



HEGGEL®

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NEWSLETTER

HEGGEL® EL

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Rubber Lining Systems as Membrane Layers

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Operating Under Extreme Conditions

Across process industries, certain critical equipment operates under some of the most demanding conditions found in industrial environments. Exposure to elevated temperatures, aggressive chemicals, oxidizing atmospheres, and continuous thermal cycling places extraordinary stress on internal protection systems. In such applications, surface protection is not merely a maintenance consideration, but a fundamental component of asset integrity and operational reliability.





Failure Mechanisms

These extreme environments create a convergence of aggressive attack mechanisms:

- **Chemical attack:** Acidic or corrosive condensates readily form on cooler surfaces, eating into unprotected steel.
- **Thermal shock:** High operating temperatures followed by rapid cooling cycles put tremendous stress on linings and structures.
- **Oxidation:** The presence of oxidizing species (like free chlorine or oxygen at high temperature) accelerates corrosion reactions.
- **Mechanical stress:** Cyclic operation, temperature gradients, and pressure fluctuations exert mechanical and thermal stress that can crack or fatigue protective layers.

Unprotected carbon steel will corrode rapidly when exposed to hot acids and oxidizers. Even high-alloy materials can suffer localized attack, particularly at weld seams and geometric transitions. Rigid lining systems may crack under thermal cycling, allowing corrosive media to penetrate behind the protective layer. In highly demanding environments, single-layer coating systems may not provide sufficient long-term protection without additional structural reinforcement.





◆ Fundamental Design Strategy

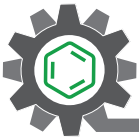
In severe chemical and thermal environments, internal lining must be treated as a structural design requirement. The protection system must create a continuous chemical barrier, withstand thermal shock and cyclic movement, maintain strong adhesion to the steel substrate, and ensure reliable protection even if the outer layer is locally damaged.

These demands are best met through a multi-layer lining concept that integrates rigid chemical resistance with flexible sealing performance.



◆ Layered Protection for Severe Conditions

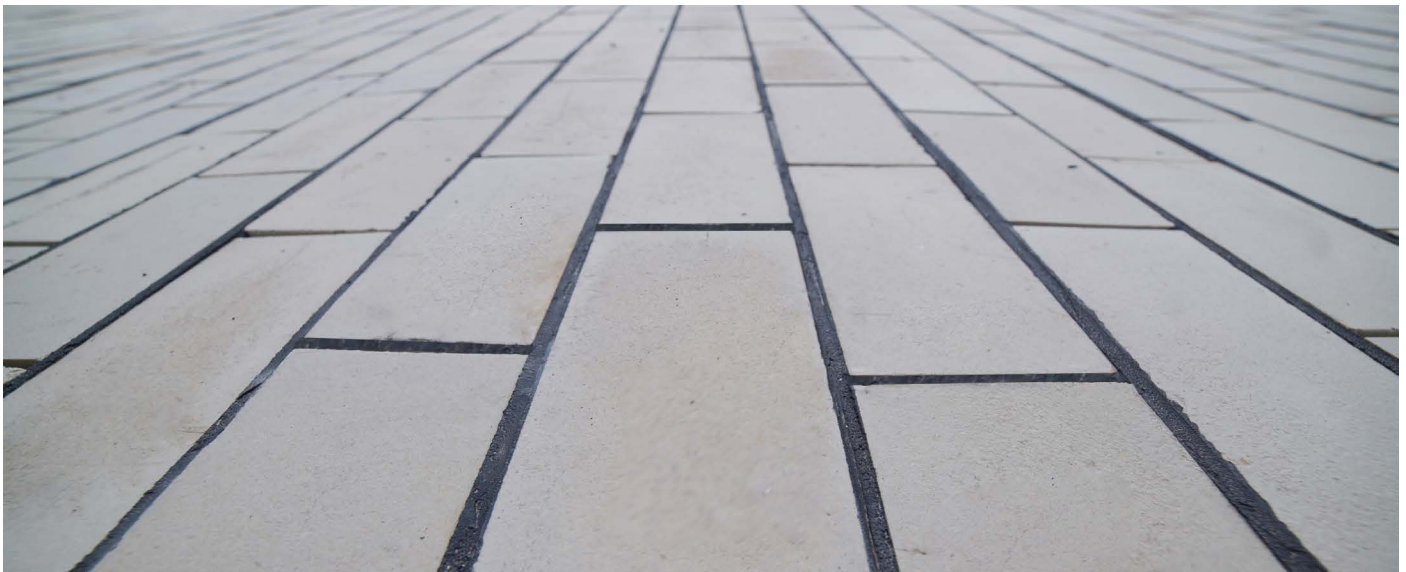
A proven approach for extremely aggressive environments is the use of acid-resistant brick or tile lining as the primary protective layer, installed with a suitable chemical-resistant mortar. This rigid outer layer provides a firm, durable shield against direct chemical attack and high-temperature exposure. It withstands direct chemical exposure, thermal and mechanical load, and abrasion, and it offers structural durability under severe operating conditions.



In many **HEGGEL** lining systems, fiber-reinforced plastic (FRP) membranes are used as intermediate sealing layers beneath brick linings. **HEGGEL FRP** membranes provide chemical resistance and structural reinforcement and are widely applied across industrial equipment. However, in environments characterized by intense thermal cycling, rapid expansion and contraction, or mechanical vibration, or in cases where the chemical environment exceeds the qualified resistance range of specific FRP systems,

these rigid composite structures may face long-term performance constraints.

In such demanding scenarios, a more resilient and chemically robust intermediate layer may be required. Rubber lining systems can be applied both on steel and concrete substrates, offering excellent chemical resistance combined with high flexibility. In areas where FRP systems do not achieve the necessary chemical resistance, whether on steel or concrete surfaces, rubber linings provide a reliable alternative solution.



By installing a flexible rubber membrane directly onto the steel substrate beneath the brick lining, the system gains a critical second layer of defense. The rubber membrane absorbs thermal movement and mechanical stress without cracking, while maintaining continuous sealing integrity over the steel or concrete surface.

The integration of a rigid brick layer with a resilient rubber underlayer therefore combines structural strength with operational flexibility. The brick withstands direct process exposure, while the rubber membrane ensures long-term protection of the underlying structure even under cyclic thermal and mechanical loading.



HEGGEL EL: Rubber Linings Applied as Membrane Layers

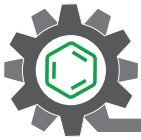
To perform reliably as a membrane layer, a rubber lining must offer an exceptional balance of chemical resistance, mechanical durability, strong adhesion, and flexibility under thermal stress. **HEGGEL EL** is a category of engineered rubber lining systems developed specifically for aggressive chemical environments and cyclic thermal loading. These elastomeric linings are designed to serve as standalone corrosion barriers in harsh service, and they can also be integrated as membrane layers beneath brick or tile linings for a multi-layer protection strategy.

Depending on project requirements, **HEGGEL EL** linings are available in different elastomer bases, each formulated for specialized performance:

- **Bromobutyl:** Optimized for enhanced acid resistance and reduced diffusion permeability
- **Natural Rubber:** Proven performance in general acid service applications
- **CSM-based compounds:** Improved resistance against oxidizing media and chemical degradation
- **EPDM-based formulations:** Balanced resistance to heat and a broad range of chemicals

Through careful material selection, the membrane layer can be engineered to meet project-specific chemical, thermal, and mechanical demands.





Long-Term Reliability

The combination of acid-resistant brick lining and a bonded rubber membrane layer creates a protection concept in which rigidity and flexibility operate together. The outer lining withstands direct exposure, while the rubber membrane preserves the integrity of the steel substrate under movement and stress.

By integrating **HEGSEL EL** rubber membranes into brick-lined systems, plant operators gain more than corrosion resistance. They achieve enhanced structural security, extended service life, reduced maintenance risk, and improved operational reliability.

In demanding industrial environments, this engineered layered protection strategy ensures predictable performance, structural integrity, and long-term asset reliability.

Your Protection Strategy with HEGSEL

[Click here to contact our team](#) for a detailed technical consultation. Our engineering team supports EPC contractors, plant operators, and maintenance specialists with system-engineered lining solutions tailored to demanding industrial environments.

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