

# Whitepaper 2022/10

#stopCr6  
#calciumfree

the substitution of **calcium**-containing  
insulation systems to avoid the formation of  
the **hexavalent chromium-compound calcium  
chromate** (CaCrO<sub>4</sub>) on turbines and engines  
and other hot parts



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# #calciumfree

## Kavarmat© high-temperature and heat-retaining insulation pillows

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Why Kavarmat©? Because it is the first calcium-free insulation system, especially developed to avoid the formation of chromates on turbines, engines and machines

### 5.1 first sign

calcium-free instead of low calcium.

If calcium is the reason for the formation of calcium chromate, this chemical element must be completely banned from the machine!

- » When using pillows and blankets, the cover must be made of a calcium-free material, at least where it could come into contact with a stainless steel body.
- » If the cover should be damaged, the insulation material must not contain any calcium.

### 5.2 connecting benefits

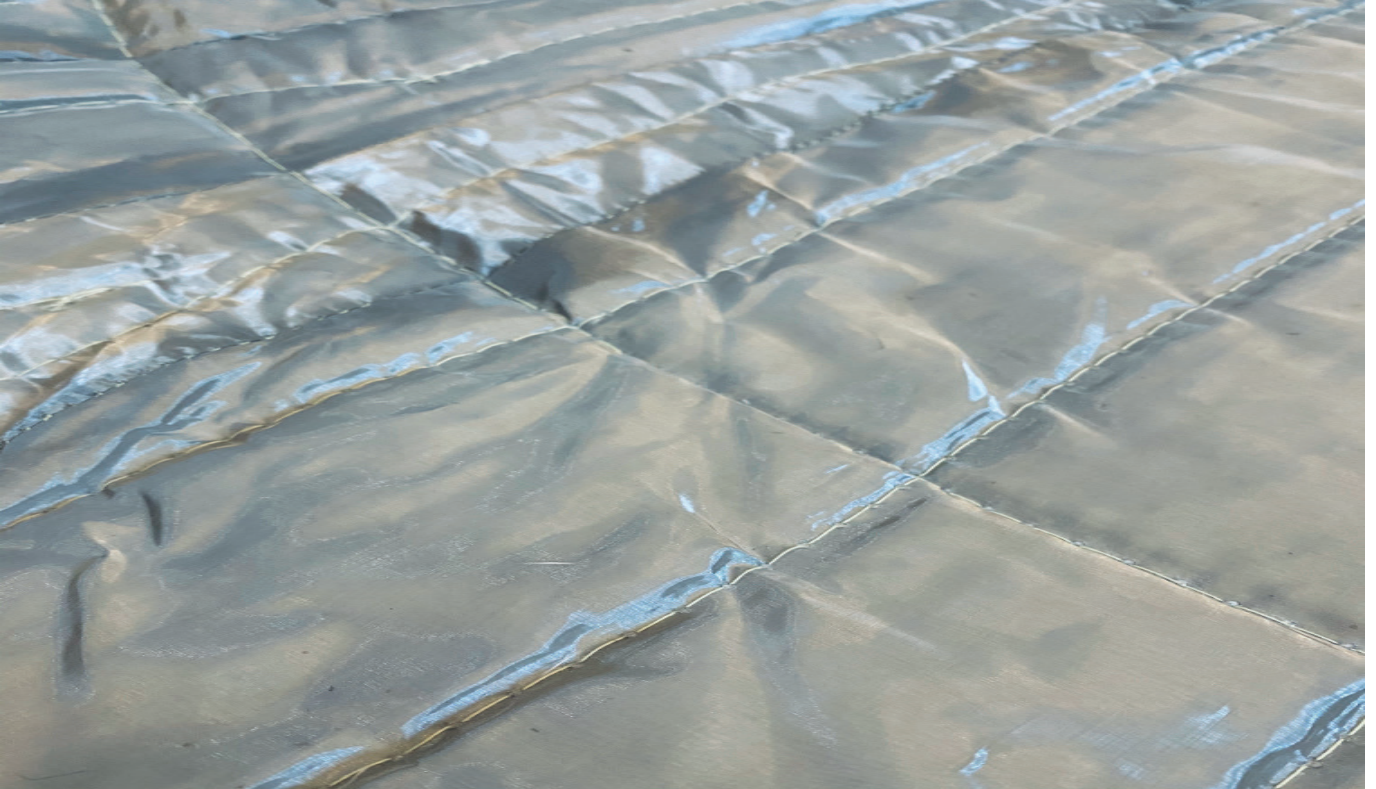
**Kavarmat© insulation systems consist exclusively of calcium-free components!**



Dr. rer. pol. Gerhard Kocher

Research & development is  
dangerous:

you could discover something new.



## 6. steel becomes fabric

### 6.1 equals among equals

a chemical element can react with another element.  
Probably not two of the same elements!

- » **Kavar**steel is woven stainless steel.
- » Countless stainless steel threads are woven into a fabric and form the protective layer of the cover.

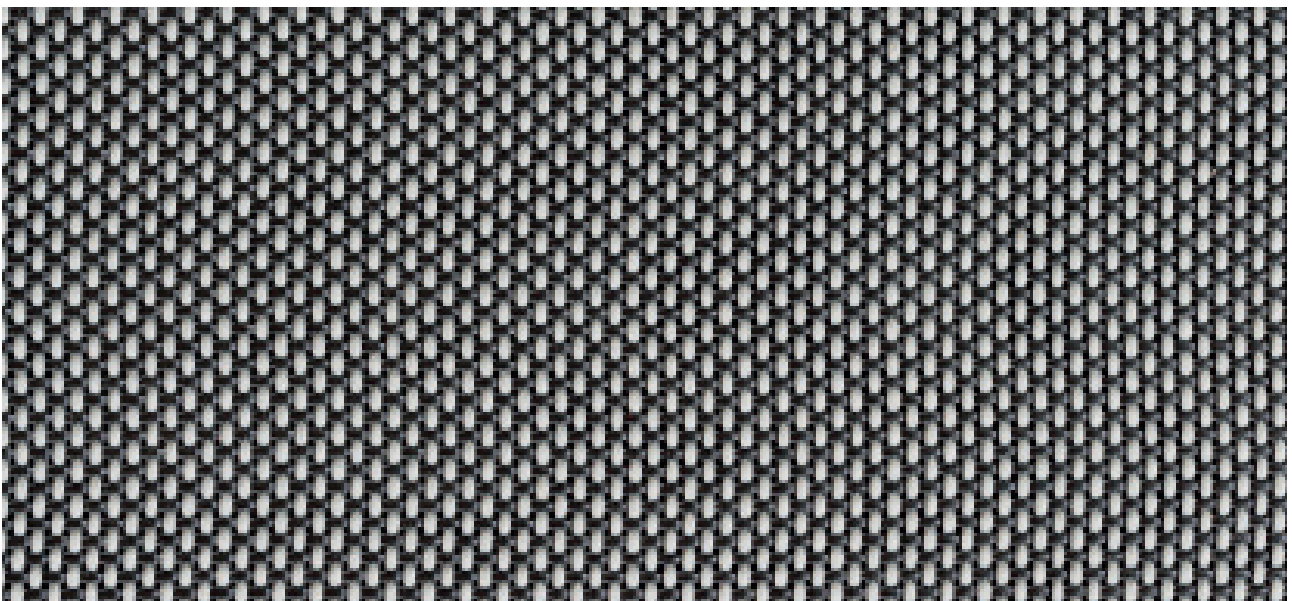
# Kavarsteel stitching metal

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Not possible? Never say never. *When there's a will there's a way!* Kavarsteel is the way to make stitching metal possible.

## 6.2 making metal flexible

With the smallest mesh size of the warp and weft threads, Kavarsteel becomes a textile, cuttable and ready-to-use fabric. Through the use of pure stainless steel threads, the heat from the object to be insulated is directed into the insulating element and thus directly onto the insulating material.



# #Bergkristall

## the masterpiece of thermal insulation

### high-temperature quartz fibermats

mineral in its almost purest form  
made of high-quartz rock crystal



See the difference!

Due to its excellent insulating properties, silica fibers are often used for thermal insulation. Often, however, these are combined with calcium mixtures and used as so-called "calcium silicate products". These products also consist of 30% calcium compounds, sometimes even more than 30%.

*Unfortunately, the term "silicate mats" has established itself on the insulation market, even if these only partly consist of silicates!*

#Bergkristall high-temperature quartz fibermats and tissues consist of approx. 95% pure silicate fibers and contain NO calcium compounds and thus offer the certainty that the oxidation process of chromium (III) compounds to harmful calcium chromates is prevented!

Scientific studies even show that  $\text{SiO}_2$  compounds can lead to hexavalent chromium (VI) being "oxidized down" to harmless chromium (III) compounds.

# #Bergkristall

## The mineral of the earth's crust

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Sometimes, however, "the devil is in the detail" and we have to pay close attention to the definition, also exactly distinguish which material e.g. is used for the manufacture of [#Bergkristall](#)

Pure quartz is completely transparent and colorless and, when it develops well-formed crystals, is called rock crystal (Latin formerly *Cristallus*). Quartz crystals are usually milky cloudy due to microscopic inclusions of liquids and gases (milky quartz) and appear gray when grown into the rock. Under the name *Rheinkiesel* transparent to milky cloudy rolled pieces of rock crystal are also known, which originate mainly from the Alpine region and are found in the *Rheinkies*.



source: Von SoylentGreen - Myself, Earth-Texture is from NASA, CC BY-SA 3.0

# KavarTex

## Fabrics made of #Bergkristall

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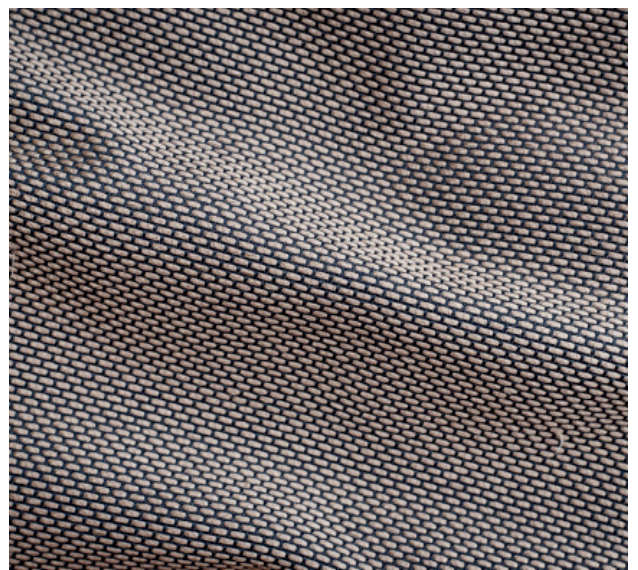
Finest cloth using natural raw materials. Committed to our calcium-free obligation.

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With KavarTex, a tissue was specially developed for use as a covering for calcium-free insulation materials, which takes account of the challenges that are placed on such a material.

All KavarTex fabrics consist of a multitude of interwoven threads made of high quartz rock crystals and are additionally reinforced with stainless steel threads to improve the tensile strength in the warp and weft.

KavarTemp tissues are heat-resistant up to 750°C and are characterized by its good skin tolerance.





# it doesn't itch Become a #happyfitter

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## Put an end to dust and itching!

If you want to usher in a paradigm shift and develop innovations, you should put everything to the test and turn off and revise the things that have made work difficult up to now.

With Kavarmat pure, we have developed not only a calcium-free, but also itch-free and low-dust high-temperature insulation system. So you can apply our insulation systems without hand protection and without face and mouth protection, provided local regulations allow it, and you can do so in ordinary work clothes.

If new development, then right and so installing #pure - heat-retaining insulation pillows by Kavarmat© is a pure pleasure!



As far as we know today, all Kavarmat© products can be disposed of as normal building rubble after use without having to comply with special disposal regulations. Nevertheless, it is necessary to check country-specific whether special regulations have to be observed.

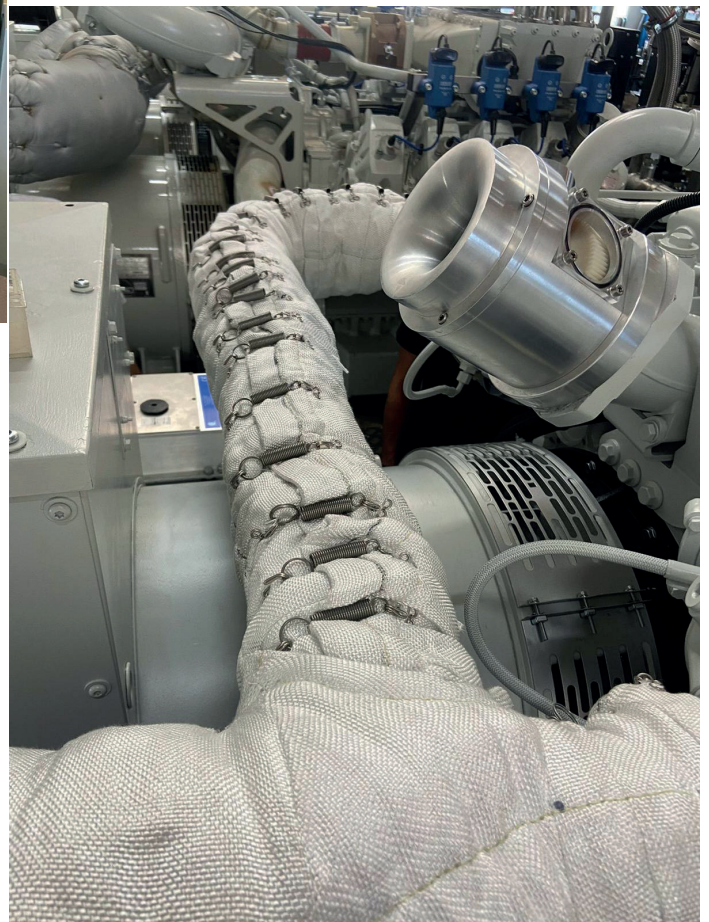


Exchange  
the future of thermal insulation  
is #calciumfree

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# basics Kavartech



cover

# KavarTech by #Bergkristall

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Composition : 88,5 % high-quartz rock crystal (SiO<sub>2</sub>)  
11,5 % Stainless Steel 1.4401

Weight : 760 g/m<sup>2</sup> ± 8 %  
Width : 1000 mm ± 20 mm

Thickness : 1,0 mm ± 0,2 mm

Construction Weave : plain weave

Warp yarn : 540 tex + V4A ± 40 tex  
Weft yarn : 540 tex + V4A ± 40 tex

Number of ends (warp) : 6,0 ends/cm ± 2 Fd  
Number of picks (weft) : 5,0 picks/cm ± 2 Fd

Tensile strength:

Warp : >400 N/cm  
Weft : >300 N/cm

# Inlet KavarTemp by #Bergkristall

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Composition:	95,0 % high-quartz rock crystal	(SiO <sub>2</sub> )	+/- 1,0%
	3,5 % corundum	(Al <sub>2</sub> O <sub>3</sub> )	+/- 0,5%
	interlocked/needled without binding agents		

manufactured in several thicknesses (12/25 mm)

Thermal conductivity:

°C	100	200	300	400	500	600	700	800	900
W/m K	0,042	0,052	0,065	0,082	0,098	0,119	0,148	0,175	0,190

All raw materials used for the manufacture of Kavarmat© products are **asbestos-free** and free from substances that are subject to labeling.

According to the current state of the art and taking into account all chemical and scientific principles, the use of our products does NOT lead to the formation of **hexavalent chromium-compounds (calcium chromate)**!

The data of these sheets can only be taken as a non-binding guide due to the variety of installation and service conditions.

# The bucket list it doesn't itch



**Bergkristall**  
#calciumfree  
it doesn't itch!  
high-temperature quartz fiber mats and tissues

it doesn't itch and dust!

#calciumfree  
high-temperature heat-retaining  
insulation pillows

prevents the formation of carcinogenic  
**chromium VI** compounds such as  
calcium chromate on machines, engines,  
turbines and hot parts

[www.kavarmat.com](http://www.kavarmat.com)



## Disclaimer:

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This white paper reflects our state of knowledge, which we have summarized based on available scientific data and our own findings.

All conclusions result from the intensive analysis of competent sources, which we are happy to name or provide in fair copy.

When we use the term "chromium (VI)", we usually mean a "**chromium (VI) compound**" or a **hexavalent chromate**, mainly the **calcium chromate CaCrO<sub>4</sub>**. The pure so-called "chromium (VI)" with the chemical formula CrO<sub>3</sub> is NOT part of this white paper or other papers, published in the name of **Kavarmat©** s.c..

Far be it from us to defame the suppliers of **calcium**-containing insulation materials in any way or to deny their products.

The only core message of this whitepaper is the technical understanding that **calcium**-containing insulation materials should not have direct contact with chromium-containing bodies when operated hotter than 300°C, if it is desired to prevent the possibility of **calcium chromate** formation.

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The **Cleansulation** company

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