RivaTherm and RivaChem

The asbestos free gaskets sheets of *kempchen*

With the development of the gasket materials **RivaTherm** and **RivaChem *kempchen*** has made exceptional technical progress.

These extraordinary gasket materials combine properties which in their variety and application do not exist in any other gasket materials.

RivaTherm .....: sheets and foils of pure expanded graphite

RivaTherm-Super ...: group of gasket materials made of RivaTherm and metal reinforcements such as smooth foils, grabble metal foils or perforated metal foils

RivaChem-Super ....: gaskets of PTFE with grabble metal reinforcement

Advantages of RivaTherm and RivaChem

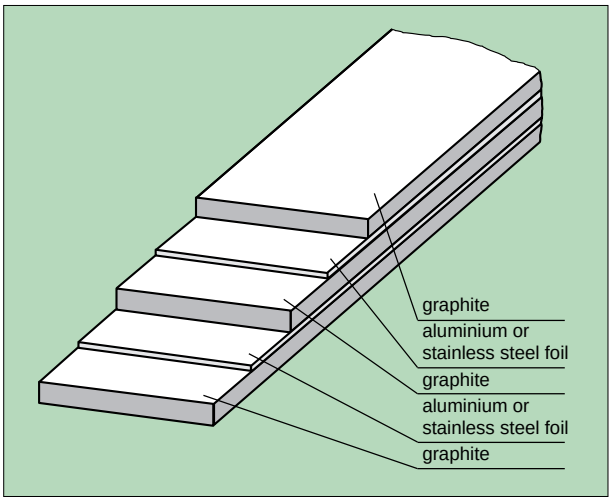
1. **free of contaminating pollutants**
   - asbestos free
   - ferrite free
   - poor in chloride and sulphide
     content Cl < 20 ppm
     resp. Cl < 50 ppm
2. **high stability**
   - high chemical resistance
   - extreme temperature resistance
     RivaTherm - 200 up to + 550 °C
     RivaChem - 250 up to + 150 °C
3. **reliable installation**
   - good shape stability
   - assembly without problems
   - disassembly without problems. No costly re-machining of the flanges. The used gasket is easy to remove.

Design of materials

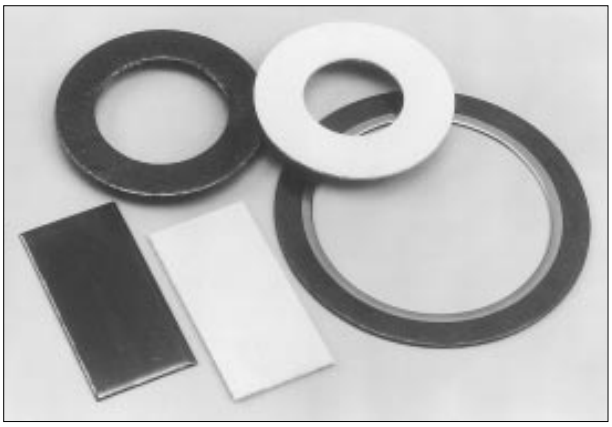
RivaTherm-Super with smooth metal foils

RivaTherm-Super with smooth metal foils consists of alternate layers of chemically pure graphite and thin metal foils which are laminated with a polymere. The graphite layers are normally 0.5 mm thick with a specific density of 0.7 g/cm^3. As reinforcement, aluminium foils in 0.05 mm thickness (for example RS1A1) and chrome-nickel-steel foils (18/8) in about 0.025 mm respectively 0.05 mm thickness (for example RS2E2) are used. The polymere is virtually free from chloride and sulphide.

The gasket material **RivaTherm-Super** is easily punchable, depending upon the sandwich construction from graphite and metal foils, which are bonded with an extremely fine polymere film. Even complicated gasket forms can be cut with a knife edged cutting tool.



For example, from 3 mm thick gasket material **RivaTherm-Super,** complicated gaskets for single-tube-gas and gas consumption equipment with only 3 mm sealing width, respectively rib width, can be punched. Or for gaskets of 10 mm width, with bolt holes of 4.2 mm, the remaining 2.9 mm strips seal at both sides. As a result, this valuable material can be used economically. From sheets, gaskets can be cut without problems using a circular cutter or a sharp blade at site.



kempchen
the right choice !

Gaskets • Packings • Expansion Joints • Rubber and Plastic Parts

RivaTherm and RivaChem

RivaTherm-Super with tanged reinforcement

RivaChem-Super

RivaTherm-Super with tanged reinforcement is usable for applications where glued materials are not permitted. RivaTherm-Super with grabble reinforcement, consists of a 0.1 mm stainless steel foil 1.4401 (AISI 316) perforated with a tangs tool and two graphite foils with a specific density of 1 g/cm³, which are held mechanically by the tanged grabble reinforcement.

The graphite foil thickness will alter with the total specified thickness. The good adherence between the grabble reinforcement and the graphite foils is dependent upon the specially manufactured embed 'flags' of the reinforcement which are bent backward into the graphite, and thus do not stand vertically.

Therefore a low initial bolt load -depending upon a low bending force (and used for bending the reinforcement flags)- transmitted by the flanges sealing surface, will already give the necessary compression of the graphite to produce good sealing.

Handling in stores or at assembly site requires no special precautions. Gaskets made of **RivaTherm-Super with grabble reinforcement** do not delaminate even if the material is bent.

The graphite surface is soft and flexible which is the reason for it's excellent sealability, and additionally for the sensitiveness to rough handling, and possible damage. Marks or similar surface defects, (without loss of material), are not significant and do not influence the sealing behaviour. Such 'optical' defects will be compensated during the installation.

See also our leaflet **RivaTherm-Super with tanged reinforcement.**

In certain instances, it may be advantageous to manufacture, or to complete gaskets from components at site. This is possible with **RivaTherm-Super with grabble reinforcement**. Please ask for our additional information.

RivaChem-Super is a variation of the service-proved RivaTherm-Super with grabble reinforcement.

The grabble reinforcement is equipped on both sides with 1 mm thick sintered PTFE. The components are linked purely by mechanical means, without any adhesives. The 'flags' of the reinforcement embed in the PTFE, without perforating it.

For material design in 1 mm thickness, with 0.5 mm PTFE foil on both sides, the flags may project through the PTFE. Due to the slight deformability of the flags the stainless steel flange surface will not be affected. With other flange materials, and the influence of medium, electro-chemical affect may appear.

Due to the special manufacture of the grabble reinforcement, creep of the PTFE layers is drammatically reduced. If attack to the metal reinforcement is assumed, the finished gaskets can be sealed on the fluid side with an envelope of PTFE.

Table of surface pressure limits

Delivery forms

Table of surface pressure limits

material	temperature °C: 20 — initial surface pressure σ_v N/mm²	20	300	400	500 — allowable surface pressure σ_Φ N/mm²	width/ thickness ratio b/h
RivaTherm-Super e.g. RS1A1; RS2E2	10	120	110	100	100	≥ 8*
RivaTherm-Super with grabble reinforcement	20	140	120	110	100	≥ 8
2K110 : 1K110	20	160	140	130	120	

material	temperature °C: 20 — initial surface pressure σ_v N/mm²	20	100	150 — allowable surface pressure σ_Φ N/mm²	width/ thickness ratio b/h
RivaChem-Super 2C110	20	70	50	30	≥ 20

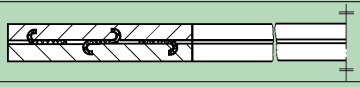
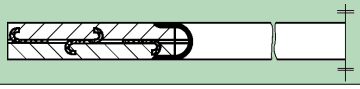
* in compressed condition

Delivery forms

Standard size and design***

designation	thickness mm	dimensions mm x mm	C-content	density ** g/cm³	reinforcement material
1A1	1	1000 x 1000	98 %	0,7	1 x 0,05 mm, Al
2A2	2	1000 x 1000	98 %	0,7	2 x 0,05 mm, Al
1E1	1	600 x 1500	99,8 %	0,7	1 x 0,025 mm, 1.4401*
1E1	1	1000 x 1000	99,8 %	1	1 x 0,05 mm, 1.4401*
1E1	1	1000 x 1000	98 %	1	1 x 0,05 mm, 1.4401*
2E1	2	1000 x 1000	99,8 %	1	1 x 0,05 mm, 1.4401*
2E1	2	1000 x 1000	98 %	1	1 x 0,05 mm, 1.4401*
2E2	2	600 x 1500	99,8 %	0,7	2 x 0,025 mm, 1.4401*
2E2	2	1000 x 1000	98 %	1	2 x 0,05 mm, 1.4401*
3E2	3	600 x 1500	99,8 %	0,7	2 x 0,025 mm, 1.4401*
3E2	3	1000 x 1000	98 %	1	2 x 0,05 mm, 1.4401*
1,5K110	1,5	1000 x 1000	98 %	1	1 x 0,1 mm, 1.4401*
2K110	2	1000 x 1000	98 %	1	1 x 0,1 mm, 1.4401*
2C110	2	1000 x 1000	PTFE	~ 2,15	1 x 0,1 mm, 1.4401*

* 316L ~= DIN material-no. 1.4401, 1.4404, 1.4435
** density of the soft materials
*** delivery of graphite sheets and foils of RivaTherm without reinforcement as agreed

profile	cross section
A1	
F1	

Workability
Service suitability

Quality characteristics of RivaTherm-Super

A detailed description or the following lettering should be given with an inquiry or order to avoid errors.

1. The letter RS for RivaTherm-Super or RC for RivaChem-Super.
2. The nominal thickness of the material for example 1.5 if the requested thickness is 1.5 mm.
3. The letter A for a metal reinforcement of aluminium in thickness 0.05 mm or E for stainless steel 18/8 in thickness 0.025 mm resp. 0.05 mm or K for stainless steel grabble reinforcement in thickness 0.1 mm or S for stainless steel perforated reinforcement.
4. The quantity of metal foils.
5. Reference number for the reinforcement thickness and graphite grade. This data need not be specified for standard quality and design.

RS 2 K 1 10 98

- graphite quality
  - 99.85 % C chloride < 20 ppm
  - 98 % C chloride < 50 ppm
- reference number for reinforcement thickness
  - 25 = 0,025 mm
  - 50 = 0,05 mm
  - 10 = 0,1 mm
- quantity of metal foils
- reinforcement
  - A = aluminium foil
  - E = stainless steel foil
  - K = stainless steel grabble reinforcement
  - S = stainless steel perforate reinforcement
- thickness in millimetre
  - 1; 1,5; 2; 3 mm
- material reference letters
  - RS = RivaTherm-Super with graphite foils
  - RC = RivaChem-Super with PTFE foils

Example order for a flat-ring gasket, profile A1, nominal width DN100, nominal pressure PN16 made of RivaTherm-Super with limpet reinforcement for flanges raised face according to DIN

Flat-ring gasket A1, DN100, PN16, DIN2690, RS2K110

Dimensions see our leaflet „General dimension tables DIN, ANSI, API and BS for flat-ring gaskets“.

Workability
Service suitability

Gaskets made of **RivaTherm-Super** have a comparatively low weight, and therefore are easy to install. If assembling without adhesives is not prefered, the gaskets can be fixed with an adhesive such as 'UHU' at the flange surfaces.

RivaTherm-Super gaskets which have been in service for an extended period under high temperature, are still easy to disassemble. In particular cases where it is possible that graphite sticks on the flange surface, especially if an adhesive was used during the installation, the graphite residue can be removed without problems, using a wire brush.

The graphite should be brushed or rasped off only in circumferential and never in the radial direction.

Quality characteristics of RivaTherm-Super

- DVGW-registrations:

  RivaTherm-Super with stainless steel reinforcement DIN-DVGW-registration

  RivaTherm-Super with aluminium reinforcement DIN-DVGW-registration-no. NG-5124AS0060

  RivaTherm-Super with grabble stainless steel reinforcement DIN-DVGW-registration-no. 90.01e079

  (DIN-German Institute on Standardization). (DVGW-German Association of gas and water fields)
- Good up to excellent tensile strength tensile strength for material thickness of 2 mm with aluminium reinforcement in 0.05 thickness 6 N/mm^2 with stainless steel reinforcement (18/8) in approx. 0.025 mm thickness about 20 N/mm^2
- High compressibility >40 up to 50%
- Excellent creep resistance according to DIN 52913 > 45 N/mm^2
- Extraordinary sealability 0.2 ml/min
- Qualification test for oxygen-service 130 bar, 200 ^{0}C

  RivaTherm-Super with stainless steel reinforcement BAM-registration-no. 10811/85 4-3723

  RivaTherm-Super with limpet stainless steel reinforcement BAM-registration-no. 9501/90 4-3509

(BAM= Federal Institute on material Research and Testing)

RivaTherm and RivaChem

Our special Service:

$$F_{SO} \geqq d_D \cdot \pi \cdot b_V \cdot \sigma_V \cdot U_{SO} = d_D \cdot \pi \cdot b_V \cdot \sigma_{min}$$

$$F_{SO} \leqq d_D \cdot \pi \cdot b_\vartheta \cdot \frac{\sigma_\vartheta}{U_{SO}} = d_D \cdot \pi \cdot b_\vartheta \cdot \sigma_{max}$$

$$\sigma_{min} \geqq \frac{(F_{p_i}$$

$$\sigma_{max} \geqq \left(\frac{F}{-}\right.$$

We have the feed back of all actual problems of our customers are involved with through our sales representatives and experienced engineers of the technical advice and therefore we can recommend the latest development of gasketing.
We calculate bolt loads and torques for difficult and complex flange connections at competitive rates.

Our extensive stock of standards and non - standard products and sizes is at your disposal on call.

Our storage of raw material is manifolded on sizes and grades to be able to deliver as quick as possible.

We have a developed, established and implemented quality assurance system according to DIN ISO 9001and QS9000/DIN EN 9002. The well defined quality elements and actions are systematically audited and perfected.
We hold among others, the following licences:

- API-Std. 6 A for Ring-Joint-Gaskets, PSL 4
- KTA 1401, QSP 4a and AVS D 100/50 from Siemens/KWU for nuclear plants.
- of automotive industry and other important business groups.

The reliable materials used for ***kempchen*** products are quality controlled and additionally tested in our chemical and physical laboratories.

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