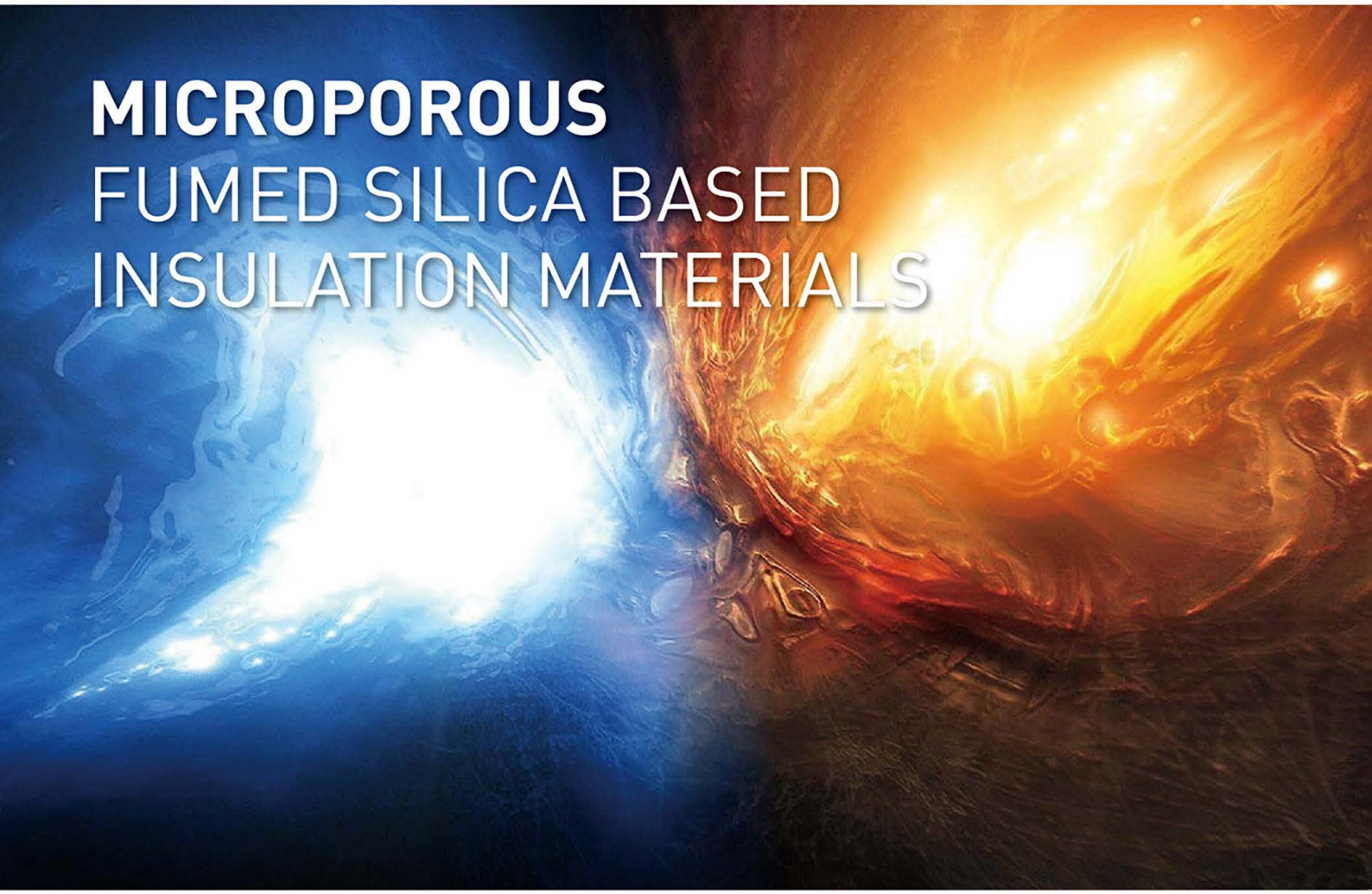
UNICORN
Insulations




Unicorn Insulations Limited


## Profound knowledge put into practice

Unicorn Insulations is the innovative producer and supplier of microporous insulation products and solutions for sophisticated thermal applications and processes. We rely on decades of experience in various industries and realized projects at worldwide key players.

The deep understanding of this materials characteristic, first in the production process and later in the application, enables us to catalyze your ideas and their feasibility and accelerate your R&D project.

Our R&D laboratories in Germany and China ensure short distances and quick results.

We believe that high performance thermal insulation is significantly contributing to solve the world' s major challenges like energy availability, global warming and even food shortage induced by heat degeneration.

Less visionary: it helps you to reduce the energy consumption of your application and therefore optimizes your profit.


CTO / Co-founder Thomas Eyhorn


Our microporous insulation materials has become state of the art in many areas and still is expanding its success portfolio.

- **industrial ovens and kilns**
- **ferrous and non-ferrous industry**
- **petrochemical industry**
- **glass production and processing**
- **renewable energy**
- **cement industry**
- **cold chain logistic**
- **building insulation**
- **household appliances**
- **PFP (Passive Fire Protection) systems**

**Professional technic solutions**

Thermal simulation and solutions

Production of 3D shapes

Sample verification

Custom made mold (dimensions or shapes)

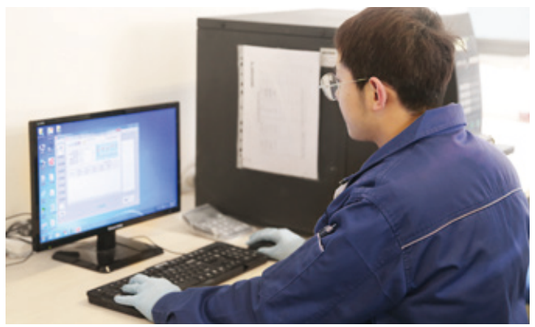
**Reliable • Trustworthy • Sustainable**

RoHS compliant

TÜV SÜD ISO 9001:2015 certified

Extensive inhouse test programs

Total Quality Management mindset






**Best in class packing solution**

Strong, sustainable, reusable

Easy to unpack

Easy to repack for resellers

We provide a good and waste optimized solutions for FCL to save costs and resources and efforts of the client to dispose the packing

*“Unicorn has always put quality and reliability as highest priority. They offered us a sustainable solution by optimizing our process in terms of energy consumption and throughput.”*

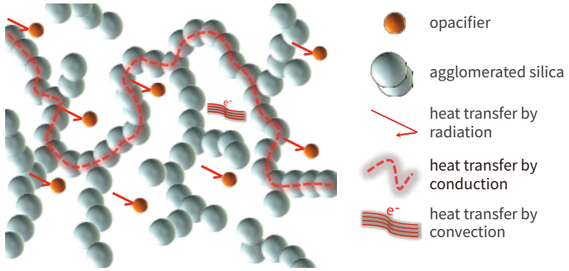
# The advantages of Unicorn microporous insulation solutions

Microporous insulation panels are the first choice for high temperature insulation applications. When using this product a high thermal insulation performance will be achieved, along with simultaneously low insulation thickness. In this way this synthesis guarantees a technologically sophisticated insulation and a high economic efficiency.

The panels are non-flammable and conform to the requirements of fire resistance 'Grade A'.

## Lowest thermal conductivity

The outstanding insulation effect and the low space requirement of the insulation are due to the extremely low thermal conductivity of the microporous material. Owing to their microporous structure and the existence of opacifiers, all three components of heat transmission – conduction, convection and radiation – are optimized to the physical limit under atmospheric pressure.




The low thermal conduction arises from the very small silica particle agglomerates of approximately 10 nm which only have a single point to touch each other. The pores in which the gas molecules could transfer their energy to the next molecule are smaller than the necessary free path length of the gas. As an effect the convection is limited to a minimum. The specified minerals cause the infrared radiation to be limited.

## Advantages compared to conventional materials

The following advantages arise from the use of microporous insulating products in comparison to conventional materials.

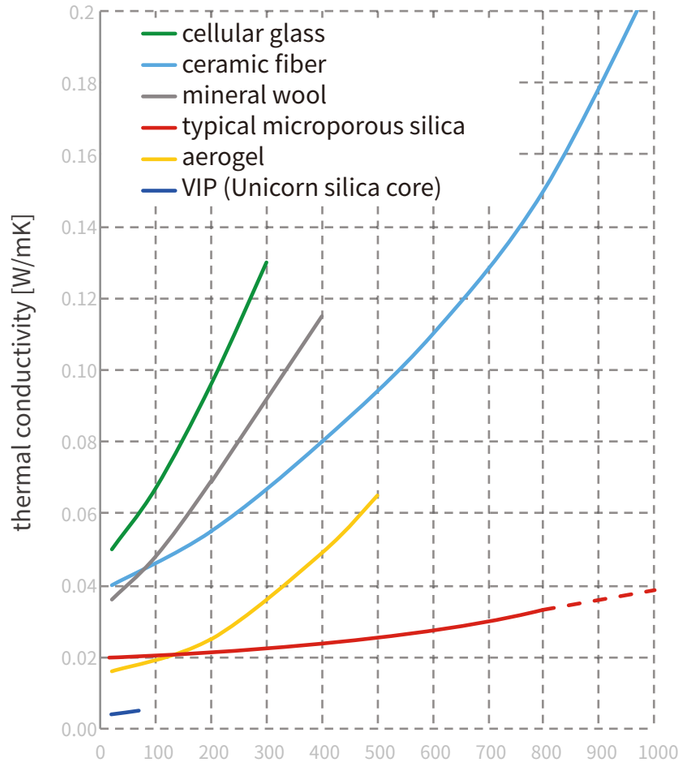
- saving space by means of thinner insulation with the same effect
- less heat loss with the same space requirements
- greater application volume capacity with the same space requirements and heat loss.

## Versatile and easy workability

The product can be processed by using standard woodworking tools and machines. It can be cut, sawed or even milled. As a result the insulation panels are quick and easy to handle even in demanding installation contexts.



**thermal conductivity of different materials**




Microporous insulation panels are characterized by a high temperature resistance of up to 1200 °C (2192 °F). In particular at high temperatures the products far exceed the insulating effect of alternative insulation materials. The low rising of the thermal conductivity with temperature increase and the minimal shrinkage at maximum temperature are also advantageous.

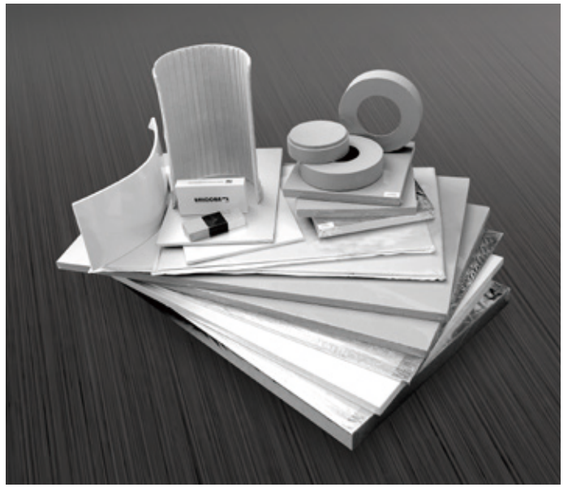
The microporous material is thermal shock resistant. It tolerates fast heating and cooling cycles for a long duration of time.


## Features and benefits

| Feature | Benefit |
|---|---|
| Lowest thermal conductivity | Low space requirement of the insulation; helps systems builders to provide competitive “green” products; helps end-users to reduce their energy bill |
| Temperature resistance of up to 1200 °C (2192 °F) | Suitable for a large variety of applications |
| Variable characteristics, thicknesses and formats of insulation available | Suitable for a broad range of applications such as high temperature insulations or VIP cores, quick and easy installation |
| Versatile and easy workability, high flexural strength | Meets requirements of demanding application contexts |
| Non hazardous material | Safe handling for staff; protects health; recyclable |

# Product Family overview

## Second to none: Unicorn microporous insulation panels

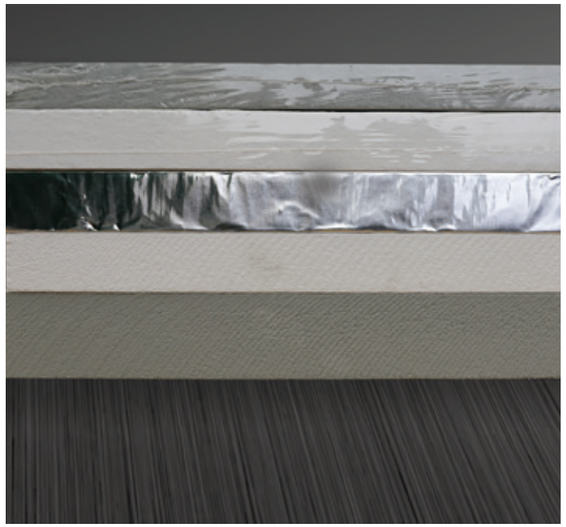


The Unicorn insulating panels are provided in a wide variety of dimensions. The required length and width of the panel can be chosen more or less without restriction. Thicknesses of insulation panels from 3 mm up to 50 mm and various formats (standard trimmed panel: 1000 mm x 600 mm) are ready.

Flexible panels are also available. These panels can be bent in order to insulate curved shapes.

Customized pressing molds deliver exactly the required dimensions in an application and reduce the cutting waste to a minimum. Using a customized press mold amounts in a considerable economical advantage for large order volumes.

## Broad variety of options



The use of a lamination enhances the performance of the insulation panel in two ways. It minimizes dust when handling the insulation material and reduces the risk of damage during installation, as the lamination provides an additional reinforcement.

As an option the panels can be packed in POF shrink foil. Alternatively they can be laminated or wrapped with aluminum or glass fabric cloth.

For the VIP core, we offer from raw to “ready to use”, later is cut to the right dimension and wrapped into a non-woven fabric.

The user–friendly cutting service for panels and VIP cores allows a maximum of flexibility to ensure a fast and efficient installation. The service also avoids cutting damage at the customer’ s site and reduces disposal costs.

## Ecologically effective throughout the entire life span

All Unicorn insulating materials are free of organic binding agents. They consist of silica (silicon oxide), an inorganic opacifying agent and non-hazardous fibres which are resistant to high temperatures. These inherently stable products are long-lasting, do not rot, are vermin resistant and easy to recycle.



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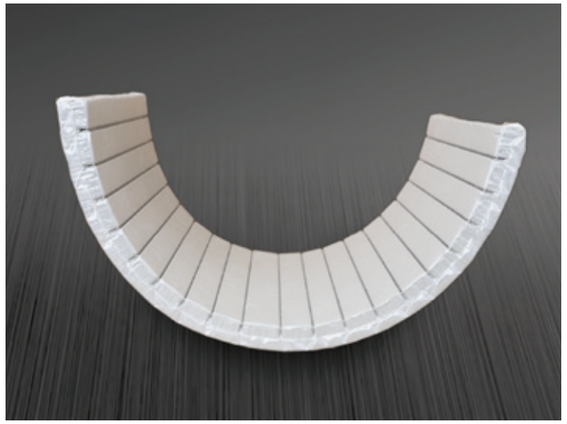
## Machined high temperature microporous parts

Unicorn provides accurately premachined microporous insulation components with excellent thermal and mechanical properties. They are available with various shapes and coverings, for incorporation into demanding products and assemblies.

Unicorn machined parts are 100% tailor made: from the selection of the raw materials right through the finished shape. We use finest silica as main component for our products. To push the limits towards 1200 °C we use alumina as base material.

## Efficient and flexible: unicorn microporous pipe insulation



Unicorn groovy technology is specially developed for applications in pipe insulation, pipe in pipe systems and big diameter applications.

It offers a compact and efficient solution for thermal insulation due to its lightweight properties and significant reduction in thickness. It is supplied as one-piece or more sections, depending on the pipe diameter.

Packed in a PE bag where a vacuum is applied, this product is protected from the harshest environmental conditions and ensures the fastest possible installation along a pipeline. This process also offers the possibility to virtually eliminate the introduction of moisture into a closed system to prevent condensation and corrosion under insulation.

## Efficient and flexible: Unicorn microporous mat insulations solution

Unicorn sflex is a 3D flexible and low thermal conductivity solution for customers to achieve highly efficient for difficult insulation tasks. The homogeneous microporous core is covered with an outer envelope which we provide in several choices of glass fabric to enable fast and clean installation. The stitched grid guarantees the necessary flexibility and twisting properties. By Unicorn professional processing, the sflex products allow tighter sealing joints from one panel to another, reducing thermal bridges and consequent heat loss with minimizing the gaps.

## Long lasting: Unicorn microporous VIPs core material

In using Unicorn core material, the Vacuum Insulation Panel manufacturer benefits from a list of important features typical of the microporous insulation material.

Being the longest lasting among the core materials is a decisive assets of the microporous material. VIPs manufactured with silica cores can attain a service time of fifty years and more.

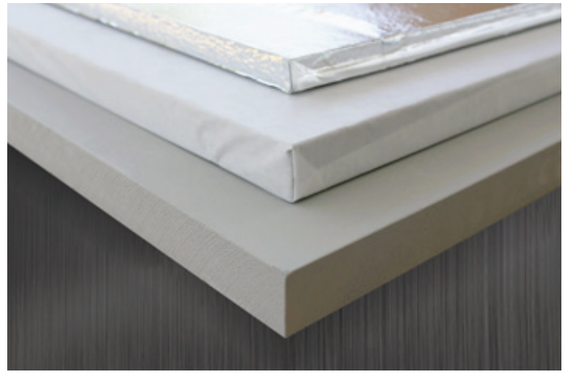
Providing best in class stability makes the panels quick and easy to handle and reduces the damage loss to a minimum. As a result the VIP manufacturer attains the best insulation result of the VIP core.

Extraordinary thin panels are available in a thickness to as little as 3 mm. This grants the VIP manufacturer flexibility in the VIP design.

Wide customization of the panels ensures the optimum solution in differing contexts. The design of a customized mold reduces the cutting waste.

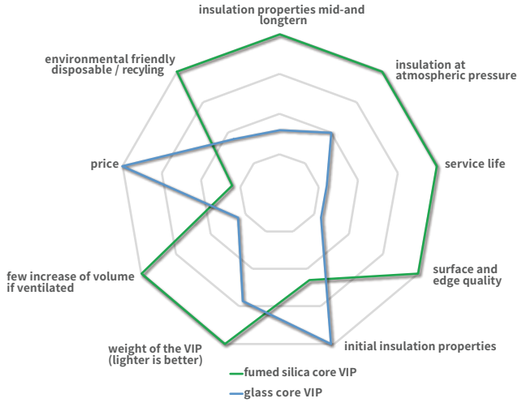
Excellent thermal insulation is provided by the Unicorn core itself, even when the vacuum no longer exists. In the case of such a critical condition of a VIP the very low increase of volume compared to other core materials is essential.

Absolutely non-hazardous material offers three benefits. The REACH regulation is met, the disposal costs at the end of the duration of use are low and handling the material is in no way detrimental to health.



Typical applications for VIPs are building insulations with zero energy or plus energy houses, the cool boxes used in pharmaceutical, biotechnological and medical industry, the latest generation refrigerators and various applications within the cool-chain logistics segment. The latter could be cool car insulation or cool houses.

## Outstanding performance: Unicorn silica core




### VIPs with Unicorn silica core offer:

- Longest possible lifetime of the VIP
- No hazardous materials involved
  - No harmful fibres
  - No toxic getter materials
- Lowest expansion when vacuum loss
- Excellent thermal insulation properties even if vacuum is lost, superior to most other materials.
- Best choice for high temperature VIP applications like water boilers or facades.



## Product Portfolio

The unicorn product spectrum offers a broad range of insulation products. Each product is suitable for different application and deployment scenarios.The product spectrum comprises two product families, the core materials for vacuum insulation panels (VIPs) and the thermal insulation panels for industrial applications.

### *TT core*

**TT core** is a microporous insulation panel optimized for the usage in vacuum insulation panels – so called VIP. The Unicorn VIP core material shows a very low density and as an effect the lowest possible thermal conductivity (typically around 4 mW/m K). Even with such an extremely low density the boards are excellent to handle.

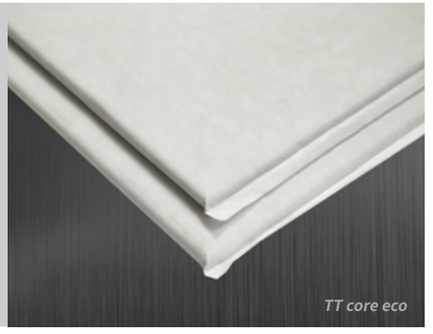
As a service Unicorn offers customized cutting. For large order volumes customized pressing molds reduce the cutting waste to a minimum. As an option the core can be wrapped in a non-woven fabric to prevent dust during the evacuation process.

*VIP, **TT core** packed in PET, **TT core***

### *TT core eco*

**TT core eco** is a microporous insulation panel with cambered edge, it is designed for the usage in vacuum insulation panels–so called VIP. TT core eco can be produced in very low densities and as an effect of that can reach even lower thermal conductivities than a standard VIP (<4 mW/m K).

The outside non-woven fabric puts a dust prove but air permeable cover around the microporous core, therefore the product can be fed directly into your process before drying and vacuuming.



*TT core eco*

### *TT 1000 classic*

**TT 1000 classic** is a board shape microporous insulation material approved in many insulation applications. It has an application temperature up to 950°C.

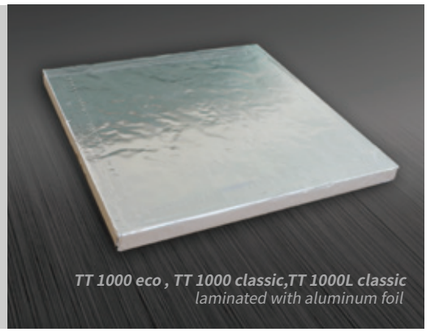
TT 1000 classic features good handling and machining properties; the extremely low thermal conductivity provides excellent insulating properties with reduced thickness, allowing to design equipment with the benefits of highest energy efficiency, space optimization and reduction of weight.

***TT 1000L classic, TT 1000 classic,***
*POF shrink foil and all sides aluminum*

## TT 1000L classic

**TT 1000L classicis** a board shape microporous insulation material with an application temperature up to 950°C which offers excellent lambda values and flexural strength at lowest weight and shrinkage values.

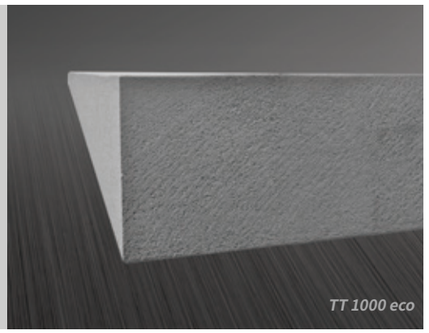
TT 1000L classicfulfills functions of reducing energy emission and increasing in effective volume.



*TT 1000 eco , TT 1000 classic,TT 1000L classic*
*laminated with aluminum foil*

## TT 1000 eco

**TT 1000 eco** microporous insulation panel covers many high temperature applications up to 950°C. It is advantageous in use for price sensitive applications. Nevertheless it is quick and easy to handle and offers the excellent insulation performance of the microporous material.



*TT 1000 eco*

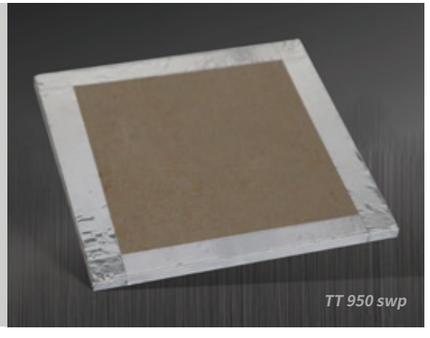
## TT 1000 fabric

**TT 1000 fabric** has an application temperature up to 950 °C. These rigid boards can be produced in customized dimensions and offer good thermal insulation properties. The woven glass fabric adds additional strength during handling and supports an almost dust free and smooth installation process.

*TT 1000 fabric*

## TT 950 swp

Unicorn **TT 950 swp** for elevator landing doors provide a cost effective solution with excellent mechanical reaction and good thermal insulation properties. The microporous insulation panel combined with gypsum board or fiber cement board and laminated with one side or full sides aluminum foil. The aluminum foil lamination offers good water repellent properties, a damage of the microporous material due to condensing water is therefore significantly reduced.



*TT 950 swp*



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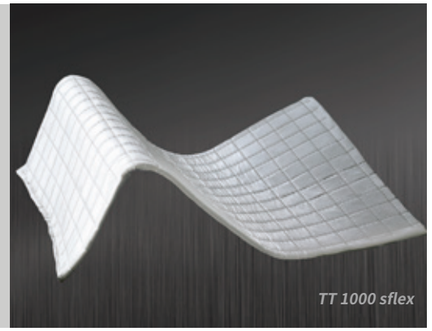
## TT 1000 sflex

**TT 1000 sflex** is a flexible , custom made microporous insulation mat. It features good handing and cutting properties, outstanding insulation performance in limited thickness.

The microporous core is covered from all sides with a glass cloth which is seamed and quilted in two directions to achieve flexibility without destroying the microporous core. This process makes the panel clean and easy to handle and provides flexible insulation in limited space.



*TT 1000 sflex*

## TT 1000 HY sflex

**TT 1000 HY sflex** is a flexible, custom made insulation panel with a water-repellent microporous core. It is an ideal solution for applications where the presence of liquids can be expected.

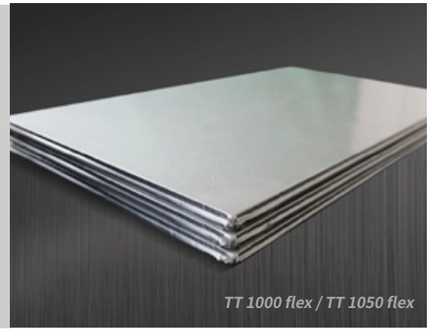
TT 1000 HY sflex also features good handing and cutting properties and provides flexible insulation for complex geometries. It is widely used when a large temperature reduction is required within limited space.

*TT 1000 HY sflex*

## TT 1000 flex / TT 1050 flex

**TT 1000 flex** and **TT 1050 flex** are flexible and compact microporous insulation panels designed for applications requiring low thermal conductivity up to their application temperature. The panels are usually thin, packed in a strong PE bag and evacuated. As an effect the panels can be bent around cylindrical objects.

The PE bag protects the microporous board from water during the installation process. At first heating the PE bag will be destroyed and evaporated like other organic materials in the system.



*TT 1000 flex / TT 1050 flex*

## TT 1000 granulate

**TT 1000 granulate** is an inorganic flowable and pourable microporous material with excellent thermal properties. It features very low thermal conductivity and maintaining a very low density, even after compaction. It is suitable for filling complex shapes or geometries having limited space structures and where shaped and rigid insulation can not be applied.

*TT 1000 granulate*

## *TT 1050 classic*

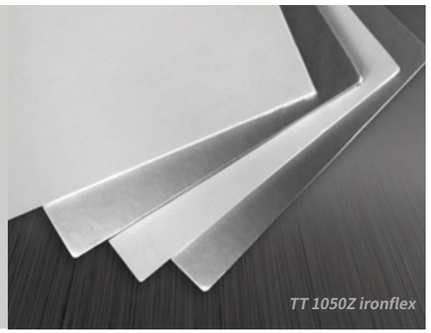
**TT 1050 classic** is a thin and lightweight microporous insulation board. It combines excellent thermal and mechanical performance and are ideally suited for high temperature applications with severe space limitations.

*TT 1050 classic glass tissue and POF wrapped*

## *TT 1050Z ironflex*

**TT 1050Z ironflex** has an application temperature of 1050 °C. It can accept 1100 °C for short exposures. It is a panel shape microporous insulation which is especially developed for iron and steel industry.

The panels offer maximum compressive strength to support the high requirements of this industry. The surrounding PE bag protects the material against water and due to the pulled vacuum the panel can be bent and easily installed in ladles and tundish.



*TT 1050Z ironflex*

## *TT 1050 sflex*

**TT 1050 sflex** is a flexible, custom made microporous insulation mat. It features good handing and cutting properties, outstanding insulation performance in limited thickness.

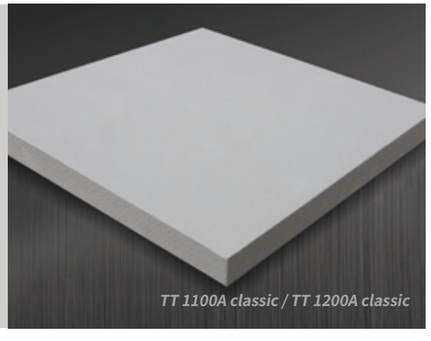
The microporous core is covered from all sides with a glass cloth which is seamed and quilted in two directions to achieve flexibility without destroying the microporous core. This process makes the panel clean and easy to handle and provides flexible insulation in limited space.

*TT 1050 sflex*

## *TT 1100A classic / TT 1200A classic*

**TT 1100A classic and TT 1200A classic** are alumina-based board shape insulation material with an application temperature respectively up to 1100°C and 1200°C, the boards offer excellent lambda especially at higher temperatures, they are the preferred choice when a large temperature reduction is required within a limited space.

The products have good mechanical properties and they are available in different covering types to provide a good handling and durability.



*TT 1100A classic / TT 1200A classic*

**Unicorn Insulations Limited**

No.72 Tongdu Road, German Industrial Park, Zhangpu
Kunshan City, Jiangsu Province, China

Tel: +86 512 36856506
Fax: +86 512 36856501
info@unicorn-insulations.com

**www.unicorn-insulations.com**