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NEWSLETTER

HEGGEL® Corr 216

February 2025

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Next-Gen Composite Coating for Extreme Conditions

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Advanced Corrosion Resistant Coating

> Autoclaves in Modern Industry — INNOVATIVE APPLICATIONS

Autoclaves are essential in industrial processes, providing precision, durability, and material integrity across various industries. They enable high-performance manufacturing, material treatment, and quality assurance in demanding applications. Here's a breakdown of the key types and their specialized uses:

Steam Autoclaves: Primarily used for sterilization in medical, pharmaceutical, and laboratory settings. They are also employed in composite material production for aerospace and automotive industries, where heat and pressure enhance material strength and uniformity.

Vacuum Autoclaves: Designed for applications that require degassing and air pocket removal, these autoclaves are essential in rubber lining and composite curing, improving adhesion quality and eliminating voids for superior mechanical properties.

Chemical Autoclaves: Widely used in polymerization, vulcanization, and chemical processing, these autoclaves are critical in oil & gas applications, where materials need treatment to withstand harsh chemical environments, including high-temperature and high-pressure (HPHT) conditions.

Gas Autoclaves: Essential in metal treatments such as sintering, brazing, and diffusion bonding, these autoclaves support advanced industries, including semiconductor manufacturing and precision metallurgy, where controlled gas atmospheres ensure structural integrity and performance.

Hydrothermal Autoclaves: Used for synthesizing advanced materials, including synthetic crystals, zeolites, and ceramics. They are critical in materials science research and industrial applications, particularly in catalysis, energy storage, and high-performance coatings.

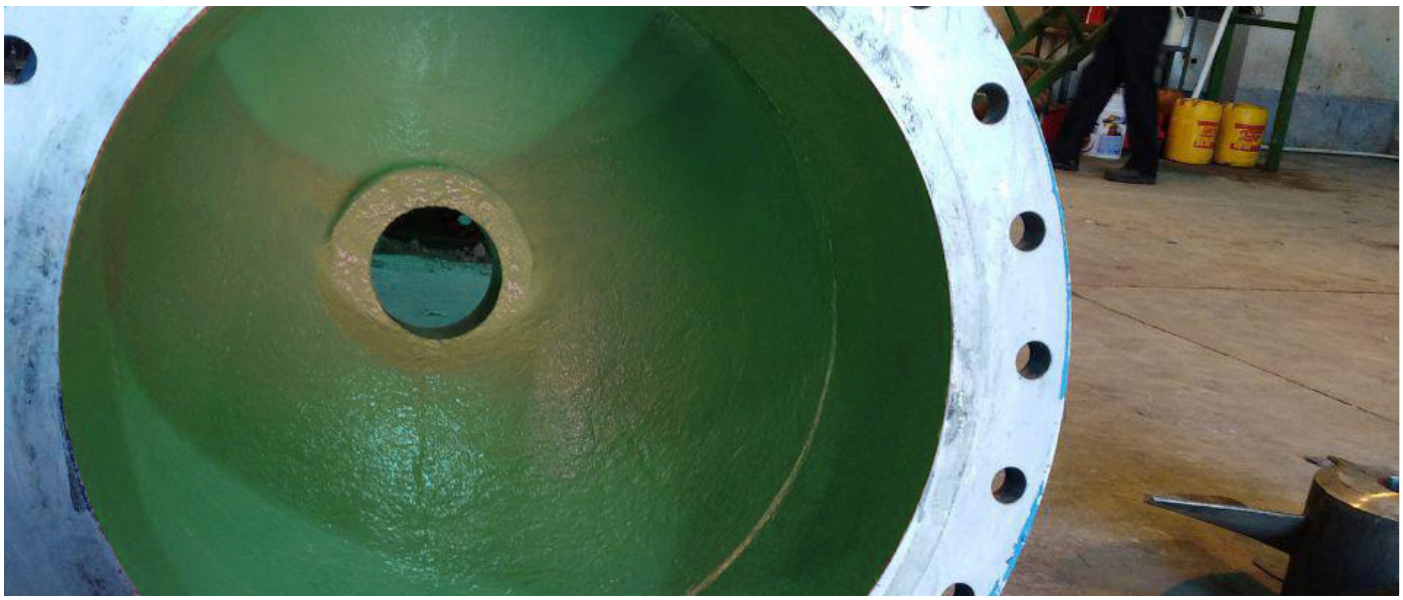
The Essential Role of Autoclaves in Heavy Industry and Laboratory Applications

Autoclaves are essential in the oil & gas and heavy industries, playing a crucial role in material testing, protective coating evaluations, and stress assessment of components. Operating in highly corrosive environments, these components must withstand extreme pressure, aggressive chemicals, and mechanical stress to maintain operational integrity and longevity.

One critical application of autoclaves is rubber processing stage for rubber lining, a widely used method for corrosion protection of storage tanks, pipelines, and processing equipment. Vacuum and steam autoclaves facilitate the optimal adhesion and curing of rubber coatings through a controlled pressurized process, enhancing their durability, mechanical resistance, and chemical stability. By ensuring proper curing, autoclaves significantly extend the service life of industrial components, improving their performance under high temperatures and harsh operating conditions.

Similarly, in research and development, laboratory autoclaves play a key role in validating material reliability and coating performance before full-scale industrial deployment. These specialized systems replicate real-world conditions, allowing for precise evaluation and optimization under controlled environments. Corrosion testing autoclaves enable high-pressure, high-temperature (HPHT) corrosion assessments, following industry standards such as NACE TM0177 and TM0284, to determine material resistance in extreme environments. Meanwhile, coating and composite curing autoclaves support small-scale polymer and composite curing, ensuring proper adhesion and structural integrity under regulated pressure and temperature conditions.

Beyond coatings and corrosion testing, polymerization and material synthesis autoclaves contribute to the development of



high-performance resins and hydrothermal materials, which are crucial for advanced material science applications. Additionally, microbiological and sterilization autoclaves play a vital role in microbial-induced corrosion (MIC) studies and the sterilization of oilfield laboratory equipment, ensuring contamination-free research conditions. Through these diverse applications, laboratory autoclaves serve as critical tools for material innovation, performance validation, and industrial quality assurance, reinforcing their importance in modern material science and corrosion protection strategies.

Corrosion in Autoclaves: Risks and Consequences

Autoclave environments pose a significant risk of corrosion, driven by extreme operating conditions that accelerate material degradation and equipment failure. Several key factors contribute to this challenge:

- High temperatures and pressures intensify oxidation and chemical breakdown, weakening structural materials over time.
- Exposure to aggressive chemicals, including acids, alkalis, and hydrocarbon-based substances, further accelerates corrosion, particularly in industrial and oil & gas applications.
- Moisture presence creates an ideal environment for electrochemical reactions, leading to the gradual deterioration of critical components.
- Mechanical stress induces micro-cracks, which become initiation points for corrosion, compromising equipment longevity.

The consequences of corrosion in autoclave facilities can be severe, resulting in equipment failure, costly shutdowns, and compromised structural integrity. Additionally, contamination caused by corroded components can disrupt processes and reduce operational efficiency, making corrosion control a critical priority for industries relying on autoclave systems.

Corrosion Prevention: An Industrial Imperative

With continuous advancements in automation, real-time monitoring, and energy efficiency, autoclaves are evolving to meet higher safety standards, sustainability goals, and precision manufacturing demands. Their critical role in corrosion prevention, composite material processing, and specialized chemical applications makes them necessary across oil & gas, aerospace, automotive, and high-tech industries. However, the extreme conditions within autoclaves—high temperatures, pressure, and exposure to aggressive chemicals—make them particularly vulnerable to corrosion and material degradation. Effective corrosion protection is essential to maintain structural integrity, and long-term reliability.

Preventing corrosion in autoclave-based operations is crucial to maintaining operational efficiency, safety, and cost-effectiveness. The best approaches to corrosion prevention include:

- **Material Selection:** Using corrosion-resistant alloys and high-performance polymers.
- **Protective Coatings and Linings:** Advanced polymeric coatings and rubber linings serve as barriers against aggressive environments.
- **Environmental Control:** Monitoring pressure, temperature, and humidity to minimize corrosion triggers.
- **Regular Inspection and Maintenance:** Ensuring early detection and intervention before irreversible damage occurs.

A Reliable Solution for Corrosion Protection

Autoclaves operate under extreme temperatures, high pressure, and exposure to aggressive chemicals, all of which accelerate material degradation. However, traditional protective solutions face significant challenges in these demanding environments. Rubber linings, while effective against corrosion, require a complex installation process, including challenging application, curing, and vulcanization, which demand specialized equipment and controlled conditions, such as high temperatures and pressures, to ensure proper adhesion and performance. Additionally, repair and maintenance can be labor-intensive and costly, as damaged sections often require extensive surface preparation, precise patching, and re-vulcanization, making in-field repairs particularly difficult.

Similarly, multi-layered conventional coatings, though offering initial protection, often struggle with long-term chemical resistance, particularly under fluctuating operating conditions. Over time, exposure to thermal cycling, mechanical stress, and aggressive chemicals can lead to cohesive failure, where the coating layers themselves degrade, weakening the overall protective barrier and increasing the risk of substrate corrosion.

Other well-established protective solutions, such as fluoropolymers and glass linings, also come with installation challenges, requiring specialized handling and strict application controls to achieve reliable adhesion and consistent performance.

These limitations highlight the need for high-performance polymeric coatings, which provide a durable, chemically resistant, and more adaptable solution for autoclave environments, ensuring extended service life and reduced maintenance requirements.

Enhancing Asset Longevity

Investing in reliable corrosion protection is essential for maintaining the performance, safety, and efficiency of autoclave systems. **HEGGEL Corr 216** coating contribute to minimizing maintenance costs, reducing downtime, and optimizing operational reliability in challenging environments.

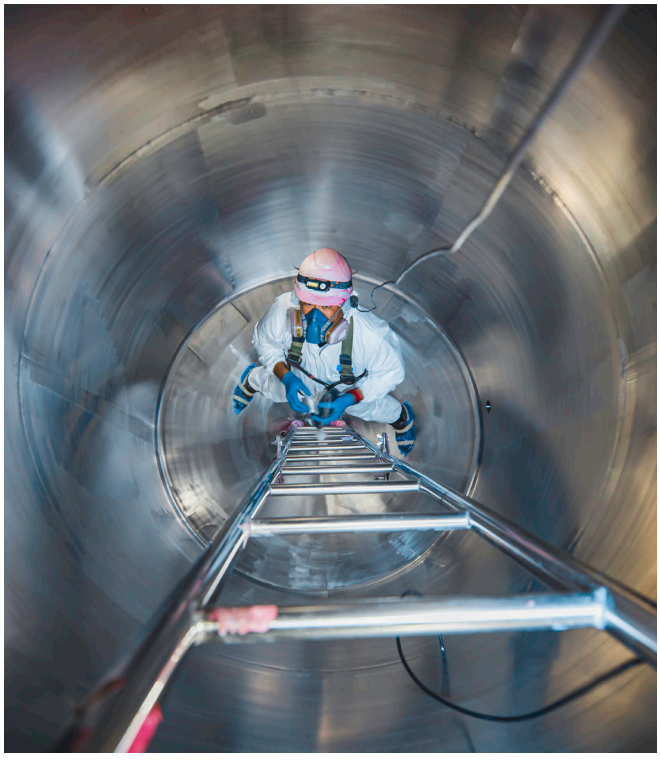
For tailored solutions in corrosion protection, contact our specialists today!

HEGGEL® Corr 216

> HEGGEL High-Performance Polymeric Coating

Advanced Protection for Demanding Environments

Industrial equipment operating under extreme conditions needs more than just standard protection—it requires reliability, durability, and resistance to chemical and thermal stress. **HEGGEL Corr 216** is engineered to meet these challenges, offering a high-performance coating solution that enhances equipment lifespan and operational efficiency. Its advanced composition ensures protection against corrosive chemicals, mechanical stress, and high temperatures, making it a versatile and effective choice for critical applications.



HEGGEL® Corr 216

Innovative Engineering for Long-Lasting Protection

HEGGEL Corr 216 features an advanced two-component composite structure with 100% solid content, ensuring maximum durability, adhesion, and resistance to harsh environments. Meticulously designed for superior protection in extreme conditions, it offers exceptional stability and thermal endurance, even in the harshest industrial settings. Its abrasion-resistant properties reinforce surfaces against mechanical impact and continuous wear, significantly reducing the need for frequent maintenance and downtime, while its solvent-free, high-solid formulation guarantees long-lasting performance and environmental compliance.

Precision Performance, Maximum Efficiency

HEGGEL Corr 216 is engineered to withstand the most demanding environments, offering exceptional chemical resistance that shields surfaces from both acidic and alkaline exposure. Its high fouling resistance prevents buildup and contamination, ensuring long-term cleanliness and efficiency. With outstanding abrasion resistance, it minimizes material wear, extending equipment lifespan. Designed for extreme conditions, it maintains stability at temperatures up to 180°C, providing reliable performance under intense heat. Its solvent-free formulation enhances environmental and workplace safety, while single-coat ambient curing simplifies application, reducing downtime and maximizing operational efficiency.

Built to Last, Engineered to Protect

With **HEGGEL Corr 216**, corrosion protection is elevated beyond standard solutions—it is about ensuring long-term reliability, minimizing risks, and optimizing operational efficiency. This advanced formulation not only safeguards equipment from aggressive chemical and mechanical exposure but also offers seamless application and extended service life. As industries push for more robust, sustainable, and high-performance solutions, **HEGGEL Corr 216** remains a trusted choice for superior protection.

Application Areas

HEGGEL Corr 216 is designed for extreme industrial environments, providing superior protection against chemical exposure, high temperatures, and mechanical stress. Its advanced formulation makes it ideal for a wide range of critical applications, including:

- Chemical Tanks – Shields against aggressive acidic and alkaline chemicals, ensuring long-term integrity.
- Storage Tanks for Crude Oil & Hydrocarbons – Resists chemical attack and prevents surface degradation in volatile storage conditions.
- Pipelines – Protects against internal corrosion and abrasion in high-pressure transport systems.
- Process Vessels – Enhances durability in vessels exposed to extreme thermal and chemical fluctuations.
- Autoclaves – Withstands high temperatures, steam, and aggressive media in pressurized environments.

Technical Data		Value	Unit
Abrasion Resistance ASTM D4060 (Taber CS-17/1kg/1000 cycles)		20	mg weight loss
Impact Resistance ASTM G14	Forward Reverse	10 2.5	Joules Joules
Adhesion Strength Cohesive failure ASTM D4541		23	MPa
Temperature Resistance Immersed NACE TM0174		+180	°C