$30/40 \pm 2$

Data of other dimensions can be given on request.

¹⁾ Standard tolerance for diameters exceeding 500 mm $\pm 1\%$

Tolerances available on special order:

	up to	120 mm	± 2.0 mm
> 120	up to	250 mm	± 2.5 mm
> 250	up to	400 mm	± 3.5 mm
> 400	up to	800 mm	± 5.0 mm



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