



You Build, We Protect!

NEWSLETTER

HEGGEL® Corr

October 2024



INSIDE THIS ISSUE:

Overcoming Corrosion Under Insulation By HEGGEL Corr High-Tech Coating Solutions

- ◆ **Understanding Corrosion Under Insulation**
- ◆ **CUI: A Major Industrial Risk**
- ◆ **Protective Measures Against CUI**
- ◆ **Preventing Hidden Damage by HEGGEL Innovative Coating Technology**
- ◆ **Comparative Insights**



Understanding Corrosion Under Insulation (CUI)

Corrosion Under Insulation (CUI) is a serious and prevalent issue that affects insulated equipment and piping in industries like oil & gas, chemical processing, and power generation.

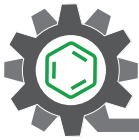
CUI occurs when water infiltrates insulation systems, creating a hidden environment conducive to corrosion, often undetected until significant damage has occurred.



Causes and Mechanisms

CUI is typically driven by the combination of moisture and temperature fluctuations under insulation. Water can enter the insulation through various means, such as rain, condensation, leaks, or high humidity. Once trapped, the moisture begins to corrode

the surface of the underlying metal, leading to oxidation and other corrosive reactions. Temperature swings exacerbate the issue by creating thermal expansion and contraction, which can cause insulation materials to crack, further allowing water ingress.



◆ The Most Common Forms of Corrosion Observed in CUI

Pitting Corrosion, a localized attack, creates small, deep pits in the metal surface, ultimately compromising structural integrity.

Crevice Corrosion, a form of localized corrosion, occurs in the crevices or gaps created by irregularities in insulation or metal joints, leading to hidden damage.

Stress Corrosion Cracking (SCC), a form of corrosion that leads to brittle fracture in materials under tensile stress in corrosive environments.



◆ The Hidden Challenge

One of the most significant dangers of CUI is its stealthy nature. Since the corrosion happens beneath layers of insulation, it often goes unnoticed until serious deterioration sets in. In industrial settings, this can result in costly failures, unplanned downtime, and even safety hazards. Regular inspection and maintenance are complicated by the need to remove insulation to detect potential issues, making CUI one of the more expensive and challenging types of corrosion to manage.



◆ Risk Factors

Several factors make insulated equipment susceptible to CUI, including:

Operating temperatures: The temperature range between 60°C and 150°C can lead to moisture accumulation and corrosion. While liquid water remains present below 100°C, at

higher temperatures, steam can condense into liquid water during temperature fluctuations or cooling, allowing moisture to cause damage over time.



Insulation material types: Certain insulation materials can trap moisture, increasing the risk of CUI.

Environmental conditions: Humid environments, high rainfall, and coastal locations present higher risks for moisture ingress.

Material type: Carbon steel and austenitic stainless steel are particularly vulnerable to CUI.

In many industries, CUI represents a substantial portion of maintenance costs

related to corrosion. For instance, the oil and gas sector alone spend billions of dollars annually on preventing and mitigating CUI-related damage. When undetected, CUI can lead to catastrophic equipment failures, resulting in leaks, fires, or the release of hazardous materials, making it not only a financial burden but also a critical safety concern. This makes CUI a significant issue for asset integrity and operational efficiency, requiring proactive measures to ensure long-term durability and safety.

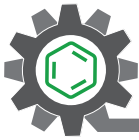
Protective Measures Against CUI

Preventing Corrosion Under Insulation (CUI) requires a multifaceted approach. Due to the hidden nature of CUI and its potential to cause severe damage, implementing protective measures is crucial for maintaining asset integrity and operational efficiency across industries.

Proper insulation design is crucial for preventing CUI. This includes sealing and weatherproofing with stainless steel or aluminum to limit water infiltration and using moisture-resistant materials like closed-cell insulation to reduce moisture buildup. Adding drainage and ventilation helps trapped moisture escape, preventing prolonged corrosion exposure.

Regular inspection and maintenance are critical for preventing significant CUI damage. Non-Destructive Testing (NDT) methods,





such as ultrasonic and infrared thermography, allow early detection without insulation removal. Inspection ports facilitate frequent monitoring, while proactive maintenance schedules should include regular inspections, insulation repairs, and reapplication of protective coatings.

Moisture barriers and sealants are vital in preventing CUI by minimizing water infiltration at insulation joints, valve covers, and vulnerable areas. As the first line of defense, they significantly reduce the risk of CUI, especially in hard-to-reach areas.

Temperature management helps reduce CUI risk by operating equipment outside the 60°C to 150°C range, where moisture retention and corrosion are more likely. Adjusting process temperatures beyond this range significantly lowers the chances of CUI developing.

Material selection is key to reducing CUI risk. Corrosion-resistant materials like stainless steel or specialized alloys minimize susceptibility, offering long-term protection and durability in high-risk environments. Though costlier upfront, they provide a cost-effective solution over time.

Proper installation and training are critical for preventing CUI. Insulation and coatings must be installed correctly by trained professionals to avoid gaps or improper sealing that allow moisture infiltration. Regular training ensures high standards are maintained, reducing the risk of CUI.

Conventional protective coatings are an effective defense against CUI, protecting metal surfaces from moisture, heat, and chemicals. Epoxy coatings provide strong adhesion and chemical resistance, while silicone and phenolic coatings offer superior protection in high-temperature environments.

However, conventional coatings alone cannot completely eliminate CUI if not supported by other essential measures described above. These strategies collectively work to reduce the risk of CUI, and their success is significantly amplified by the application of advanced protective coatings.





Preventing Hidden Damage with HEGSEL Corr Innovative Coating Technology for Superior CUI Protection

At the forefront of Corrosion Under Insulation (CUI) protection, **HEGSEL Corr** high-tech coatings deliver an advanced solution with a comprehensive, single-layer defense designed specifically to combat the unique challenges posed by CUI. These coatings are engineered for extreme industrial environments where corrosion, temperature fluctuations, and chemical exposure create constant threats to asset integrity.

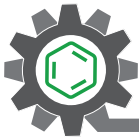
Designed with impermeability as a core feature, **HEGSEL Corr** coatings form a robust barrier, preventing moisture, chemicals, and contaminants from reaching the underlying metal. This directly mitigates one of the primary causes of CUI, effectively protecting industrial assets like pipelines, storage tanks, and insulated equipment from hidden corrosion.

What sets **HEGSEL Corr** apart from conventional solutions is its exceptional resistance to corrosive agents while providing temperature stability in both low and high extremes. This makes it ideal for industries such as oil and gas, petrochemicals, and power generation, where equipment is exposed to fluctuating temperatures that can promote CUI. The coatings maintain their integrity and adhesion even under sub-zero or extreme heat conditions, a crucial factor in environments where CUI is a hidden yet significant risk.

HEGSEL Corr's superior adhesion ensures comprehensive, gap-free coverage, effectively eliminating potential entry points for moisture and corrosive elements. This feature is particularly important for insulated equipment, where even small gaps can lead to undetected corrosion. The strong adhesion also simplifies application, providing a reliable protective layer even in hard-to-reach areas. In practice, this means that HEGSEL Corr coatings offer not only enhanced protection but also practical, fast, and efficient application.

A key feature of **HEGSEL Corr** is its wet-on-wet touch-up capabilities, allowing repairs and reapplications to be done without removing existing layers or waiting for them to cure. This minimizes downtime, which is critical in industrial operations, and ensures uninterrupted protection against CUI.

Beyond its superior resistance to CUI, **HEGSEL Corr** is designed for long-term durability, significantly extending the lifespan of industrial assets. Its durable shield minimizes both maintenance requirements and the need for frequent reapplication, making it a cost-effective solution over time. This combination of high-performance protection, ease of maintenance, and lasting durability positions **HEGSEL Corr** as the go-to choice for industries seeking to protect their equipment from CUI while maximizing operational efficiency.



HEGSEL Corr Key CUI-Related Technical Features

Temperature Resistance: All coatings are designed to protect equipment at high temperatures typical of environments where CUI is prevalent.

Chemical Resistance: All products show excellent resistance which is essential for protecting assets in industrial settings where specific chemical exposure accelerates corrosion under insulation.

Moisture Impermeability: Each product forms a strong barrier against moisture, a key factor in CUI prevention. The coatings are specifically designed to prevent moisture ingress, ensuring that insulated equipment remains protected even when exposed to humid or wet conditions.

Adhesion Strength: With adhesion strengths ranging from 23 MPa to 29.3 MPa, these coatings ensure strong bonding to surfaces, which is critical for preventing gaps where moisture and chemicals can penetrate and cause corrosion.

CUI Suitability: Each product is tailored for specific CUI applications—whether for pipelines, storage tanks, or high-temperature external surfaces—ensuring effective protection against corrosion in environments prone to insulation and thermal cycling.

Comparing Key Features of Select HEGSEL Corr Coatings

Feature	HEGSEL Corr 210	HEGSEL Corr 216	HEGSEL Corr 280
Temperature Resistance	Up to 190°C (immersed)	Up to 180°C (immersed)	Up to 250°C (continuous), 300°C (intermittent)
Chemical Resistance	Excellent against acids, hydrocarbons, solvents	High chemical resistance, excellent against hydrocarbons and chemicals	High chemical resistance, ideal for aggressive environments
Moisture Impermeability	Excellent moisture barrier, preventing CUI	High impermeability, resists moisture exposure	High moisture resistance, ideal for insulated equipment
Adhesion Strength	29.3 MPa	23 MPa	25 MPa
CUI Suitability	Excellent for pipelines, insulated surfaces, designed for thermal cycling and CUI	Ideal for pipelines, chemical tanks, and insulated equipment	Excellent for external surfaces of insulated equipment, designed for high-temperature CUI conditions