HEGGEL®

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NEWSLETTER

HEGGEL® FRP 340

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Industrial pH Neutralization

Industrial waste effluents, specifically those with low pH, can cause serious damages to infrastructures in treatment plants; for instance, acidic and/or alkaline industrial waste would destructively affect the piping systems, if it has not been neutralized prior to discharge into the sewage systems. In addition, pH neutralization is an essential treatment process in any industrial manufacturing sector releasing acidic wastewater into sewer systems, natural above and/or underground water streams, etc., in order to comply with effluent discharge requirements by authorities.

With the aim of modifying the acidic or alkaline water flow to a neutral pH, the most important objectives of neutralization are to conform the industrial waste effluents to standard discharge criteria and/or achieve treatable wastewater for further purification.

Two different systems are utilized for neutralization at industrial scale operations, both to set the pH to neutral level before discharge: batch systems that run by holding effluent in tanks or pits for removal of metal and/or contaminations with various chemicals for treatment, and continuous systems operating as effluent flows through tanks or basin where chemicals are added for treatment and measurements are done. Whether it is accomplished in a batch or continuous mode, pH is a key measurement to control the integrated effects of added reagents in neutralization process.

There are four types of neutralization reactions categorized based on the strength of the acid and base involved:

- Strong Acids with Strong Bases
- Weak Acids with Strong Bases
- Strong Acids with Weak Bases
- Weak Acids and Weak Bases

With a chemical reaction between an acid and a base, neutral components of salt and water are produced, and the destructive contaminants are considerably removed. Neutralization reactions occur through various methods, and certain chemicals are used against acidity or alkalinity of industrial wastewater during neutralization; mixing acidic wastes with lime slurries, passing acidic wastes through alkaline beds of limestone, adding alkaline solutions like certain concentrations of caustic soda (NaOH) to acidic wastes, adding sulfuric acid to alkaline wastes, etc. are among reactive materials and methods applied in the treatment process to maintain the pH value at normal neutral levels.

Corrosion in Neutralization Pits

Industrial wastewater generated by different processes in oil and gas plants contains acidic and alkaline compounds with a changing pH range.

Due to the corrosivity and destructive nature of the industrial waste drainage, it should go through a neutralization process, so that its pH level is altered to an acceptable range prior to being discharged into the sewage pipework and/or recirculating through production plants, to prevent corrosion attacks on critical assets and the consequent operational defects, failures and environmental issues.

Whether it is dilution or chemical neutralization processes, harsh wastewater from various industrial sources is normally accumulated inside large containers, tanks or so-called pits, so that the treatment could be carried out safely; concrete and steel neutralization pits are accordingly prone to serious damages due to prolonged exposure to aggressive effluents coming from process drains, production lines, regeneration units, etc.

Chemical attacks and the subsequent corrosion should be diligently considered in wastewater treatment units; for instance, certain concentrations of sulfuric acid (H_2SO_4),caustic (NaOH) and sulfate salts formed by reactions between acids and bases have significant disintegrating effects on concrete.

Although the pits are commonly designed for a long service life, continuous contact with harsh acidic and/or alkaline environment cause defects such as cracks, spalling of concrete, corrosion of steel in reinforced concrete, delamination of weak coatings, etc., imposing the risk of structural failure at early years of construction.
There are multiple approaches technically recommended for a better service life of wastewater neutralization pits including the optimized selection of resistant material and cement against aggressive media, mechanical mixers to maintain a homogeneous liquid within the pits, regular inspections, etc.; however, suitable lining systems are the most effective solution for an improved durability and optimized maintenance costs.

Vinyl Ester Lining Systems

Corrosion protection lining systems are ideal for concrete and metal structures which are continuously subjected to environments with heavy-duty chemicals, high temperatures and mechanical loads.

Vinyl esters display outstanding chemical resistance against a variety of concentrated acids, alkalis and solvents, combined with thermal stability and mechanical features such as impact and stress-fatigue resistance; they are generally used in applications where corrosion resistance is a requirement. Furthermore, fiberglass reinforcement using vinyl ester resin in the lining's structure enhances the mechanical strength, cracking resistance and durability.

Vinyl ester lining systems provide a cost-effective solution for various industrial applications from chemical processing, mineral processing, secondary containment systems, to water treatment.

As a robust solution for corrosion protection and control against a broad range of chemicals, HEGGEL FRP 340 has incredibly increased the resistance characteristics of the glass mat reinforced vinyl ester lining systems, very well-tailored to the industrial requirements.

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HEGGEL® FRP 340

Glass Mat Reinforced Vinyl Ester Lining System

Demonstrating the combined benefits of chemical resistance and enhanced mechanical strength, **HEGGEL FRP 340** is a glass mat reinforced lining system based on a Bisphenol-A epoxy vinyl ester resin, effectively resistant to a wide array of acids and alkalis, as well as a variety of solvents commonly used across many industries.

HEGGEL FRP 340 is an ideal choice to protect concrete and steel substrates that are exposed to a variety of corrosive agents, oxidizing chemicals, acids, alkalis and solvents. The reinforced layered structure of **HEGGEL FRP 340** reduces the possibility of cracking, and with added strength, renders it an effective lining and coating system.

Meeting demanding chemical and temperature exposure requirements, **HEGGEL FRP 340** is very suitable for both internals and externals of facilities in continuous or intermittent exposures to strong chemicals, thermal or mechanical attack.

Improved mechanical properties of **HEGGEL FRP 340** with a thickness of approx. 3 mm, make it also applicable for installation as a protective containment lining and/or flooring system.

Characteristics

- Excellent chemical resistance against acids, alkalis, solvents and particularly oxidizing substances
- Temperature resistance on steel up to +100°C
- Excellent adhesion to concrete
- Very good mechanical properties
- Well drying in the air
- Crack-bridging properties
- Longer shelf life
- High toughness

Application Areas

- Internals of steel / concrete storage tanks, vessels, sumps and collecting basins
- Interior and exterior surfaces of liquid storage facilities
- Secondary containment
- High temperature equipment
- Exteriors of trenches, pits, and sumps

Technical Data

HEGGEL FRP 340 Resin/ Typical Clear Casting Properties	Standard	Unit	Value
Styrene Content	-	%	45
Tensile Strength	ASTM D638	MPa	85-90
Elongation at Break	ASTM D638	%	5-6
Flexural Strength	ASTM D790	MPa	130-140
Barcol Hardness	934-1	-	40±2

HEGGEL FRP 340 Laminate	Standard	Unit	Value
Compressive Strength	EN ISO 604	N/mm^2	60
Max. Operating Temperature Dry	-	°C	+100