FLAT GASKETS MADE FROM GRAPHITE, FIBRE, PTFE, ELASTOMER

Soft-material gaskets are universal sealing elements with a large range of application in all branches of industry. They can be used within a temperature range of - 200 °C up to a maximum of + 550 °C. A suitable material should be selected depending on the medium, medium concentration, temperature and type of flange being used.

We produce flat gaskets in all commonly-used soft materials. See also the section **"Materials commonly used"**. As a general rule, thin gaskets are preferred to thicker ones.

The usual thickness of gaskets is 1; 1.5; 2 and 3 mm. PTFE gaskets should be used in the thinnest size possible due to cold flow.

The surface finish and evenness of the flange should determine the gasket thickness to be used. The better the flange surface, the thinner the gasket can be. Soft-material gaskets require only low seating surface pressure av, but can be more easily overloaded than metal gaskets or metal/soft-material gaskets, especially at narrower gasket widths.

In order to avoid collapse, the sealing surface pressure must be between σ_V and σ_ϑ and the following width/height relationships must be complied with:

Width / height relationships:

Material	$b_G/h_G >$
Graphite with reinforcement	8
Graphite without reinforcement	12
Fibre sheet	10
PTFE	20

If smaller relationships arise due to design considerations, the gaskets must be encased, e.g. using tongue and groove or male/female face flanges. When calculating the assembly bolt load, the reduced stability due to the reduction of the σ_V value must be taken into consideration. The σ_ϑ value is not affected.

Flat gaskets made from soft material are available in ring shape, as frames, as oval gaskets and practically any other special kind of shape. To close the porous interfaces in fibre sheet gaskets (FA) or in expanded flexible graphite or RivaTherm Super, gaskets are rimmed on the inside with a thin metal band.

Gaskets with outer rim made of a thin metal band are used where the media wear comes from the outside. This is the case, for example, with self-sealing manholes, head access hole locks or even in construction apparatus, if internal fixtures need to be sealed. So as to avoid misunderstandings, it must be noted that this gasket profile is not a gasket with a reinforced outer ring, as mentioned in the applicable regulations under "blowout proof gasket with metal outer ring".

Bordering with a thin inner and outer metal band can be useful in preventing the extrusion of the soft sealing material into gaps, as can happen for example when used in flange connections with male and female faces.

It must be taken into account, that the characteristic of gaskets for tongue and groove-according to DIN, EN resp. ANSI standard-with inner and/or outer rim corresponds with a metal jacketed gasket.

» **Profile A1** Flat gasket made of soft material with a rectangular cross-section

» **Profile F1** internal with a thin metal band rim

» **Profile F7** with an internal and external rim of thin metal

Gasket limiting values

Profile			A1	A1	A1	A1	A1	F1	A1	A1	A1	A1
Materials			FA 1 mm	FA 1,5 mm	FA 2 mm	PTFE	Rubber	FA / 1.4541	RivaTherm-Superplain sheet metal	RivaTherm-Super tanged sheet metal	RivaTherm-Super-Plus	RivaTherm-HD
Recommended max. roughness of flange surface	µm	from	50	50	50	50	50	25	50	50	50	50
		to	100	100	100	100	100	50	100	100	100	100
Surface pressure limits for 20 °C	N/mm²	σ_v	40	35	30	15	2	35	10	20	20	20
		σ_ϑ	100	80	60	90	15	60	120	140	160*	290*
Surface pressure limits for 300 °C	N/mm²	σ_v	-	-	-	-	-	-	10	20	20	20
		σ_ϑ	-	-	-	-	-	-	110	120	140*	260*

* Values measured in accordance with DIN EN 13555 at a 20 mm gasket width

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Gasket profiles

with / without rim

Profile	cross-section
A1	 Soft material
	 RivaTherm Super with plain sheet metal (laminated)
	 RivaTherm Super with tanged sheet metal
	 RivaTherm-Super-Plus
	 RivaTherm-HD
CA1	
F1	 Soft material
	 RivaTherm Super with plain sheet metal (laminated)
	 RivaTherm Super with tanged sheet metal
	 RivaTherm-Super-Plus
	 RivaTherm-HD
	 Egraflex Steelflon Waveline-WLP
F7	 Soft material
TFG 9A	 Metal-graphite

RivaTherm products

Gaskets made from RivaTherm Super have a wide range of application. They can be used as pipeline or cover gaskets with corrosive media and at high temperatures. Further they can be used to fit tanks, steam pipelines, existing systems, heating systems, systems with heat transfer oil and non-oxidising melting and exhaust gaskets.

RivaTherm Super laminated, made from expanded graphite and generally having several metal sheet in layers. The lamination is provided by a low chloride and sulphide reaction polymer in a sandwich joint. The joint is free from all cyan and furan bonds. Because of its many layers, the laminate can withstand very high pressures. This is perfectly suited to non-standard gaskets.

Approved for application in the gas industry by the German Association for Gas and Water (DVGW) and with oxygen installations by the Federal Institute for Materials Research and Testing (Manufacturer certificate on the basis of a BAM test report).

» Purity C > 99 % or > 99.85 %

» Low chloride Cl- < 25 ppm or < 20 ppm

» Temperature range - 200 °C to + 550 °C

RivaTherm Super with tanged sheet metal reinforcement and impregnation is a glue-free graphite sheet which is impregnated so as to render the surface completely impervious to damage. The impregnation of RivaTherm Super leads to a significant increase in stability. There is a very low level of lateral deformation. Using impregnated sheet, the leak rate can be reduced by up to two orders of magnitude.

» Graphite purity 99 %

» Low chloride Cl- < 25 ppm

» Temperature range - 200 °C to 550 °C

Approvals and test reports from PAS.

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RivaTherm Super Plus Type RSP 2S2075-I is a modern sealing sheet. It fulfils all leak-proof requirements in accordance with VDI 2440 and in terms of gasket characteristic values is regarded as a high-value gasket in terms of the TA Luft. The structure of this sealing sheet is based on a glue-free sandwich construction with two modified tanged sheet metal overlays made from stainless steel with alternating arrangements of graphite sheets.

The thickness of the stainless steel inlayer has been reduced by 0.05 mm. As a result the punching and cutting properties of the sealing sheet have been improved. The RivaTherm Super Plus sealing sheet represents a significant further development of the proven range of impregnated RivaTherm Super Type RS 2S110-I.

The adjustment from RivaTherm Super Type RS 2S110-I to RivaTherm Super Plus Type RSP 2S2075-I is made easy by the retention of She gasket characteristic values.

» Graphite purity 99 %

» Low chloride < 25 ppm

» Temperature range - 200 °C to 550 °C

Approvals and test reports:

» TA-Luft

» BAM

» DVGW

» Blow out resistance

» Fire safe

RivaTherm-HD Type RHD 2S3075-I is Kempchen's premium graphite sealing sheet. This impregnated sealing sheet has excellent mechanical properties. Besides its classification as high-value by TA Luft, RivaTherm HD has extremely high stability under load. All the leak-proofing requirements of VDI 2440 are fulfilled.

The thickness of the stainless steel inlayer has been reduced by 0.05 mm. As a result the punching and cutting properties of the sealing sheet have been improved.

Gaskets made from this impregnated sealing sheet fulfil the highest possible demands of system security with regard to pressure, temperature and leak-proof properties.

The structure of the high-strength RivaTherm HD sealing sheet is based on a glue-free sandwich construction with three modified tanged sheet metal inlayers made from stainless steel with alternating arrangements of graphite sheets.

» Graphite purity 99 %

» Low chloride < 25 ppm

» Temperature range - 200 °C to 550 °C

Approvals and test reports:

» TA-Luft

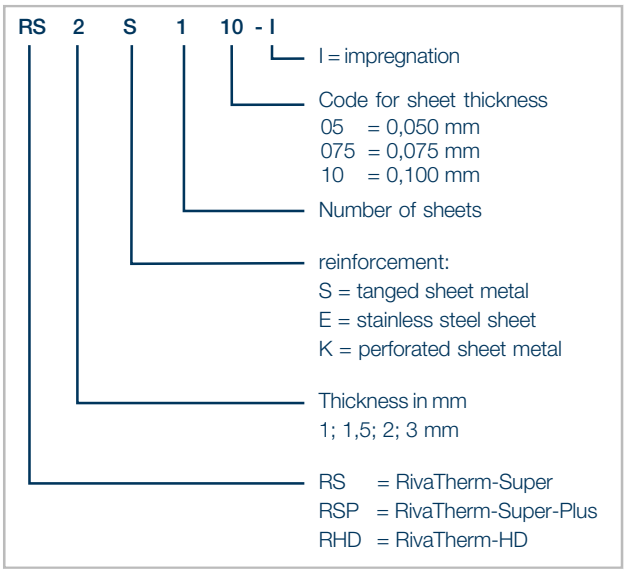
» BAM

» DVGW

» Blow out resistance

» Fire safe

The RivaTherm Super sheet description broadly corresponds with the actual composition of the sheets. The combination of letters and numbers stands for the following:



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Fibre sheets

The overwhelming majority of fibre sheets (FA) have an operating range limited to 150 °C up to 180 °C. High-quality examples can also be used at higher temperatures.

The sheets are usually made of a natural rubber matrix into which aramide, glass, carbon and/or calcium sulphate fibres are embedded. A wide range of different types are available. All of these different types are designated with "FA" in accordance with DIN 28091-2.

Due to the high demands that are placed on security of the sealing connections as well as the requirements for the lowest leakage rates, it is necessary to select and install the correct fibre sheet gasket using the correct know-how.

We supply gaskets from all fibre sheet materials currently on the market (e.g. Klingersil).

PTFE flat gaskets

In flange connections where there are high levels of chemical attack, PTFE flat gaskets are increasingly being used. Due to the cold flow tendencies of unfilled PTFE, the gaskets should be as thin as possible in order to limit the cold flow. Filled or modified PTFE has a higher resistance to compressive strength. However, due to the materials used to fill PTFE and the proportion of filler present, the universal media resistances of filled PTFE are limited.

Rubber flat gaskets

In sealing technology, rubber flat gaskets have a wide range of application. Wherever an inexpensive sealing of media at low temperatures and pressures is required, rubber gaskets provide an optimal solution. For each area of application there is a wide selection of rubber qualities available such as NR, NBR, EPDM and FKM.

We offer lines of rubber gaskets that have been punched or cut by water jet. In addition, we supply vulcanised extrudates and moulds in various rubber qualities.

Meter and fitting gaskets

For fittings in the gas and water industry, we stock a range of gaskets in NBR, EPDM and fibre materials with the necessary certification. The rubber bolt gaskets are punched from sheets or manufactured as tube rings. Our gaskets can be used in single and double pipe fittings.