

Mission possible

A 3M case study in cooperation with company Insulcon

High temperature insulation solutions for industrial cracking furnaces with 3M™ Nextel™ Ceramic Fibers and Textiles

Insulcon is solving high temperature insulation challenges all over the world, pairing their expertise with the unique features of Nextel ceramic fabrics from 3M.

Managing the extreme temperatures in process heaters and furnace reformers in the petrochemical industry poses a significant challenge. It often leads to the formation of coke and causes premature wear and tear on tube passings located on roofs, floors and walls. Such demanding conditions require specialized materials such as Nextel ceramic fabrics, which help to enhance high-temperature resistance and flexibility in tube sealing for a wide range of process heaters, furnaces, and reformers. Additionally, they are used on radiant coils (process tubes) to help decrease the formation of coke and reduce premature ageing of the tube skin.

INSULCON

LEADER IN HIGH TEMPERATURE SOLUTIONS

“A scheduled maintenance shut-down can be planned, and the downtime will be under control.

The perfect combination of expertise, innovation and the unique features of 3M™ Nextel™ Ceramic Fabrics enable us to design and pre-fabricate for fast solutions, but maintenance shutdowns include surprises - and what if an unplanned hot spot occurs?”



Andries Eggebeen,
Product Manager
at Insulcon

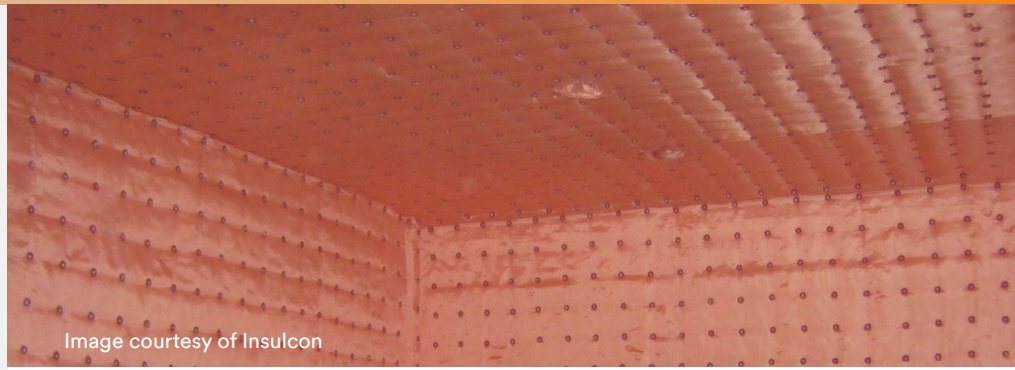


Image courtesy of Insulcon

Not only heat shielding but also furnace lining, applications attached to furnace walls and ceilings, help to reduce dust pollution and improve the product quality.

Unwanted entry of cold air (ingress) can be reduced with Multi Tube Bellows (MTBs), which form a flexible and durable solution to seal the protrusion at the inlets and outlets of the furnace.

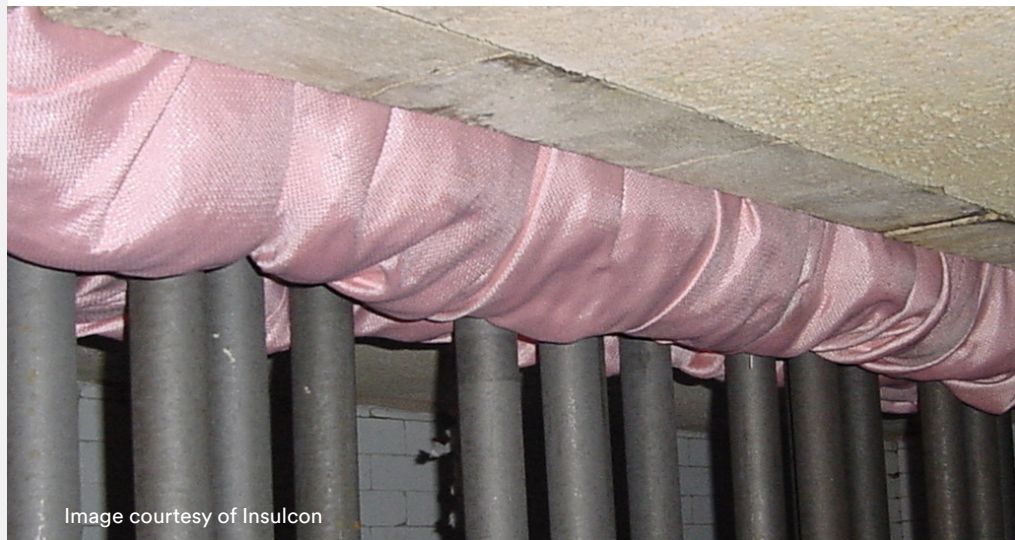


Image courtesy of Insulcon

The ceramic fabrics, woven tapes, and braided sleeves can be sewn and converted into a large number of shapes and geometries including heat shields to protect specific areas or even as tie-cords to securing an object within a high-temperature location like a cracking furnace.

In these applications, the Nextel fabric not only shields the steel from heat and oxidation but also reflects the heat, resulting in improved process efficiency by minimizing heat loss.

Multi Tube Bellows are designed and prefabricated for the specific application and needs – depending on the type of cracking furnace, the nature of the media in use, the geometry and the process temperature.

Prefabricated MTBs help to reduce the downtime and ensure reliability and control of the process parameters.

But the efficiency and performance of high temperature insulation are depending on the expertise and craftsmanship of the converter.



Image courtesy of Insulcon

Andries comments that **Insulcon** has more than 40 years of experience serving and supporting demanding environments in challenging applications all over the world out of their multiple facilities in the heart of Europe.

3M's broad portfolio of 3M™ Nextel™ Ceramic Fibers and Textiles, from sleeveings and tapes to rovings and fabrics, combined with the necessary yarns provide all products to design and manufacture the parts that help to protect the customers' valuable process equipment.



Picture of the Insulcon facility

Why 3M™ Nextel™ Ceramic Fibers and Textiles?

No other material can withstand the temperature for a long time whilst maintaining its flexibility and strength without significant shrinkage.

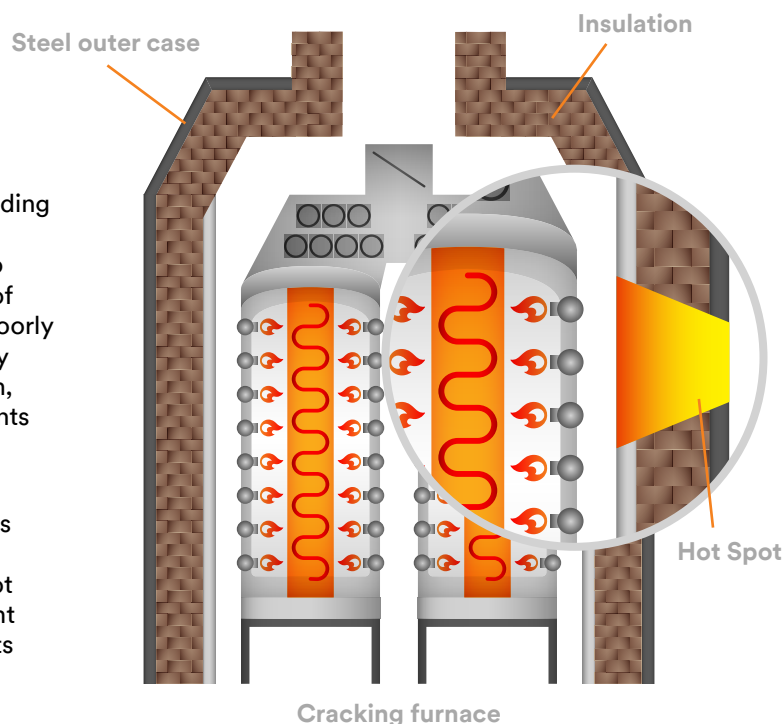
says Andries Eggebeen, Insulcon, The Netherlands

The “hot spot” in a cracking furnace

What is a hot spot?

A hot spot refers to a localised area or region within the furnace where the temperature is significantly higher than the desired or designed operating temperature. Understanding why hot spots occur is crucial in managing their impact on furnace operation. Long-term exposure to heat can lead to the degradation of insulating materials and the formation of hot spots. Uneven heat distribution, often resulting from poorly connected seams between insulation elements is a primary contributing factor. Inadequate processing or compression, the use of subpar materials for joining insulation components at the seams, or even shrinkage of the insulation materials can all result in the formation of hotspots.

Hot spots may result in uncontrolled temperature increases that can lead to thermal stress on the equipment, causing unplanned downtime or even failure. Overall, managing hot spots in a cracking furnace is essential for safe and efficient operation, ensuring the production of high-quality products while reducing downtime and maintenance costs.



Insulcon uses Nextel ceramic fabrics in its technology to repair hot spots while the furnace continues to run at required capacity.



How can that work in a furnace that is operated at $> 1,200^{\circ}\text{C}$?

While the furnace continues to run at required capacity, holes are drilled in the casing plate.

Specially developed injection moulds are now being injected through the mounted couplings to repair the insulation.

High tech heat shields made from 3M™ Nextel™ Ceramic Fabric, are installed to protect the working space and personnel in case of excessive heat. Andries explains “As soon as the injection mould is injected, the whole area of the hot spot cools down immediately, changes of pressure combined with over 30 years of experience indicate when the gap is completely filled.

The drilled holes/couplings are closed. The repaired spot usually remains colder than the rest of the surrounding area.”

Image courtesy of Insulcon



Application:

Prefabricated Multi Tube Bellows in cracking furnaces and hot spot repair whilst the furnace is in operation.



Challenge:

Improve the efficiency and lifetime of high temperature cracking furnaces in critical situations.



Solution:

The experience of the converter, along with the unmatched flexibility and temperature resistance of 3M™ Nextel™ Ceramic Fabrics, provides exceptional performance.

Want to learn more about
**3M™ Nextel™ Ceramic Fibers
and Textiles?**

YOUR LINK TO 3M

Prefer to explore **hot spot repair**
in industrial cracking furnaces?

YOUR LINK TO INSULCON

For more information get in touch with
Insulcon B.V.



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