

novapress® 850
Extreme adaptability.
High fault tolerance.
Maximum sealing performance.



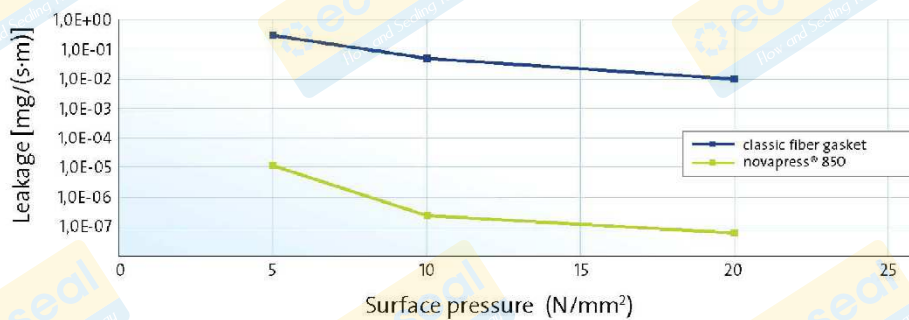
A quantum leap in tightness

Maximum sealing performance is one of the key requirements for gasket materials to ensure superior leakage properties. Until now, conventional fiber gaskets could not compete with elastomer gaskets in terms of tightness. novapress® 850 opens up a new dimension of tightness: novapress® 850 can be used to create reliable gasket systems even with minimal surface pressure thanks to its

unique raw material concept and sophisticated process technology that results in significantly higher adaptability compared to all conventional fiber gaskets.

novapress® 850 represents a quantum leap in tightness.

Comparison of leakage properties novapress® 850 Ring dimension 92 x 49 x 1 mm, 10 bar helium



Quality assurance thanks to a process control system throughout the entire production process.

novapress® products are state-of-the-art gasket sheets manufactured using the calendering process. The blends consist exclusively of high-quality raw materials obtained from renowned suppliers. Every batch is subject to precise specifications and undergoes a rigorous inspection upon receipt to ensure that only perfect raw materials are used for production.

A process control system is used to monitor and control the preparation of the formulations, the blending operation and finally the calendering process itself. This guarantees consistently high quality at all times. Every sheet has a unique batch number and is additionally equipped with our new Gasket Code Technology – for full traceability.

The tightness of an elastomer gasket with the robustness of a fiber gasket

novapress® 850 closes the gap between fiber and elastomer gaskets while combining the positive properties of both materials:

- **Excellent adaptability**
 - almost like an elastomer gasket
- **Mechanical stability**
 - like conventional fiber gaskets

Its innovative combination of key properties makes novapress® 850 ideal for applications where rubber gaskets and conventional fiber gaskets fall short. It is the right choice for numerous applications thanks to its outstanding adaptability during installation, excellent tightness during operation and high mechanical stability even under temperature stress.

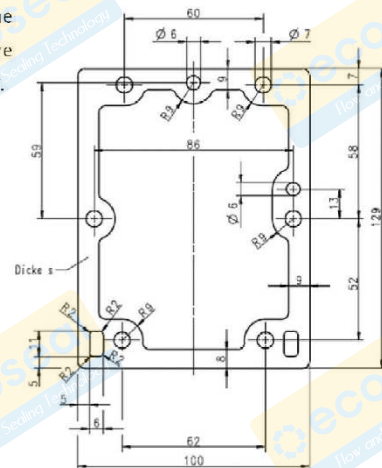
novapress® 850 satisfies requirements that were previously considered unsolvable. Wide bolt spacing in easily deformed components with low bolt forces creates only partial, minimal surface pressure. Conventional fiber gaskets are not able to achieve the desired tightness in such cases. Rubber gaskets, on the other hand, cannot handle the mechanical conditions – especially under temperature stress. novapress® 850 brings together the positive properties of both products in a completely new material composition. novapress® 850 is soft and adaptable at the beginning of the fitting process, yet still provides the mechanical robustness of a conventional fiber gasket throughout the entire application. At the same time, novapress® 850 offers nearly the same tightness level of standard elastomer products.

Resistant to oils, fuels and refrigerants

novapress® 850 is superior to conventional elastomer gaskets in terms of chemical resistance, making it ideal for use in oils, fuels and refrigerants.

novapress® 850: The perfect solution for transmissions

Thanks to its excellent adaptability, novapress® 850 easily meets the demands in transmissions and perfectly compensates for the low surface pressure in these applications.



Installation situation Drawing



Gasket Code Technology for full traceability of every gasket

Until now, it was not possible to identify the material with 100% assurance after the first punching or cutting operation; in some cases it was no longer possible to identify it at all. Frenzelit has developed its own Gasket Code technology, which gives novapress® 850 a unique and permanent "fingerprint" that not only identifies the material but also provides information about the production batch.

Now you can get all the information you need even from removed gaskets to clearly identify the product and its production batch – no matter what level of temperature and media exposure it has been subject to. This makes novapress® 850 suitable for "Industry 4.0" applications, which require transparency of all plant components, and paves the way for the future of "articulate" gasket connections.



Perfect for a variety of applications

Compliance with food industry regulations according to EC 1935/2004 and FDA

novapress® 850 complies with current regulations for use in contact with food such as EC 1935/2004 and FDA. This makes novapress® 850 suitable for many food industry applications.



Food industry application

Use in drinking water according to the elastomer guideline

novapress® 850 easily satisfies the criteria of the new elastomer guideline for use in drinking water for both cold and hot water applications. novapress® 850 also passes W270 tests with flying colors. This means that novapress® 850 is perfect for use in drinking water applications and can even replace the commonly used rubber-steel gaskets with ease. A special advantage for utility companies: novapress® 850 can be used for gas and drinking water!

DVGW and VP 401 – ideal for gas utilities

novapress® 850 meets the requirements of regulations for use in gas plants – in both industrial and domestic applications (service lines).



Gas transfer station

Gas meter gasket

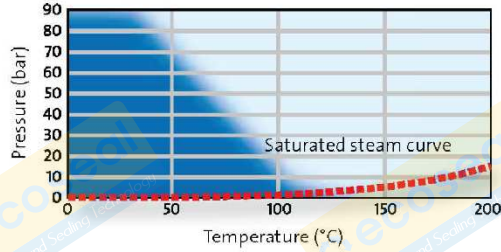


Use in drinking water supply

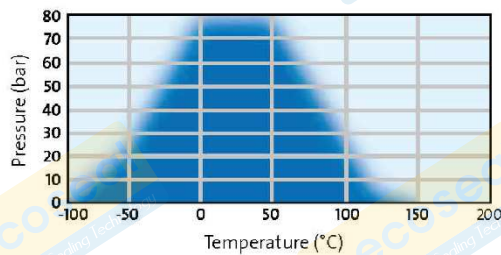
Recommendations for use

Depending on pressure and temperature levels

Water/ water vapor



Other media*



Note about the recommendations for use

The temperature and pressure recommendations in the graphs apply to gaskets 2.0 mm thick that are used with raised face flanges. Higher stresses are possible when thinner gaskets are used! The information provided should therefore be considered cautious estimates rather than specific operational limits.

* Example for the most common other media. Precise data for individual cases can be obtained from the Frenzeli novaDISC program or by contacting our application engineering specialists.

Material data

General information

| | |
|----------------------|--|
| Approvals and tests | Blow-out VDI 2200, DVGW, EG 1935/2004, FDA, GL, TA Luft, VP 401, W270, WRAS, drinking water according to the elastomer guideline ("KTW") |
| Identification color | Light brown |

| Physical properties | Test standard | Unit | Value* |
|---------------------------------------|------------------|----------------------|--------|
| Sample thickness 2.0 mm | | | |
| Density | DIN 28 090-2 | [g/cm ³] | 1.35 |
| Residual stress 175 °C | DIN 52 913 | [N/mm ²] | 26 |
| Compressibility | ASTM F 36 J | [%] | 39 |
| Recovery | ASTM F 36 J | [%] | 60 |
| Cold compressibility ϵ_{KSW} | DIN 28 090-2 | [%] | 20 |
| Cold recovery ϵ_{KRW} | DIN 28 090-2 | [%] | 12 |
| Hot creep $\epsilon_{WSW/200}$ | DIN 28 090-2 | [%] | 30 |
| Hot recovery $\epsilon_{WRW/200}$ | DIN 28 090-2 | [%] | 1 |
| Specific leakage rate | DIN 3535-6 | [mg/(s·m)] | 0.001 |
| Tensile strength transverse | DIN 52 910 | [N/mm ²] | 5 |
| Media resistance | ASTM F 146 | | |
| ASTM IRM 903 | 5 h / 150 °C | | |
| | Weight change | [%] | 8 |
| | Thickness change | [%] | 2 |
| ASTM Fuel B | 5 h / 23 °C | | |
| | Weight change | [%] | 12 |
| | Thickness change | [%] | 9 |
| Leachable chloride content | PV 01605 | [ppm] | ≤ 150 |

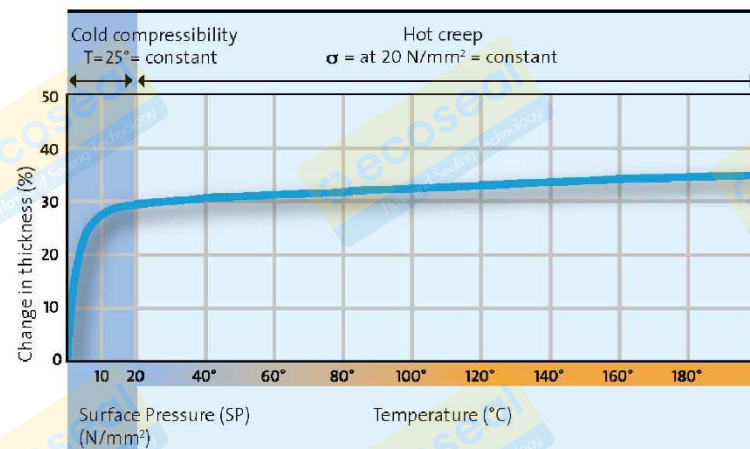
*Modal value (typical value)

Product data (tolerances acc. to DIN 28 091-1)

| | |
|------------------|--|
| Dimensions [mm] | 1000 x 1500 / 1500 x 1500 / 3000 x 1500 |
| Thicknesses [mm] | 0.3 / 0.5 / 0.75 / 1.0 / 1.5 / 2.0 / 3.0 |

Temp-Test

at 20 MPa – sample thickness: 1.0 mm



Note about the Temp-Test:

The purpose of the Temp-Test is to determine how the gasket deforms under certain conditions. It is a special test developed by Frenzeli that represents what is effectively a "fingerprint" of key gasket properties.

The compression set of the gasket at room temperature is determined in the first part of the test. This curve indicates the adaptability of the gasket during installation.

In the second part of the test, the temperature is increased at a specified speed, while the surface pressure reached in the first part is held at a constant level. Thus the system is not allowed to "relax" as a result of gasket compression. This is excessive – the load on the gasket would be lower in a real gasket connection – but it reveals the true character of the gasket.

Good for people and the environment.

From research and development to our manufacturing operations and use of the product by the customer: quality assurance and a responsible approach to resources and the environment are a firm commitment we observe in everything we do throughout the life cycle of all products.

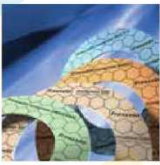





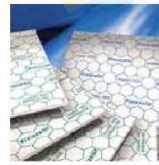
The Frenzelit gasket division has obtained certification that the company complies with the requirements of ISO 9001, ISO 14001 and ISO 50001. This means complete transparency in all areas and therefore provides a high degree of security – for the benefit of our employees, the environment and our customers.

Quality management ISO 9001

Environment management ISO 14001

Energy management ISO 50001

Engineered by Frenzelit: Gasket materials/fiber-reinforced compounds

| novapress® | novatec® | novafilon® | novaphit® | novamica® | novaplan® | isoplan® |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| 200°C | 250°C | 260°C | 550°C | 1000°C | 1000°C | 1100°C |
| -100°C | -100°C | -200°C | -200°C | -200°C | -100°C | -100°C |
| Elastomer-bonded fiber gaskets | Fiber-reinforced graphite gaskets | Modified and filled PTFE gaskets | Expanded graphite with/without stainless steel expanded metal insert | Phlogopite mica with/without stainless steel expanded metal insert | Soft layer/insert for heat shield applications and cylinder head gaskets | High-temperature insulation materials |

novapress® 880

**Maximum adaptability for the
chemical industry.**

**Perfect for designs that comply with VDI 2290.
First gasket for Industry 4.0.**

ss 880

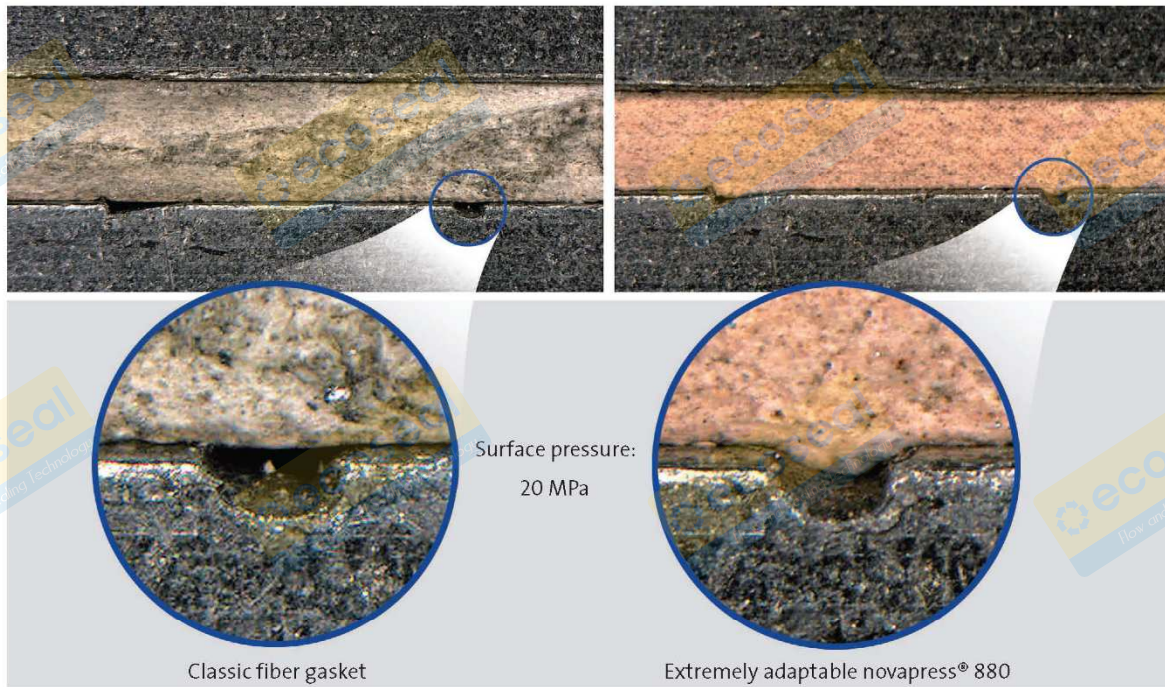
novapress 880

e in Germany

Frenzel

novapress 880

Maximum adaptability for the chemical industry



Leakage sources

Numerous leakage tests have shown that most of the leakage experienced with fiber gaskets is via the surfaces. There are as a result differences – considerable in some cases – between the leakage levels measured in the laboratory and with real flange connections. Substantially higher leakage levels are recorded in particular with flanges that are no longer new, that show standard signs of wear or are even damaged. The restrictions on surface pressure that are dictated by the design of the flange-screw combination used make it difficult to satisfy legally stipulated sealing criteria in practical applications. This challenge can only be met successfully by making the gasket significantly more adaptable to flange unevenness.

Enhanced adaptability

With a compressibility level of 18 % in accordance with ASTM F36J, novapress® 880 performs three times better than standard materials. This means that the flange unevenness mentioned above is already compensated for reliably at comparatively low surface pressure levels. Thanks to new process technology and an optimised material composition, such proven properties as media resistance and mechanical stability under temperature stress are combined with high adaptability. The benefits of more efficient sealing properties in everyday practical maintenance conditions are obvious.

Perfect for designs that comply with VDI 2290

Gasket constants according to DIN EN 13555 on a new level

Practically all plants in modern process industry are required to satisfy the requirements of TA Luft (German Clean Air Act). What are needed are implementable gasket connection designs that meet the specifications of sealing category $L_{0,01}$ indicated in VDI directive 2290. This is only possible when an exceptionally good leakage performance is already achieved at relatively low surface pressure levels. Classic fiber gasket materials have failed to satisfy this criterion up to now. novapress® 880 allows technically sensible gasket system designs, that provide greater security with respect to screw and flange stress, and is significantly less sensitive to unavoidable tolerances during installation too.

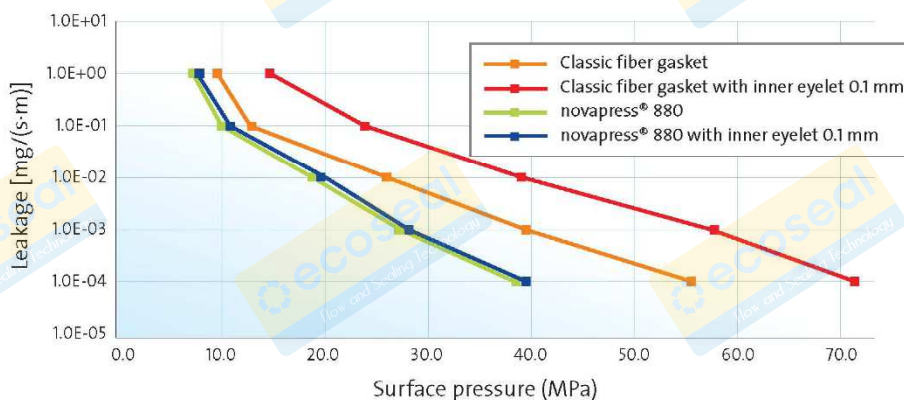
Impact of an inner eyelet

A special feature of this extremely adaptable gasket: the sealing performance is achieved to the same extent with and without inner eyelet. The user is free to buy novapress® 880 simply punched out of a

Put in simple terms: a gasket connection with novapress® 880 operates within the limits demanded by TA Luft and VDI 2290, even in the case of manual installation - including all tightening tolerances attributable to the system. Less than 20 MPa for the parameter Q_{smin} (L0,01) at an internal pressure level of 40 bar are convincing proof. The Q_{smin} figure for the same sealing performance of 5 MPa is impressive for calculations as specified by DIN EN 1591-1. The requirements made in the guide issued by VCI for the establishment of flange connections are also satisfied reliably with regard to the P_{QR} readings.

sheet or - with almost identical parameters - finished with stainless steel inner eyelet. This reduces storage and logistics in production of the gasket and takes full advantage of the potential savings associated with this.

Leakage comparison / 40 bar



World premiere: fiber gaskets for Industry 4.0 – Gasket Code Technology



Quality monitored and maintained by using a process control system for the entire manufacturing process.

novapress® products represent the latest state of the art for gasket sheets manufactured by the calendering process. The blends consist exclusively of high-quality raw materials obtained from well-known suppliers. All the batches of raw material delivered are not merely in line with precise specifications; they are also subjected to strict incoming goods testing. This means that only tested and approved raw materials reach production.

A process control system monitors and controls preparation of the formulations, the blending operation and, finally, the calendering process itself. Consistently high quality is always guaranteed as a result. Every production batch is identified uniquely, which makes uninterrupted traceability of the gasket sheet possible.

World premiere: Gasket Code Technology for punched gaskets

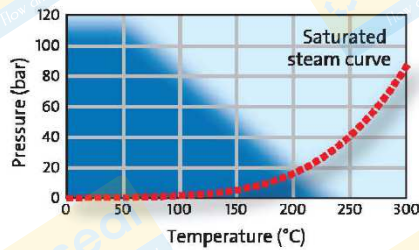
Manufacturers of high-quality fiber gasket materials identify every gasket sheet. Any identifications are no longer detectable on the component after the first punching or cutting operation, however. This means that the finished gasket cannot be traced back any more. The new Gasket Code Technology for novapress® 880 makes identification (type, manufacturing period and production batch) possible via a unique “fingerprint” of the material. Not only the identity of the material but also the relevant production batch can be determined exactly as a result. The information is available, for example, within the framework of incoming goods testing of new gaskets. It can also be obtained reliably from even the smallest of gasket residue. The same is true of gaskets that have been removed after they have been subjected to the effects of temperature and media. novapress® 880 is therefore the first gasket material anywhere in the world that provides the transparency of all plant components that is required in the context of “Industry 4.0”. This represents the first step towards “articulate” gasket connections.



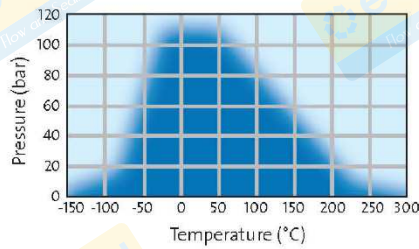
Recommendations for use

Depending on pressure and temperature levels

Water/ water vapor



Other media*



Material data

General information

| | |
|-----------------------|--|
| Approvals and tests | BAM, Blow-out VDI 2200, DVGW, drinking water according to the elastomer guideline ("KTW"), TA Luft, EG 1935/2004, FDA, VP 401, W 270 |
| Identification colour | Beige (pigment-free) |
| Treatment | Anti-stick coating (PTFE) |

| Physical properties | Test standard | Unity | Value* |
|---------------------------------------|---------------|----------------------|--------|
| Gasket thickness | 2.0 mm | | |
| Density | DIN 28 090-2 | [g/cm ³] | 1.30 |
| Residual stress 300 °C | DIN 52 913 | [N/mm ²] | 20 |
| Compressibility | ASTM F 36 J | [%] | 18 |
| Recovery | ASTM F 36 J | [%] | 65 |
| Cold compressibility ϵ_{ISW} | DIN 28 090-2 | [%] | 16 |
| Cold recovery c_{KRW} | DIN 28 090-2 | [%] | 7 |
| Hot creep $\epsilon_{WSW/200}$ | DIN 28 090-2 | [%] | 19 |
| Hot recovery $c_{WRW/200}$ | DIN 28 090-2 | [%] | 2 |
| Specific leakage rate | DIN 3535-6 | [mg/(s·m)] | 0.01 |
| Tensile strength transverse | DIN 52 910 | [N/mm ²] | 6 |
| Media resistance | ASTM F 146 | | |
| IRM 903 | 5 h/ 150 °C | | |
| Weight change | | [%] | 6 |
| Thickness change | | [%] | 2 |
| Fuel B | 5 h/ 23 °C | | |
| Weight change | | [%] | 7 |
| Thickness change | | [%] | 6 |
| Leachable chloride content | PV 01605 | [ppm] | ≤ 150 |

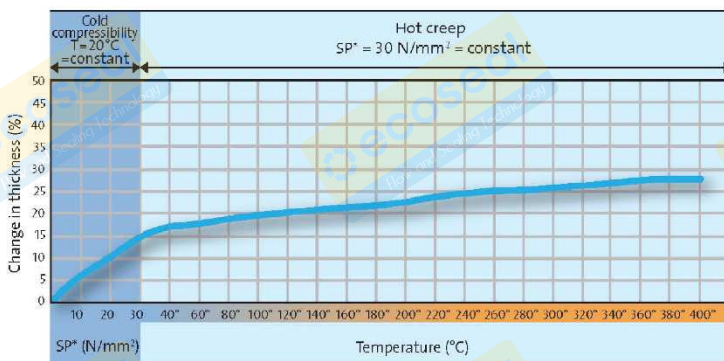
*Modal value (typical value)

Product data (tolerances according to DIN 28 091-1)

| | |
|------------------|---|
| Dimensions [mm] | 1000 x 1500 / 1500 x 1500 / 3000 x 1500 |
| Thicknesses [mm] | 0.5 / 0.75 / 1.0 / 1.5 / 2.0 / 3.0 |

Temp-Test

at 30 MPa - sample thickness: 2.0 mm



* surface pressure

Explanatory notes about the temperature test:

The purpose of the temperature test is to determine how the gasket deforms under certain conditions. It is a special Frenzelit development that represents what is effectively a "fingerprint" of major gasket properties.

The compression set of the gasket at room temperature is determined in the first part of the test. This curve indicates the adaptability of the gasket during installation.

In the second part of the test, the temperature is increased at a specified speed, while the surface pressure level reached in the first part is maintained consistently. I.e. the system is not allowed to "relax" as a result of gasket compression. This is overly critical - the strain on the gasket would be lower in a real sealing situation - but it unsurprisingly reveals the character of the gasket.

Good for people and the environment.

From research and development to our manufacturing operations and use of the product by the customer: quality assurance and a responsible approach to resources and the environment are a firm commitment we observe in everything we do throughout the life cycle of all products.



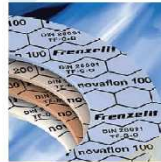

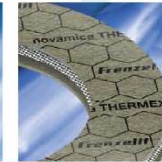

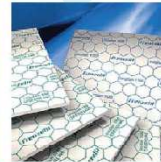
The Frenzelit gasket division has obtained certification that the company complies with the requirements of ISO 9001, ISO 14001 and ISO 50001. This means complete transparency in all areas and therefore provides a high degree of security – for the benefit of our employees, the environment and our customers.

Quality management ISO 9001

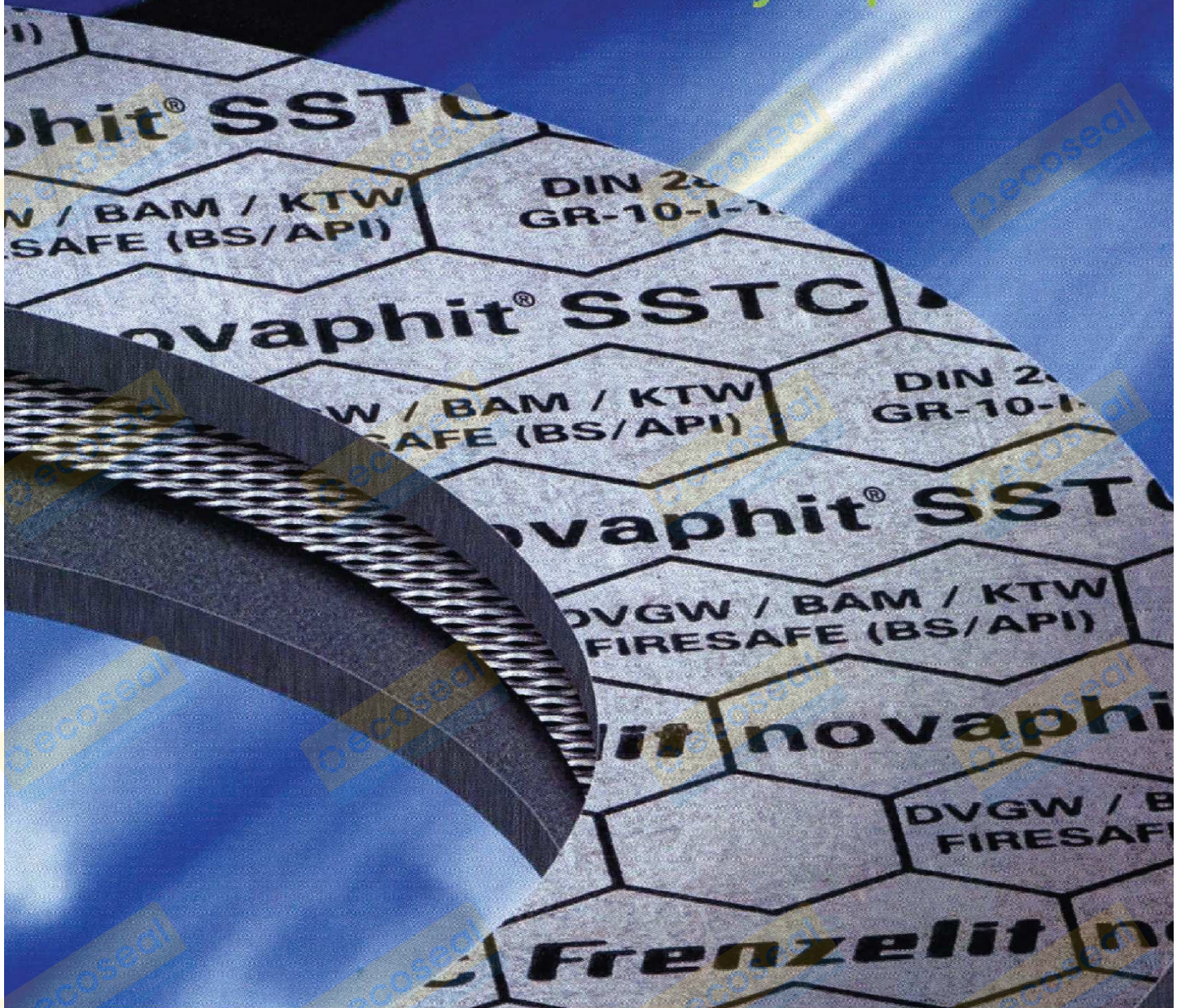
Environmental management ISO 14001

Energy management ISO 50001

Engineered by Frenzelit: Gasket materials/fiber-reinforced compounds

| novapress® | novatec® | novafilon® | novaphit® | novamica® | novaplan® | isoplan® |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| 200°C -100°C | 250°C -100°C | 260°C -200°C | 550°C -200°C | 1000°C -200°C | 1000°C -100°C | 1100°C -100°C |
| Elastomer-bonded fiber gaskets | Fiber-reinforced graphite gaskets | Modified and filled PTFE gaskets | Expanded graphite with/without stainless steel expanded metal insert | Phlogopite mica with/without stainless steel expanded metal insert | Soft layer/insert for heat shield applications and cylinder head gaskets | High-temperature insulation materials |

novaphit® – high-pressure gasket
material made from expanded graphite
for **maximum safety requirements.**



Optimum efficiency thanks to the combination of pure graphite and three-dimensional expanded metal reinforcement.

Unique material profile for maximum safety requirements

- Thoroughly proven material structure consisting of high-quality expanded graphite (purity level at least 99 %) and expanded metal inserts made from acid-proof stainless steel
- Material compound without any bonding and filling agents

High heat and mechanical resistance

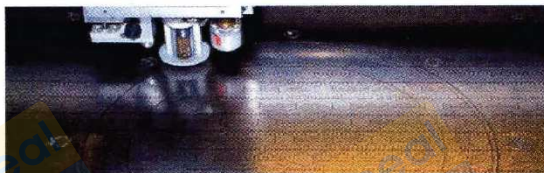
- From -240 °C to 550 °C
- Very high operating pressure levels of up to 250 bar (depending on the product)
- Suitable for extreme changing loads and cycles

Standardisation throughout the plant

- Thanks to their material concept, novaphit® products can reduce the variety of different gaskets used in the process industry.

Unique media resistance

- Resistant to practically all organic and inorganic acids, alkalis, oils and solvents
- DVGW, KTW and BAM approvals (depending on the product)
- Firesafe tested in accordance with BS and API (depending on the product)



Expanded metal made from extremely acid-resistant stainless steel

The material is resistant to corrosion and acids (material no. 1.4404/AISI 316L).

Thickness of the expanded metal insert used

Expansion of the stainless steel foil used (0.15 mm) produces a three-dimensional structure with a considerably thicker projected height (about 0.5 mm), as a result of which genuine "chambering" of the gasket core is achieved. Irrespective of the gasket thickness chosen and the surface pressure applied, there is never any contact between the expanded metal insert and the gasket surface.

Minimisation of the danger of injury during handling and processing – no "sharp" cut edges.

Geometry of the stainless steel insert

- No undercutting in the insert material.
- Better use of the surface pressure available to compress the graphite, because no crowns have to be bent. Installation of the gasket is completed more quickly.
- Easy cutting, handling benefits in manual and/or in-house finishing.

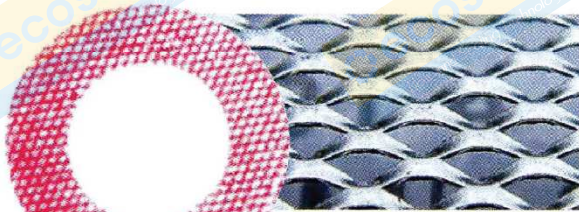
Excellent processing properties

- thanks to optimum choice of parameters and the low mesh size of the expanded metal insert
- novaphit® can be processed very effectively not only with standard die-cutting equipment but also in manual finishing operations and with plotter cutters

Typical application areas for novaphit®

- Universal use in all areas of the chemical industry
- Covers the complete range of classic flat gaskets
- Suitable in general for all applications in extreme conditions, including varying loads
- Excellent oval closure lid gasket in the special novaphit® SSTC^{TRD 401} version approved by the TÜV technical control authorities

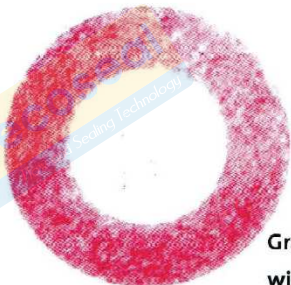
Optimisation of surface pressure distribution is a major advantage of expanded metal inserts over other insert concepts. This is shown impressively by closed lines of increased surface pressure (see the Fuji film picture of novaphit® with expanded metal).



**novaphit® SSTC
with expanded metal**



**Graphite gasket
with tanged metal**



**Graphite gasket
with smooth metal**

- The favourable mesh geometry (mesh aperture = 3.0 mm) makes it possible to produce gaskets with very narrow bridges.
- Considerably less danger of delamination when the gasket is bent. Even in the case of a bent gasket, the graphite foil is pressed into position around the insert again completely when pressure is applied to the gasket during installation in the flange, i.e. larger tolerance with respect to installation faults.
- The “countless” insert flexing operations are irreversible because of strain hardening, i.e. the insert has good recovery properties and participates actively in the sealing process! This guarantees greater gasket reliability, above all at higher surface pressure levels.

Material structure

- Multilayer structure alternating between pure graphite foils and expanded metal inserts
- 2 layers of pure graphite foil and 1 layer of expanded metal are combined in novaphit® SSTC
- To form novaphit® SUPER HPC, up to 5 layers of graphite and up to 3 layers of expanded metal are laid on top of each other alternately – depending on the final thickness required. The metal inserts are placed at right angles to each other to guarantee consistent strength both longitudinally and transversely.

Fuji film pictures

- Sensitivity: medium



novaphit® product family



novaphit® SSTC

The proven plant standard with one expanded metal insert.

The advantages of novaphit® SSTC are attributable primarily to the use of the expanded metal insert made of stainless steel. This guarantees straightforward handling before installation and a strong performance in the flange. Whether a standard gasket is chosen or a specially designed gasket with a complicated geometry. Wherever conditions are demanding, the ideal combination of high-quality expanded graphite and a three-dimensional expanded metal insert demonstrates its proven efficiency. novaphit® SSTC is an excellent standard gasket for the entire plant.



novaphit® SUPER HPC

Pure graphite with several expanded metal inserts.

Several inserts made from expanded metal guarantee maximum mechanical resistance in novaphit® SUPER HPC.

Arrangement of the inserts at right angles to each other makes sure that tensile strength is consistent in all directions.



novaphit® VS

Pure graphite without an insert.

For all applications where a stainless steel insert cannot be used. The material is pre-densified during production in order to optimise the handling properties. It is simple to produce even the narrowest gasket widths as a result.

novaphit® SSTC^{TRD 401}

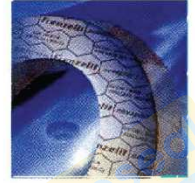
The TÜV-certified solution for oval closure lid gaskets.

This type of gasket, which is based on the classic novaphit® SSTC product, has become the popular standard for oval gaskets that require official approval since TÜV TRD 401 testing was introduced. novaphit® SSTC^{TRD 401} has been tested and approved by the TÜV technical control authorities in the highest possible category D (250° C/40 bar) in accordance with the directive TRD 401 (test number: TÜV.D.00-004.d).

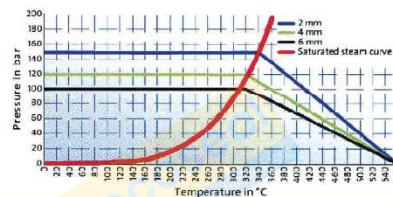
Oval gaskets 2, 4 or 6 mm thick are produced from the original material (which is 2 mm thick) by certified manufacturers. They cover all the different applications, from the new boiler that is being delivered to the steam generator that has already been in operation for a long time.

novaphit® SSTC^{TRD 401}'s strength is its particularly good adaptability to unevenness in the gasket surface. This is due to a sufficiently thick graphite layer. The expanded metal inserts are another positive feature, because they have no adverse impact on compression of the gasket. This means that the low surface pressure in the closure lid area for design reasons can be exploited to full effect to form the graphite.

novaphit® SSTC^{TRD 401} also has all the properties of novaphit® SSTC and can therefore be used smoothly for all other steam generation application areas too.



Recommendations for use of novaphit® SSTC^{TRD 401}



Product data

novaphit®

- Dimensions in mm: 1000 x 1000
1500 x 1500
- Thickness in mm: 1.0/1.5/2.0/3.0
- Further dimensions and thicknesses are available on request

novaphit®

- Dimensions in mm: 1000 x 1000
1500 x 1500
- Thickness in mm: 1.0/1.5/2.5/3.0
- Further dimensions and thicknesses are available on request

novaphit® VS

- Dimensions in mm: 1000 x 1000
1500 x 1500
- Thickness in mm: 1.0/1.5/1.5/2.0
- Further dimensions and thicknesses are available on request

novaphit® SSTC^{TRD 401}

- Dimensions in mm: 1000 x 1000
1500 x 1500
- Thickness in mm: 2.0
- Further dimensions and thicknesses are available on request

novaphit® SSTC^{TA-L}

Safety for all plant areas certified in accordance with fugitive emission regulations

The first graphite gasket for which certification has been obtained that it meets the requirements of the fugitive emission regulations directly from the sheet – no matter whether it has an inner eyelet or not.

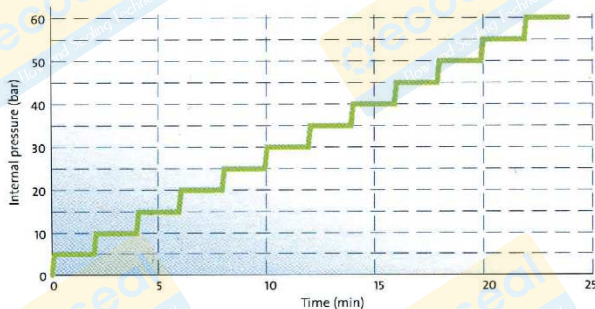
The basis here is also the proven expanded metal insert made from chrome-nickel steel (material no. 1.4404/AISI 316 L). In order to satisfy the new legal requirements, extremely pure graphite foils processed into a gradient gasket material are used in this case. An additional feature is the internal impregnation, which in turn helps to achieve leakage rates that are already considered to be the new standard in the field of graphite gasket materials.

Blow-out test

novaphit® SSTC^{TA-L} demonstrates its efficiency under extreme conditions where blow-out resistance is concerned too:

The gasket even withstands surface pressure of 7.5 N/mm² and internal pressure of 60 bar. Measurement is carried out in accordance with VDI 2200 (06/2005 version) following 24-hour storage at 300° C and subsequent application of nitrogen in a DN40/PN40 flange.

novaphit® SSTC^{TA-L} blow-out test



novaphit® SSTC^{TA-L}

- Dimensions in mm: 1000 x 1000
1500 x 1500
- Thickness in mm: 1.0/1.6/3.0
- Further dimensions and thicknesses are available on request



Certification of compliance with German air pollution regulations

The fugitive emission regulations that have applied in Germany since October 2002 define and specify the commitments for operators of industrial equipment that requires approval. Clear rules are made there for flange connections. In this context, technically tight flange connections have to be used in accordance with VDI 2440 (issue 11/2000).

novaphit® SSTC^{TA-L} has been tested by Amtec. The result: classification as a high-quality gasket in accordance with the test criteria of VDI 2440 for the German pollution regulations.

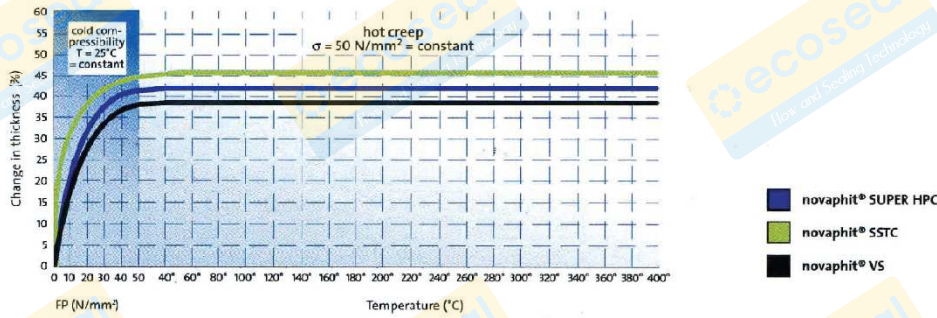
novaphit® SSTC^{TA-L} observes the leakage criterion of the German pollution regulations comfortably with 8·10⁻⁵ mbar·l/(s·m).

Further details about novaphit® SSTC^{TA-L} can be found in the novaphit® SSTC^{TA-L} product folder, which can be requested free of charge and is available to be downloaded from the Internet at www.frenzelit.com.

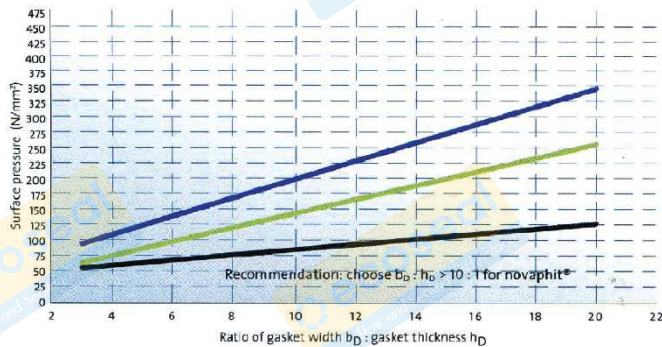


Typical material properties for products with a gasket thickness of 2 mm

Compression set – temperature test: 50 N/mm² – 400 °C

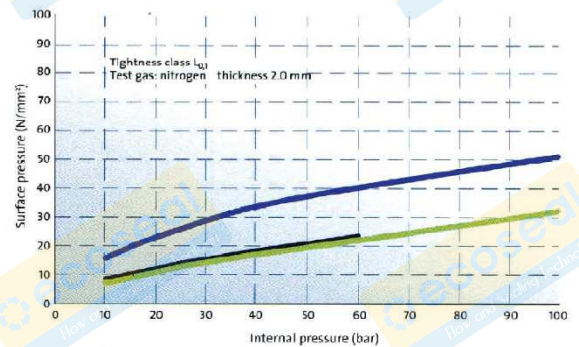


Maximum surface pressure when installed σ_{vo} with smooth sealing faces*

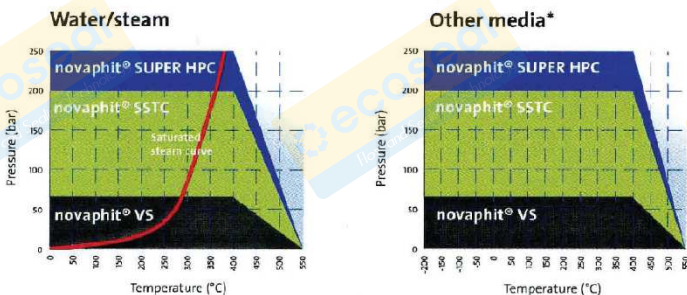


* The maximum surface pressure can be increased by 1.5 in the case of tongue-and-groove flanges.

Necessary minimum surface pressure σ_{vu} σ -p graph



Recommendations for use in the most important media groups according to the pressure and temperature



The temperature and pressure recommendations in the graphs apply to gaskets with a thickness of 2.0 mm and smooth flanges. Higher stresses are possible when thinner gaskets are used!

* Example for the most common other media. Exact data for specific individual cases are available in the Frenzelit novaDISC programme or contact our application engineering specialists.

Warranty exclusion

In view of the variety of different installation and operation conditions and application and process engineering options, the information given in this prospectus can only provide approximate guidance. There is as a result no basis for warranty claims.

Material data

| General information | | | novaphit® SSTC/SSTC ^{TRD 401} | novaphit® SUPER HPC | novaphit® VS |
|---------------------------------------|---|----------------------|---|------------------------------|-----------------|
| Binders | without organic binder | | | | |
| Approvals | DVGW, KTW, BAM (max. 200 °C/130 bar), Fire Safe, TRD 401* | | | BAM (max. 200 °C/130 bar) | |
| Colour | grey | | | | |
| Anti-stick coating | none | | | | |
| Sheet sizes and thickness tolerance | according to DIN 28 091-1 | | | | |
| Physical properties | Test standard | Unit | Value** | | |
| Gasket thickness 2.0 mm | | | | | |
| Identification | DIN 28 091-4 | | GR-10-I-1M-Cr | GR-10-I-2M-Cr | GR-10-O-O-O |
| Density | DIN 28 090-2 | [g/cm ³] | 1.30 | 1.60 | 1.20 |
| Tensile strength | DIN 52 910 | [N/mm ²] | | | |
| longitudinal | | | 17 | 20 | 6 |
| transverse | | | 8 | 18 | 5 |
| Residual stress $\sigma_{dE/16}$ | DIN 52 913 | | | | |
| 175 °C | | [N/mm ²] | 47 | 46 | 48 |
| 300 °C | | [N/mm ²] | 45 | 45 | 46 |
| Compressibility | ASTM F 36 J | [%] | 40 | 35 | 34 |
| Recovery | ASTM F 36 J | [%] | 15 | 20 | 18 |
| Cold compressibility ϵ_{KSW} | DIN 28 090-2 | [%] | 39.0 | 35.0 | 35.0 |
| Cold recovery ϵ_{KRW} | DIN 28 090-2 | [%] | 4.0 | 4.0 | 5.0 |
| Hot creep $\epsilon_{WSW/300}$ | DIN 28 090-2 | [%] | 2.0 | 2.0 | 1.0 |
| Hot recovery $\epsilon_{VRW/300}$ | DIN 28 090-2 | [%] | 3.5 | 3.5 | 4.0 |
| Recovery R | DIN 28 090-2 | [mm] | 0.070 | 0.080 | 0.080 |
| Specific leakage rate | DIN 3535-6 | [mg/(s·m)] | ≤0.100 | ≤0.100 | ≤0.100 |
| Specific leakage rate $\lambda_{2,0}$ | DIN 28 090-2 | [mg/(s·m)] | 0.050 | 0.050 | 0.050 |
| Fluid resistance | ASTM F 146 | | | | |
| ASTM IRM 903 | 5h/150 °C | | | | |
| Weight change | | [%] | 30 | 30 | 30 |
| Thickness change | | [%] | 6 | 5 | 6 |
| ASTM Fuel B | 5h/23 °C | | | | |
| Weight change | | [%] | 30 | 30 | 30 |
| Thickness change | | [%] | 6 | 5 | 6 |
| Chloride content | DIN 28 090-2 | [ppm] | ≤50 | ≤50 | ≤50 |

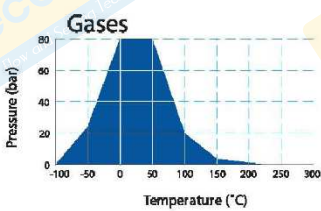
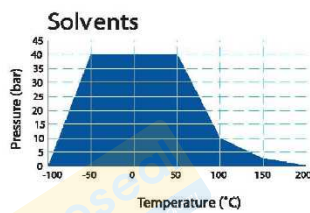
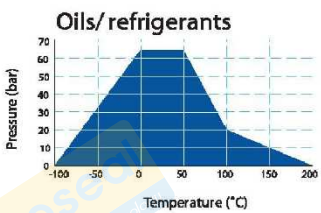
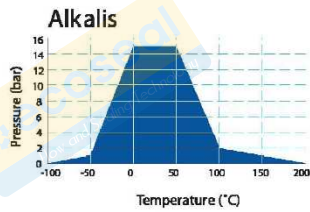
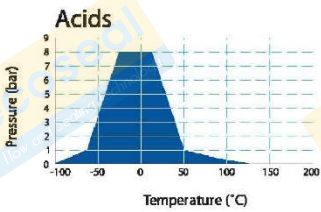
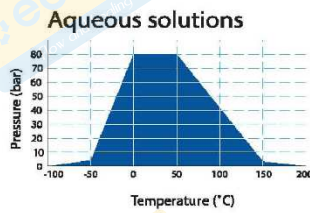
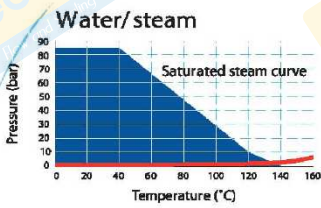
* Applies to the TÜV-approved novaphit® SSTC^{TRD 401} version

** Modal value (typical value)



Technical information about novapress BASIC

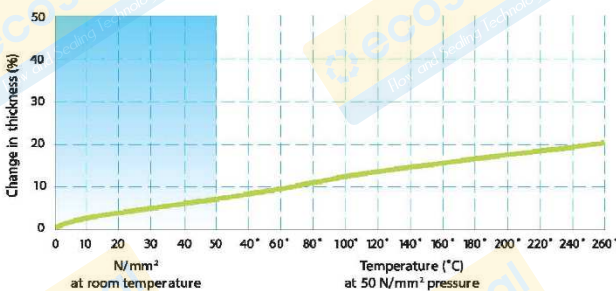
Recommendation for use in the most important media group according to the pressure and temperature



The temperature and pressure recommendations in the graphs apply to gaskets with a thickness of 2.0 mm and smooth flanges. Higher stresses are possible when thinner gaskets are used!

Warranty exclusion
In view of the variety of different installation and operation conditions and application and process engineering options, the information given in this prospectus can only provide approximate guidance. There is as a result no basis for warranty claims.

Deformation under temperature 2.0 mm



Material dat General data

| | |
|------------------------------------|---------------------------------------|
| Binders | NBR |
| Approvals | DVGW, HTB, KTW, VP-401, WRC |
| Colour | both sides orange |
| Anti-stick coating | serially one side an ti-stick coating |
| Sheet size and thickness tolerance | according DIN 28 091-1 |

| Physical properties | Standard | Unity | Value* |
|----------------------------|------------------|----------------------|--------------|
| Gasket thickness | 2.0 mm | | |
| Identification | DIN 28 091-2 | | FA - MA1 - O |
| Density | DIN 28 090-2 | [g/cm ³] | 175 |
| Tensile strength | DIN 52 910 | | |
| longitudinal | | [N/mm ²] | 14 |
| transverse | | [N/mm ²] | 6 |
| Residual stress | DIN 52 913 | | |
| 175 °C | | [N/mm ²] | 30 |
| 300 °C | | [N/mm ²] | 17 |
| Compressibility | ASTM F 36 J | [%] | 8 |
| Recovery | ASTM F 36 J | [%] | 60 |
| Cold compressibility | DIN 28 090-2 | [%] | 8 |
| Cold recovery | DIN 28 090-2 | [%] | 3 |
| Hot creep | DIN 28 090-2 | [%] | 22 |
| Hot recovery | DIN 28 090-2 | [%] | 2 |
| Recovery R | DIN 28 090-2 | [mm] | 0.040 |
| Specific leakage rate | DIN 3535-6 | [mg/(s·m)] | 0.100 |
| Specific leakage rate | DIN 28 090-2 | [mg/(s·m)] | 0.100 |
| Fluid resistance | ASTM F 146 | | |
| ASTM IRM 903 | 5h/150°C | | |
| Weight change | [%] | | 7 |
| Thickness increase | [%] | | 2 |
| ASTM Fuel B | 5h/23°C | | |
| Weight change | [%] | | 7 |
| Thickness increase | [%] | | 4 |
| Leachable Chloride content | Siemens AV-9-014 | [ppm] | 150 |

* Mode (typical value)

Product data

- Dimensions in mm: 1000 x 1500
1500 x 1500
3000 x 1500
- Thicknesses in mm: 0.3/0.5/0.75/1.0/1.5/2.0/3.0/4.0
- Further dimensions and thicknesses are available on request

novaflon® PTFE gaskets for industrial applications.



GASKETS

TECHNICAL TEXTILES

EXPANSION JOINTS

INSULATION

NEW MATERIALS

 **Frenzelit**

creating
hightech
solutions



At a glance: the benefits of navaflon®

navaflon® combines decisive advantages over conventionally manufactured PTFE:

- Excellent media resistance to most lyes and acids throughout the pH range (pH levels 0-14)
- High residual stress
- Resistant to cold flow
- High mechanical resistance
- Wide temperature range from -210 °C to 260 °C
- Unlimited shelf life
- Excellent leakage properties: Meets German fugitive emission regulation TA Luft [leakage rate <math>< 10^{-4}</math> mbar-l/(s·m)]
- Compliance with FDA 177.1550 Perfluorocarbon regulation

Typical application areas for navaflon®

- All-purpose use in the chemical, petrochemical, pharmaceutical, paper and food industries
- Oils and greases, acids and alkalis, solvents, refrigerants, water, steam
- Compliance with the German fugitive emission regulation TA Luft in these areas:
 - Petrochemicals
 - Chemical industry
 - Pharmaceutical industry
 - Food industry

The better choice: novaflon® - gaskets made from PTFE

novaflon® 100

Modified PTFE with hollow glass microspheres

Thanks to its extremely high compressibility, novaflon® 100 is eminently suitable for use in stress-sensitive flanges, such as glass, ceramic and FRP flanges.

Very good anti-stick properties are an outstanding feature of the all-purpose gasket made from modified PTFE. Downtime is minimised as a result, while machine reliability and availability are increased. Another advantage: novaflon® 100's impressive adaptability enables it to compensate for minor damage or unevenness in the flange surface.

Excellent media resistance makes novaflon® 100 the ideal solution for use in the chemical industry.

novaflon® 200

Modified PTFE with barium sulphate

novaflon® 200 has the best chemical resistance to strong alkalis.

High mechanical resistance, high pressure resistance (vacuum to 83 bar) and strongly optimised creep properties are convincing features of the all-purpose flat gasket made from modified PTFE.

The high purity of the gasket material, which is physiologically harmless, makes novaflon® 200 the ideal solution for use in the food and pharmaceutical industry.

novaflon® 300

Modified PTFE with silica

novaflon® 300 offers a very good balance between chemical resistance and reduced creep properties.

The flat gasket is not affected by concentrated acids either (except for hydrofluorides). The all-purpose gasket made from modified PTFE is therefore the product of choice for process industry applications.

High mechanical resistance at both high pressure (vacuum to 83 bar) and high temperatures makes novaflon® 300 the ideal solution for use in the chemical and petrochemical industry.

novaflon® 500

100% multi-directional expanded PTFE

novaflon® 500 offers a universal chemical resistance (pH 0-14).

Due to its unique production process novaflon® 500 shows an extremely good resistance to creep and cold flow.

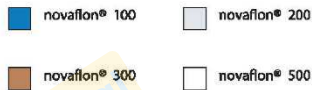
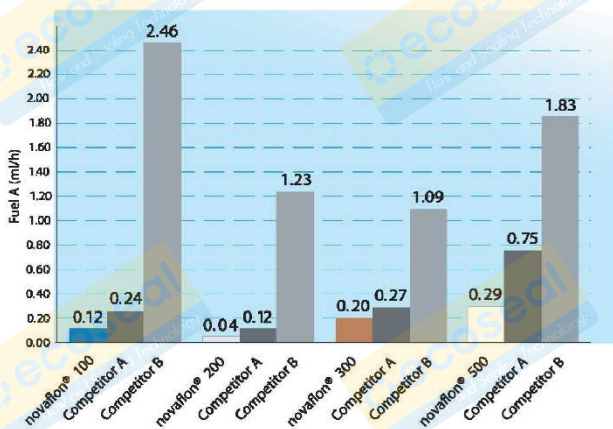
The gasket material compensates low bolt forces as well as flange irregularities and moreover stands out by extremely high pressure resistance (vacuum up to 200 bar)

These properties predestine novaflon® 500 for the application in the pharmaceutical industry, the food and beverage industry, especially suitable for glass lined flanges and FRP equipment or in reactors in the process industry.



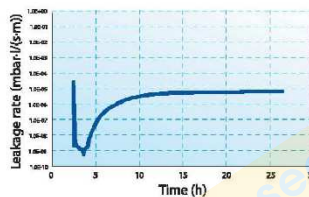
Technical information about novaflon

Leakage measurement - ASTM F 37 A

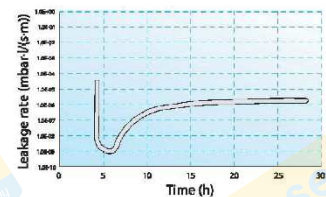


novaflon® meets the German fugitive emission regulation TA Luft

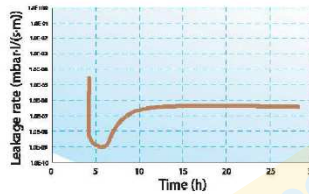
novaflon® 100
Leakage rate $5.8 \cdot 10^{-6}$ mbar-l/(s-m)



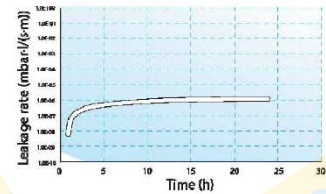
novaflon® 200
Leakage rate $1.7 \cdot 10^{-6}$ mbar-l/(s-m)



novaflon® 300
Leakage rate $5.4 \cdot 10^{-7}$ mbar-l/(s-m)

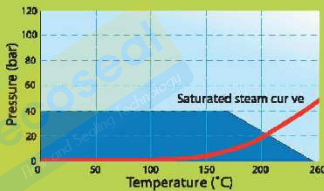


novaflon® 500
Leakage rate $1.2 \cdot 10^{-6}$ mbar-l/(s-m)

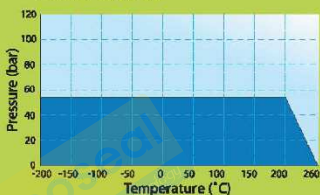


Recommendations for use according to the pressure and temperature

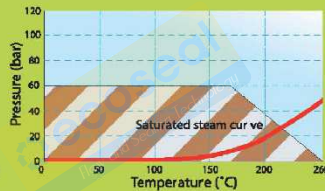
novaflon® 100 Water/steam



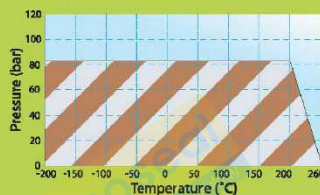
Other media*



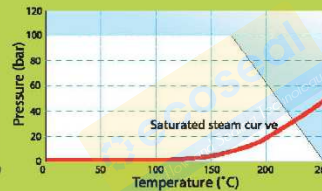
novaflon® 200/300 Water/steam



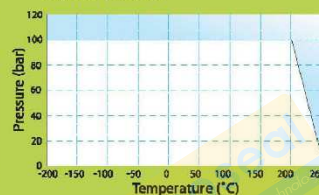
Other media*



novaflon® 500 Water/steam



Other media*



The temperature and pressure recommendations in the graphs apply to gaskets with a thickness of 2.0 mm and smooth flanges. Higher stresses are possible when thinner gaskets are used!

*Example for the most common other media. Exact data for specific individual cases are available in the Frenzlit novaDISC programme or contact our application engineering specialists.

Warranty exclusion

In view of the variety of different installation and operation conditions and application and process engineering options, the information given in this prospectus can only provide approximate guidance. There is as a result no basis for warranty claims.

Material data

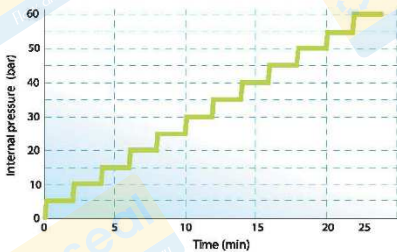
Blow-out test passed easily

Proof of the blow-out resistance of the gasket system is required in addition to leakage testing. According to the latest version of VDI 2200, the gasket has to be able to withstand 1.5 times nominal pressure at very reduced surface pressure levels. The gasket is fitted in a DIN flange DN 40/PN40 at 30 N/mm².

After storage of the flange system at 150 °C for 24 hours, nitrogen is applied gradually at a pressure of up to a maximum of 60 bar. Pressure would drop very rapidly if the gasket failed.

The gasket is then tested at two considerably reduced surface pressure levels. If the test is passed at 10 N/mm², a further reduction is made to 7.5 N/mm². Even in the most critical case of an extremely low surface pressure level of 7.5 N/mm² and maximum pressure of 60 bar, novaflo[®] gaskets demonstrate their impressive blow-out resistance in line with the German fugitive emission regulation TA Luft ...without internal edging. We can provide a certificate confirming this on request.

Blow-out test



General data

Approvals

Colour

Tolerances in thickness

Physical properties

Sample thickness 2.0 mm

Identification

Density

Tensile strength

Residual stress dE/16

Compressibility

Recovery

Cold compressibility KSW

Cold recovery KRW

Hot creep WSW/150

Hot recovery WRW/150

Leakage

Specific leakage rate (TA Luft)

Helium, 1bar, 30 MPA

VDI 2440/TA Luft

Helium, 1bar, 30 MPA

Helium, 1bar, 30 MPA

Helium, 1bar, 30 MPA

Helium, 1bar, 30 MPA

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Helium, 1bar, 30 MPA

| | novaflo [®] 100 | novaflo [®] 200 | novaflo [®] 300 | novaflo [®] 500 | | |
|---------------------------------|--------------------------|------------------------------|--------------------------|--------------------------|----------------------|----------------------|
| Approvals | FDA, TA Luft | FDA, TA Luft, DVGW, BAM | FDA, TA Luft, DVGW, BAM | FDA, TA Luft, DVGW, BAM | | |
| Colour | light blue | white | fawn | white | | |
| Tolerances in thickness | acc. DIN 28 091-1 | | | | | |
| Test standard | Unit | Value* | Value* | Value* | Value* | |
| Identification | DIN 28 091-3 | TF - G - O | TF - M - O | TF - M - O | TF - O - O | |
| Density | DIN 28 090-2 | [g/cm ³] | 1.70 | 2.90 | 2.10 | 0.90 |
| Tensile strength | DIN 52 910 | [N/mm ²] | 16 | 18 | 17 | 26 |
| Residual stress dE/16 | DIN 52 913 | [N/mm ²] | 12 | 14 | 16 | 18 |
| Compressibility | ASTM F 36 J | [%] | 25 | 3 | 5 | 50 |
| Recovery | ASTM F 36 J | [%] | 40 | 45 | 45 | 10 |
| Cold compressibility KSW | DIN 28 090-2 | [%] | 20 | 3 | 3 | 40 |
| Cold recovery KRW | DIN 28 090-2 | [%] | 4 | 1 | 1 | 3 |
| Hot creep WSW/150 | DIN 28 090-2 | [%] | 45 | 40 | 20 | 15 |
| Hot recovery WRW/150 | DIN 28 090-2 | [%] | 6 | 4 | 3 | 2 |
| Leakage | DIN 3535-6 | [mg/(m ² ·s)] | 0.015 | 0.015 | 0.015 | 0.015 |
| Specific leakage rate (TA Luft) | VDI 2440/TA Luft | [mbar·l/(m ² ·s)] | 5.8·10 ⁻⁶ | 1.7·10 ⁻⁶ | 5.4·10 ⁻⁷ | 1.2·10 ⁻⁶ |
| Helium, 1bar, 30 MPA | | | | | | |



Product data

novaflo[®] 100/200/300

- Dimensions in mm: 1200 x 1200 (for thickness 1.0mm) 1500 x 1500 (from thickness 1.5mm)
- Thicknesses in mm: 1.0/1.5/2.0/3.0

novaflo[®] 500

- Dimensions in mm: 1500 x 1500
- Thicknesses in mm: 0.5 to 9.0

Further dimensions and thicknesses are available on request.

novaflo[®] XXL

Large novaflo[®] gaskets can be supplied with scarfed edges and welded in one piece. Ideal for large gasket dimensions in use with corrosive media, for example in heat exchanger applications.

- Optimised leakage properties compared with PTFE dovetail joints
- Uncritical handling
- Less installation work
- Shorter downtime

Do you have any questions about your application?

The gasket information service will help you:

tatlee@tatelethailand.com



Good for people and the environment.

Frenzelit has obtained certification that the company complies with the requirements of both ISO/TS 16949 and ISO 14001. This means complete transparency in all areas and a high degree of security for our customers.

Quality management
ISO/TS 16949

Environmental management
ISO 14001

IPPC directive and TA Luft

Since October 2002 plant operators have had to observe the drastically tightened threshold values on diffuse emissions -- that's what the revised German fugitive emission regulation TA Luft requires which have thus been adjusted to the new European regulation (Council Directive 96/61/EC) as well as to new environmental and technical standards.

All novaflo[®] products observe the strict leakage criteria of the German fugitive emission regulation TA Luft comfortably.

GASKETS

TECHNICAL TEXTILES

EXPANSION JOINTS

INSULATION

NEW MATERIALS

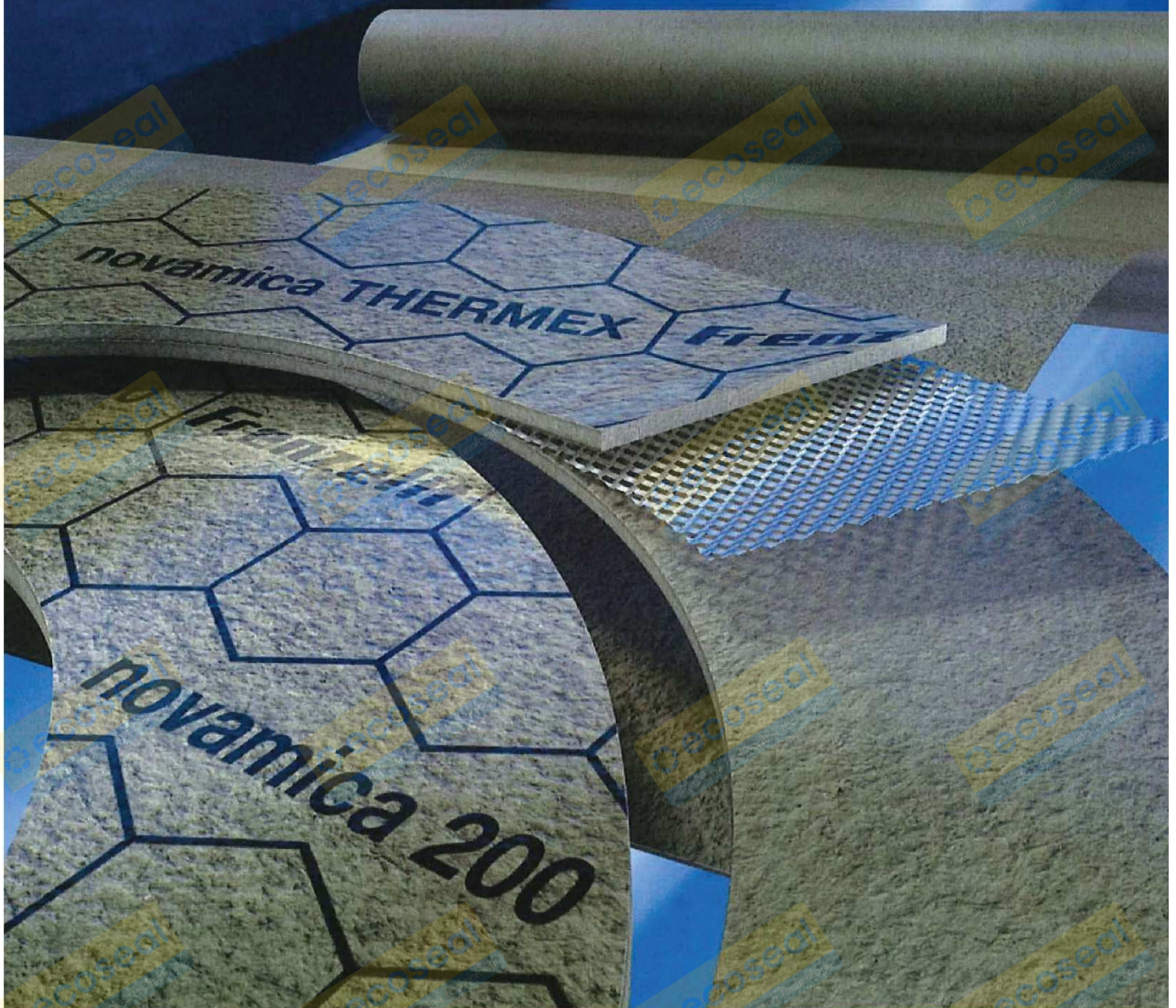


Frenzelit

creating
hightech
solutions

novamica®

Phlogopite mica for highest temperatures,
chemical resistance and electrical insulation.



Why novamica®?

Our materials made from optimised phlogopite mica have outstanding temperature resistance, chemical resistance, electrical insulation and processing properties.

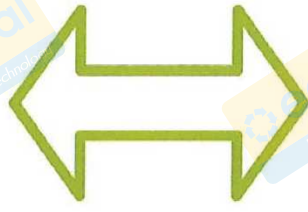
With the novamica® portfolio, we are supplying individual solutions for:

- Sealing at high temperatures up to 1000°C
- Sealing of aggressive / corrosive media at high temperatures
- Soft mica layers for metal gaskets (e.g. grooved and spiral wound gaskets)
- Production of parts with filigree geometry
- Processability with all the standard methods (plotter, water jet, punch, shears, cutter)



Applications

- Machine manufacturing
- Process industry
- Energy sector
- Glass industry
- Furnace manufacturing
- Automotive industry / mobility



Typical application areas

- Gaskets (high-temperature)
- Electrical insulation
- Soft layer
- Temperature-resistant compensation elements

Excellent material characteristics

The phlogopite mica used in the novamica® products resists temperatures of up to more than 1000°C. Other mica materials are far less resistant. Muscovite mica starts to calcinate at about 600°C, for example, while such structures as vermiculite that are similar to mica begin to calcinate at as low as 100°C.

With the material combination consisting of high-quality phlogopite mica, an efficient bonding system and expanded metal (THERMEX), it is possible to produce premium solutions for a wide range of high-temperature applications.

The material combinations

| novamica® | THERMEX | 200 | 100 REEL |
|---------------------------------------|---------|-----|----------|
| High-quality phlogopite mica | ◆ | ◆ | ◆ |
| Stainless steel expanded metal insert | ◆ | | |
| High-temperature bonding system | ◆ | ◆ | ◆ |
| Product range | | | |
| Sheets | ◆ | ◆ | |
| Reels | | | ◆ |

Technical details

| novamica® | | THERMEX | 200 | 100 REEL |
|----------------------------|---------|------------------------|------------------------------|--|
| Density (* = modal value) | [g/cm³] | 1.80* | 1.80* | 1.60* |
| Thickness range | [mm] | 1.0 / 1.5 2.0 / 3.0 | 0.8 / 1.0 1.5 / 2.0 / 3.0 | 0.5 |
| Sheet length x width | [mm] | 1,200 x 1,000 | 1,200 x 1,000 | - |
| Reel width x length | [mm] | - | - | 1,000 x 50,000 4.0 / 4.5 / 5.6 / 6.0 / 6.5 / 7.0 / 7.2 / 8.0 x 25,000 |
| Material strength | | ✓✓✓ | ✓✓ | ✓ |
| Temperature resistance | | ✓✓✓ | ✓✓ | ✓✓ |
| Adaptability / flexibility | | ✓✓✓ | ✓✓ | ✓✓✓ |
| Sealing properties | | ✓✓✓ | ✓✓ | ✓✓ |
| Media resistance | | ✓✓ | ✓✓✓ | ✓✓✓ |
| Electrical insulation | | ✓ | ✓✓✓ | ✓✓ |

✓ = Basically suitable ✓✓ = Very suitable ✓✓✓ = Highly suitable

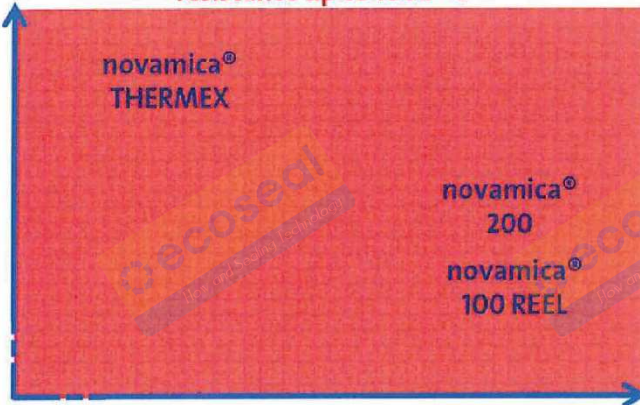
novamica® family: efficient operation in high temperature ranges

Strength
sealing
properties

Excellent

Good

Long-term temperature
resistance up to 1000 °C



Good

Excellent

Chemical resistance
Electrical insulation

Possible applications



Highly temperature-resistant
compensation element



Gasket with sophisticated
geometry



Electrical insulation



Corrosive media

Good for people and the environment.







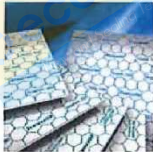
From research and development to our manufacturing operations and use of the product by the customer: quality assurance and a responsible approach to resources and the environment are a firm commitment we observe in everything we do throughout the life cycle of all products. The Frenzelit gasket division has obtained certification that the company complies with the requirements of ISO 9001, ISO 14001 and ISO 50001. This means complete transparency in all areas and therefore provides a high degree of security – for the benefit of our employees, the environment and our customers.

Quality management
ISO 9001

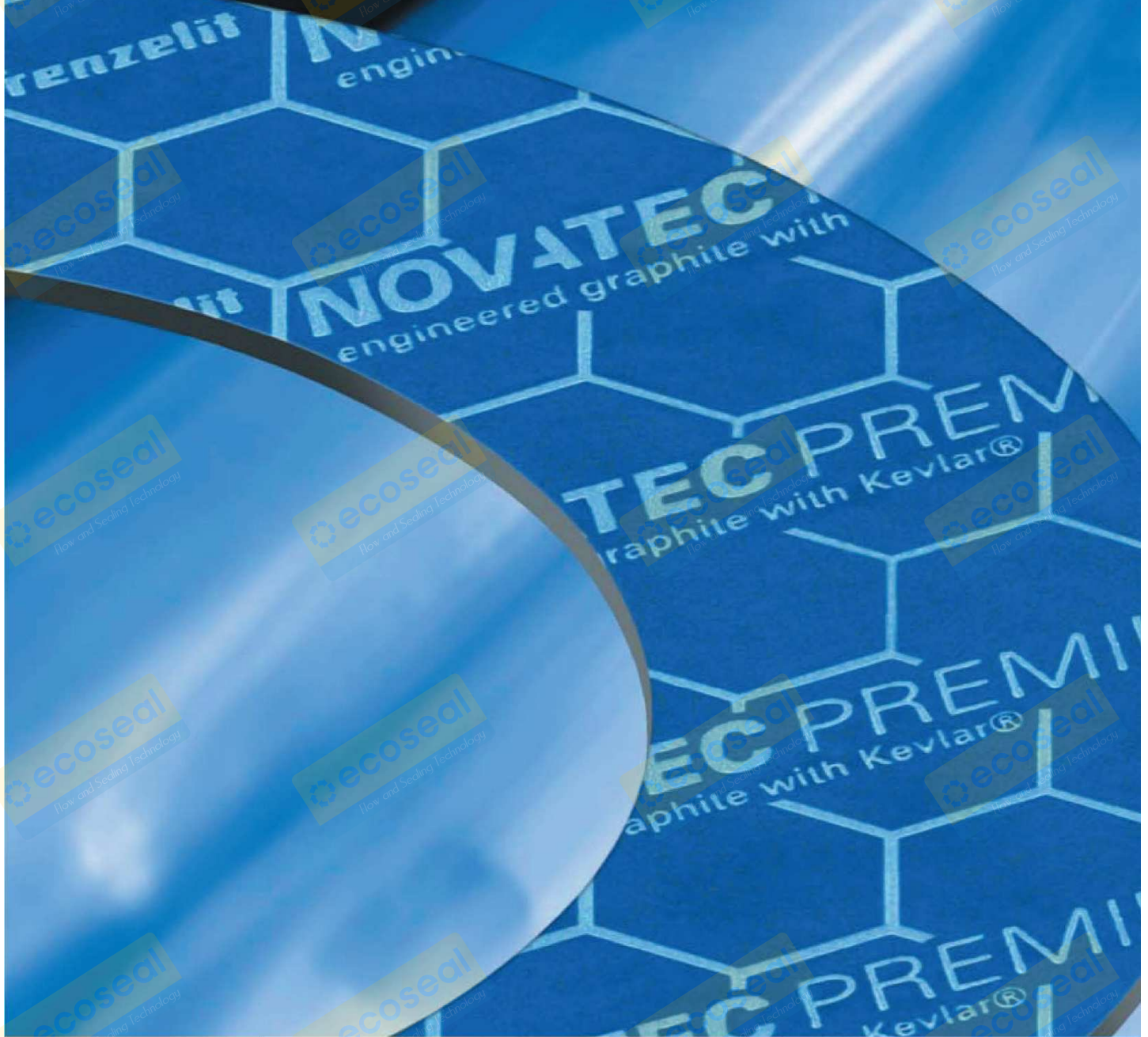
Environmental management
ISO 14001

Energy management
ISO 50001

Engineered by Frenzelit: Gasket materials / fibre-reinforced compounds

| novapress® | novatec® | novafilon® | novaphit® | novamica® | novaplan® | isoplan® |
|---|---|---|---|--|---|---|
|  |  |  |  |  |  |  |
| 200°C | 250°C | 260°C | 550°C | 1000°C | 1000°C | 1100°C |
| -100°C | -100°C | -200°C | -200°C | -200°C | -100°C | -100°C |
| Elastomer-bonded fibre compound gaskets | Fibre-reinforced graphite gaskets | Modified and filled PTFE gaskets | Expanded graphite with/without stainless steel expanded metal insert | Phlogopite mica with/without stainless steel expanded metal insert | Soft layer/insert for heat shield applications and cylinder head gaskets | High-temperature insulation materials |

novatec® PREMIUM II
The standard gasket for
industrial applications.





Your wish ...

- Higher safety standards
- Higher temperature resistance
- Higher media resistance
- All-purpose products
- Maximum design reliability
- Optimised adaptability
- Better handling properties

... is our command

- novatec® PREMIUM II is the standard gasket.
- novatec® PREMIUM II covers 80% of all industrial applications.

Optimum benefits thanks to a unique material composition

Media-resistant at high temperatures

novatec® PREMIUM II is the generation of the proven novatec® PREMIUM range. The graphite-Kevlar® material combination guarantees an efficiency level that exceeds all standard fibre gaskets on the markets on the market. The large proportion of graphite combined with the small proportion of bonding agent provides resistance to about 80% of all the media used commonly for general industrial applications as well as in the chemical industry particularly.

Excellent pressure resistance

novatec® PREMIUM II has long-term resistance properties and guarantees constant reliability throughout the maintenance cycle. Pressure resistance is higher than with all conventional high-pressure gaskets. The long useful life extended maintenance intervals and can therefore be relied on to cut costs.

Optimised adaptability

Due to its material structure, novatec® PREMIUM II compensates for flange unevenness and roughness that are found in old systems in particular.

Unique release properties

The special process used to apply the release coating incorporated in the blue colour makes the coating considerably more effective than conventional fibre gaskets, while the solvent-free formulation means it contributes actively to protection of the environment.

Tool-friendly processing

novatec® PREMIUM II is simple and excellent to process because of the large proportion of graphite it contains.

Better handling properties

Since they are very flexible, even sheets 3.0 mm thick can be shipped inexpensively in tubes. novatec® PREMIUM II proves to be extremely rugged when handled improperly during transport and installation.

Single-piece gaskets of all sizes and thicknesses

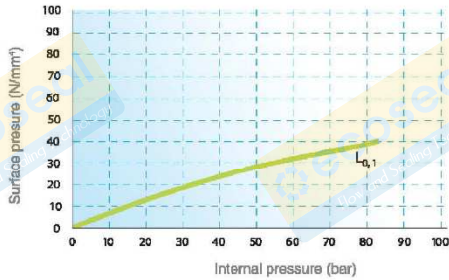
novatec® PREMIUM II is available in large formats and all normal thicknesses. Special dimensions can be produced in a single piece without any complicated processing operations.

Kevlar® is a trademark registered by DuPont.



Technical information about novatec PREMIUM II

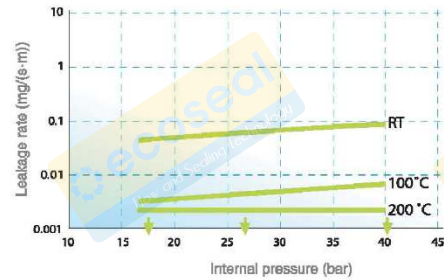
Specific leakage rate



novatec® PREMIUM II remains well below the leakage limits specified by DIN 3535.

Leakage category: $L = 0.1 \text{ mg}/(\text{s}\cdot\text{m})$ · test gas: nitrogen · thickness: 2.0 mm

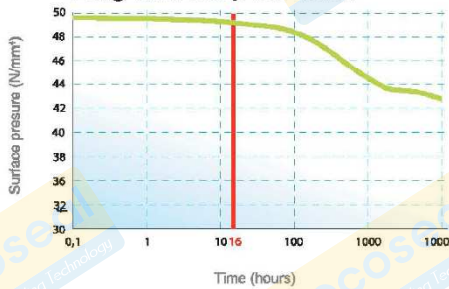
Leakage rate under the influence of temperature



novatec® PREMIUM II is designed for minimum leakage. Microporosity under the influence of temperature and surface pressure is reduced and the gasket material is transformed into a closed, homogeneous structure. Leakage at 200 C is lower than the detection limit in mass flow rate measurement of 0.001 mg/(s·m)

Surface pressure: $O = 30 \text{ N/mm}^2$ · specimen dimensions: 90 x 50 x 2 mm.
test medium: N_2

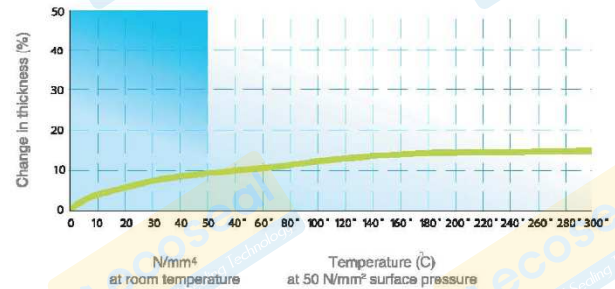
Long-term creep relaxation



novatec® PREMIUM II has very high long-term pressure resistance properties and thus provides constant reliability throughout the maintenance cycle.

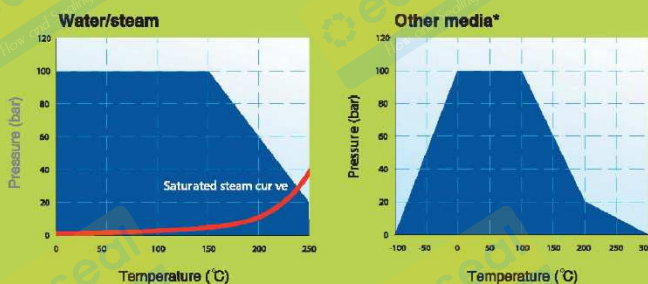
Gasket dimensions: 75 x 55 x 1.5 mm · surface pressure: 48 - 50 N/mm²
test temperature: 300 C stiffness C: 840 kN/mm

Deformation under temperature 2.0 mm



The thickness of novatec® PREMIUM II decreases to a particularly small extent under the influence of temperature. At 300 C, thickness is only 5 % lower than at room temperature.

Recommendations for use according to the pressure and temperature



The temperature and pressure recommendations in the graphs apply to gaskets with a thickness of 2.0 mm and smooth flanges. Higher stresses are possible when thinner gaskets are used!

*Example for the most common other media. Exact data for specific individual cases are available in the Frenzelit novaDISC programme or contact our application engineering specialists.

Warranty exclusion

In view of the variety of different installation and operation conditions and application and process engineering options, the information given in this prospectus can only provide approximate guidance. There is as a result no basis for warranty claims.

Material data

Material profile

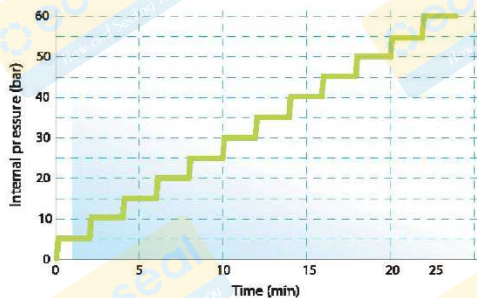
- Very Compact gasket material, pressure-resistant, temperature-resistant and with good forming properties
- The main components are graphite and aramide fibres, bonded with NBR.
- State-of-the-art composite material that combines the advantages of graphite and aramide

Blow-out test passed easily

Proof of the blow-out resistance of the gasket system is required in addition to leakage testing. According to the latest version of VDI 2200, the gasket has to be able to withstand 1.5 times nominal pressure at very reduced surface pressure levels. The gasket is fitted in a DIN flange DN40/PN40 at 30N/mm².

After storage of the flange system at 200°C for 24 hours, nitrogen is applied gradually at a pressure of up to a maximum of 60 bar. Pressure would drop very rapidly if the gasket failed.

The gasket is then tested at two considerably reduced surface pressure levels. If the test is passed at 10 N/mm², a further reduction is made to 7.5 N/mm². Even in the most critical case of an extremely low surface pressure level of 7.5 N/mm² and maximum pressure of 60 bar, novatec® PREMIUM II demonstrates its impressive blow-out resistance in line with the German pollution regulations-without internal edging. We can provide a certificate confirming this on request.



General data

| | |
|-------------------------|--|
| Binders | NBR |
| Approvals | DVGW, KTW, WRC, W 270, VP 401, BAM (max . 120°C/130 bar), TA Luft, SVGW royal blue |
| Colour | royal blue |
| Anti-stick coating | both sides A 310 standard |
| Tolerances in thickness | according to DIN 28 091-1 |

Physical properties

| | Standard | Unity | Value* |
|-----------------------|------------------|----------------------|--------------|
| Gasket thickness | 2.0 mm | | |
| Identification | DIN 28 091-2 | | FA - A 1 - O |
| Density | DIN 28 091-2 | [g/cm ³] | 170 |
| Tensile strength | DIN 52 910 | | |
| longitudinal | | [N/mm ²] | 18 |
| transverse | | [N/mm ²] | 14 |
| Residual stress | dE/16 | | |
| 175°C | DIN 52 913 | [N/mm ²] | 37 |
| 300 °C | | [N/mm ²] | 30 |
| Compressibility | ASTM F 36 J | [%] | 7 |
| Recovery | ASTM F 36 J | [%] | 60 |
| Cold compressibility | KSW | [%] | 6 |
| Cold recovery | KRW | [%] | 3 |
| Hot creep | WSW /200 | [%] | 6 |
| Hot recovery | WRW/200 | [%] | 2 |
| Recovery R | DIN 28 091-2 | [mm] | 0.04 |
| Specific leakage rate | DIN 3535-6 | [mg/(s·m)] | 0.1 |
| Specific leakage rate | 2,0 | [mg/(s·m)] | 0.1 |
| Fluid resistance | ASTM F 146 | | |
| ASTM IRM903 | 5h/150°C | | |
| Weight change | | [%] | 10 |
| Thickness increase | | [%] | 5 |
| ASTM Fuel B | 5h/23 °C | | |
| Weight change | | [%] | 10 |
| Thickness increase | | [%] | 5 |
| Chloride content | Siemens AV-9-014 | [ppm] | 5 0 |

* Mode (typical value)

Product data

- Dimensions in mm: 1500 x 1500
Thicknesses in mm: 0.5/0.8
- Dimensions in mm: 2000 x 1500
Thicknesses in mm: 1.0/1.5/2.0/3.0
- Further dimensions and thicknesses are available on request

Good for people and the environment.

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Quality management

ISO/TS 16949

Environmental management

ISO 14001

German fugitive emission regulations with clear instructions

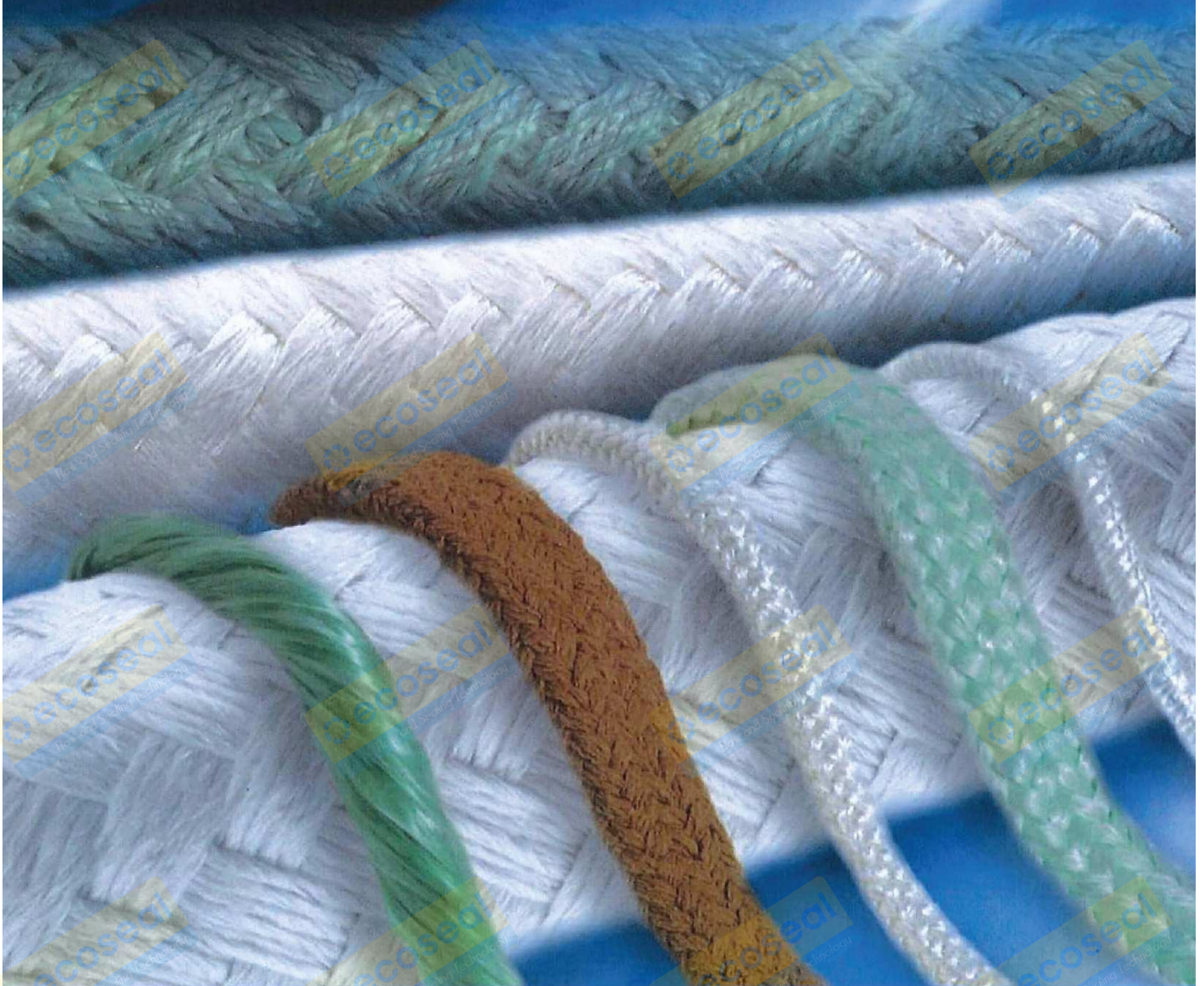
The air pollution regulations that have applied in Germany since October 2002 define and specify the commitments for operators of industrial equipment that requires approval.

Clear rules are made there for flange connections. In this context, technically tight flange connections have to be used in accordance with VDI 2440 (issue 11/2000).

novatec® PREMIUM II has been tested extensively at a temperature of 250 °C at MPA Stuttgart and has been classified as a high-quality gasket in accordance with the VDI directive 2440 for the German pollution regulations. The leakage rate of $2.3 \cdot 10^3$ mbar · l/(s·m) is therefore substantially lower than the maximum acceptable limit of 10^4 mbar · l/(s·m), which is measured with the help of a helium mass spectrometer at a surface pressure level of 30 N/mm² and with pressure of 1 bar.



Technical cords and braids for sealing and insulation.



Technical cords and braids

As a major supplier of technical textiles for use in gaskets and thermal insulation we help our customers to increase their competitive edge over their competitors.

Frenzelit has been developing and manufacturing textiles which are capable of withstanding high temperatures for more than 50 years. We listen to customer requirements, and give pro-active support throughout the development, sampling and manufacturing processes.

Your advantage: You, the customer, benefit not only from our technical knowledge but also from our decades of experience in application engineering.



There are four technical cord and braid product lines offered by Frenzelit, each with different temperature limits and numerous product types – perfectly adapted to their particular application.

Innovations made by Frenzelit

Continuous improvement is essential in order to remain competitive in today's market. Frenzelit has extensive research and development facilities where new products are fully tested prior to introduction to the marketplace. Where customers provide time constraints we are able to offer timely customer support to ensure solutions are found and new technologies are implemented on time and within budget. These are the outstanding features of "innovations made by Frenzelit".

Application areas

Optimum raw material processing makes sure that cords and braids from Frenzelit have consistently high sealing and insulating properties.

The extensive range means that the products can be put to many different uses in all application areas.

The appropriate product line is chosen according to the original temperature and the particular application. It is more and more frequently the case that standard products are replaced by special versions with properties that are developed together with the customer.



Product lines

isoTHERM® ST

Application temperature limit
1050 °C (1100 °C for a short time)

Special SiO₂ glass fibres that withstand high temperatures are the basic material for these products.

Their characteristic properties are low thermal conductivity, minimum heat storage and absolute incombustibility.

isoTHERM® ST does not irritate the skin, is absolutely harmless to health and has excellent chemical resistance properties.

- Filament diameter 6–9 µm
- Incombustible (based on DIN 4102)
- Loss due to shrinkage < 3 %

isoTHERM® 800

Application temperature limit
700 °C (800 °C for a short time)

The products are based on textured special glass and can be identified by their light green colour. Extremely textile properties even at high temperatures are their particular characteristic.

isoTHERM® 800 is absolutely harmless to health, withstands high temperatures and has excellent chemical resistance properties.

- Filament diameter 6–14 µm
- Incombustible (based on DIN 4102)
- Loss due to shrinkage < 3 %

isoGLAS®

Application temperature limit
450 °C (550 °C for a short time)

E-glass is the basic material. Texturing guarantees a large storage volume and thus good insulation properties.

isoGLAS® products are extremely textile and harmless to health.

- Filament diameter 6–11 µm
- Incombustible (based on DIN 4102)
- Loss due to shrinkage < 1.5 %

novaTEX® GOLD

Application temperature limit
450 °C (Decomposition temp. 650 °C)

High-performance fibres with outstanding properties form the basis for this product family.

The main characteristics of novaTEX® GOLD are high strength and excellent wear properties combined at the same time with high temperature resistance.



Product types



Cords

Features: Round, left/right twisted strands, knitted sheath (depending on the product line and dimensions), dimensionally stable, elastic and tear-resistant

Product lines available: isoGLAS®, isoTHERM® 800, isoTHERM® ST

Dimensions available: 3 - 30 mm



Packings

Features: 2/3-diagonally braided, square, rectangular or round (braided sleeving) for static applications

Product lines available: isoGLAS®, isoTHERM® 800, isoTHERM® ST, novaTEX® GOLD (The isoGLAS®, isoTHERM® 800 and isoTHERM® ST product lines can also be supplied in a round version as well as with a flexible fibre filling)

Dimensions available: Square 5 - 60 mm, round 6 - 50 mm (novaTEX® GOLD, square 5 - 12 mm)



Sleevings

Features: Braided, flexible, wall thicknesses 3 - 6 mm (depending on the dimensions)

Product lines available: isoTHERM® 800, novaTEX® GOLD

Dimensions available: 6 - 50 mm inside diameter



Knitted ropes

Features: Round, dimensionally stable, highly flexible, adaptable

Product lines available: isoGLAS® (can be supplied with a flexible fibre filling too)

Colours available: White, black

Dimensions available: 6 - 20 mm

Different grades, versions and dimensions as well as finished parts are available on request.

Application areas

Heating and air conditioning

Sealing in furnace and boiler manufacturing:

- Boiler doors
- Furnace doors
- Chimney doors
- Chimney pipes
- Inspection flaps
- Hatches
- Panelling

Process industry

Sealing for the steel industry:

- Moulds
- Continuous casting
- Chamber frames
- Tanks
- Feed tubes
- Charging cars
- Telescopic pipes
- Substructures
- Furnace sleeving

Zinc strippers

Protection for hoses and electricity cables

Sealing for the aluminium industry:

- Crucibles
- Smelting furnace lids
- Distribution channels
- Casting furnace spouts

Transport rollers for the glass industry

Power industry

Pipe insulation

Protection for hoses and electricity cables

Inspection hatches and door sealing

Good for people and environment.

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Quality management

ISO/TS 16949

Environmental management

ISO 14001

Further sealing and insulating products from Frenzelit

Technical needlemats
for thermal and acoustic insulation and the filtration industry



Technical tapes and woven fabrics
for sealing and insulation



novaSEAL®
Boiler and tank rings



Tadpole tapes, wound packings and layered tapes
for sealing applications



Solutions
for acoustic and heat insulation



Thermal blankets
to protect people and property



Technical needlemats for thermal and acoustic insulation and filtration.



Technical needlemats for thermal and acoustic insulation and filtration.



Technical needlemats

As a comprehensive supplier of systems for gaskets, insulation and technical textiles, we help to make sure our customers maintain and increase their competitive edge.

We have been involved in the area of textiles that withstand high temperatures for more than 60 years now: development, testing, sampling, production - we give our customers active support throughout the process chain as an all-round manufacturer of textile insulation.

Your advantage: you benefit not only from our extensive material know-how but also from our decades of experience in international application engineering.

Innovations made by Frenzelit

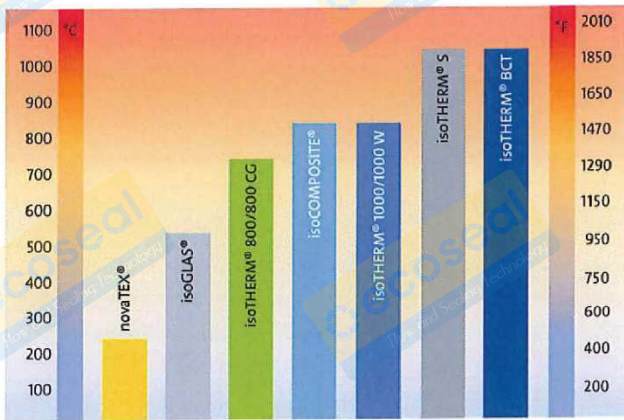
Continuous improvement is essential in order to remain competitive. In research and development. In testing and implementing new technologies. And where the time factor is concerned. So we liaise with our customers to develop solutions that set standards for others. Short implementation times, clear customer orientation, perfect support - these are the outstanding features of „innovations made by Frenzelit“.

Application areas

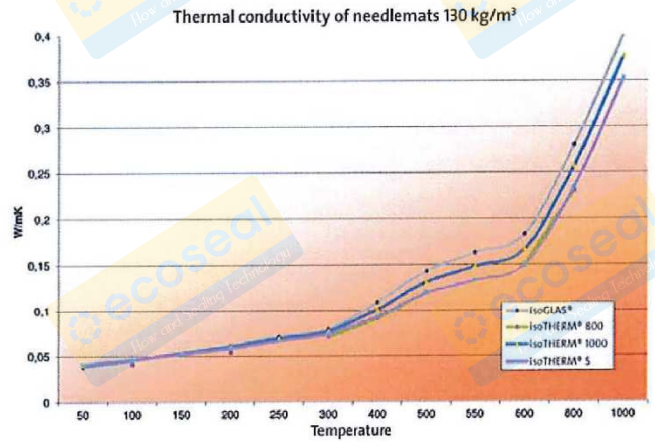
Careful selection and optimum processing of our raw materials make sure that technical needlemats from Frenzelit have consistently high insulation properties - whether they are supplied in rolls, punched or cut into 3D and 2D shapes by water jets.

Our technical needlemats are used not only in the insulation field but also in many other areas. The product line chosen is determined according to the insulation capacity required and the application temperature.





Summary of the application temperature limits of Frenzelit needlemats

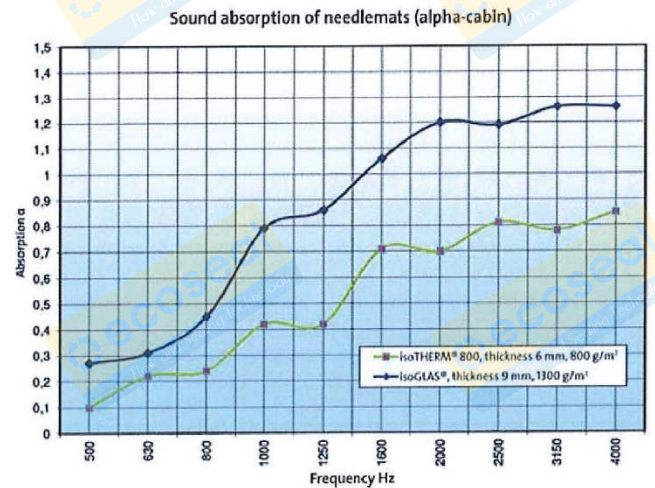


Comparison of the thermal conductivity of Frenzelit needlemats

Long-term functional stability

Glass fibres that are harmless to health are the basic material we always use for high-temperature applications. The fibre diameter of at least 6 µm is considerably higher than the WHO respirability limit. The fibres do not contain any toxic components either and they are easy on the skin (no REACH classification is necessary). The insulation materials are manufactured using our shot-free and glass bead-free technology. The continuous fibres used for this purpose are shot-free and therefore guarantee maximum quality without any faults.

There are eight technical needlemat product lines in total. With different temperature limits. And with numerous product types - so there is always one that is the perfect choice for any application.



Absorption graphs for isoGLAS® and isoTHERM® 800 needlemats



Product lines

isoTHERM® BCT

Application temperature limit **1050 °C** (1100 °C for a short time)
 Product made from high-performance fibres with an SiO₂ content of at least 94 %.
 Low thermal conductivity, low smoke and odour as well as flexible, easily processed final material characteristics are the outstanding properties of this product.

- Non-combustible
- Shot-free & glass bead-free

isoTHERM® S

Application temperature limit **1050 °C** (1100 °C for a short time)
 Special SiO₂ glass fibres that withstand high temperatures are the basic material for these products.
 Their characteristic properties are low thermal conductivity, minimum heat storage and absolute incombustibility.

isoTHERM® S is easy on the skin, is absolutely harmless to health and has excellent chemical resistance properties.

- Incombustible (ap. for fire category A1 according to DIN 4102)
- Shot-free & glass bead-free

isoTHERM® 1000

(Colour blue)

isoTHERM® 1000 W

(Colour off-white)

Application temperature limit **850 °C** (1000 °C for a short time)
 The basic material is produced by a chemical refinement process. The components that melt at a low temperature are eliminated from E-glass fibres in this process, so that the temperature resistance level is increased.

isoTHERM® 1000 has extremely textile properties, is very easy on the skin and is classified as absolutely harmless to health.

- Non-combustible
- Shot-free & glass bead-free

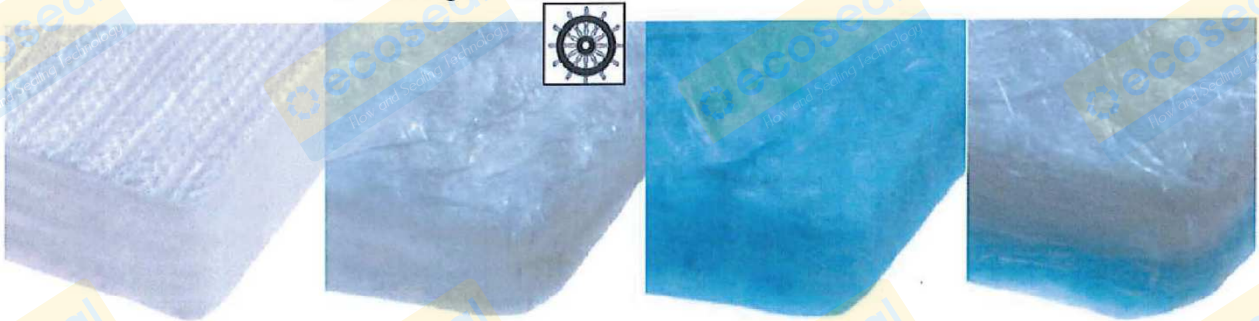
isoCOMPOSITE®

Application temperature limit **850 °C** (1000 °C for a short time)

A specific combination of isoTHERM® 1000 and isoGLAS® needlemats is the basic material for this mat.

It is an extremely efficient and economic heat insulation material.

- Non-combustible
- Shot-free & glass bead-free

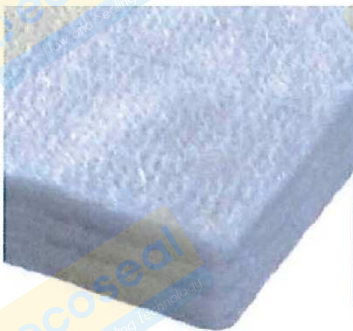


isoTHERM® 800 CG

Application temperature limit
750°C (850 °C for a short time)
Product based on special glass that has extremely textile properties even at high temperatures.

isoTHERM® 800 and 800 CG are absolutely harmless to health, resist high temperatures and have good chemical resistance properties.

- Shot-free & glass bead-free



isoGLAS®

Application temperature limit
550°C (650 °C for a short time)
E-glass is the basic material. Texturing guarantees a large storage volume and thus good insulation properties.

isoGLAS® mats are extremely textile and harmless to health.

- Incombustible (ap. for fire category A1 according to DIN 4102)
- Shot-free & glass bead-free

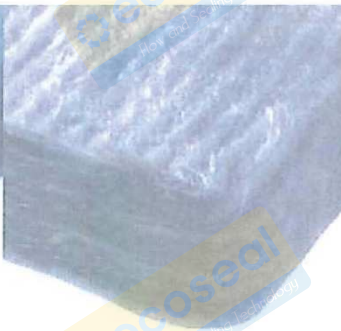


isoGLAS® GN

Application temperature limit
550°C (650 °C for a short time)
Needlemat based on low-sizing glass fibres that develop particularly little smoke and odour and practically no formaldehyde, loss on ignition < 0,15 %.

isoGLAS® GN has been developed for applications in cooking stoves, ovens, commercial kitchens and smoke-houses. No advance heating is required.

- Non-combustible
- Shot-free & glass bead-free



isoTECH needlemats

High-performance fibres made - for example - from meta-aramide, para-aramide, polyester, viscose FR, polyimide, polypropylene and carbon are the basis for this generation of innovative needlemats - either in combinations or alone, depending on the application.

isoTECH needlemats are developed in close co-operation with our customers for specific applications - so they are always a solution that meets your requirements perfectly. Their thickness and weight depend on the fibre used in each case.



Properties

Cover fabrics

isoGLAS® or isoTHERM®

Specially finished with, for example, Mtex®, Alufix, silicone, depending on the requirements (abrasion resistance, resistance to weathering, UV resistance, low emissivity, hydrophobicity, oleophobicity, suitability for fire protection applications, low fire toxicity, washability)

Inner fabrics

isoGLAS® or isoTHERM®

Reinforced with stainless steel wire if necessary (greater wear protection, mechanical strength for better insulation integrity, run-flat properties, high heat resistance)

Insulation materials made from needlemat

isoGLAS® or isoTHERM®

Depending on the temperature requirements: highly effective insulation properties, high temperature resistance, vibration resistance, no shot content, low heat flux and thus low heat loss, low thermal conductivity, high heat resistance

Application areas

| | |
|--|---|
| Automotive | Insulation Heat shielding Rear-window shelves Panelling Soundproofing Wagon manufacturing |
| Heating and air conditioning | Heating system production Heatproofing production Tiled and chimney heating stove insulation |
| Energy industry | Solar collectors |
| Machine manufacturing and plant engineering | Turbine insulation Insulation pillows Expansion joints External insulation of boilers Soundproofing |
| Electrical appliance industry | Night storage heaters Electric cookers Ovens Gas cookers Fire protection in cable ducts |
| Safety engineering | Fire protection Fire barriers Fire protection covers Fire door insulation Roll-down doors |

Cut to size



There is a choice of 7 standard needlemat materials for insulation solutions in different temperature ranges up to 1100°C. Additional alternatives are produced to customers' individual specifications wherever needed. The basic designs required are created in the CAD system (e.g. from dwg, dxf or jpeg files) and are then manufactured accurately, right down to the smallest detail - using either our punching or our water jet cutting equipment.

Moulded



A perfect fit in the third dimension too: appropriate tooling is used to produce finished, moulded 3D parts from isoTHERM® SG insulation material based on isoTHERM® needlemat and special chemistry. Dimensional stability and exact dimensions not only facilitate the installation of insulation materials. In addition to this, they in particular guarantee maximum possible functionality.

Product types

isoTHERM® BCT

Thickness: 3 - 25 mm
 Weight: 350 - 4300 g/m²

All needlemat qualities have a density of 130 - 160 kg/m³

isoTHERM® S

Thickness: 3 - 25 mm
 Weight: 350 - 4300 g/m²

isoTHERM® 1000/1000 W

Thickness 1000: 6, 10, 12 mm
 Thickness 1000 W: 3 - 25 mm
 Weight 1000: 700, 1400 g/m²
 Weight 1000 W: 350 - 4300 g/m²

isoCOMPOSITE®

Thickness: 10 - 75 mm
 Weight: 1800 - 10000 g/m²

isoTHERM® 800/800 CG

Thickness: 3 - 25 mm
 Weight: 350 - 4300 g/m²

isoGLAS®

Thickness: 3 - 75 mm
 Weight: 300 - 10000 g/m²

isoGLAS® GN

Thickness: 3 - 75 mm
 Weight: 300 - 10000 g/m²

isoTECH-Nadelvliese

Thickness: up to 25 mm
 Weight: 100 - 2000 g/m²

Different grades, versions and dimensions as well as finished parts are available on request.

Coating/lamination and needlemat reinforcement

Coating, lamination or reinforcement with scrim (up to 9 mm thick): finishing processes can be used to adapt the properties of our needlemats so that they satisfy your specific requirements.

The options available are:

- Scrim to 9 mm thickness
- Vermiculite coating 700 °C
- Alufix coating 200 °C
- Aluminium foil lamination 650 °C
- Aluminium lattice foil lamination 650 °C

Good for people and the environment.

From research and development to manufacturing at our factory and use of the product by the customer: quality assurance and a responsible attitude to resources and the environment are central features of all we do - throughout the life cycle of every single product.

The Frenzelit Technical Textile Division has obtained certification of its compliance with the requirements not only of ISO 9001 and ISO/TS 16949 but also of ISO 14001 and also complies with marine work safety association Module D. This means complete transparency in all areas and therefore guarantees maximum safety and security - for our employees, for the environment and for our customers.

Quality management

ISO 9001

ISO/TS 16949

Marine work safety association Module D

Environmental management

ISO 14001



Further sealing and insulating products from Frenzelit:

Technical woven fabrics and tapes
for sealing and insulation



Technical cords and braids
for sealing and insulation



novaSEAL®
Boiler and tank rings



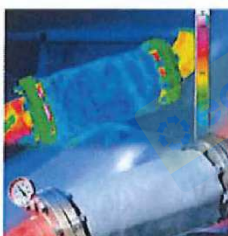
Tadpole tapes, wound packings and layered tapes
for sealing applications



Acoustic solutions
for acoustic and thermal insulation



Blankets
to protect people and property



Engineered textile solutions
for thermal and acoustic insulation