

# SIGRAFLEX® UNIVERSAL PRO

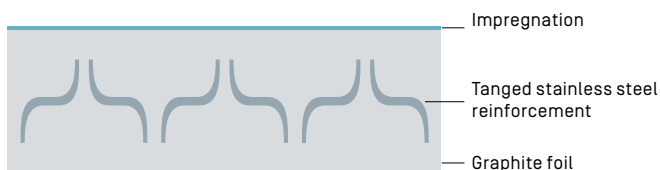
Impregnated SIGRAFLEX flexible graphite foil reinforced with tanged stainless steel



SIGRAFLEX UNIVERSAL PRO is an adhesive-free gasket sheet made of SIGRAFLEX flexible graphite foils with one or two tanged stainless steel reinforcements. The sheet is antistick impregnated to reduce leakage and improve handling.

## Applications

- For all common pipework and vessel flange designs
- For one-piece gasket designs up to an outside diameter of 1500 mm; for diameters above 1500 mm, for example two-layer structures with segmented sections and staggered joints are recommended
- For operating pressures from vacuum up to 100 bar
- For corrosive media
- Operating temperatures range from  $-269^{\circ}\text{C}$  up to  $550^{\circ}\text{C}$  depending on chemical resistance. Life time might be limited at high temperatures. Consult the manufacturer when application temperatures exceed  $450^{\circ}\text{C}$ . Please refer to our technical guideline regarding thermal stability.
- Gaskets for the chemical, petrochemical and refinery industries
- Steam pipework in power generation plants and heating equipment
- Existing plants



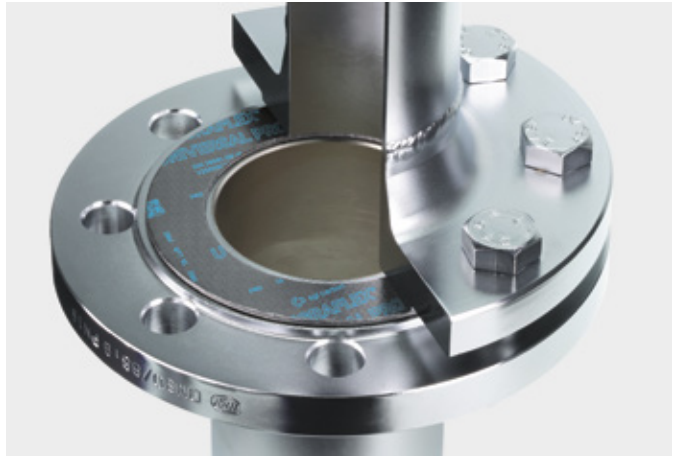
↑ Cross-section

## Properties

- Reduction in fugitive emissions due to high leak-tightness
- Complies with the TA Luft leakage requirements for all sheet thicknesses
- High blow-out resistance and mechanical strength
- Long-term stability of compressibility and recovery
- Good chemical resistance
- High fault tolerance during assembly and operation
- High operational reliability, increased plant availability
- Excellent oxidation resistance
- Good scratch resistance and antistick properties due to special impregnation
- No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- High thermal shock resistance
- No aging or embrittlement (no adhesives or binders)
- Asbestos-free (no associated health risks)

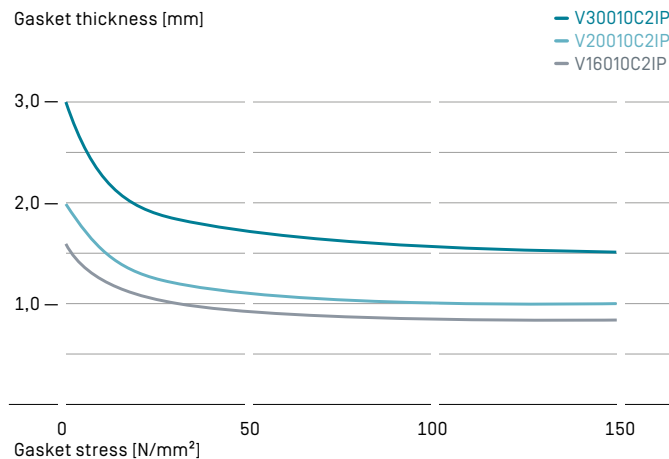


↑ Gaskets made from SIGRAFLEX UNIVERSAL PRO



↑ Flange with SIGRAFLEX UNIVERSAL PRO gasket

## Compressibility of SIGRAFLEX UNIVERSAL PRO



## Approvals/Test reports

Please see [www.sigraflex.com/downloads](http://www.sigraflex.com/downloads) for details

- TA Luft (VDI 2440/VDI 2200) for all thicknesses
- Fire safe according to API 607 and API 6FB
- Blow-out safety HOBt (ASTM WK26064)
- BAM oxygen
- DVGW (DIN 3535-6)

## Assembly instructions

Our detailed assembly instructions are available on request.

## Material data of SIGRAFLEX® UNIVERSAL PRO

Typical properties		Units	V16010C2IP	V20010C2IP	V30010C2IP	
Thickness		mm	1.6	2.0	3.0	
Dimensions		m	1.5 x 1.5 1.0 x 1.0	1.5 x 1.5 1.0 x 1.0	1.5 x 1.5 1.0 x 1.0	
Bulk density of graphite		g/cm <sup>3</sup>	1.0	1.0	1.0	
Ash content of graphite (DIN 51903)		%	≤ 2.0	≤ 2.0	≤ 2.0	
Purity		%	≥ 98	≥ 98	≥ 98	
Total chloride content		ppm	≤ 25	≤ 25	≤ 25	
Total halogen content (Cl, F, B, I)		ppm	≤ 70	≤ 70	≤ 70	
Total sulphur content		ppm	< 300	< 300	< 300	
Oxidation rate in air at 670 °C (TGA)		%/h	< 4	< 4	< 4	
Oxidation inhibitor			yes	yes	yes	
Passive corrosion inhibitor (ASTM F 2168-13)			yes	yes	yes	
Reinforcing steel sheet details			Tanged stainless steel sheet			
	ASTM material number		316L	316L	316L	
	Thickness	mm	0.1	0.1	0.1	
	Number of sheets		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	
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	12
		16 bar	N/mm <sup>2</sup>	12	12	14
		25 bar	N/mm <sup>2</sup>	15	15	17
		40 bar	N/mm <sup>2</sup>	17	17	19
	m			1.3	1.3	1.3
	$\sigma_{V0}$		N/mm <sup>2</sup>	180	160	140
	$\sigma_{B0 at 300 °C}$		N/mm <sup>2</sup>	160	140	120
Gasket factors (DIN EN 13555)			see <a href="http://www.esadata.org">www.esadata.org</a> or <a href="http://www.gasketdata.org">www.gasketdata.org</a>			
Compression factors (DIN 28090-2)						
Compressibility	$\epsilon_{KSW}$	%	40	40	40	
Recovery at 20 °C	$\epsilon_{KRW}$	%	5	5	5	
Hot creep	$\epsilon_{WSW}$	%	< 5	< 5	< 5	
Recovery at 300 °C	$\epsilon_{WRW}$	%	5	5	5	
E-Modul at 20 N/mm <sup>2</sup> (DIN 28090-1)		N/mm <sup>2</sup>	900	900	900	
ASTM	„m“-factor		2.5	2.5	2.5	
	„y“-factor	psi	2000	2000	2000	
Compressibility (ASTM F36)		%	42	42	42	
Recovery (ASTM F36)		%	14	14	14	
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) Recommended gasket assembly stress: $\geq 20$ N/mm <sup>2</sup> up to $\sigma_{B0}$	$\epsilon_{KSW}$	Compression set under a gasket stress of 35 N/mm <sup>2</sup>
$\sigma_{BU}$	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 ( $\sigma_{BU} = p_i \times m$ )	$\epsilon_{KRW}$	Gasket recovery after reduction in gasket stress from 35 N/mm <sup>2</sup> to 1 N/mm <sup>2</sup>
$\sigma_{V0}$	Maximum permissible gasket stress at 20 °C	$\epsilon_{WSW}$	Gasket creep compression under a gasket stress of 50 N/mm <sup>2</sup> at 300 °C after 16 h
$\sigma_{B0 at 300 °C}$	Maximum permissible gasket stress in service	$\epsilon_{WRW}$	Recovery after reduction in gasket stress from 50 N/mm <sup>2</sup> to 1 N/mm <sup>2</sup>
$m$	$m = \sigma_{BU} / p_i$		
„m“-factor	Similar to $m$ , but defined acc. to ASTM, hence different value		The percentage changes in thickness of $\epsilon_{KSW}$ , $\epsilon_{KRW}$ , $\epsilon_{WSW}$ und $\epsilon_{WRW}$ are relative to the initial thickness.
„y“-factor	Minimum gasket stress in psi		
$k_0$	in mm, factor for gasket assembly stress		Unless stated otherwise, all values are valid at room temperature, typical, non-binding and subject to change. Please note some values correspond to the graphite foil only. For engineering or design purposes please contact our technical sales team.
$k_1$	in mm, factor for gasket stress in service		
$K_D$	in N/mm <sup>2</sup> , max. gasket stress-bearing capacity under assembly conditions		

## Product overview

Products	Characteristics	Recommended applications
SIGRAFLEX FOIL F.../C/E/Z/APX/APX2®	Flexible, soft, continuous	- 250 °C to approx. 550 °C, for die-formed packing rings, filler material for spiral wound gaskets, facing material for kammprofile and corrugated 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...C2IP	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...Z3IP	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.sigraflex.com/downloads](http://www.sigraflex.com/downloads)



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