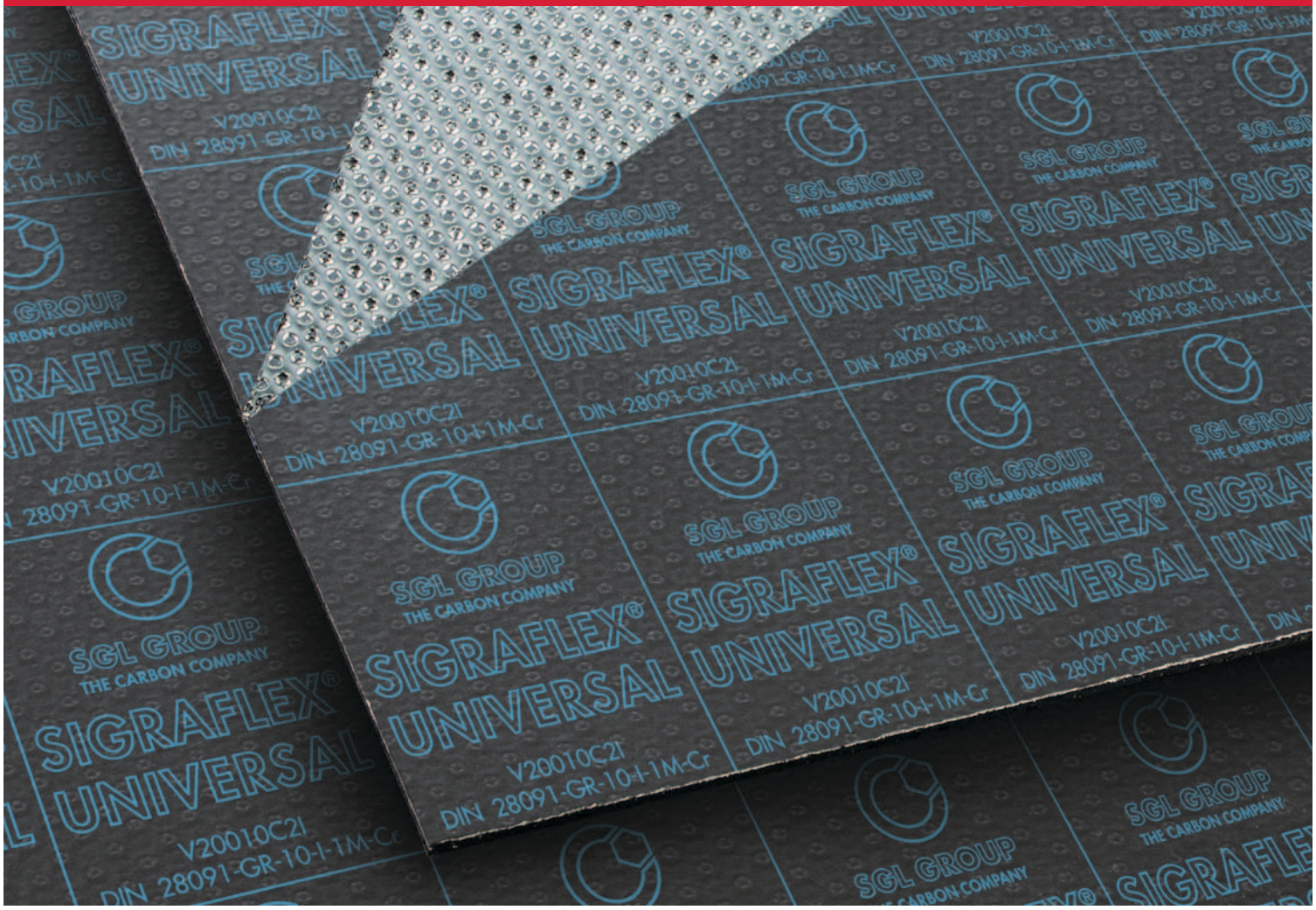
SIGRAFLEX® UNIVERSAL

Impregnated Sealing Sheet in Natural Graphite
with Tanged Stainless Steel Sheet Reinforcement

Expanded Graphite



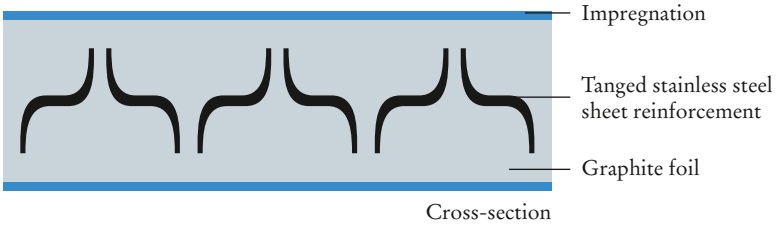
Broad Base. Best Solutions.

SGL GROUP
THE CARBON COMPANY

SIGRAFLEX® UNIVERSAL

High Performance and Safety in Sealing Systems

SIGRAFLEX® UNIVERSAL
is an adhesive-free graphite sealing sheet made from flexible graphite foil with one or two tanged 316 (L) stainless steel sheet reinforcements. The sealing sheet is impregnated to reduce leakage and improve handling.



Cross-section

Applications

- For all common pipework and vessel flange designs
- Recommended for one-piece gaskets up to 1500 mm outside diameter; for diameters over 1500 mm as two-layer structures with segmented sections and staggered joints, for instance
- 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

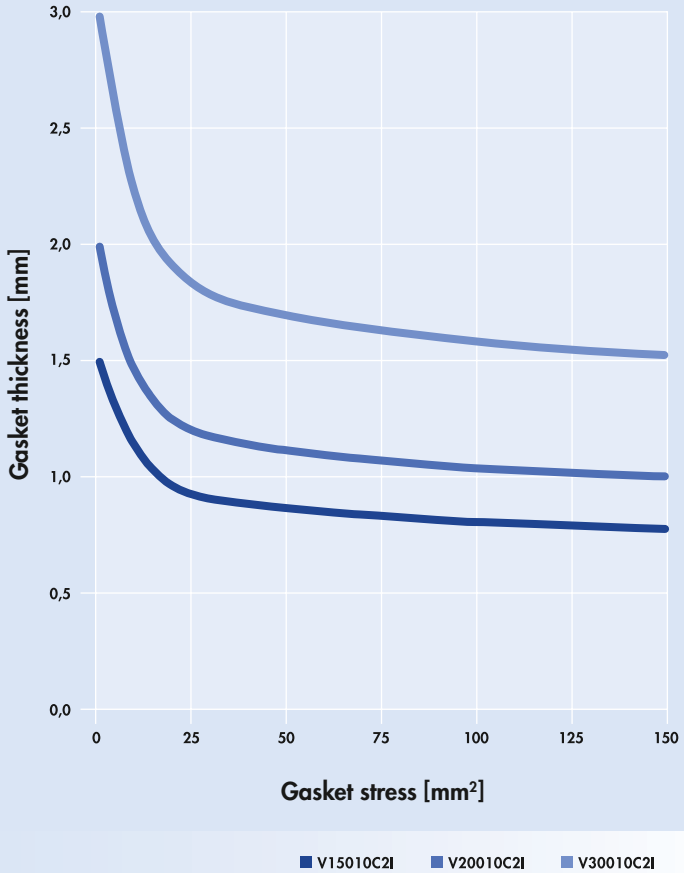
Properties

- High operational reliability and excellent oxidation resistance
- High blow-out resistance and high mechanical strength
- Very high fault tolerance during assembly and operation
- Good chemical resistance
- Long-term stability of compressibility and recovery, even under fluctuating temperatures
- Good scratch resistance; antistick finish due to special impregnation
- No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- No aging or embrittlement, owing to absence of adhesives or binders
- Asbestos-free, no associated health risks

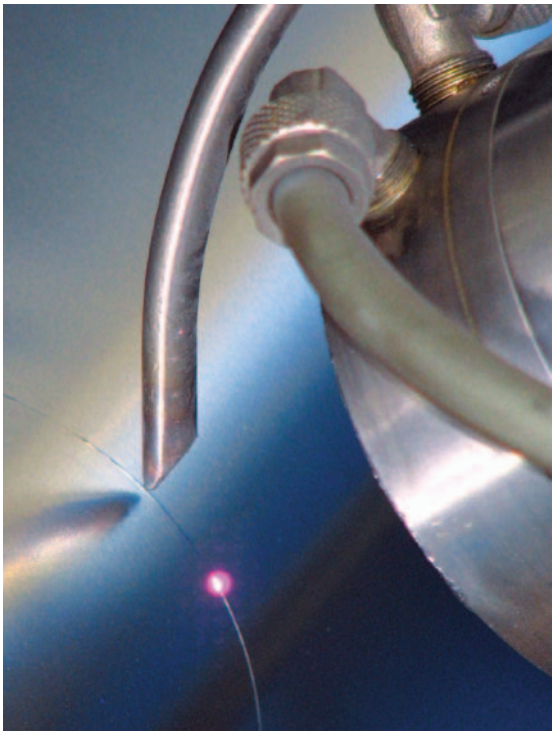
Approvals

- Fire safety according to BS 6755-2
- Blow-out resistance (TÜV at 2.5 times the nominal pressure)
- BAM oxygen
- BAM ethylene oxide/ propylene oxide
- Germanischer Lloyd
- DVGW (DIN 3535-6)
- US Coastguard

Compressibility of SIGRAFLEX® UNIVERSAL



Compressibility of SIGRAFLEX UNIVERSAL depending on gasket thickness and gasket stress under service conditions



Our patented, overlap-free laser welding process allows sheets of up to 1500 mm width without leakage channels

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 centrically 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 UNIVERSAL sheets are available in the following dimensions and type designations:

Dimensions in mm	**Types**
1500 x 1500 x 1.5	V15010C2I
1500 x 1500 x 2.0	V20010C2I
1500 x 1500 x 3.0	V30010C2I

The sheets can also be supplied in dimensions of 1000 x 1000 mm.

Material data of SIGRAFLEX® UNIVERSAL

Material type		V15010C2I	V20010C2I	V30010C2I
Thickness	mm	1.5	2.0	3.0
Dimensions	m	1.5 x 1.5 / 1.0 x 1.0		
Bulk density of graphite	g/cm³	1.0		
Ash content of graphite (DIN 51903)	%	≤ 2.0		
Total chloride content	ppm	≤ 25		
Reinforcing steel sheet details		Tanged stainless steel sheet		
ASTM material number		316 (L)		
Thickness	mm	0.1		
Number of sheets		1	1	2
Residual stress (DIN 52913) $\sigma_{D\ 16\ h,\ 300\,°C,\ 50\ N/mm^2}$	N/mm²	≥ 45		
Gasket factors (DIN E 2505/DIN 28090-1)				
Gasket width b_D = 20 mm				
at an internal pressure of				
$\sigma_{VU/0.1}$ 10 bar	N/mm²	10	12	18
16 bar	N/mm²	14	15	23
25 bar	N/mm²	17	18	30
40 bar	N/mm²	20	22	35
m		1.3	1.3	1.3
σ_{VO}	N/mm²	180	160	140
$\sigma_{BO\ at\ 300\,°C}$	N/mm²	160	140	120
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}	%	4 – 6		
Hot creep ε_{WSW}	%	< 4		
Recovery at 300 °C ε_{WRW}	%	2 – 4	3 – 5	3 – 5
Young's modulus at 20 N/mm² (DIN 28090-1)	N/mm²	850		
ASTM "m" factor		2.5	2.5	2.5
"y" factor	psi	3000	2000	2000
Compressibility ASTM F36	%	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 0.1 (according to DIN 28090-1)
Recommended gasket assembly stress: ≥ 20 N/mm² up to σ_{BO}

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 ($\sigma_{BU} = p \cdot m$)

σ_{VO} Maximum permissible gasket stress at 20 °C

$\sigma_{BO,\ 300\,°C}$ Maximum permissible gasket stress in service

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

k_1 In mm, factor for gasket stress in service

K_D In N/mm², max. gasket stress-bearing capacity under assembly conditions

ε_{KSW} Compression set under a gasket stress of 35 N/mm²

ε_{KRW} Gasket recovery after reduction in gasket stress from 35 N/mm² to 1 N/mm²

ε_{WSW} Gasket creep compression under a gasket stress of 50 N/mm² at 300 °C after 16 h

ε_{WRW} Recovery after reduction in gasket stress from 50 N/mm² to 1 N/mm²

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

01 2011/0 9NÄ Printed in Germany

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