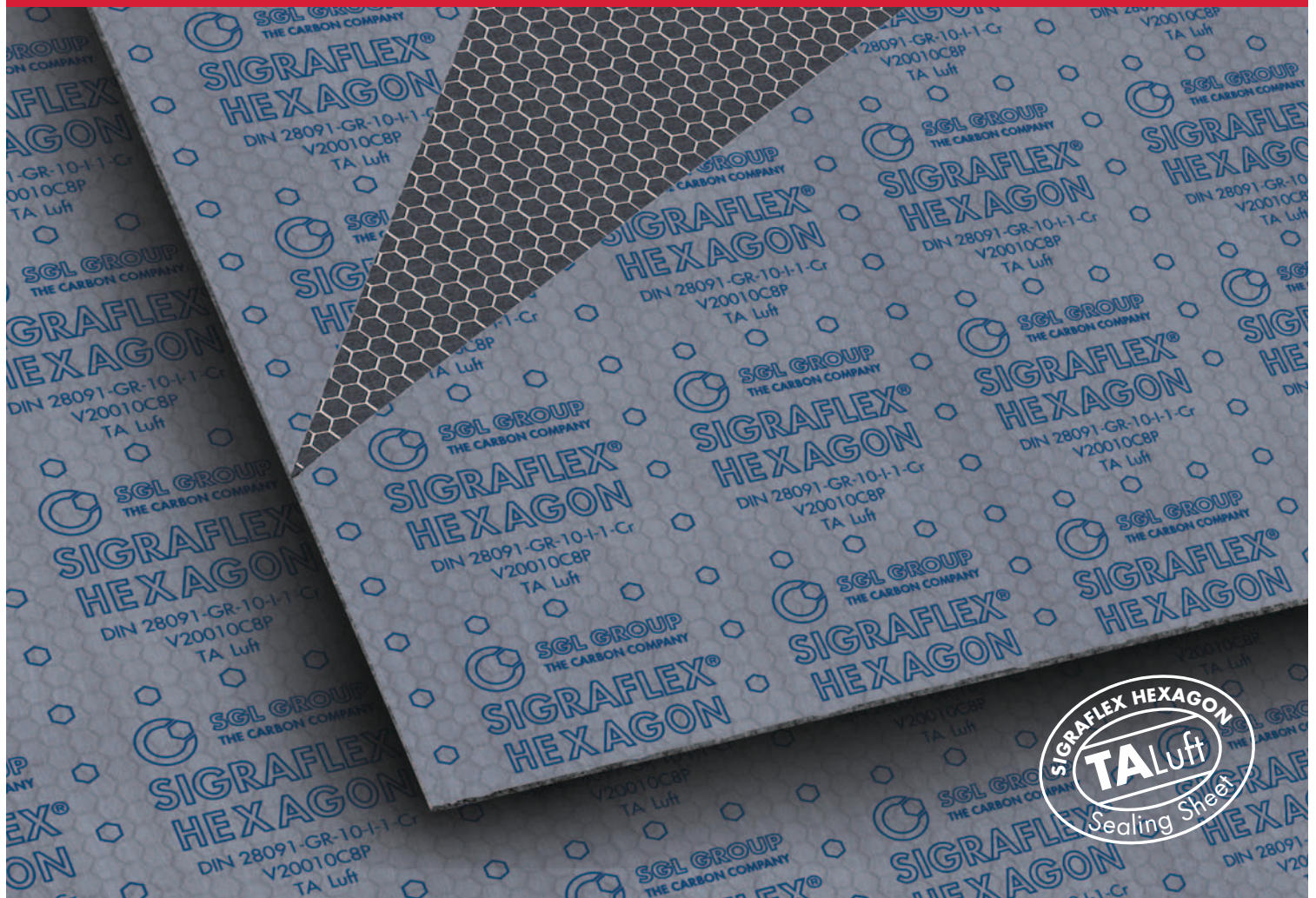


SIGRAFLEX® HEXAGON

Impregnated TA Luft-Compliant Sealing Sheet
Made from Natural Graphite with
Honeycomb Stainless Steel Reinforcement

Expanded Graphite



Broad Base. Best Solutions.



SGL GROUP
THE CARBON COMPANY

SIGRAFLEX® HEXAGON

Our Contribution to Environmental Protection

SIGRAFLEX® HEXAGON

is an adhesive-free graphite sealing sheet made from flexible graphite foil with a single honeycomb 316 (L) stainless steel reinforcement. The layers of graphite and stainless steel are joined together in a patented adhesive-free process. Contrary to conventional stainless steel reinforcements such as smooth, tanged or expanded metal, the innovative honeycomb structure reduces leakage significantly. The constant thickness of the honeycomb reduces the diffusion of the media through the gasket due to the increase in gasket stress around each cell. To further reduce leakage the sealing sheet is impregnated. With SIGRAFLEX HEXAGON the SGL Group offers a sealing sheet which meets the tightened legislative requirements for environmental protection.

Applications

- ▶ For all common pipework and vessel flange designs
- ▶ In particular for applications involving toxic, inflammable, polluting or high-value media
- ▶ 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 under consideration of the chemical resistance; 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 and heating facilities
- ▶ Existing plants



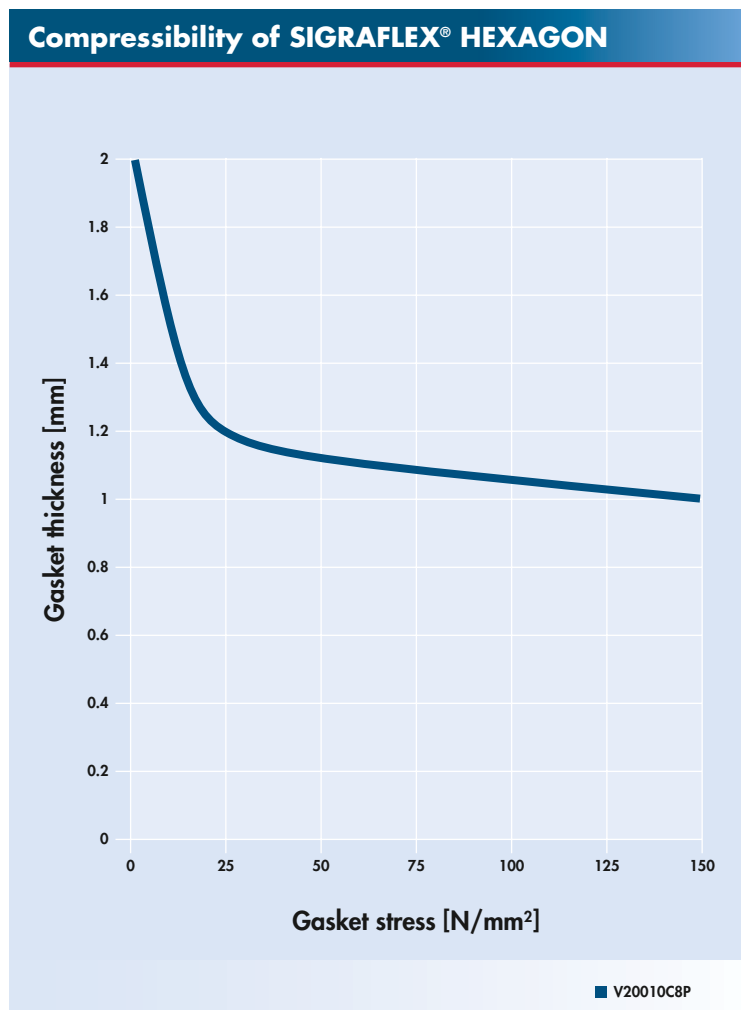
Properties

- ▶ Reduction in fugitive emissions due to very high leak-tightness
- ▶ Complies with the TA Luft leakage requirements
- ▶ Savings in cost of ownership (media loss, downtimes, assembly cost)
- ▶ High blow-out resistance
- ▶ Long-term stability of compressibility and recovery
- ▶ Good chemical resistance
- ▶ Very high fault tolerance during assembly and operation
- ▶ High operational reliability and excellent oxidation resistance
- ▶ No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- ▶ High thermal shock resistance
- ▶ No aging or embrittlement, owing to absence of adhesives or binders
- ▶ Asbestos-free, no associated health risks



Approvals

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



Compressibility of SIGRAFLEX® HEXAGON depending on gasket stress under service conditions



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.

Forms supplied

SIGRAFLEX HEXAGON sheets are available in the following dimension and type designation:

Dimensions in mm

1500 x 1240 x 2.0

Types

V20010C8P

Material data of SIGRAFLEX® HEXAGON

Material type		V20010C8P
Thickness	mm	2.0
Dimensions	m	1.5 x 1.24
Bulk density of graphite	g/cm ³	1.0
Ash content of graphite (DIN 51903)	%	≤ 2.0
Total chloride content	ppm	≤ 25
Reinforcing steel sheet details		Honeycomb stainless steel sheet
ASTM material number		316 (L)
Thickness	mm	0.5
Number of sheets		1
Residual stress (DIN 52913) σ_D 16 h, 300 °C, 50 N/mm ²	N/mm ²	≥ 45
Gasket factors (DIN E 2505/DIN 28090-1)		
Gasket width $b_D = 20$ mm		
at an internal pressure of		
$\sigma_{VU/0.1}/\sigma_{VU/0.01}$ 10 bar	N/mm ²	10/14
16 bar	N/mm ²	10/15
25 bar	N/mm ²	11/16
40 bar	N/mm ²	12/17
m		1.3
σ_{VO}	N/mm ²	160
σ_{BO} at 300 °C	N/mm ²	110
Gasket factors according to DIN EN 13555		see www.gasketdata.org
Compression factors (DIN 28090-2)		
Compressibility ϵ_{KSW}	%	35 – 45
Recovery at 20 °C ϵ_{KRW}	%	3 – 5
Hot creep ϵ_{WSW}	%	< 4
Recovery at 300 °C ϵ_{WRW}	%	4 – 7
Young's modulus at 20 N/mm ² (DIN 28090-1)	N/mm ²	1000
ASTM "m" factor		2.5
"y" factor	psi	2000
Compressibility	%	35 – 45
Recovery	%	15 – 25
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 0.01 (according to DIN 28090-1)	k_1	In mm, factor for gasket stress in service
	Recommended gasket assembly stress: ≥ 20 N/mm ² up to σ_{BO}	K_D	In N/mm ² , max. gasket stress-bearing capacity under assembly conditions
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 ($\sigma_{BU} = p \cdot m$)	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
σ_{VO}	Maximum permissible gasket stress at 20 °C	ϵ_{WSW}	Gasket creep compression under a gasket stress of 50 N/mm ² at 300 °C after 16 h
$\sigma_{BO, 300 °C}$	Maximum permissible gasket stress in service	ϵ_{WRW}	Recovery after reduction in gasket stress from 50 N/mm ² to 1 N/mm ²
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		

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

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.
SIGRAFLEX® HEXAGON V.....C8P	■	s/s** foil with honeycomb pattern, without glue, impregnated	High requirements for sealability (TA Luft*), for pipework and vessels in the petro-/chemical industries and in power stations

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".

Graphite Specialties

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