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# SIGRAFLEX® ECONOMY

Sealing sheet made from natural graphite with bonded stainless steel foil reinforcement



SIGRAFLEX ECONOMY is a bonded sealing sheet made from flexible graphite foil with one or two 0.05 mm thick stainless steel foil reinforcements.

## Applications

- For pumps, fittings and valves, especially for thin gaskets
- For unstable flanges with low gasket stresses and for waste gas pipelines, e.g. in incineration plants
- For raised-face flanges meeting DIN EN 1514 and DIN 2690
- For operating pressures from vacuum up to 40 bar
- For corrosive media
- Operating temperatures range from  $-250^{\circ}\text{C}$  up to  $450^{\circ}\text{C}$  depending on chemical resistance, and possibly to  $550^{\circ}\text{C}$  after consulting the manufacturer. Life time might be limited by actual equipment temperatures and operating conditions. Please refer to our technical guidelines regarding thermal stability.



† Cross-section

## Properties

- Excellent oxidation resistance
- Soft, highly adaptable
- Good chemical resistance
- Long-term stability of compressibility and recovery, even under fluctuating temperatures
- No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- No aging or embrittlement of the graphite layers
- Thin adhesive film of less than 10  $\mu\text{m}$  with low chloride content
- Ease of processing
- Asbestos-free (no associated health risks)

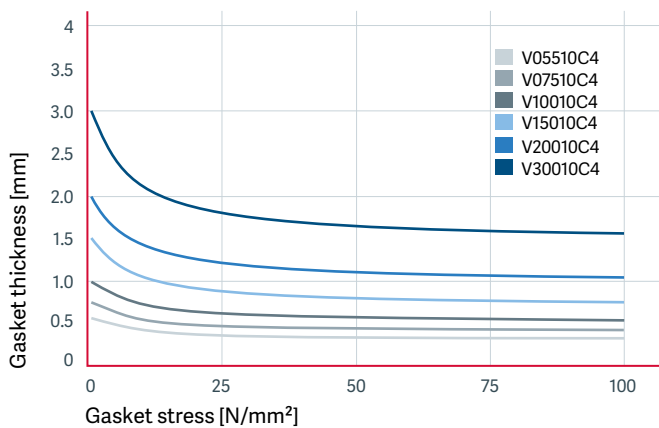


↑ SIGRAFLEX ECONOMY sealing sheets and gaskets



↑ Gaskets made from SIGRAFLEX ECONOMY

## Compressibility of SIGRAFLEX ECONOMY



## Approvals/Test reports

- BAM oxygen
- DVGW (DIN 3535-6)
- RST test report about the burning behaviour of automotive interior

## Assembly instructions

Our detailed assembly instructions are available on request.

**Material data of SIGRAFLEX® ECONOMY**

Typical properties	Units	SIGRAFLEX					
		V05510C4	V07510C4	V10010C4	V15010C4	V20010C4	V30010C4
Thickness	mm	0.55	0.75	1.0	1.5	2.0	3.0
Dimensions	m	1.0 x 1.0	1.0 x 1.0	1.0 x 1.0	1.0 x 1.0	1.0 x 1.0	1.0 x 1.0
up to 1 mm thickness also supplied on rolls							
Bulk density of graphite	g/cm <sup>3</sup>	1.0	1.0	1.0	1.0	1.0	1.0
Ash content of graphite (DIN 51903)	%	≤ 2.0	≤ 2.0	≤ 2.0	≤ 2.0	≤ 2.0	≤ 2.0
Purity	%	≥ 98	≥ 98	≥ 98	≥ 98	≥ 98	≥ 98
Total chloride content	ppm	≤ 25	≤ 25	≤ 25	≤ 25	≤ 25	≤ 25
Total halogen content	ppm	≤ 100	≤ 100	≤ 100	≤ 100	≤ 100	≤ 100
Total sulphur content	ppm	< 300	< 300	< 300	< 300	< 300	< 300
Oxidation rate in air at 670 °C (TGA)	%/h	< 4	< 4	< 4	< 4	< 4	< 4
Oxidation inhibitor		yes	yes	yes	yes	yes	yes
Passive corrosion inhibitor (ASTM F 2168-13)		yes	yes	yes	yes	yes	yes
Reinforcing steel sheet details		Smooth stainless steel foil					
ASTM material number		316 (L)	316 (L)	316 (L)	316 (L)	316 (L)	316 (L)
Thickness	mm	0.05	0.05	0.05	0.05	0.05	0.05
Number of sheets		1	1	1	1	1	2
Residual stress (DIN 52913)	$\sigma_{D 16 h, 300 °C, 50 N/mm^2}$ N/mm <sup>2</sup>	≥ 45	≥ 45	≥ 45	≥ 45	≥ 45	≥ 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/mm <sup>2</sup>	10	10	10	10	18
	16 bar	N/mm <sup>2</sup>	10	10	10	12	26
	25 bar	N/mm <sup>2</sup>	10	10	13	17	34
	40 bar	N/mm <sup>2</sup>	11	15	20	27	46
$m$			1.3	1.3	1.3	1.3	1.3
$\sigma_{VO}$		N/mm <sup>2</sup>	220	200	180	160	100
$\sigma_{BO}$ at 300 °C		N/mm <sup>2</sup>	200	180	160	140	80
Gasket factors according to DIN EN 13555					see <a href="http://www.gasketdata.org">www.gasketdata.org</a>		
Compression factors (DIN 28090-2)							
Compressibility	$\epsilon_{KSW}$	%	40	40	40	40	40
Recovery at 20 °C	$\epsilon_{KRW}$	%	4	4	4	4	4
Hot creep	$\epsilon_{WSW}$	%	< 5	< 5	< 5	< 5	< 5
Recovery at 300 °C	$\epsilon_{WRW}$	%	3	3	3	3	3
Young's modulus at 20 N/mm <sup>2</sup> (DIN 28090-1)		N/mm <sup>2</sup>	750	750	750	750	750
ASTM	„m“-factor		2.0	2.0	2.0	2.0	2.0
	„y“-factor	psi	1500	1500	1500	1500	1500
Compressibility (ASTM F36)		%	40	40	40	40	40
Recovery (ASTM F36)		%	12	12	12	12	12
The gasket factor conversion formulas as per AD Merkblatt B7 are as follows					$k_0 \times K_D = \sigma_{VU} \times b_D$ $k_1 = m \times b_D$		

**Definitions**

$\sigma_{VU/0.1}$	Minimum gasket assembly stress needed to comply with leakage class L 0.1 (according to DIN 28090-1)	$k_0$	in mm, factor for gasket assembly stress
	Recommended gasket assembly stress: $\geq 20$ N/mm <sup>2</sup> up to $\sigma_{BO}$	$k_1$	in mm, factor for gasket stress in service
$\sigma_{BU}$	Minimum gasket assembly stress in service, where $\sigma_{BU}$ is the product of internal pressure $p_i$ and gasket factor $m$ for test and in service ( $\sigma_{BU} = p_i \times m$ )	$K_D$	in N/mm <sup>2</sup> , max. gasket stress-bearing capacity under assembly conditions
$\sigma_{VO}$	Maximum permissible gasket stress at 20 °C	$\epsilon_{KSW}$	Compression set under a gasket stress of 35 N/mm <sup>2</sup>
$\sigma_{BO}$ at 300 °C	Maximum permissible gasket stress in service	$\epsilon_{KRW}$	Gasket recovery after reduction in gasket stress from 35 N/mm <sup>2</sup> to 1 N/mm <sup>2</sup>
$m$	$m = \sigma_{BU} / p_i$	$\epsilon_{WSW}$	Gasket creep compression under a gasket stress of 50 N/mm <sup>2</sup> at 300 °C after 16 h
„m“-factor	Similar to $m$ , but defined acc. to ASTM, hence different value	$\epsilon_{WRW}$	Recovery after reduction in gasket stress from 50 N/mm <sup>2</sup> to 1 N/mm <sup>2</sup>
„y“-factor	Minimum gasket stress in psi		

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

## Product overview

Products	Characteristics	Recommended applications
SIGRAFLEX FOIL F.../C/E/Z/APX/APX2	Flexible, continuous	-250 °C to approx. 550 °C, for die-formed packing rings, 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 stainless steel foil	Pumps, fittings, gas supply and waste gas pipelines
SIGRAFLEX UNIVERSAL V...C2I	Reinforced with tanged stainless steel, impregnated	Pipework and vessels in the chemical and petrochemical industries and in power generation plants
SIGRAFLEX UNIVERSAL PRO V...C2I-P	Reinforced with tanged stainless steel, impregnated	TA Luft applications, for pipework and vessels in the chemical and petrochemical industries and in power generation plants
SIGRAFLEX SELECT V16010C3I	Reinforced with stainless steel foil, adhesive-free, impregnated	TA Luft applications, raised-face flanges, pipework in the chemical and petrochemical industries
SIGRAFLEX HOCHDRUCK V...Z3I	Multilayer material, reinforced with stainless steel foil, adhesive-free, impregnated	Universal sealing sheet, also for solving sealing problems in pipework, process equipment, tongue-and-groove flanges and non-standard joints in the chemical, petrochemical and nuclear industries and in power generation plants
SIGRAFLEX HOCHDRUCK PRO V...Z3I-P	Multilayer material, reinforced with stainless steel foil, adhesive-free, 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 chemical, petrochemical and nuclear industries and in power generation plants
SIGRAFLEX APX2 HOCHDRUCK V...W3	Multilayer material, reinforced with stainless steel foil, adhesive-free	Universal sealing sheet, also for solving sealing problems in high temperature applications in pipework, process equipment, tongue-and-groove flanges and non-standard joints in the chemical and petrochemical industries and in power generation plants
SIGRAFLEX MF V...MF	Adhesive-free laminate made of graphite, stainless steel and PTFE	Maximum requirements for sealability (TA Luft), safety and process hygiene; sealed joints in the chemical, petrochemical, pharmaceutical and food industries
SIGRAFLEX EMAIL V...Z3E	Reinforced with stainless steel foil, adhesive-free	PTFE-envelope gaskets for enameled pipework, vessels and stub connections, etc.



**Additional information** on our SIGRAFLEX sealing materials can be found under "Download Center" on our homepage.

[www.sglgroup.com/sigraflex-downloads](http://www.sglgroup.com/sigraflex-downloads)

TDS ECONOMY\_Sheet.00

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