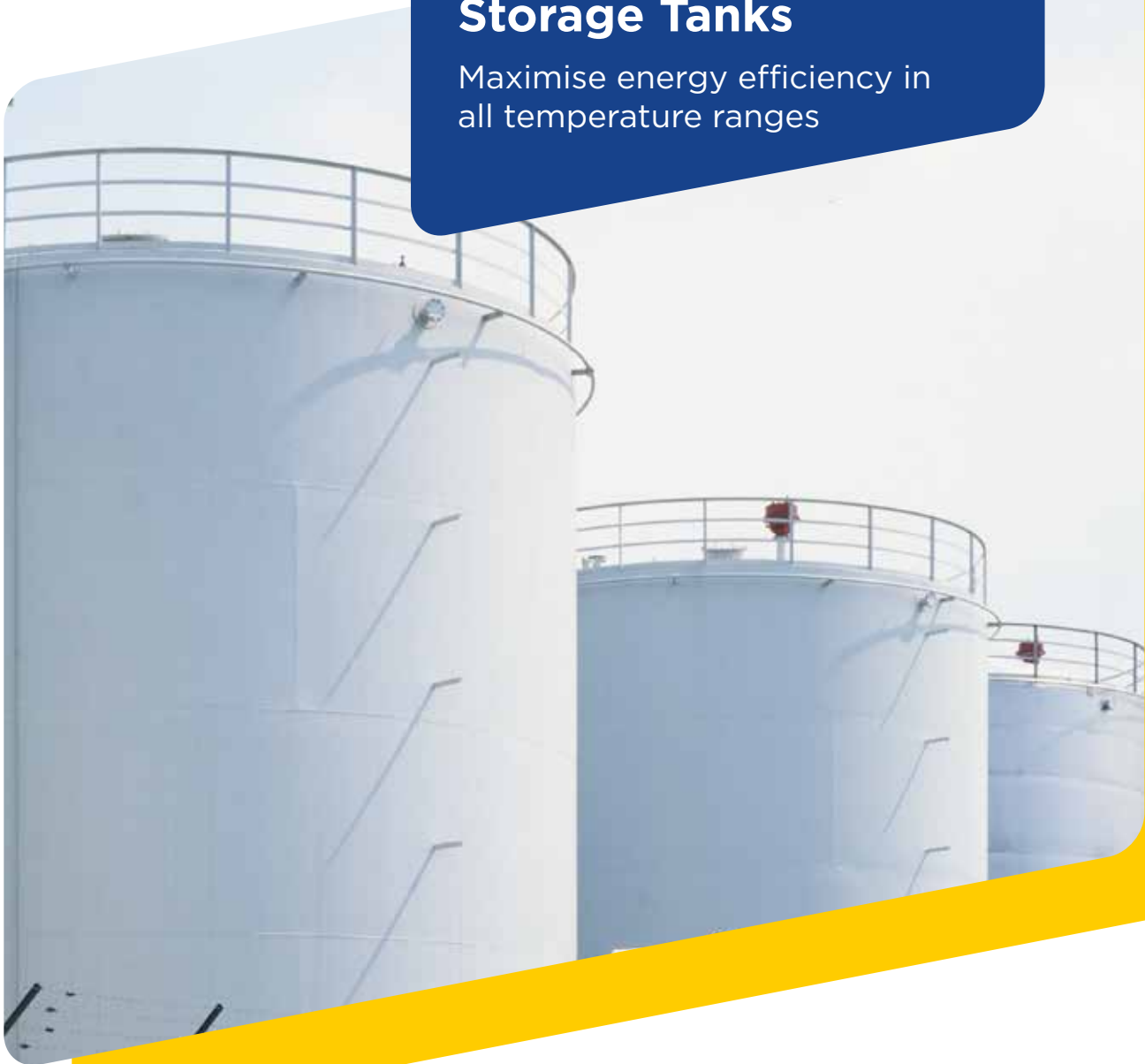


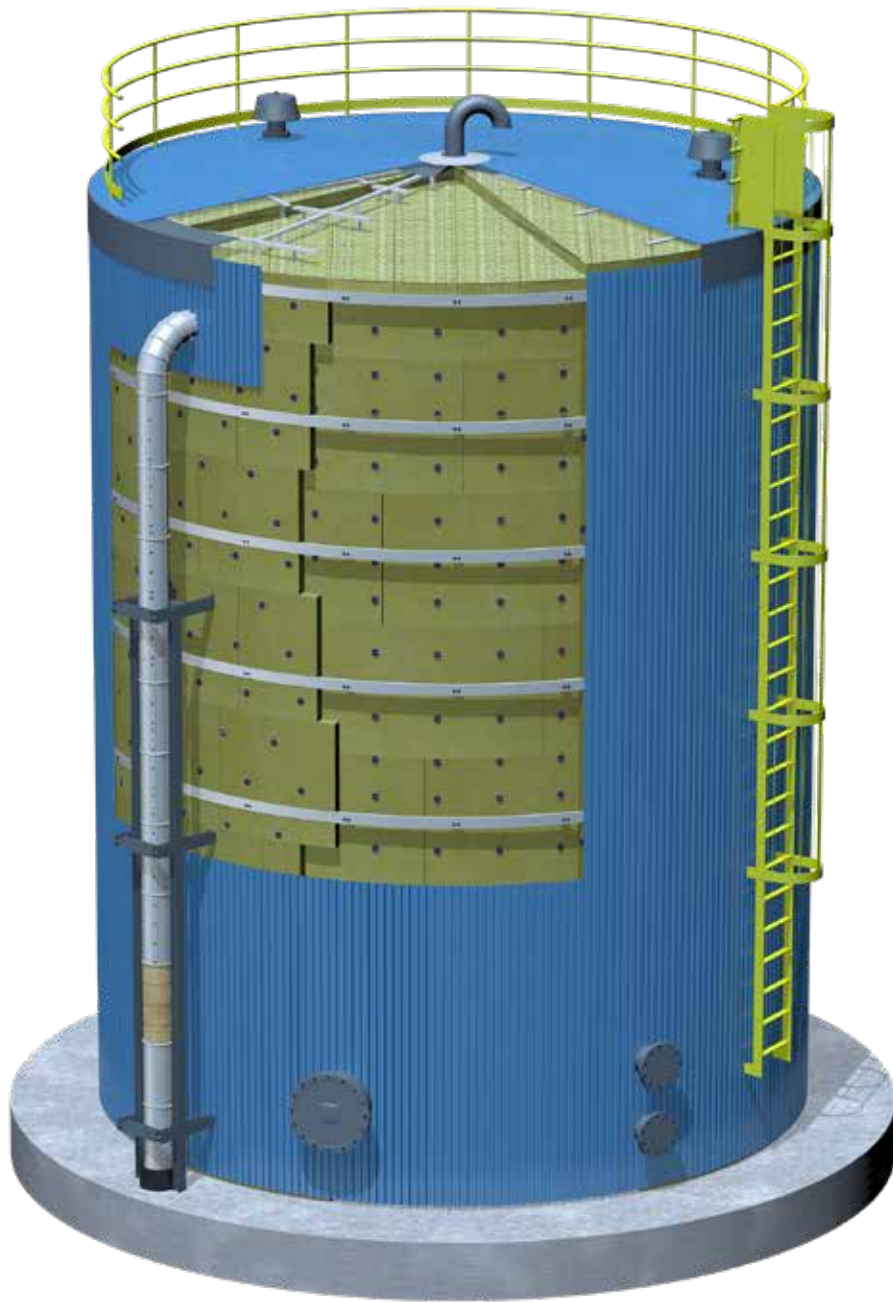
Insulation Solutions for Storage Tanks



Maximise energy efficiency in
all temperature ranges



Behind THE SCENES



Build efficient tanks, WHATEVER YOUR SECTOR OF ACTIVITY

Tanks are large containers or vessels used to store, mix, process or transport liquids, gases, or other substances.

Tanks can be found in a wide range of industries and applications, most likely including yours:

- › **Oil and Gas:** In refineries, terminals, depots and distribution centers, tanks are used to store crude oil, refined petroleum products (such as gasoline, diesel, jet fuel, heavy fuel oil), liquefied natural gas (LNG) or liquefied petroleum gas (LPG).
- › **Power Generation:** Installed in or nearby power plants, some tanks are used for heat storage, e.g. in district heating projects or molten salt tanks in concentrated solar power plants.
- › **Chemical Industry:** In chemical plants, pharmaceutical facilities and industrial warehouses, tanks are used to store various chemicals and liquid raw materials.
- › **Water and Wastewater:** Typically installed in water treatment plants, municipal utilities, and industrial facilities, tanks are used to store drinking water, wastewater, and industrial process water.
- › **Food and Beverage:** In food processing plants, dairy farms or breweries, tanks are used for storing ingredients, intermediate products, and finished products.
- › **Agriculture:** Installed on farms, agricultural cooperatives, or agricultural supply centers, tanks are used for storing fertilizers, pesticides, water, and other agricultural chemicals.

MAXIMISE TANK EFFICIENCY WITH THE RIGHT INSULATION SOLUTION

Tanks come in different shapes, sizes and materials (e.g. steel, concrete, plastic or fiberglass). In many cases, they are insulated to meet several goals, including energy savings, temperature control, corrosion protection, process efficiency, improved safety, and sustainability.

As energy prices continue to rise and energy efficiency becomes the watchword, initiatives to optimise energy consumption and minimise waste are increasingly prioritized, across all sectors of the industry. For tanks, the savings potential is significant and often underestimated. By insulating them effectively, you can minimise heat loss or gain, reduce heating or cooling needs, and ultimately reduce energy consumption and associated costs. Additionally, reducing energy waste also helps mitigate climate change by reducing greenhouse gas emissions associated with energy production and consumption.

GET THE MOST OUT OF YOUR TANK

We understand that tank insulation can be complex, both in terms of initial investment and installation, requiring careful planning, engineering expertise and attention to detail to ensure thermal performance efficiency, structural integrity, and safety throughout the life of the tank.

With all this in mind, we have developed a complete range of solutions, specially adapted to the insulation of walls and roofs of industrial tanks, efficient and easy to install, whatever the type of tank, the temperature range and your industrial sector.



Supporting customers from **PLANNING TO INSTALLATION**

At Isover, we work closely with our customers and various stakeholders to best understand the specifics of each project. Our experts support you at every stage of your project.



AS A PLANT OWNER

- › Make sure your process runs smoothly at the right temperature
- › Ensure the safety of your operators
- › Optimise the energy efficiency of your installations
- › Be assured of your return on investment
- › Do your bit for the environment by reducing CO₂ emissions



AS A SPECIFIER

- › Design high-performance insulation systems
- › Bring key benefits to your customers
- › Address the most stringent regulations (thermal, acoustic & fire performance)
- › Meet the specific requirements of the tank industry



AS A CONTRACTOR

- › Implement insulation solutions, approved for the tank industry
- › Install easily and comfortably, whether for maintenance or new construction
- › Reduce installation time and labour costs
- › Rely on a partner, locally or globally

6 GOOD REASONS TO INSULATE YOUR TANKS WITH SAINT-GOBAIN SOLUTIONS

- › Protect your operators
- › Make your process smooth and efficient
- › Lower your energy bills
- › Reduce the environmental footprint
- › Prevent corrosion
- › Save installation time

Protect YOUR OPERATORS

Tanks often need to be insulated to mitigate potential hazards associated with operator exposure to hazardous materials or extreme temperatures.

PREVENT BURNS OR FROSTBITE

In the case of substances with extremely high or low temperatures, the insulation helps to regulate the temperature of the external surface of the tank which must not exceed 60°C or 35°K for example. This helps prevent accidental burns or frostbite for workers who may come into contact with the tank during routine operations or maintenance activities.

PROTECT FROM HAZARDOUS SUBSTANCES

Insulation can be used to contain spills or leaks of chemicals, acids or other hazardous substances, and minimise the risk of exposure to nearby workers. In nuclear power plants, insulation contributes to containment barriers.

ENSURE FIRE PROTECTION

Insulation helps protect the interior of the tank and its contents in the event of a nearby fire. This can help prevent a rapid rise in temperature inside the tank, reducing the risk of explosion or release of flammable vapours.

REDUCE NOISE IN THE WORKPLACE

In some cases, tanks may be insulated to reduce noise levels generated by equipment or processes inside the tank which contributes to a safer and more comfortable working environment.



**DID
YOU
KNOW**

In its early days, insulation was first used for safety, that is to say to protect operators from burns in the event of contact with hot surfaces.

Make your PROCESS SMOOTH AND EFFICIENT

Thermal management of storage tanks is essential to ensure the integrity of stored products and optimise operational efficiency. Thermal insulation plays a crucial role in this process, as it helps maintain the temperature inside the tank within the desired ranges.

THE CHOICE OF THE RIGHT SUPPLY SYSTEM DEPENDS ON SEVERAL FACTORS

- › **The type of products stored:** Substances sensitive to temperature variations, such as chemicals, oils and food liquids, require strict thermal control to avoid any alteration of their physical or chemical properties.
- › **External climatic conditions:** As climatic conditions affect the internal temperature of tanks, effective insulation will help counteract these external effects. In extreme conditions, insulation will prevent tanks from freezing at low ambient temperatures.
- › **The type of energy system used to maintain the temperature inside storage tanks:** The most common systems are heating and cooling systems. Heating is achieved by providing heat via electrical resistances, steam, hot water or thermal oil, while refrigeration involves the extraction of heat by means of compression or absorption systems, using refrigerant means to maintain the temperature within acceptable limits.

Considering these factors will enable the implementation of optimal insulation solutions that contribute to the sustainability and profitability of storage operations.

In the end, everything follows the same logic: Effective thermal insulation reduces heat or cold loss, which is essential to preserve product quality and ensure efficient operation. In addition to improving energy efficiency, the process becomes less dependent on external temperature maintenance systems.

INSULATION SOLUTIONS FOR ALL APPLICATIONS AND TEMPERATURE RANGES

Our range of insulation solutions provides optimal thermal conductivity for every application, whatever the operating temperature (-200°C to 700°C). Thermal conductivity is measured over the entire temperature range, in accordance with EN 12667 for flat products and ISO EN 8497 for pipe sections. Maximum Service Temperature (MST) is measured according to EN 14706 for flat products and EN 14707 for pipe sections.

The thermal performance of our products is guaranteed by a strict quality control protocol, both internal and external, for example through the VDI 2055 quality system or other third-party accreditations.

Since 2013, all our products in Europe have also been CE marked according to the EN 14303 standard for mineral wool insulation.

Lower YOUR ENERGY BILLS

Rising energy prices amplify the importance of energy efficiency across all sectors. Plant owners and operators face higher expenses for heating, cooling, electricity, and other energy-intensive processes. It then becomes essential to give priority to energy efficiency in the design, operation and maintenance of your tanks.

INSULATE TO BETTER CONTROL COSTS

While thermal insulation in the industrial sector has for many years been limited to aspects of personal protection and process efficiency only, rising energy prices have a direct impact on operating costs, leading to increased expenses for manufacturers. This is where insulation comes into play as one of the effective ways to improve energy efficiency! By reducing the overall energy consumption of tanks, it helps mitigate the impact of rising energy prices, manage costs and maintain profitability throughout the life of the tank.

INSULATE TO STAY COMPETITIVE

In industries where profit margins are tight, companies that operate more efficiently by minimising energy waste have a competitive advantage, that is, they can offer more competitive prices, attract customers and potentially gain market share.

MAKE YOUR OPERATIONS FUTURE PROOF

As one of the energy-saving practices, insulation offers protection against fluctuations in energy prices. By reducing their dependence on energy, manufacturers have better financial resilience and resistance to economic volatility, ensuring the viability of their operations over the long term.

COMPLY WITH UPCOMING REGULATIONS

As surprising as it may seem, in industry, unlike construction, insulation is still largely underused, and many industrial facilities still have a low level of energy efficiency. Until recently, no regulations defined the minimum level of performance of insulation to be installed in European industry.

But the situation is changing, with the entry into force of the German directive VDI 4610, part 1 ("Energy efficiency of industrial installations - Thermal insulation") and the European standard EN 17956 "Heating systems and water based cooling systems in buildings - Energy efficiency classes for technical insulation systems", which respectively define 7 energy efficiency classes for technical insulation systems.

**DID
YOU
KNOW**



Heat loss costs can be calculated with our thermal calculation software ISOVER TechCalc 2.0, based on ISO 12241 and industry standards such as VDI 2055.

Reduce THE ENVIRONMENTAL FOOTPRINT

The European Union has set two ambitious goals: reducing greenhouse gas emissions by at least 55% by 2030 and being climate neutral by 2050, with net zero CO₂ emissions. The decarbonisation of European industry is therefore one of the main challenges to achieve these objectives.

BUILDING MORE SUSTAINABLE TANKS BY COMBINING STRATEGIES

Reducing the environmental footprint of tanks in industry involves implementing a combination of strategies to minimise energy consumption, emissions, resource use and environmental impacts associated with tank operations.

These strategies range from designing tanks with energy efficiency in mind, to selecting energy-efficient equipment (such as pumps and agitators) or incorporating features that minimise heat loss or gain. At the same time, the integration of renewable energy sources such as solar, wind or biomass can also help reduce dependence on fossil fuels and reduce greenhouse gas emissions.

Additionally, optimising tank processes, preventive maintenance, waste minimisation and recycling systems, water conservation measures and specific emissions control technologies, can effectively reduce the environmental footprint of tanks and minimise the risk of environmental incidents, while maintaining operational efficiency and competitiveness.

REDUCE CO₂ EMISSIONS WITH ENHANCED INSULATION SYSTEMS

Enhanced insulation systems are an effective way to minimise heat transfer and improve thermal performance. The use of high-performance insulation solutions, increased insulation thicknesses as well as additional measures such as double-layer insulation or low-emissivity claddings can further reduce heat loss and energy consumption.

By improving energy efficiency and reducing heating or cooling requirements, insulation proportionally minimises greenhouse gas emissions and reduces the environmental footprint of tanks.

HARNESSING THE UNTAPPED POTENTIAL OF INSULATION

The tank segment, like the entire industrial sector, is lagging behind in terms of sustainable development, particularly compared to the construction sector. For many years, insulation was used only for safety purposes, then to prevent condensation and ensure process efficiency. More recently, there has been an interest in insulation to save energy, and it is only very recently that attention has been focused on its potential to reduce the sector's carbon footprint.

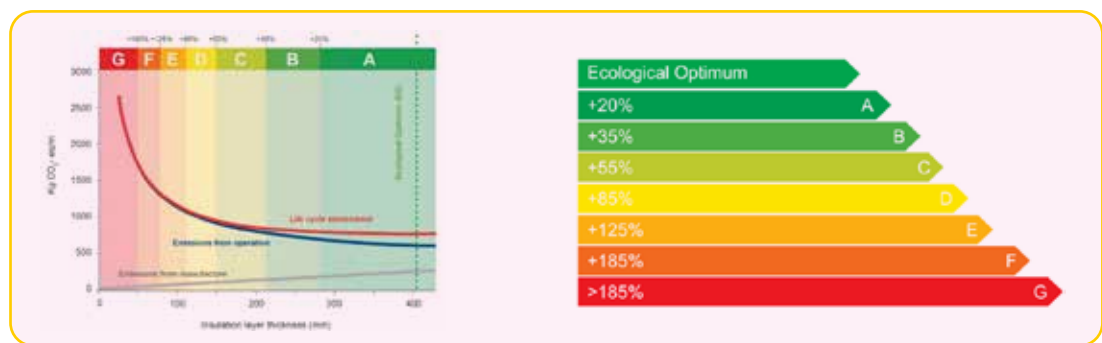
However, according to a study carried out by EiiF in 2021, 14 Mtoe of energy could be saved by improving insulation standards in industry, equivalent to a reduction in EU CO₂ emissions of 40 Mt each year.



Having said this, there is still a long way to go to take advantage of this energy saving potential through improving industrial insulation, increasing thickness and insulating elements that are to date not yet insulated at all (flanges, valves, etc.).

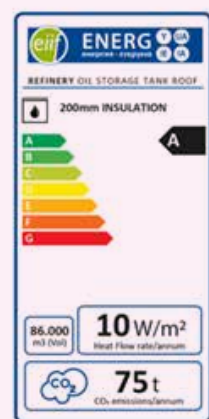
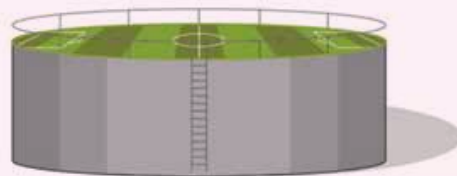
CHANGES IN REGULATIONS WILL ENCOURAGE THE USE OF EFFICIENT INSULATION SYSTEMS

Based on the EN 17956 / VDI 4610 standards, new insulation systems can be planned with progressive energy efficiency requirements, and existing insulation systems can be reassessed, from the best and most sustainable solution in energy class A to inefficient solutions which waste energy and money while emitting avoidable CO₂ emissions below energy class F.



SCENARIO

- › A refinery tank containing oil at 60°C
- › Roof size equivalent to a football field
- › Increase of the roof insulation thickness from 30 to 200 mm



Increasing the thickness of the insulation from 30 mm to 200 mm makes it possible to move from class G to class A.

Each insulation system will be assigned an energy efficiency class based on its thermal performance.

Prevent CORROSION

Corrosion poses a significant risk for tanks, particularly when storing liquids such as water, chemicals or petroleum products. It can have several harmful effects on equipment and processes.

Corrosion can affect the structural integrity of the tank, potentially leading to leaks, spills or even failures. It is a risk factor for staff safety, the environment and profitability. Corrosion can also cause contamination of the stored liquid, compromising its quality, which is particularly critical for food, beverages or drinking water. In addition, corrosion requires costly maintenance and repair efforts, sometimes with downtime.

Tanks are often made of high-alloy austenitic steels, which contain chromium, nickel, and molybdenum. These alloys can be susceptible to stress corrosion cracking (SCC), particularly in environments containing chloride ions, which is often the case with industrial process fluids.

To mitigate the risk of corrosion, industries implement prevention and monitoring measures, such as the selection of corrosion-resistant materials for tank construction, the implementation of protective coatings, and regular inspections.

MITIGATING THE RISK OF CORROSION WITH THE RIGHT INSULATION SOLUTIONS

Water trapped between the insulation and the surface of tanks can lead to corrosion under insulation (CUI).

To prevent CUI, our insulation solutions for tanks are low in chlorides. In addition, our products are hydrophobic and non-hygroscopic, thus limiting potential water absorption. Their open cellular structure allows them to dry quickly if they get wet, without loss of their mechanical or insulating properties. Our insulation solutions with superior water-repellent properties reduce absorption rates even further.

Hydrophobic performance is assessed by a partial immersion test in water for 24 hours according to EN ISO 29767. The method simulates short-term water exposure and absorption on one side, which happens when insulation is exposed to rain during installation. The test is carried out on unheated insulation, as well as insulation exposed to a temperature of 250°C for 24 hours.

PROPER INSTALLATION OF INSULATION IS ALSO IMPORTANT TO PREVENT TANK CORROSION

It is essential to ensure good sealing of the joints and edges of the insulation to prevent moisture infiltration. In most cases, protective coatings (flat or corrugated sheets) are applied to the insulation on tank walls and roofs, as an additional layer of protection against corrosion. Here it is important to ensure adequate ventilation between the insulation and the cladding to prevent moisture build-up and to help dry out any moisture or condensation that may build up.

And finally, the insulation system should allow easy access for inspection of the tank surface below to make it easier to detect any signs of corrosion at the earliest.

Save INSTALLATION TIME

The insulation of tanks can be complex due to various factors, and particularly due to their large dimensions, reaching several meters or even tens of meters in diameter and height.

Here are some of the challenges of installing tank insulation:

- › A tank can be very large, sometimes gigantic, with a height and diameter of up to several tens of meters. Accessing such large structures to properly insulate them can be difficult. Specialised height access equipment and techniques may be required.
- › A tank must support the weight of the insulation which is often non-negligible, and which adds an additional load to the structure. It is essential to consider this weight in the design phase, and to respect it meticulously in the installation phase, to guarantee the structural integrity of the tank and ensure that the additional weight does not compromise its stability or safety.
- › Insulation should be installed to permit easy and regular inspection and maintenance of the tank and its components. This may involve the integration of access points or removable panels.
- › While insulation offers long-term energy savings and other benefits, the initial cost of installation can be significant, especially for large tanks. Calculating return on investment (ROI) requires careful analysis of factors such as energy consumption, maintenance savings and the expected lifespan of the insulation system.

OPTIMISE INSTALLATION TIME AND COSTS WITH THE RIGHT INSULATION SOLUTION

The choice of the most suitable insulation solution depends on several criteria: the size of the tank, its geometry and the material of the equipment, but also the working temperature.

When the targeted thermal performance requires an insulation thickness greater than 100 mm or when operating temperatures are greater than 100°C, it is generally considered that several layers of insulation are necessary. We nevertheless offer specific solutions in rolls which allow thicknesses greater than 100 mm to be installed per layer, which saves valuable installation time.

Our tank insulation solutions are available in the form of slabs, rolls or wired mats. Slabs are the preferred choice for components with flat surfaces or large radius curved surfaces or for tank roofs that require high compressive strength, while wired mats are often preferred for insulating smaller components where the existence of stiffeners, supports or other components makes the installation more complex.

Rolls can be an interesting choice when it comes to insulating large surfaces in thick layers, in order to optimise installation time. Not to mention our CRYOLENE rolls, up to 40 meters long and 2.4 meters wide, which save a lot of installation time!

Our technical experts support you to define the optimal thickness in relation to the performance required for your projects. Our best-in-class thermal insulation solutions, and in particular those made from our lightweight ULTIMATE™ stone wool, often make it possible to reduce the thickness of the insulation, which can be of great help during installation.

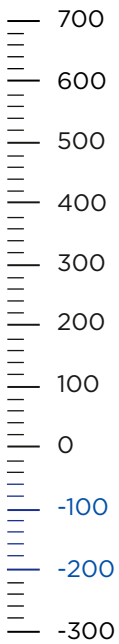


SOLUTIONS FOR ALL TYPES OF TANKS

Industrial tanks are particularly distinguished according to their operating temperature. We offer insulation solutions for all temperature ranges.

Cryogenic tanks, FROM -200°C TO -50°C

$^{\circ}\text{C}$



Cryogenic tanks are designed to store and transport materials at extremely low temperatures, often below -150°C . These are mainly liquefied gases such as liquid oxygen, nitrogen, hydrogen or ammonia, as well as liquefied natural gas (LNG).

Cryogenic tanks are generally made of materials capable of withstanding the extremely cold temperatures and pressure exerted by the vaporisation of the stored liquefied gas. The most commonly used materials are stainless steel, aluminium and nickel alloys. Cryogenic tanks often feature a double-walled construction which provides an additional layer of protection against temperature transfer and a safety barrier for possible gas leaks.



MEETING THE MOST EXTREME INSULATION CHALLENGES

To minimise heat transfer into the tank, which could cause heating and evaporation of the stored material, cryogenic tanks must be thermally insulated. It is no wonder that the insulating materials used in this environment must meet the strictest requirements:

- › **Adapt to changing tank volumes:** As the level of stored liquid rises or falls, and cooling and warming processes take place, thermal expansion and contraction will occur in the tank and the insulation must be designed to accommodate these movements. To meet this challenge, our CRYOLENE solutions, specially developed for the insulation of cryogenic tanks, have both excellent compressibility and good resilience.
- › **Provide best-in-class thermal performance:** Beyond low thermal conductivity, CRYOLENE is delivered in the form of a giant roll which allows the entire height to be insulated in one piece and thus reduces thermal bridges.
- › **Enable efficient installation:** The extended length of the product makes CRYOLENE particularly fast to install, reducing installation time by up to 75%.

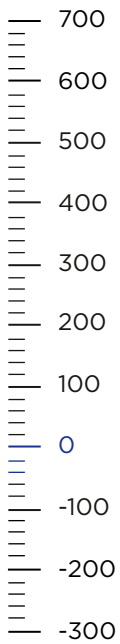
CRYOLENE is our range of very resilient glass wool rolls designed to maintain the elasticity of their fibres over time at temperatures ranging from -170°C to $+120^{\circ}\text{C}$.

CRYOLENE has a low binder content, making it safe in the event of a fire. Reinforced glass tissue or aluminium foil facings provide high tensile strength and prevent damage when the annular space is filled with perlite or settles down.



Refrigerated tanks, FROM -50°C TO 0°C

°C

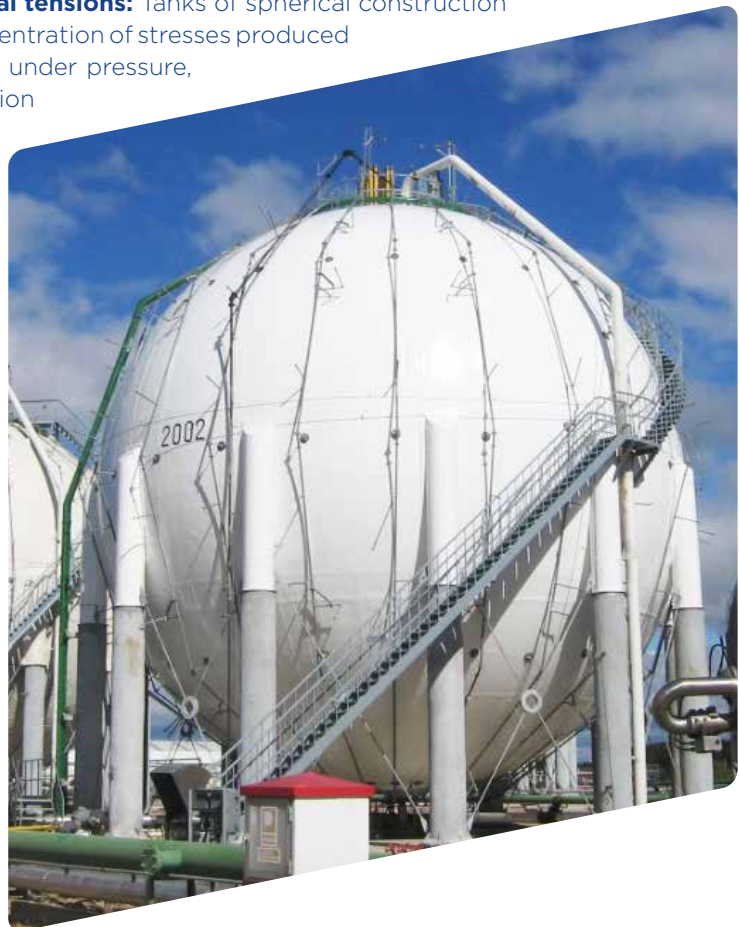


Refrigerated tanks are used to store and transport goods, usually liquids or gases, at temperatures below ambient. They are equipped with refrigeration systems to maintain the desired temperature inside the tank and commonly used in industries such as food processing, pharmaceuticals, chemicals and liquefied gases.

Refrigerated tanks can come in different sizes and shapes, from spherical to cylindrical or prismatic, depending on the type of refrigerated product stored, desired storage capacity, available space and specific technical requirements.

Spherical tanks are typically preferred for their structural integrity and efficient use of space. They are generally used to store liquids below ambient temperature and gases under pressure such as ammonia, propane, butane, propylene, liquefied petroleum gas, etc.

- › **Optimally resist to structural tensions:** Tanks of spherical construction optimally distribute the concentration of stresses produced during the storage of gases under pressure, since the resistance to tension is uniform over the entire surface of the tank.
- › **Save storage space:** Another advantage is that the spherical shape is optimal for storing large volumes in the smallest possible space, compared to all other possible shapes.



MITIGATE TEMPERATURE VARIATIONS WITH ELASTOMERIC FOAM INSULATION

Insulation serves to mitigate variations in working temperature of tanks operating at storage temperatures below ambient temperature. Thanks to its low thermal conductivity, elastomeric foam effectively reduces heat transfer, helping to maintain the desired temperature inside the tank.

PREVENT CONDENSATION AND FREEZING

The right choice of insulation is important to avoid the appearance of ice and condensation on the external surfaces of tanks. Elastomeric foam is moisture resistant, which is important for maintaining insulation effectiveness and to avoid CUI (corrosion under insulation) in humid environments.

COMPENSATE FOR TANK CONTRACTION MOVEMENTS

Elastomeric foam is flexible and can conform to irregular surfaces, making it suitable for insulating complex shaped tanks. In addition, the cutting patterns of the insulation parts can be optimised to absorb variations.

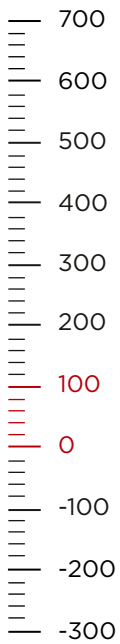
Overall, elastomeric foam insulation can be a cost-effective and effective choice for insulating refrigerated tanks operating at temperatures between -50°C and 0°C.



Standard temperature tanks, FROM 0°C TO 100°C

In the temperature range from 0°C to 100°C, we find different types of tanks, from common storage tanks to hot water storage tanks or digester tanks for example.

°C

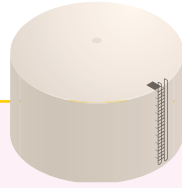


- Common storage tanks:** They typically operate at or near ambient temperature and can store a wide variety of goods, including water, certain chemicals and food products, but also certain petroleum products, pharmaceuticals or industrial fluids.
- Hot water storage tanks:** Made of materials such as steel, copper or stainless steel, hot water tanks are used to hold a volume of water which is heated and stored until needed for domestic or commercial use. Good insulation is essential to minimise heat loss from stored water and improve energy efficiency.
- Digester tanks:** Digestion tanks provide a closed environment for anaerobic digestion. Organic materials, such as animal manure, sewage sludge, agricultural residues, organic food or industrial waste, are decomposed by microorganisms in the absence of oxygen, and transformed into biogas or digestate. Biogas is used as a renewable energy source for heating, electricity production or as a transport fuel, while digestate is used as fertilizer.

MAXIMISE ENERGY EFFICIENCY WITH THE CORRECT INSULATION

For all tanks whose operating temperature is ensured by a heating or cooling source, it is important to avoid heat or cold losses, to avoid energy waste. Insulation helps maintain the right temperature and increase energy efficiency. Either elastomeric foam or mineral wool can be used in this temperature range, depending on the tank location and process.



**Example:**

- › Storage Tank
- › Fluid temperature: 55°C
- › Diameter: 17 meters
- › Height: 12,5 meters
- › Insulated wall surface of the tank: 1.396 m² (2 layers)



SCENARIO 1 SAVE INSTALLATION TIME

Insulation thickness: 180 mm

	Standard mineral wool wired mat 50-80 kg/m ³	U TECH Wired Mat MT 4.0	TECH Crimped Roll 2.0
Energy Class	Class B	Class A	Class B
Heat loss	9,87 W/m ²	8,60 W/m ²	9,63 W/m ²
Installation time		- 9,2%	- 13,8%

Improving thermal performance or offering at least equivalent performance to the standard insulation solution, our high-performance insulation solutions allow savings in installation time of up to 13,8%.



SCENARIO 2 OPTIMISE ENERGY EFFICIENCY

Insulation thickness: 180 mm

	Standard mineral wool wired mat 50-80 kg/m ³	TECH Wired Mat MT 4.1	U TECH Wired Mat MT 4.0
Energy Class	Class B	Class B	Class A
Heat loss	9,87 W/m ²	9,58 W/m ²	8,60 W/m ²
		- 2,9%	- 12,9%

With the same insulation thickness as the standard insulation solution, our high-performance insulation solutions reduce heat loss by up to 12.9%, making it possible to move from energy class B to A.

Medium temperature tanks, FROM 100°C TO 350°C

°C



Medium temperature tanks are used in many industrial processes where precise temperature control and reliable containment of high temperature substances are required.

Used for heating, storage, mixing, or distillation of various substances, these tanks find applications in a wide range of industries including chemical processing, petrochemicals, pharmaceuticals, food and beverages and energy production. Depending on the process, they can integrate heating or cooling systems to control the temperature within the desired range.

Commonly made of materials such as stainless steel, carbon steel, or specialised alloys, capable of withstanding high temperatures, effective insulation is also essential. Given the relatively high temperatures, regular inspection and maintenance are all the more important to ensure that tank performance and integrity are maintained, including corrosion checks and leak detection.

INCREASE ENERGY EFFICIENCY AT RELATIVELY HIGH TEMPERATURES

Insulation helps reduce heat loss, especially when tank contents must be maintained at high temperatures. It therefore improves energy efficiency and reduces operating costs associated with heating or maintaining process temperatures.

ENSURE THE EFFICIENCY OF YOUR PROCESSES

Insulation helps reduce temperature fluctuations or gradients caused by external environmental factors such as ambient temperature variations, especially important when precise temperature control is necessary for product quality or process efficiency.

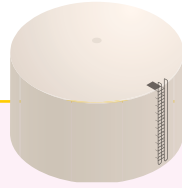
ENSURE PERSONAL SAFETY

Insulation prevents the outer surface of the tank from becoming excessively hot, reducing the risk of burns or injuries to personnel working nearby.

REDUCE THE ENVIRONMENTAL IMPACT

Insulating reduces greenhouse gas emissions associated with energy consumption. By improving energy efficiency, insulation contributes to a lower carbon footprint and helps organisations meet sustainability goals.



**Example:**

- › Bitumen/Asphalt Tank
- › Fluid temperature: 155°C
- › Diameter: 15 meters
- › Height: 14,5 meters
- › Insulated wall surface of the tank: 1.394 m² (2 layers)



SCENARIO 1 SAVE INSTALLATION TIME

Insulation thickness: 200 mm

	Standard mineral wool wired mat 50-80 kg/m ³	U TECH Wired Mat MT 4.0	TECH Crimped Roll 2.0
Energy Class	Class D	Class C	Class D
Heat loss	33,64 W/m ²	28,74 W/m ²	34,4 W/m ²
Installation time		- 9,2%	- 13,7%

Improving thermal performance or offering at least equivalent performance to the standard insulation solution, our high-performance insulation solutions allow savings in installation time of up to 13,7%.



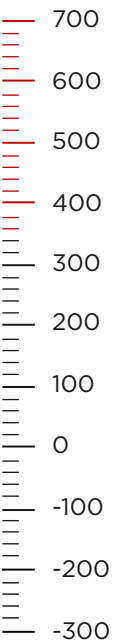
SCENARIO 2 OPTIMISE ENERGY EFFICIENCY

	Standard mineral wool wired mat 50-80 kg/m ³	U TECH Wired Mat MT 5.0	TECH Wired Mat 4.1	U TECH Wired Mat MT 4.0
Insulation thickness	200 mm	180 mm	200 mm	200 mm
Energy Class	Class D	Class C	Class C	Class C
Heat loss	33,64 W/m ²	30,94 W/m ²	30,16 W/m ²	28,74 W/m ²
		-8,3%	-10,3%	-14,6%

Our high-performance insulation solutions make it possible to reduce the thickness of the insulation while increasing heat loss, and to move from energy class D to C. When keeping the same insulation thickness as the standard insulation solution, our solutions reduce heat loss by up to 14.6%.

High temperature tanks, FROM 350°C TO 700°C

°C



High temperature tanks, designed to operate in a temperature range of 350°C to 700°C, are used in specialised industrial processes that require extreme heat resistance and precise temperature control.

High temperature tanks are used in industries where processes require extremely high temperatures for smelting, refining or material processing. They are made of advanced materials capable of withstanding extreme heat, such as refractory metals and specialty alloys.

An example of high temperature tanks are salt tanks, used in concentrated solar power (CSP) systems. These tanks serve to store thermal energy in the form of molten salts, typically in the range of 290°C to 565°C, depending on the specific CSP system design and power plant requirements.

Insulating high temperature tanks, such as salt tanks, is essential to maximise energy storage capacity, maintain operational efficiency, and ensure the safety of equipment and personnel. Proper selection and installation of insulation materials is essential.

MINIMISE HEAT LOSS AND OPTIMISE ENERGY EFFICIENCY AT HIGH TEMPERATURES

Insulation helps reduce heat transfer from the tank to the environment and improves the overall energy efficiency of the system by keeping stored thermal energy at the desired temperature for longer periods.

ENHANCE ENERGY STORAGE CAPACITY

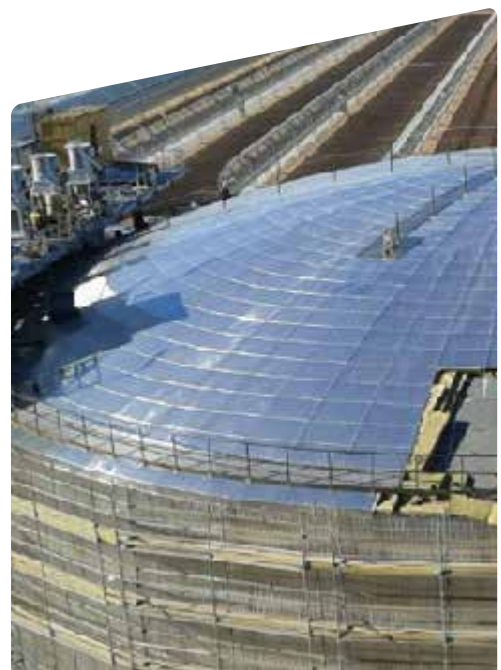
Proper insulation of high-temperature tanks improves their energy storage capacity by reducing heat loss and improving thermal energy storage efficiency. This allows CSP systems for example to store larger quantities of thermal energy, thus providing greater flexibility in electricity production and more stable operating conditions.

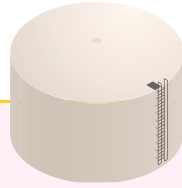
PROTECT SURROUNDING EQUIPMENT AND PERSONNEL

Insulating high temperature tanks helps protect surrounding equipment and personnel from excessive heat exposure.

PREVENT CORROSION

In addition to thermal insulation, adequate insulation also provides protection against corrosion of the tank's structural materials. This is particularly important for salt tanks, where molten salts can be corrosive and degrade the structural integrity of the tank over time.



**Example:**

- › Molten salt tank
- › Fluid temperature: 385°C
- › Diameter: 38 meters
- › Height: 14 meters
- › Insulated wall surface of the tank: 5.067 m² (3 layers)



SCENARIO 1 SAVE INSTALLATION TIME

Insulation thickness: 300 mm

	Standard mineral wool wired mat 80-120 kg/m ³	U TECH Wired Mat MT 6.0	U TECH Wired Mat MT 4.0
Energy Class	Class E	Class D	Class D
Heat loss	96,69 W/m ²	79,78 W/m ²	90,77 W/m ²
Installation time		-8,4%	-14%

Improving thermal performance compared to the standard insulation solution, our high-performance insulation solutions allow savings in installation time of up to 14%.



SCENARIO 2 OPTIMISE ENERGY EFFICIENCY

Insulation thickness: 300 mm

	Standard mineral wool wired mat 50-80 kg/m ³	TECH Wired Mat MT 5.1	TECH Wired Mat MT 6.1	U TECH Wired Mat MT 6.0
Energy Class	Class E	Class D	Class D	Class D
Heat loss	96,69 W/m ²	88,48 W/m ²	84,97 W/m ²	79,78 W/m ²
		-8,5%	-12,1%	-17,5%

With the same insulation thickness as the standard insulation solution, our high-performance insulation solutions reduce heat loss by up to 17.5%, making it possible to move from energy class E to D.



**DID
YOU
KNOW**

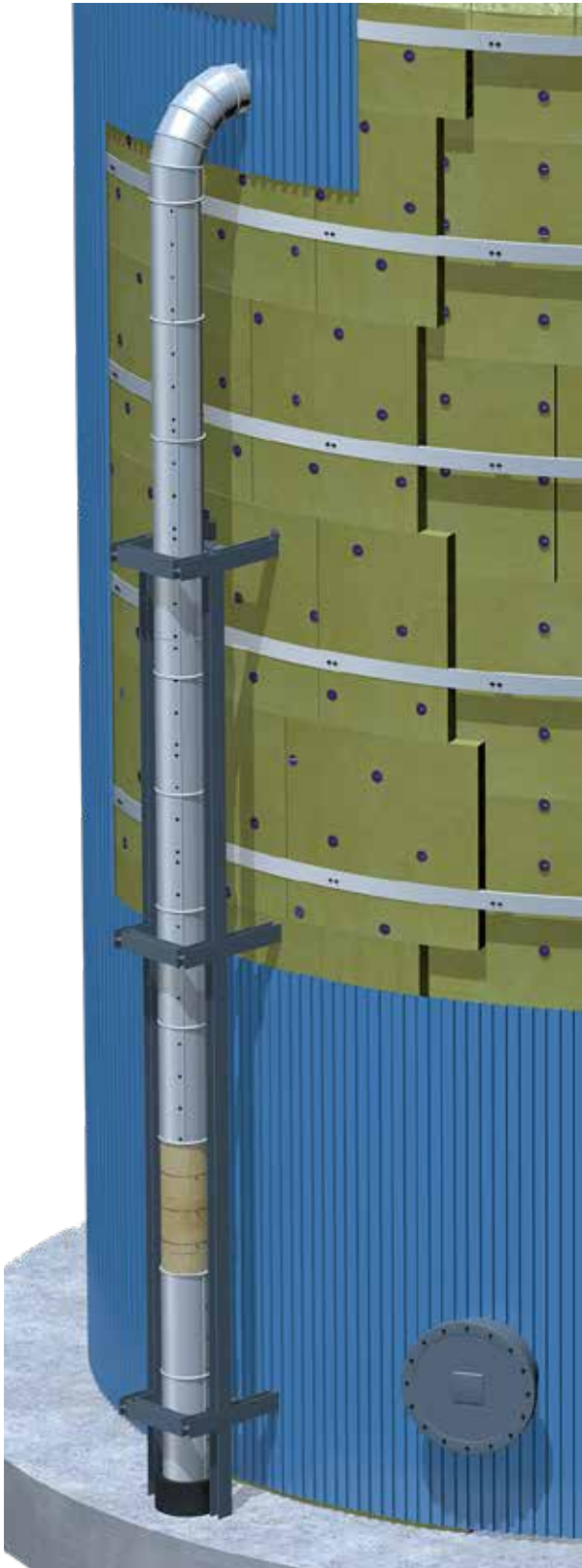
*Tank roof insulation,
often overlooked, can significantly
improve the energy efficiency and
environmental impact of tanks,
alongside wall insulation.*



A FULL RANGE OF PRODUCTS AND SERVICES

Get an overview of
our product range for
tank applications
and discover our
dedicated services.

Insulation solutions FOR TANK WALLS & PIPES



FOR WALLS

TECH Roll - For temperatures from 0°C to 350°C



U TECH Roll - For temperatures from 0°C to 700°C



TECH Slab - For temperatures from 0°C to 700°C

Available in glass wool and stone wool



U TECH Slab - For temperatures from 0°C to 700°C



FOR WALLS & PIPES

TECH Wired Mat - For temperatures from 0°C to 700°C



U TECH Wired Mat - For temperatures from 0°C to 700°C



Kaiflex Sheet - For temperatures from -50°C to 100°C



FOR PIPES

Kaiflex Tube - For temperatures from -50°C to 100°C



TECH Pipe Section - For temperatures from 0°C to 350°C



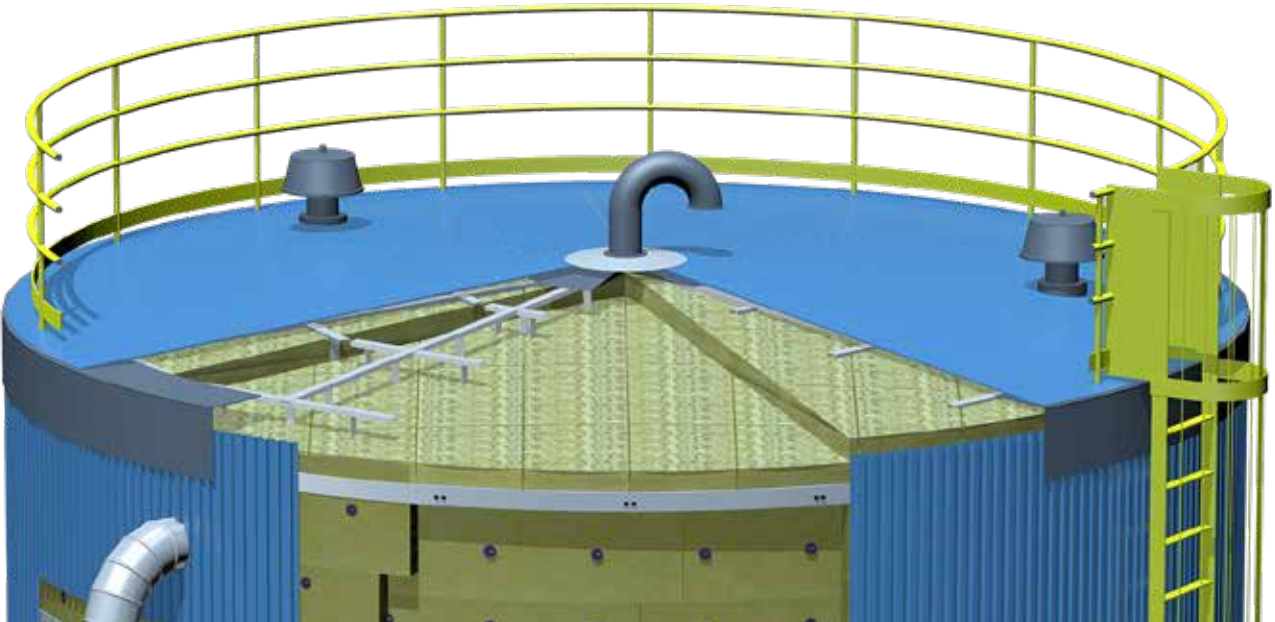
U TECH Pipe Section - For temperatures from 0°C to 700°C



- ☀ Thermal insulation
- 🔊 Acoustic insulation
- 💧 Condensation prevention
- 💰 Cost effective solution
- 🔥 High service temperatures

- 🔄 High Flexibility
- 👉 Easy handling
- 🚚 Fast installation
- 📦 Improved logistics
- 🌿 Lightweight

Insulation solutions FOR TANK ROOFS



FOR ROOFS

TECH Tank Roof Slab - For temperatures from 0°C to 700°C

High compressive strength:

Optimal use in applications requiring high mechanical strength, e.g. if it is necessary to walk on the roof during installation and maintenance.



	TECH TANK ROOF SLAB 20 kPa	TECH TANK ROOF SLAB 50 kPa	TECH TANK ROOF SLAB 60 kPa	TECH TANK ROOF SLAB 80 kPa	TECH TANK ROOF SLAB 100 kPa
THICKNESS	20-100 mm	60-140 mm	80-140 mm	20-40 mm	60-100 mm
DENSITY	150-165 kg/m ³	125-160 kg/m ³	150 kg/m ³	190 kg/m ³	190 kg/m ³
COMPRESSIVE STRENGTH	20 kPa	50 kPa	60 kPa	80 kPa	100 kPa

Kaiflex Sheet - For temperatures from -50°C to 100°C



- ⊕ Mechanical resistance
- ⊖ Thermal insulation
- 🔊 Acoustic insulation
- 🌡️ Condensation prevention
- 🕒 High service temperatures

Overview of TANK INSULATION SOLUTIONS

OUR SOLUTIONS			TEMPERATURE RANGE				
	MATERIAL	FORMAT	[-200°C to -50°C]	[-50°C to 0°C]	[0°C to 100°C]	[100°C to 350°C]	[350-700°C]
CRYOLENE	Glass Wool	ROLL	X				
TECH CRIMPED ROLL	Glass Wool	ROLL			X	X	
TECH ROLL	Glass Wool	ROLL			X	X	
TECH LAMELLA MAT	Glass Wool	LAMELLA			X	X	
TECH LOOSE WOOL	Glass Wool	LOOSE			X	X	
TECH SLAB	Glass Wool	SLAB			X	X	
	Stone Wool				X	X	X
TECH PIPE SECTION	Glass Wool	PIPE SECTIONS			X	X	
	Stone Wool				X	X	X
TECH TANK ROOF SLAB	Stone Wool	SLAB			X	X	X
TECH WIRED MAT	Stone Wool	WIRED MAT			X	X	X
TECH LOOSE WOOL HT	Stone Wool	LOOSE			X	X	X
U TECH ROLL	Ultimate	ROLL			X	X	X
U TECH SLAB	Ultimate	SLAB			X	X	X
U TECH WIRED MAT	Ultimate	WIRED MAT			X	X	X
U TECH PIPE SECTION	Ultimate	PIPE			X	X	X
KAIFLEX	Elastomeric Foam	TUBE		X	X		
		SHEET		X	X		

Overview of TANK INSULATION SOLUTIONS

OUR SOLUTIONS			TANK APPLICATION			
	MATERIAL	FORMAT	Tank Wall	Tank Roof	Pipes (inlet/outlet)	Dead spaces / Cavities...
CRYOLENE	Glass Wool	ROLL	X	X		
TECH CRIMPED ROLL	Glass Wool	ROLL	X		X	
TECH ROLL	Glass Wool	ROLL	X		X	
TECH LAMELLA MAT	Glass Wool	LAMELLA	X		X	
TECH LOOSE WOOL	Glass Wool	LOOSE				X
TECH SLAB	Glass Wool	SLAB	X	X		
	Stone Wool		X	X		
TECH PIPE SECTION	Glass Wool	PIPE SECTIONS			X	
	Stone Wool				X	
TECH TANK ROOF SLAB	Stone Wool	SLAB		X		
TECH WIRED MAT	Stone Wool	WIRED MAT	X		X	
TECH LOOSE WOOL	Stone Wool	LOOSE				X
U TECH ROLL	Ultimate	ROLL	X		X	
U TECH SLAB	Ultimate	SLAB	X	X		
U TECH WIRED MAT	Ultimate	WIRED MAT	X		X	
U TECH PIPE SECTION	Ultimate	PIPE			X	
KAIFLEX	Elastomeric Foam	TUBE			X	
		SHEET	X	X		

For further information on our range of products, and to define the most suitable solution for your individual situation, do not hesitate to contact your local Isover representative.

Tipcheck energy audits to save energy and **REDUCE CO₂ EMISSIONS**

TIPCHECK is an energy audit programme for industrial facilities. It was implemented by the European Industrial Insulation Foundation (Eiif), to save energy and reduce CO₂ emissions thanks to insulation.

TIPCHECKs evaluate the insulation systems of existing facilities, planned projects or retrofits, and demonstrate how more efficient thermal insulation could:

- › **Save energy**
- › **Save costs**
- › **Contribute to a cleaner production through reduced CO₂ emissions**

Payback times for insulation investments following TIPCHECK audits are in most cases only 1 to 2 years. The annual energy savings achieved are often in the range of 200,000 – 400,000 MWh, reducing production costs for TIPCHECK customers by more than 7 million EUR every year.

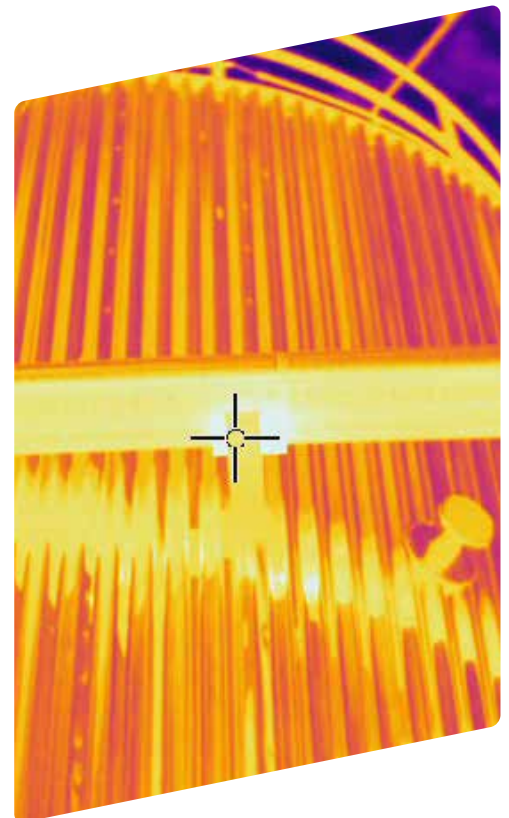
Beyond identifying and exploiting energy efficiency potentials, the TIPCHECK thermal energy audit can also help identify process efficiency improvements and personnel safety risks.

BENEFIT FROM THE SUPPORT OF OUR TIPCHECK EXPERTS

At Saint-Gobain, we have several certified TIPCHECK experts who can carry out TIPCHECK audits, internally or at our customers. To prepare for an audit, the TIPCHECK expert will request some initial information concerning the installations to be audited: general and detailed drawings, current insulation specification of the areas to be checked, operating temperature of each zone, process diagram, type of energy used (gas, electricity, etc.), energy price.

The audit will then take place in three stages:

1. Field measurements to collect all the data.
2. Based on the data collected, we draw up an inventory of the actual performance of the installations, considering the existing insulation. Then we recommend an optimised insulation system.
3. And finally, we deliver a standardised TIPCHECK report detailing the conclusions of the audit.



Technical support and tools to DESIGN EFFICIENT INSTALLATIONS

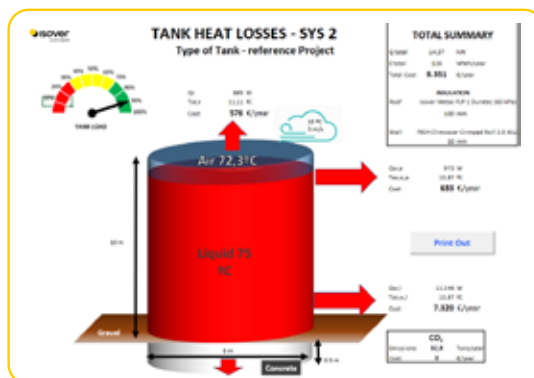
Calculating the thermal performance of complex installations is not an easy task and is often very time-consuming. Whether you are an industrial planner, specifier, or insulation contractor, rely on our thermal calculation tools to help you design thermally efficient constructions quickly, easily and with reliable results.

TECHCALC 2.0 FOR ADVANCED THERMAL CALCULATIONS

TechCalc 2.0 uses the procedures defined in ISO 12241, ISO 23993, VDI 2055 and the ASTM C680, as the basis for its thermal insulation calculations. The software is the result of decades of practical experience and offers detailed calculation procedures with an easy-to-use interface.

It covers a full range of different scenarios, such as:

- › Heat flow and surface temperatures
- › Required insulation thickness for required heat resistance
- › Operating costs and CO₂ savings
- › Relationship between energy saving and insulation
- › Minimum insulation thickness to prevent condensation
- › Multilingual (including English, German, French, Spanish, Italian...)
- › Easy to use
- › Customisable database (products, climate data, locations, etc.)



ADVANCED TECHNICAL SUPPORT WITH TANKCALC

To choose the most effective insulation system for your tanks, depending on the fluid stored, the filling level of the tank and the operating temperature, and to minimise heat loss, as well as to define the optimal logistics solution (number of packs, rolls etc.), our engineers will support you! For this, they have TankCalc, software specifically developed for thermal calculations on tanks.

Our INDUSTRY MANUAL offers a comprehensive guide to our energy-efficient and sustainable insulation solutions for industry. It includes theoretical insights, standards, technical documents, energy audit schemes, and installation guidelines.

You can access it from our website



A hand with a white manicure points upwards towards a yellow star. The background is a light blue gradient with several other yellow stars scattered around.

OUR SOLUTIONS IN ACTION

Trusted by customers around the world, our insulation solutions for tanks are widely used to improve energy efficiency, optimise processes and ensure safety, for all types of industrial tanks.

Vattenfall – Berlin (Germany)

Inaugurated in 2023, with a height of 45 meters, a diameter of 43 meters and a capacity of 56 million liters, Germany's largest heat storage tank will store district heating water at a temperature of 98 degrees Celsius. This colossal heat accumulator promises to play a pivotal role in Berlin's energy security and transition towards a greener, carbon-neutral society.

“

Heat storage is an important component regarding flexibility in the grid, which is needed to feed in more and more renewable energies.

With smart storage solutions, the heat supply of the future will not only be more climate-friendly, but also more secure.

Christian Feuerherd -
CEO of Vattenfall Wärme
Berlin AG

EFFICIENT THERMAL CALCULATIONS WERE THE KEY TO SUCCESS

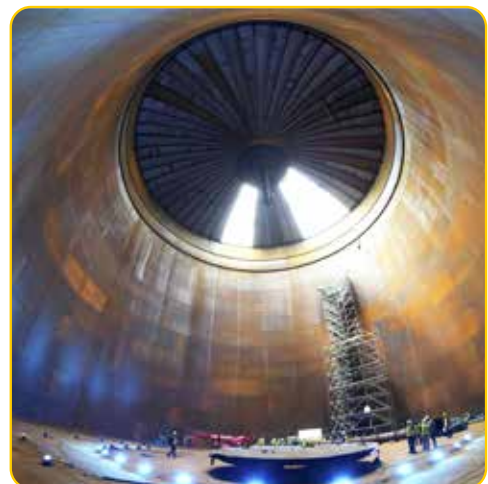
At the beginning of the project, only two parameters were explicitly specified regarding insulation. One was the mineral wool density of 22 kg/m³, to ensure sufficient mechanical strength. The second was the maximum heat loss of <12 W/m².

With the right calculations according to the AGFW FW 313 standard, we could precisely optimise the insulation thickness required for this project. As a result, 400 mm of our Glass Wool Felt FE (AS) SI were installed around the tank, in two layers of 200 mm each.

REDUCED INSTALLATION TIME FOR A GIGANTIC PROJECT

”

Beyond the required heat loss reduction, the challenge was also to reduce installation costs, given the huge dimensions of the project, and all the more so as construction deadlines were tight. In total, 12,000 m² of tank wall insulation and an additional 5,000 m² of roof insulation were used!



TIPCHECK of storage tanks - Las Palmas de Gran Canaria (Spain)

EVALUATE THE ENERGY PERFORMANCE OF FUEL STORAGE TANKS

A TIPCHECK audit of two storage tanks located in Las Palmas de Gran Canaria (Canary Islands) was carried out in 2020, to determine possible energy losses, reduce energy consumption as well as CO₂ emissions, while maintaining the temperature inside the tank at 50°C minimum.

AGING INSULATION LEADING TO HEAT LOSS

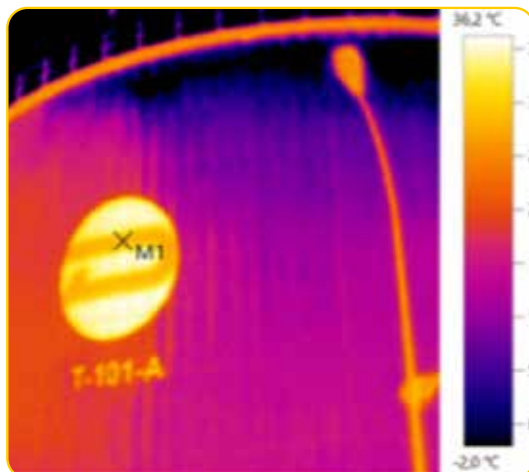
After an initial visual inspection of the insulation and the temperatures recorded with a thermographic camera, it was found that many areas of both tanks showed heat loss. In fact, the existing polyurethane insulation had lost a large part of its thermal efficiency.



A NEW INSULATION SYSTEM OFFERING BIG SAVINGS AND A RAPID RETURN ON INVESTMENT

A new glass wool insulation solution was proposed with the ultra-light and flexible TECH ROLL 2.0 ALU2, offering optimal thermal efficiency and guaranteeing energy losses of less than 15 W/m² on all surfaces.

The potential annual savings convinced the owner to implement the upgrades early 2021. With an investment cost of € 272,500 and a payback of only 1.22 years (14.6 months), the owner decided to implement the upgrades early 2021.



	Annual savings potential
Energy	- 5.333 MWh
Cost	- € 224.190
CO ₂ emissions	- 1.498 tons CO ₂

Water treatment plant - Berlin (Germany)



PREVENTING HEAT LOSS FOR EFFECTIVE WASTEWATER TREATMENT

Around 650,000 m² of wastewater is cleaned and purified every day in Berlin's six sewage treatment plants, an essential process for protecting public health and preventing pollution of rivers and lakes.

One of the most important stages of water purification is the fermentation of waste in a large septic tank, at temperatures of around 36-37°C, a necessarily energy-intensive process in order to maintain these temperatures inside the tanks. This is why it was decided to progressively upgrade the plants and to implement energy saving measures.

In particular, it was decided to properly insulate the wastewater tanks and therefore Kaiflex KKplus Protect Alu-TEC was chosen.

INSULATION IN A HUMID ENVIRONMENT

Being installed in such a damp and humid environment, the potential for moisture

ingress had to be considered. This is why a closed cell insulation solution was favoured, in order to protect the surface of the tank from the formation of condensation and the risk of corrosion. The elastomeric foam insulation solution Kaiflex KKplus Protect Alu-TEC was chosen, providing high levels of energy saving over long periods.

A COST-EFFICIENT SOLUTION

The scale of the septic tanks - 11.4 m high - made the installation complex. Over 2,000 m² of insulation had to be installed, and the choice fell on the 19 mm thick Kaiflex KKplus Protect Alu-TEC with a pre-applied self-adhesive backing. As a flexible material supplied in long rolls, Kaiflex is easily applicable to large tanks. For this specific project, Kaimann even made 11.4 m long rolls so that each one would fit the tank perfectly.

“

The flexible elastomeric foam was perfect for insulating a container several meters high. Thanks to Kaiflex KKplus Protect Alu-TEC, the contractor was able to reduce installation costs by around 50%.

Stephan Baugirdis -
Segment Manager Industry
at Kaimann GmbH

”

ABOUT US

A photograph showing a pair of hands gently holding a small, young green plant with several leaves. The background is a bright, hazy outdoor setting, possibly a field or garden. The image is partially obscured by a yellow callout box in the lower right.

Discover the Saint-Gobain Group, and read more about Saint-Gobain Technical Insulation, the world leading supplier of sustainable insulation solutions.



MAKING THE WORLD A BETTER HOME



Saint-Gobain designs, manufactures and distributes solutions for the construction, mobility, healthcare and other industrial application markets. Developed through a continuous innovation process, they provide wellbeing, performance and safety while addressing the challenges of sustainable construction, resource efficiency and the fight against climate change.

This strategy of responsible growth is guided by the Saint-Gobain purpose, "MAKING THE WORLD A BETTER HOME", which responds to the shared ambition of the women and men in the Group to act every day to make the world a more beautiful and sustainable place to live in.





Saint-Gobain ISOVER

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