

SIGRAFLEX® APX2® HOCHDRUCK

Multilayer high-strength gasket sheet made of SIGRAFLEX flexible graphite foil reinforced with flat stainless steel for high-temperature applications



SIGRAFLEX APX2 HOCHDRUCK is a multilayer high-strength gasket sheet – designed for high-temperature applications. It is comprised of 0.5 mm thick layers of highly oxidation resistant SIGRAFLEX APX2 flexible graphite foils and 0.05 mm thick layers of stainless steel foils.

The sheet is manufactured with our proven SIGRAFLEX HOCHDRUCK technology. SIGRAFLEX APX2 HOCHDRUCK was developed for end users in the process industry to cover a broad range of demanding gasket requirements with a reliable and safe product. SIGRAFLEX APX2 HOCHDRUCK is specifically designed for high temperature flat gasket applications.



Applications

- Operating temperatures range from -269°C up to 580°C depending on chemical resistance. Life time might be limited at high temperatures. Consult the manufacturer when application temperatures exceed 480°C . Please refer to our technical guideline regarding thermal stability.
- All common pipework and vessel flange designs as well as difficult and highly stressed sealed joints.
- 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 250 bar
- For corrosive media
- Steam pipework and boilers in power generation plants
- Heat transfer oils and heating equipment
- Inspection glasses, pumps, fittings and valves
- Nuclear power generation plants
- Pulp and paper mills
- Existing plants

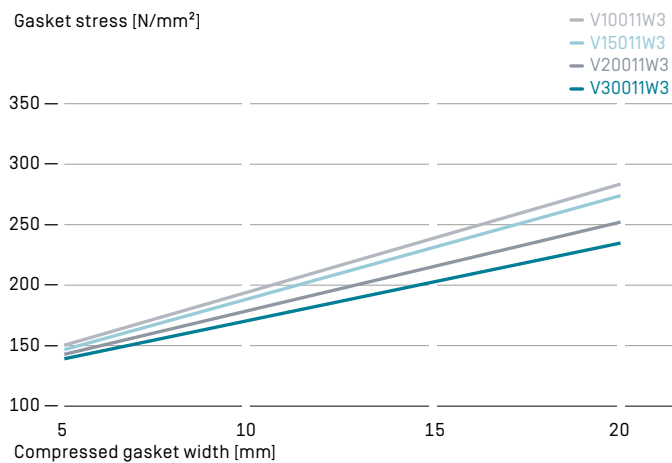
Properties

SIGRAFLEX APX2 HOCHDRUCK combines the outstanding characteristics of both SIGRAFLEX APX2 graphite foil and reinforced sheets manufactured with SIGRAFLEX HOCHDRUCK technology:

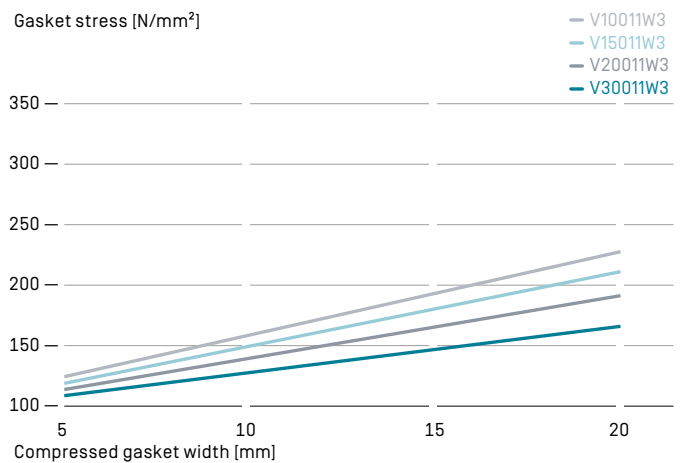
- Increased gasket life and improved operational safety due to very high oxidation resistance
- Reliable product characteristics for high plant security and availability
- Outstanding maximum permissible gasket stress

- Very high blow-out resistance and mechanical strength
- Very adaptable sealing material during gasket assembly
- Good chemical resistance
- Long-term stability of assembly load and gasket stress
- No measurable cold or warm flow characteristics up to the maximum permissible gasket stress
- No aging or embrittlement (no adhesives or binders)
- Very easy to cut into required sealing shapes, even with conventional cutting equipment/tools
- Asbestos-free (no associated health risks)

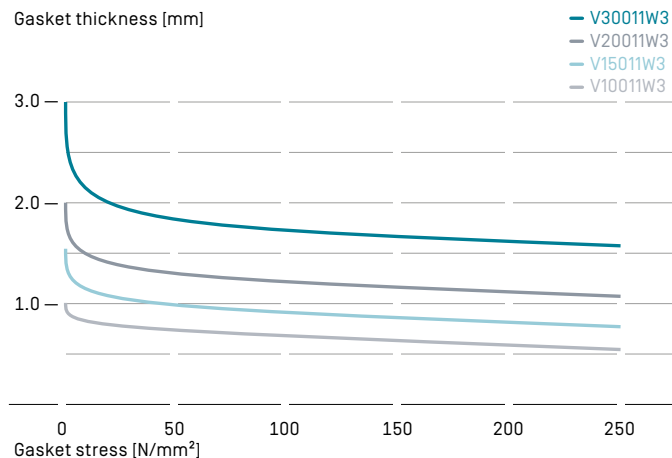
Typical maximum permissible gasket stress of SIGRAFLEX APX2 HOCHDRUCK at 20 °C



Typical maximum permissible gasket stress of SIGRAFLEX APX2 HOCHDRUCK at 300 °C



Compressibility of SIGRAFLEX APX2 HOCHDRUCK



Approvals/Test reports

Please see www.sigraflex.com/downloads for details

- Fire safe according to API 607
- 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® APX2® HOCHDRUCK

Typical properties		Units	V1001W3	V1501W3	V2001W3	V3001W3
Thickness		mm	1.0	1.5	2.0	3.0
Dimensions		m	1.5 x 1.5	1.5 x 1.5	1.5 x 1.5	1.5 x 1.5
Bulk density of graphite		g/cm ³	1.1	1.1	1.1	1.1
Ash content of graphite [DIN 51903]		%	≤ 2.0	≤ 2.0	≤ 2.0	≤ 2.0
Purity		%	≥ 98	≥ 98	≥ 98	≥ 98
Total chloride content		ppm	≤ 25	≤ 25	≤ 25	≤ 25
Total halogen content (Cl, F, B, I)		ppm	≤ 70	≤ 70	≤ 70	≤ 70
Total sulphur content		ppm	< 300	< 300	< 300	< 300
Oxidation rate in air at 670 °C (TGA)		%/h	≤ 1	≤ 1	≤ 1	≤ 1
Oxidation inhibitor			yes	yes	yes	yes
Passive corrosion inhibitor [ASTM F 2168-13]			yes	yes	yes	yes
Reinforcing steel sheet details			Smooth stainless steel foil			
	ASTM material number		316L	316L	316L	316L
	Thickness	mm	0.05	0.05	0.05	0.05
	Number of sheets		1	2	3	5
Residual stress [DIN 52913]	$\sigma_{D 16 h, 300 °C, 50 N/mm^2}$	N/mm ²	≥ 45	≥ 45	≥ 45	≥ 45
Gasket factors [DIN E 2505 / DIN 28090-1]						
Gasket width $b_D = 20 \text{ mm}$						
	σ_{VU}	N/mm ²	20	20	20	20
	m		1.3	1.3	1.3	1.3
	σ_{V0}	N/mm ²	280	270	250	230
	$\sigma_{B0 \text{ at } 300 °C}$	N/mm ²	230	210	190	170
Gasket factors [DIN EN 13555]			see www.esadata.org or www.gasketdata.org			
Compression factors [DIN 28090-2]						
Compressibility	ϵ_{KSW}	%	35	35	35	35
Recovery at 20 °C	ϵ_{KRW}	%	5	5	5	5
Hot creep	ϵ_{WSW}	%	< 3	< 3	< 3	< 3
Recovery at 300 °C	ϵ_{WRW}	%	4	4	4	4
Young's modulus at 20 N/mm ² [DIN 28090-1]		N/mm ²	750	750	750	750
ASTM	„m“-factor		2.5	2.5	2.5	2.5
	„y“-factor	psi	3000	3000	3000	3000
Compressibility [ASTM F36]		%	37	37	37	37
Recovery [ASTM F36]		%	17	17	17	17
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						
σ_{VU}	Minimum gasket assembly stress. Recommended gasket assembly stress: $\geq 20 \text{ N/mm}^2$ up to σ_{B0}		ϵ_{KSW}	Compression set under a gasket stress of 35 N/mm^2		
σ_{BU}	Minimum gasket assembly stress in service, where σ_{BU} is the product of internal pressure p_i and gasket factor m for test and in service ($\sigma_{BU} = p_i \times m$)		ϵ_{KRW}	Gasket recovery after reduction in gasket stress from 35 N/mm^2 to 1 N/mm^2		
σ_{V0}	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		
$\sigma_{B0 \text{ at } 300 °C}$	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	$m = \sigma_{BU} / p_i$					
„m“-factor	Similar to m , but defined acc. to ASTM, hence different value		The percentage changes in thickness of ϵ_{KSW} , ϵ_{KRW} , ϵ_{WSW} und ϵ_{WRW} are relative to the initial thickness.			
„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/mm ² , max. gasket stress-bearing capacity under assembly conditions		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.			

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



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