



You Build, We Protect!

NEWSLETTER

HEGGEL® Therm 4410

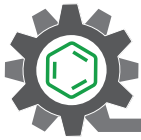
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Optimizing Thermal Performance in Edible Oil Refineries

- **Safer and More Efficient Operations**
- **High-Performance Thermal Coatings**
- **Energy Management in Fatty-Acid Tanks**



Advanced Insulation Technology for Fatty-Acid Storage Tanks

> Inside an Edible Oil Refinery

Edible oil refineries transform crude vegetable oils, such as soybean, sunflower, palm, rapeseed, and coconut, into high-purity, food-grade products consumed worldwide. These industrial plants operate through a sequence of thermally intensive processes, including degumming, neutralization, bleaching, deodorization and fractionation. Every stage relies on precise thermal management. Across these units, operating temperatures typically range from moderate heating in the 70–120 °C range during degumming and bleaching, to high-temperature

conditions exceeding 200 °C during steam-stripping deodorization. Temperatures are controlled via steam networks, hot water circuits, and heat-transfer fluids. Maintaining viscosity, preventing oxidation, ensuring clarity, and preserving nutritional quality all depend on stable and consistent thermal conditions. The tank farms surrounding these refineries are a critical part of this thermal chain, storing intermediates and final oils under controlled temperatures to maintain fluidity and ensure uninterrupted downstream processing.





A Demanding Environment

During refining, edible oil refineries handle a diverse mix of chemicals and process aids, including caustic soda, phosphoric acid, bleaching earth, and large volumes of steam. These materials interact with the tanks, pipelines, and equipment in environments that experience variable temperatures. Large carbon steel vessels and pipelines

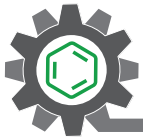
undergo continuous thermal cycling as hot liquids fluctuate between processing stages. External exposure to sunlight, rain, and humidity further intensifies mechanical and thermal stresses. Under such conditions, maintaining reliable heat retention is essential not only for product quality but also for safety and equipment longevity.



The Role of Fatty Acids in Edible Oil Refineries

Fatty acids are integral to the refining process, produced during neutralization and further separated or purified in distillation and fractionation units. Compounds such as oleic, stearic, palmitic, and linoleic acids form valuable intermediates with applications in food, cosmetics, detergents, and oleochemical manufacturing. These fatty acids are highly temperature-

dependent: they remain fluid only within a narrow operating range, below which they begin to crystallize. As a result, fatty-acid systems, including separation equipment, pipelines, and storage tanks, must be maintained at controlled temperatures to prevent solidification. Ensuring consistent thermal conditions is essential for fluid handling and for preserving product purity and avoiding operational disruptions.

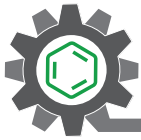


Operational Challenges

Even with their engineered design, oil storage systems continue to face a number of technical challenges. Significant heat loss can occur across the surface of large tanks, which increases steam consumption and energy costs. As temperatures drop, oil viscosity rises, affecting pumpability and potentially slowing production. Condensation forms on exposed surfaces when warm tanks are subjected to cold ambient air, accelerating external corrosion. Traditional insulation

systems, typically mineral wool wrapped with metal cladding, are highly vulnerable to moisture ingress. Once these systems absorb water, their insulating efficiency drops dramatically, while trapped moisture creates hidden corrosion under insulation (CUI). Hot external surfaces also present a safety hazard to maintenance personnel. These combined factors make effective insulation a critical requirement for both operational stability and asset protection.





Essential Functions of Thermal Insulation

An effective insulation system must achieve the following core requirements to function reliably in demanding industrial environments:

- **Energy Efficiency:** Reducing heat loss and minimizing steam demand to lower operating costs and improve overall thermal performance.
- **Thermal Stability:** Maintaining consistent product conditions to ensure smooth processing, predictable viscosity, and uninterrupted flow.
- **Safe-Touch Surfaces:** Preventing dangerously hot exterior steel surfaces to protect personnel and support compliance with safety standards.
- **Condensation Control:** Eliminating moisture formation on tank walls to avoid external corrosion and surface degradation.
- **CUI Prevention:** Stopping water ingress and hidden corrosion under insulation to extend equipment life and reduce unplanned maintenance.
- **Operational Reliability:** Ensuring continuous, trouble-free material handling for stable production and reduced downtime.





HEGSEL Therm 4410 – Advanced Insulation System

HEGSEL Therm 4410 is a high-performance, water-borne thermal-insulation coating engineered for equipment and storage tanks that require stable operating temperatures, reduced heat loss, and safe-touch surfaces. Formulated with aerogel-based insulating fillers and advanced acrylic polymers, the system creates a seamless, hydrophobic insulating layer directly on steel, eliminating the joints and moisture pathways associated with mineral wool and metal cladding.

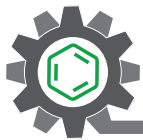


Advantages of HEGSEL Therm 4410

HEGSEL Therm 4410 achieves higher insulation efficiency at much lower thicknesses compared to traditional coating systems, reducing both material use and application time. The performance characteristics below demonstrate how **HEGSEL Therm 4410** combines efficient heat retention with strong moisture resistance to protect heated storage tanks

in demanding environments. Its insulating behavior helps maintain stable process temperatures, while low vapor permeability protects the steel surface against condensation and corrosion. Overall, these properties confirm the system's suitability for improving energy efficiency, operational reliability, and long-term durability in edible oil refineries.

Property	Value	Unit
Thermal Conductivity	$33.5 \pm 1\%$	mW/m·K
Water Vapor Transmission Rate	25	g/(m ² ·d)
Thermal Insulance	0.25	m ² ·K/W
Heat Flux Density	60.24	W/m ²



Application Areas

HEGSEL Therm 4410 is effective for fatty-acid storage tanks but is also widely used across other process systems. The coating performs well on process pipelines, steam and hot-water circuits, and equipment exposed to thermal cycling or difficult-to-maintain insulation. It is also suitable for heated reactors, heat exchangers, and auxiliary vessels, as well as structural surfaces requiring safe-touch protection and condensation control. In all applications, **HEGSEL Therm 4410** offers durable thermal performance without the moisture-related failures associated with traditional insulation systems.



A Smarter Approach to Thermal Protection

Maintaining stable operating temperatures is essential for efficiency, quality, and safety in edible oil refineries. **HEGSEL Therm 4410** offers a modern insulation solution that overcomes the vulnerabilities of conventional systems by combining superior thermal performance with a seamless hydrophobic barrier. The elimination of water

ingress dramatically reduces maintenance requirements and prevents CUI, while safe-touch surfaces and long-term durability improve operational safety and reliability. For refineries seeking to reduce energy consumption, extend equipment life, and enhance process stability, **HEGSEL Therm 4410** provides a powerful and efficient solution.

Insulate Your Asset with HEGSEL

For technical guidance or assistance in evaluating insulation solutions for your facility, contact our engineering team.

[Click here to contact our team](#) and discover how our expertise can enhance your project.

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