HEGGEL®

You Build, We Protect!

NEWSLETTER

HEGGEL® FU 638

August 2023

INSIDE THIS ISSUE:

Countermeasures Against Hydrofluoric Acid

- Expansive Utility of HF
- Potential Risks & Exposures
- Ultimate HF-Resistant Mortar for Diverse Industrial Needs

HEGGEL® FU 638

Advanced Formula for Superior Defense in Harsh Chemicals: HF Resistant Mortar

Hydrogen Fluoride (HF), a highly toxic and corrosive chemical compound, is extensively used in various industrial applications due to its unique chemical properties. In its compressed form, HF is a colorless gas or a fuming liquid that dissolves readily in water, forming hydrofluoric acid. One of its primary uses is in the glass industry, where it etches and frosts glass surfaces. It's ability to etch silicon makes it indispensable in the semiconductor industry, where silicon wafers must be cleaned and etched to precise specifications. HF also serves as one of the primary industrial sources of fluorine, a key ingredient in the production of Teflon, refrigerants, and other fluorinated compounds. HF plays an essential role as a rust remover from metals. In the aluminum production process, HF separates aluminum from its ore. In the oil and gas industry, HF is particularly vital in the refining process, where it acts as a catalyst in the alkylation process that allows refineries to utilize lighter hydrocarbons more effectively.

Handling, transfer, and storage of HF in various industrial units present potential exposure risks. Exposures can occur during mixing, reaction, and separation stages of industrial processes. Spills, leaks, or equipment failure can also lead to exposure. Storage areas with tanks or containers of HF can be potential exposure points due to leaks, overfilling, or containment system failures.

HF Corrosion

Hydrogen fluoride (HF), is a highly corrosive substance. It can corrode metals, glass, and ceramics, cement, damaging the structural integrity of substrates and leading to significant failure issues in industrial settings.

The rate of corrosion can be influenced by the concentration of HF and the temperature. Higher concentrations and elevated temperatures generally increase the corrosion rate. In some cases, even trace amounts of HF can cause corrosion, especially in the presence of moisture.

Uniform Corrosion is the most common form of corrosion caused by HF, where the entire surface of the material corrodes uniformly; HF reacts with metal surfaces, forming metal fluorides that can cause a loss of material thickness over time. HF can cause stress corrosion cracking (SCC) in certain materials, resulting in sudden and catastrophic failures, especially in high-pressure applications. Localized corrosion such as pitting or crevice corrosion occurs in specific areas of the material due to HF attack. Erosion-Corrosion occurs when a material is exposed to both chemical corrosion and mechanical wear; HF can accelerate erosion-corrosion by reacting with the material, making it more susceptible to wear. Galvanic and intergranular corrosion are also among the degrading effects of HF.

Protective Measures Against HF

Corrosion induced by HF, especially in the oil and gas industry, results in material degradation, equipment failure, and increased safety risks. Protecting against HF corrosion requires various strategies and technologies, depending on the specific industry, application, and conditions.

To counteract the corrosive effects of HF, industries adopt several preventative and protective measures such as selecting appropriate materials resistant to HF corrosion, process control, using corrosion inhibitors, protective coatings and linings, Cathodic Protection, to reduce the rate of corrosion.

The suitability of these solutions varies depending on the specific conditions. For example, tile-lining is a suitable option for areas directly exposed to HF, such as floorings of involved industrial plants, reactors, vessels, tanks, and the like, operating under high-temperature, harsh conditions. In such situations, selecting the appropriate bedding and jointing mortar for the tile-lining system is crucial.

Mortars, when used in industrial settings, are known to be an effective means of corrosion protection. They serve as a barrier between corrosive substances and the material underneath, preventing the corrosive substances from reacting with the material and causing degradation. This protective role is especially crucial in environments where equipment and infrastructure are exposed to aggressive chemicals, extreme temperatures, or other conditions that can accelerate corrosion. Mortars can be applied to a wide range of surfaces, such as concrete, metal, and ceramics, and they can be tailored to suit specific applications by modifying their composition, thickness, or application techniques.

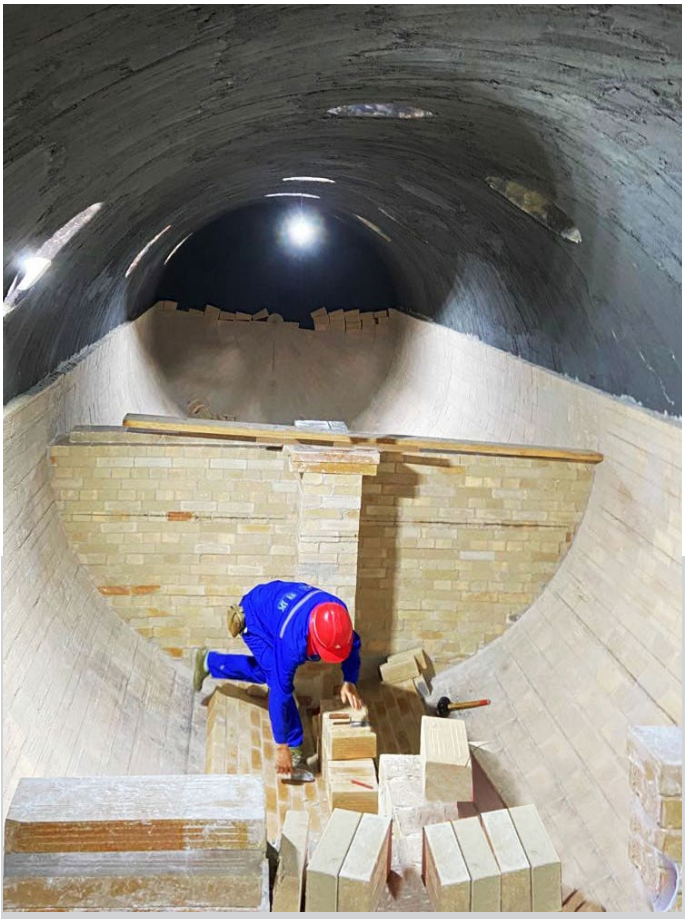
Protective Measures Against HF

There are several types of mortars available, such as Phenolic, Furan, Epoxy, Vinyl Ester, Sulfur Mortars, etc. each with its advantages and limitations; when selecting an HF-resistant mortar, it's essential to consider factors such as the concentration and temperature of HF, the specific application, and any other chemicals present.

Additionally, our choices for HF-resistant mortars are restricted due to factors like the chemical composition of the powder part, which typically contains silica, and the requirement for resistant resin bases. Both the solution and powder components must provide adequate resistance to HF. It's also crucial to follow the manufacturer's guidelines for mixing, applying, and curing the mortar to ensure optimal performance and longevity.

HF-Resistant Mortars

HF-Resistant Mortars offer a robust and effective solution for protecting against HF corrosion, delivering significant advantages in terms of chemical resistance, durability, adaptability, and mechanical properties. These mortars play a crucial role in safeguarding industrial assets and ensuring safe and efficient operations.



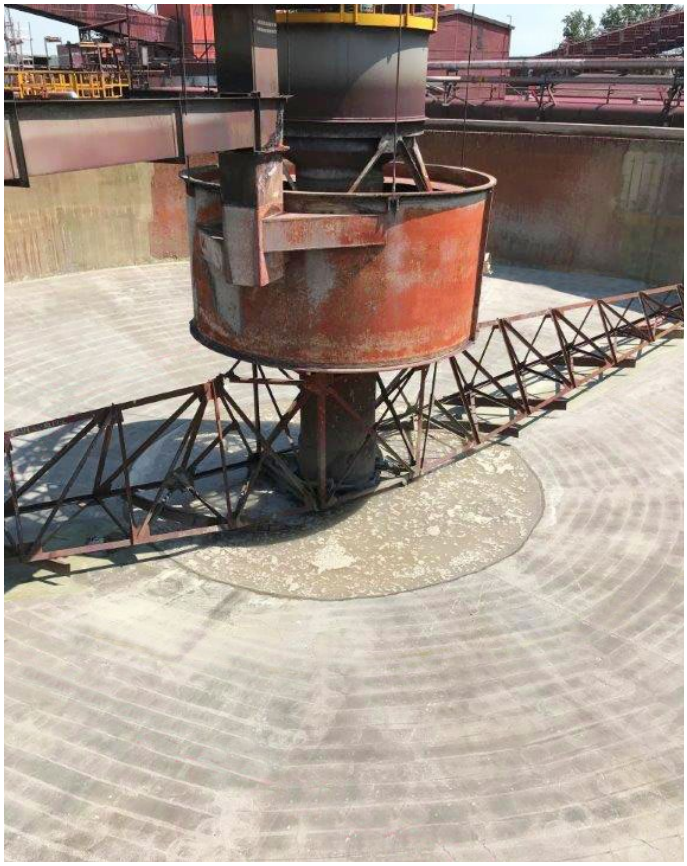
While HF-resistant mortars offer valuable protection against corrosion, they may come with various technical disadvantages. One common issue is limited temperature resistance, which restricts their use in high-temperature environments. Some mortars may also be sensitive to moisture, affecting their effectiveness. Durability can be a concern, as certain types may wear out more quickly than others, leading to increased maintenance or replacement. Application conditions can be a limiting factor, as some mortars are sensitive to temperature and humidity during application and curing. Another technical limitation includes poor adhesion, where some mortars may not bond as effectively to surfaces, potentially impacting their sealing or bonding capabilities. Lastly, limited flexibility in some mortars can restrict their use in applications that require more pliable materials

HEGGEL FU 638, an advanced HF-resistant mortar, addresses these shortcomings and offers numerous advantages. It excels in chemical resistance, and its durability ensures long-lasting corrosion resistance, even under elevated temperatures and moisture conditions. This reduces the need for maintenance and replacements. Moreover, HEGGEL FU 638 is versatile and easy to apply, compatible with a wide range of substrates, and can be tailored to specific requirements.

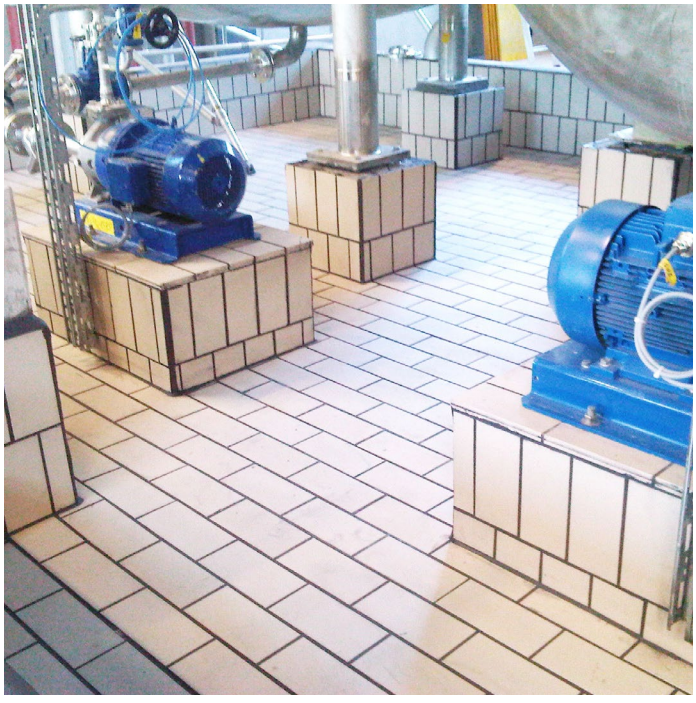
HEGGEL® FU 638

Two-Component Synthetic Furan Resin Mortar

HEGGEL FU 638 is a two-component, aldehyde-free mortar that stands out in the market for its unique properties and extensive applications. Based on a modified furan resin and hydrofluoric acid-resistant fillers, this mortar is specifically designed for easy bedding and jointing of acid-resistant ceramic tiles, bricks, or carbon bricks.



One of the most notable features of **HEGGEL FU 638** is its excellent chemical resistance to a broad spectrum of media, including various inorganic and organic acids and alkalis (including hydrofluoric acid), greases, oils and fuels, solvents, and diverse hydrocarbons. In addition to its exceptional chemical resistance, **HEGGEL FU 638** is known for its superior adhesion to ceramic tiles, bricks, and carbon bricks, ensuring a robust bond that lasts.



HEGGEL FU 638 is also remarkably temperature resistant, capable of withstanding temperatures up to 180°C depending on the type of chemical in use.

As an added benefit, **HEGGEL FU 638** is electrically conductive, offering additional application possibilities. Furthermore, this mortar provides economical use due to its favorable resin/filler ratio, making it a cost-effective choice for a wide range of industrial applications.

Application Areas

With excellent resistance to chemicals, especially solvents, basic chemicals and notably hydrofluoric acid, **HEGGEL FU 638** is engineered for bedding and jointing tile or brick linings. It stands out by offering comprehensive corrosion protection and extending the lifespan of:

- Containment Areas
- Storage Tanks
- Reactor Vessels
- Alkylation process units
- Flooring
- Chimneys and Stacks
- Neutralization Systems
- Waste Disposal Units

Technical Data	
Shore D hardness ASTM D2240	> 60 Shore D
Abrasion resistance ASTM C241	11 cm^3/50 cm^2
Flexural strength ASTM C580	30 MPa
Compressive strength ASTM C579	79 MPa
Tensile strength DIN EN ISO 527	10 MPa
Adhesive strength to ceramic tiles DIN EN ISO 4624	> 2.0 MPa
Therm. Coefficient of linear expansion ASTM C531	1.9×10^{-5} 1/K
Thermal conductivity ISO DIN 22007	2.1 W/mK