Hangzhou Sanfreund Technology Co., Ltd

Anti-Corrosion FRP Coating

Revolutionizing Preservation Technology

Company Overview

About us

Hangzhou Sanfreund Technology Co., Ltd, headquartered in Hangzhou, China, is an industry leader in anti-corrosion and anti-leakage solutions, specializing in advanced, light-curable FRP coating technology. Originating from its Japanese division, Sanfreund Co, this innovative film-based method, utilized globally for over 20 years, replaces traditional spraying techniques, providing safer, more efficient, and higher-quality solutions for the petrochemical industry. The company collaborates with Tianjin University and Zhejiang A&F University and serves major clients like Sinopec and PetroChina.

Innovation in Anti-Corrosion Technology

Our Innovation Journey

Hangzhou Sanfreund Technology Co., Ltd traces its origins to Japan, where its division, Sanfreund Co, laid the groundwork for advanced anti-corrosion coating solutions. With over 20 years of experience in tank lining repair and the development of specialized FRP (Fiber-Reinforced Polymer) coating, the company pioneered the application of lining coatings for petrochemical storage tanks, leading to global advancements in corrosion and leakage prevention.

In September 2019, Sanfreund Co's experts partnered with the Sinopec Qingdao Safety Engineering Institute to test new membrane materials. Through immersion experiments and tests across 14 different chemical media, the membrane's performance and durability were rigorously validated, proving its reliability in varied conditions and solidifying its reputation in corrosion protection.

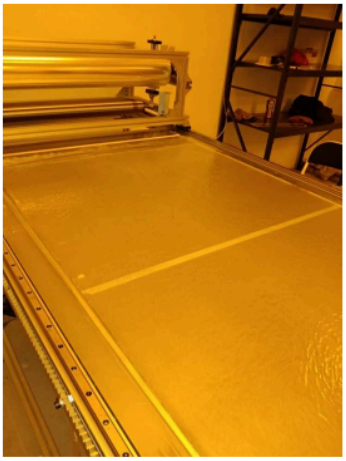
Immersion experiments were conducted on membrane materials in 14 different media at Sinopec Institute of Safety.

Obtained invention patent in China in 2019.

By January 2020, samples for domestic construction were validated on-site, solidifying our reputation for quality and precision.

Sample tank construction and on-site acceptance by the Safety Engineering Institute for the anti-seepage renovation of in-service oil tanks

By June 2022, our journey reached a new chapter as Hangzhou Sanfreund Technology established a production base in Lin'an District, Hangzhou. This marked a major step in bringing Japanese innovation to the Chinese market, achieving domestic production of our world-class membrane technology. Rigorous performance testing by third-party institutions, including the Chemical Industry Synthetic Material Aging Quality Supervision and Inspection Center and the Zhengzhou Metal Products Research Institute of China Steel Group, confirmed the exceptional durability of our membranes.

The production base established in Hangzhou

From our origins in Japan to becoming a leader in China's petrochemical industry, our commitment to excellence and innovation continues to drive our mission of providing advanced, reliable membrane solutions worldwide.

Key Advantages of Our Technology

- **Superior Corrosion and Leak Prevention**
  Engineered to meet stringent industry standards, our FRP membrane offers robust chemical and moisture resistance, ensuring effective corrosion and leak prevention. Verified through rigorous third-party testing in China and Japan, this membrane safeguards petrochemical storage tanks and pipelines from harsh environmental and chemical exposures.
- **Enhanced Durability and Longevity**
  Designed for extended use with minimal maintenance, the FRP membrane provides a long-lasting solution with a lifespan of up to 15 years across diverse environmental conditions. This durability translates into lower long-term costs and reduced maintenance needs.
- **Efficient and Rapid Curing**
  The membrane cures in just 20-60 minutes when exposed to UV light ,

significantly reducing labor costs and installation time. Its one-time curing process minimizes construction time, ensuring a streamlined and effective application.

- **Eco-Friendly and Safe**

  Composed of non-flammable, non-volatile materials, our membrane complies with Japan's JIS and China's GB/T51344-2019 standards, aligning with environmental and safety regulations. This environmentally friendly solution poses minimal operational risks, safeguarding both the workforce and the ecosystem.

- **Uniform Quality and Precision Engineering**

  Factory-produced to ensure consistent thickness and quality, the FRP membrane maintains a uniform coating, free from pinholes, foreign objects, or sagging. With superior adhesion provided by epoxy resin, the membrane outperforms traditional polyester coatings in both corrosion resistance and substrate bonding.

- **Cost-Effectiveness**

  Durable, low-maintenance design lowers overall costs, reducing replacement and maintenance expenses for petrochemical applications.

- **Customization and Flexibility**

  Adjustable thickness and specifications suit diverse projects, with flexible coverage for storage tanks, pipelines, and other structures.

- **Operational Continuity**

  Installation allows continued operations with minimal disruption; integrated access points enable easy safety inspections.

- **Easy Repair and Maintenance**

  Quick, efficient repairs maintain coating integrity, ensuring seamless and reliable maintenance.

Comparison with Traditional Methods

Feature	FRP Coating	Traditional Spray Coatings
foaming	Vacuum stirring and complete defoaming during production	Artificial defoaming, difficult to achieve complete defoaming
Adhesive Properties	Contains epoxy resin with strong adhesion	Uses unsaturated polyester with lower adhesion
Corrosion Resistance Performance	Superior corrosion resistance due to epoxy resin	Lower corrosion resistance due to high ester bond content
Curing Performance	Pre-mixed photocuring agent allows for light curing, ensuring easy, uniform, and traceable curing	Heat curing with manual measurements, often inconvenient and lacks traceability, resulting in uneven curing
Environmental Protection and Safety	No toxicity, no flammable gas, safe for personnel	Toxic, flammable gases pose flash explosion and health risks
Material Modulation	Uniform thickness, unaffected by climate and environment	Proportional mixing based on environment, quality varies
Welding Line and Seam Treatment	Soft coating covers seams easily and uniformly	Multiple spray cures, uneven quality
Construction Remediation	Easy to repair post-construction defects	Difficult to repair, uniform quality hard to achieve
Coating Quality	Uniform thickness, free of pinholes, foreign objects, and sagging	Prone to uneven thickness, pinholes, foreign objects, and sagging

Anti-Corrosion FRP Coating

Product Introduction

The Fiber-Reinforced Polymer (FRP) Coating from Hangzhou Sanfreund Technology Co., Ltd represents a pioneering solution in corrosion and leak prevention for petrochemical storage tanks. This light-curable, UV-resistant coating uses cutting-edge Japanese technology to form an advanced protective lining. Unlike traditional spray coatings, the FRP coating adheres tightly to surfaces with uniform thickness and seamless coverage over weld seams, offering superior durability, safety, and long-term resistance to environmental damage. With over 20 years of proven field success globally, this FRP technology redefines anti-corrosion standards, making it a trusted choice for tank lining in the petrochemical industry.

Product Features

- **UV-Curable:** Cures rapidly within 20–30 minutes using UV light, avoiding the need for heat and allowing installation even in colder temperatures.
- **Leakage Prevention:** Creates a tight, impermeable seal that prevents seepage and protects against environmental risks related to leakage.

- **Chemical Resistance**: Highly resistant to crude oil, gasoline, and refinery chemicals, with proven performance in tests across 14 different chemical media in China. The following list outlines the media used in these tests, ensuring our membrane's capability to withstand the rigorous conditions of the petrochemical industry:

Serial Number	Soaking Medium	Inspection Selection
1	#92 gasoline	Required
2	95 gas	Required
3	Gas No. 98	Required
4	#0 diesel	Required
5	No. 10 diesel	Required
6	Saturated sodium chloride	Obligatory
7	Distilled or deionized water	Obligatory
8	Sulfuric acid solution (pH=3)	Obligatory
9	Sodium hydroxide solution (pH=12)	Obligatory
10	50% isooctane + 50% toluene	Obligatory
11	15% anhydrous ethanol + 5% anhydrous methanol + 40% isooctane + 40% toluene	Obligatory
12	5% anhydrous ethanol + 15% anhydrous methanol + 40% isooctane + 40% toluene	Obligatory
13	30% anhydrous ethanol + 35% isooctane + 35% toluene	Obligatory
14	30% anhydrous methanol + 35% iso-octane + 35% toluene	Obligatory

- **Leak Detection System**: This setup allows for the integration of a leak detection system in the interstitial space of SF double-shell underground tanks, enhancing safety and enabling early detection of leaks. The FRP layer provides grounding, supporting continuous monitoring of potential leaks by forming a 3D cloth structure on the lining inside the tank.
- **Enhanced Adhesion:** Formulated with epoxy resin for superior bonding strength, surpassing traditional coatings in adhesion and resilience.
- **Temperature Tolerance:** Effective in environments below 100°C ~ -20C maintaining integrity under high-temperature conditions.
- **Durability:** Built to withstand prolonged exposure to petrochemical environments, extending the service life of storage tanks beyond 15 years.
- **Mechanical Integrity**: Retains structural integrity under stress from temperature fluctuations and chemical exposure.
- **Static Conductive Layer:** Integrated static conductive properties reduce static accumulation, enhancing safety in flammable environments.
- **Uniform Thickness:** Consistently manufactured to prevent pinholes, sagging, or drooping, ensuring uniform application quality.
- **Efficient Installation:** Supports rapid project completion, enabling concurrent lining of multiple tanks (e.g., two 10 KL tanks) within 5–10 days depending on tank design, reducing downtime and installation costs.
- **Flexible Thickness**: Available in a standard 2mm thickness, with the option to add additional layers post-curing for enhanced protection in extreme conditions.

Technical Specifications

Attribute	Description
Material Composition	Glass fiber and vinyl resin
Chemical Resistance	Withstands exposure to crude oil, gasoline, and petrochemical substances
Temperature Range	Effective below 100°C, suitable for all seasons, including winter
Thickness	2mm; can be layered after UV curing
Curing Time	20–30 minutes
Barcol Hardness	40 (JIS 6919); minimum 35 (Babbitt Hardness)
Heat Distortion Temperature	114°C (JIS 6919)
Bending Hardness	140 MPa (JIS 7203)
Flexural Modulus	3.3 GPa (JIS 7203)
Tensile Strength	80 MPa (JIS 7113)
Tensile Elasticity	3.3 GPa (JIS 7113)
Fracture Elongation Rate	5.2% (JIS 7113)
Impact Strength	27 KJ/㎡ (JIS 7110)
Water Absorption Rate	0.04% (JIS 6919)
Surface Resistivity	< 1 x 108 Ω
Surface Roughness	30-70 µm
Primer Thickness	≥ 0.05 mm

Distinctive Feature: Leak Detection System

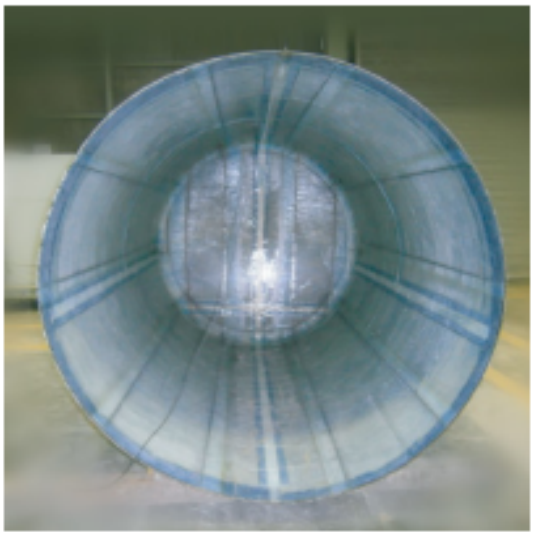
Leak Detection System

Our Anti-Corrosion FRP Coating offers a state-of-the-art leak detection system specifically designed for continuous and reliable monitoring of underground and suspended storage tanks. This system highlights our commitment to safety and environmental protection, providing a robust solution to detect and address potential leaks swiftly.

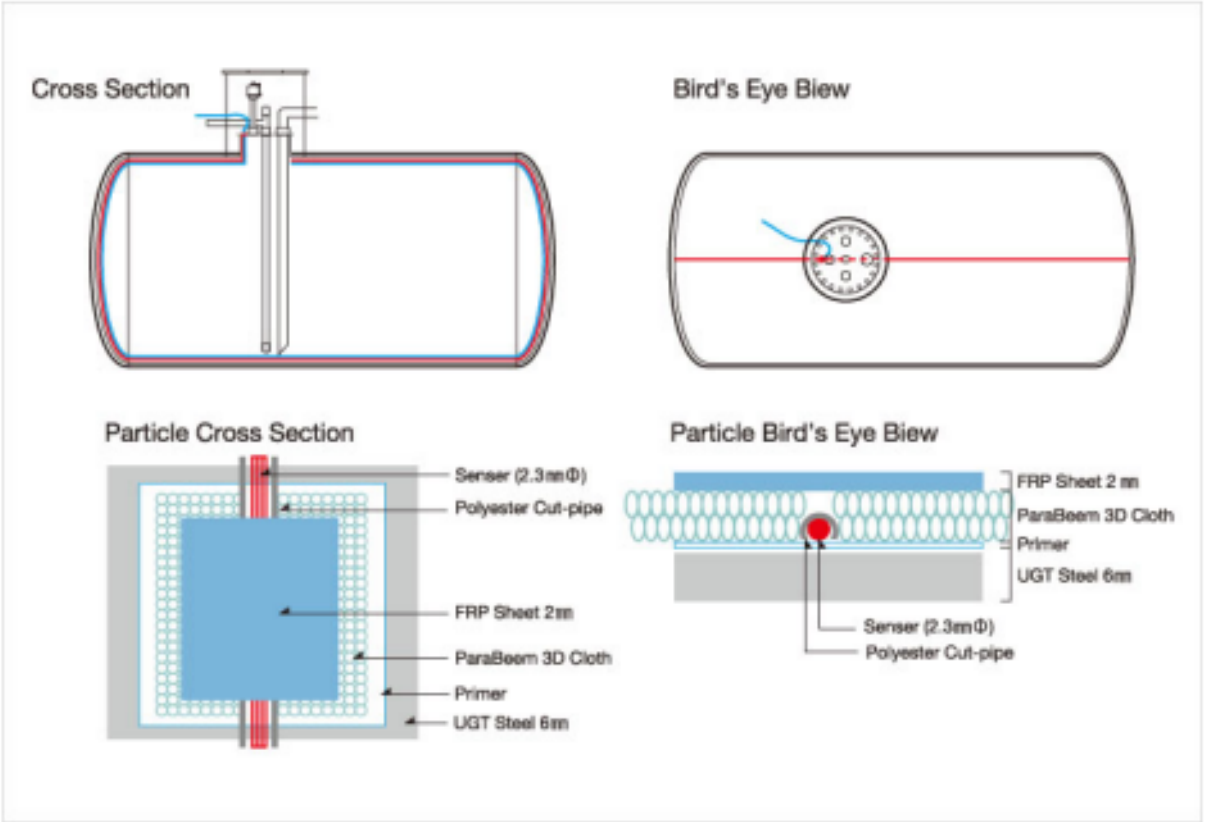
The innovative design integrates a 3D cloth structure within the interstitial space between the steel tank and the FRP layer, enabling rapid leak detection. Equipped with sensors that actively monitor for leaks, this system delivers real-time data to operators, allowing for immediate responses to prevent escalation and minimize contamination risks.

Particularly advantageous in industrial and petrochemical settings, where undetected leaks pose significant hazards, this feature enhances the functionality of our FRP coating solution. Its ease of installation, with sensors embedded seamlessly into the interstitial space, ensures straightforward integration without compromising the user experience.

This optional leak detection system elevates the Anti-Corrosion FRP coating as a comprehensive and reliable choice for underground storage tank protection.



This system always monitors leak at the tank inside by forming a 3D cloth structure on the FRP lining in order to install a leak detection system in its interstitial space on the inside of SF double shell tanks.



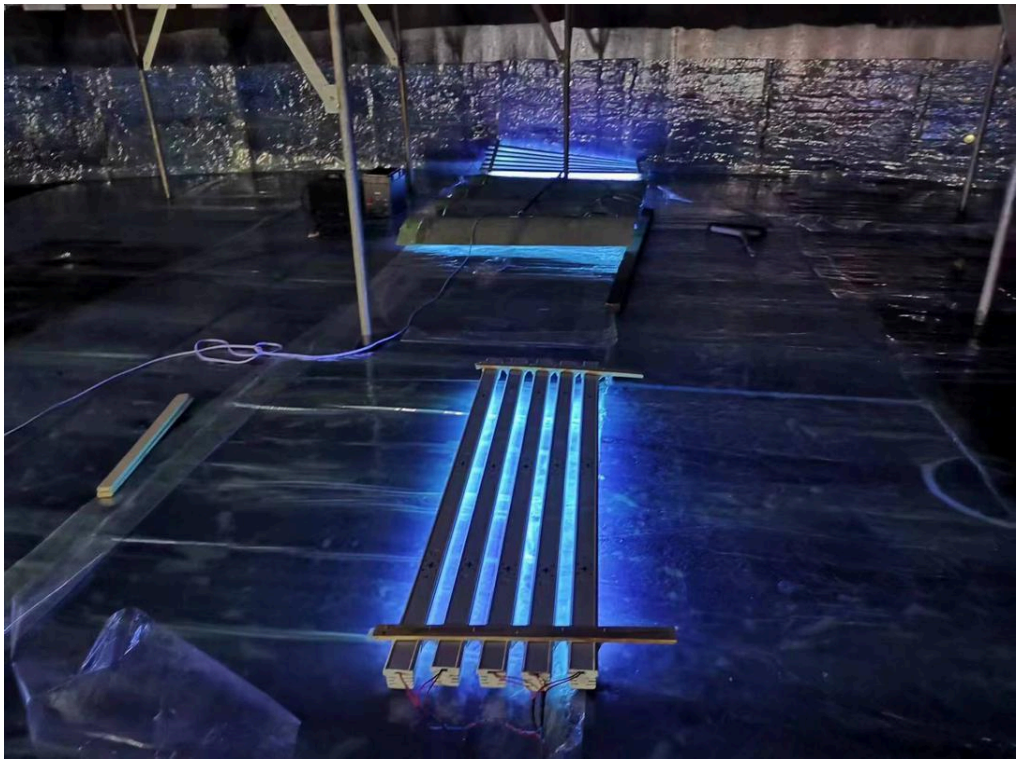
Distinctive Feature: UV-Curable Technology

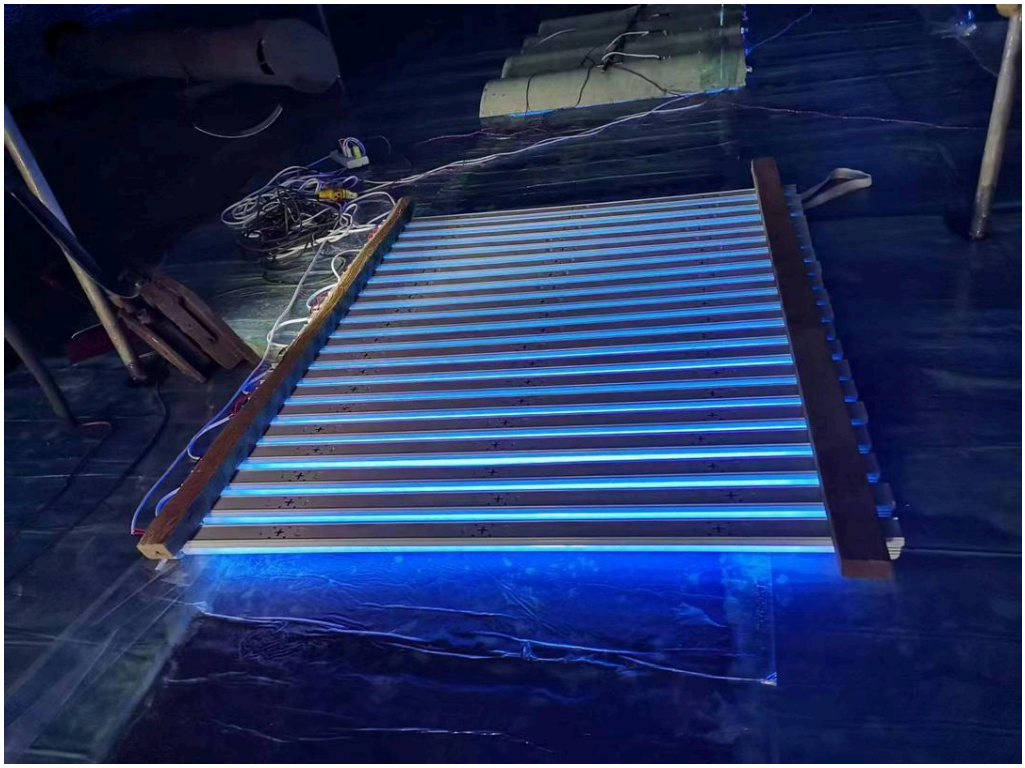
Our Fiber-Reinforced Polymer (FRP) coating stands out for its UV-Curable Technology, setting a new standard in fast, efficient, and versatile tank lining applications. Unlike conventional methods requiring heat-based curing, our FRP coating uses UV light to cure in just 20–30 minutes, minimizing environmental impact and operational downtime. This innovative curing process enables year-round installation, as the coating can be effectively applied even in cold climates where traditional coatings struggle to perform.

Key benefits of UV-Curable technology include:

- Rapid Curing: Achieves full curing in under half an hour, significantly reducing installation time and allowing for swift project completion.
- Enhanced Surface Bonding: The UV-curable coating conforms closely to tank surfaces, creating a consistent and robust seal without the risks of sagging or uneven coverage.
- Environmentally Friendly Application: By eliminating the need for heating or extended curing periods, this UV technology reduces energy consumption and enables safer application processes, even in sensitive environments.

This UV-curable feature makes our FRP coating a pioneering solution that meets the high-performance demands of the petrochemical industry, delivering durable and reliable protection in a fraction of the time of traditional methods.



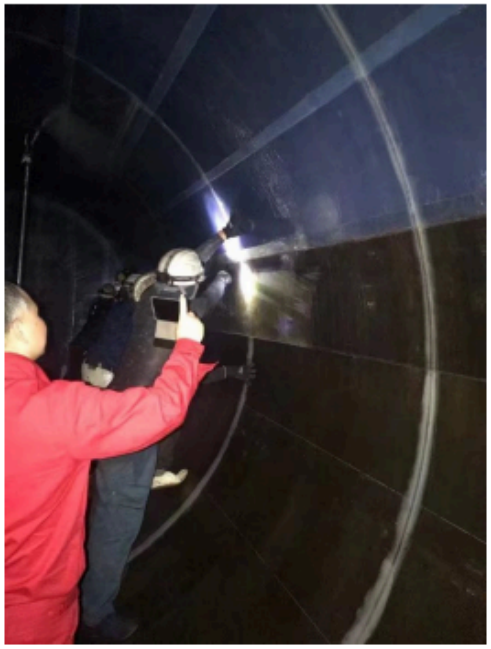


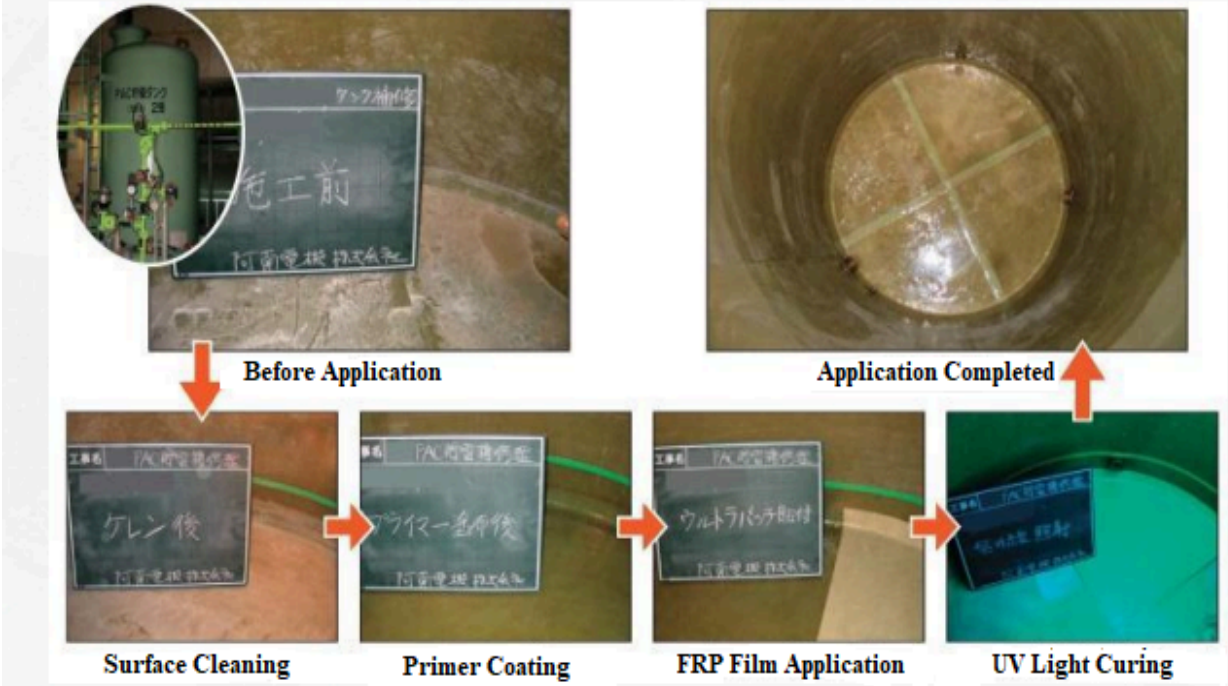
Applications of Anti-Corrosion FRP Coating

The Anti-Corrosion FRP Coating offers a versatile and advanced protective solution across various storage and containment environments in the petrochemical and industrial sectors. Its unique light-curable and durable FRP (Fiber-Reinforced Polymer) structure provides optimal resistance to harsh chemical exposure and corrosion, ensuring long-lasting performance across multiple applications:

Crude Oil and Derivatives Storage Tanks

In oil storage applications, the FRP coating acts as a preventative shield against the corrosive effects of hydrocarbons and sulfuric compounds, helping to minimize maintenance costs and extend tank lifespans.

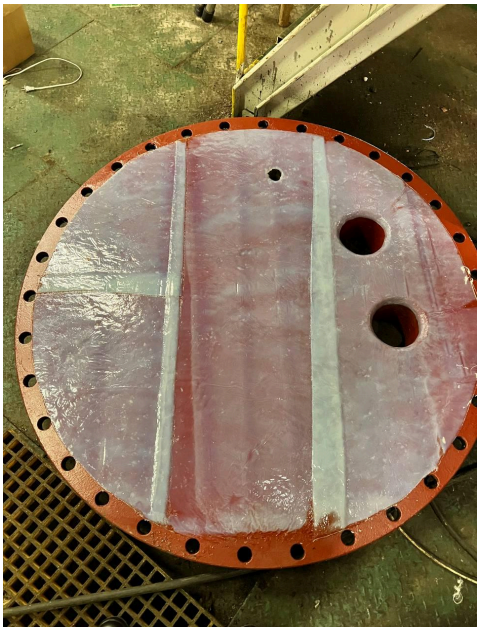



Before Application
Application Completed
Surface Cleaning
Primer Coating
FRP Film Application
UV Light Curing

Shipbuilding and Marine Industries

The insulation of tanks in chemical and crude oil carrier vessels, as well as facilities and saltwater tanks like sea chests on ships, which are highly susceptible to severe corrosion, is of critical importance. UV-FRP coating, with its extremely fast application process and no need for heat during installation, offers a 15-year durability, presenting a revolutionary solution to drastically reduce costs and time in the marine industry.

The National Iranian Tanker Company (NITC) is one of this company's clients currently equipping its fleet with UV-FRP insulation to significantly enhance the efficiency and durability of its marine facilities.

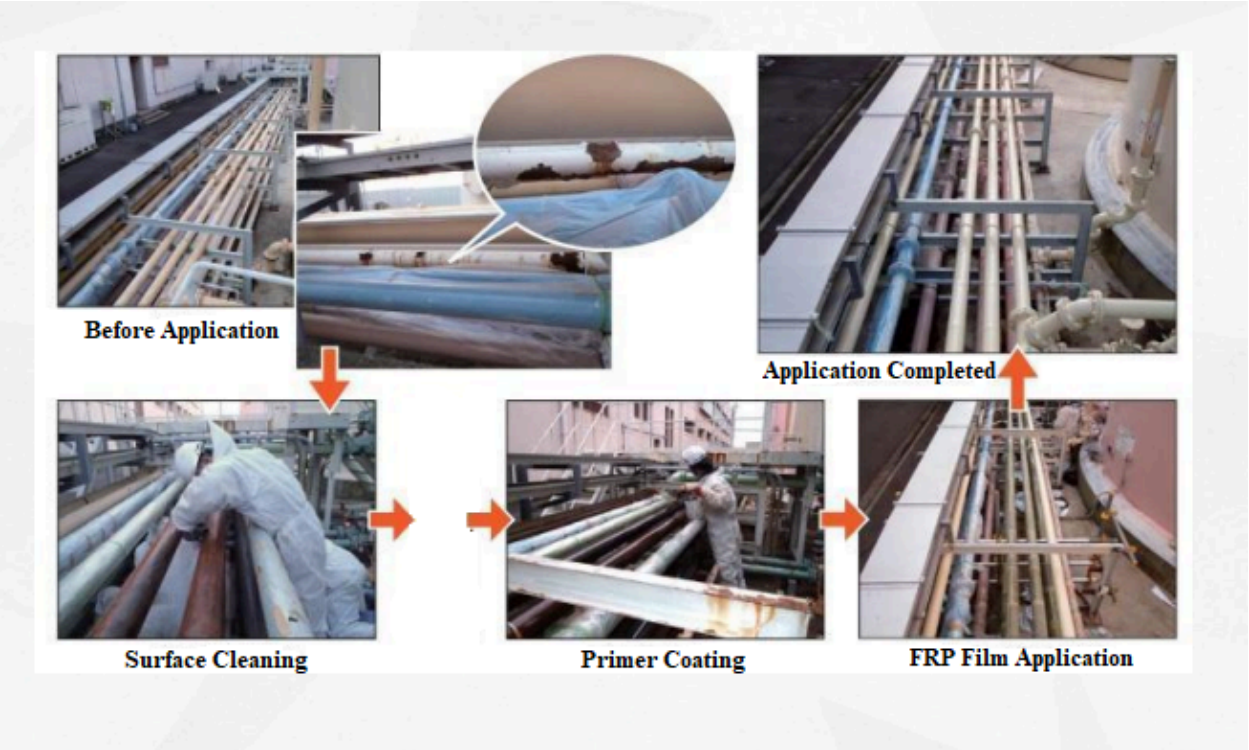


Desalination, Power Plant, and Dam Industries

Seawater has the highest corrosive impact on metal and concrete tanks, as well as desalination and water treatment facilities, imposing significant annual maintenance and repair costs on the industry. UV-FRP insulation is the most effective solution to prevent corrosion and leakage, with our Japanese company guaranteeing the durability of this insulation for up to 15 years.

Petrochemical Pipelines & Tanks

With exceptional flexibility and strength, the FRP membrane is ideal for protecting pipelines against corrosion, especially in sections prone to chemical exposure and environmental stress.

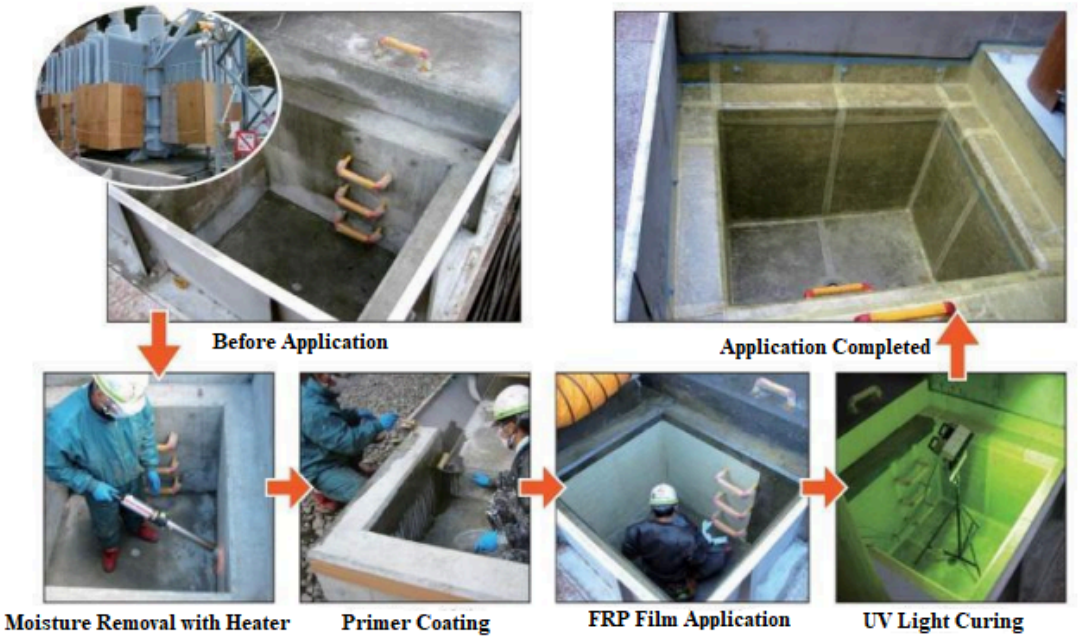


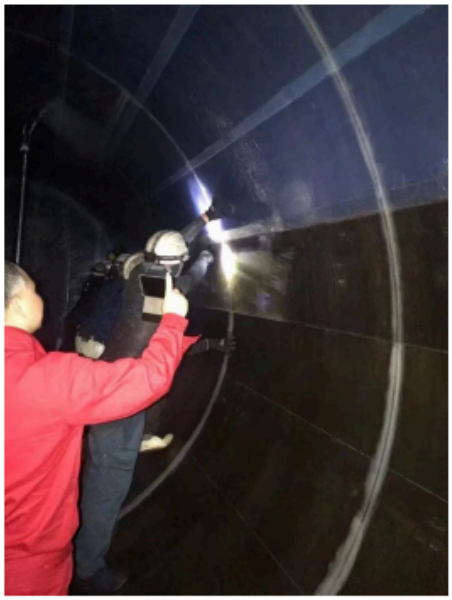
Underground Storage Tanks at Gas Stations

Specifically designed to endure the challenging environment of underground storage, the FRP coating provides robust protection against moisture, soil contamination, and chemical penetration, ensuring the long-term integrity of fuel tanks.

Concrete Tanks

This anti-corrosion coating effectively resists chemical erosion and microbial degradation, offering reliable, durable performance in challenging conditions.





FRP Coating Installation Method

Our advanced installation method for the FRP membrane offers a secure and enduring inner lining solution for petrochemical storage tanks. Every step in the process—from preliminary safety checks to the final quality assurance—ensures a reliable, corrosion-resistant lining that meets the highest industry standards. Utilizing cutting-edge light-curing technology, this method minimizes downtime while delivering a protective, cost-effective solution that extends the life of storage tanks and optimizes maintenance cycles.

Installation Steps

1. Preliminary Inspection

Safety Confirmation: Ensure safety by verifying the absence of combustible gasses and sufficient oxygen levels before entry. Conduct initial gas and leakage checks as per regulatory standards.

Leakage Confirmation: Inspect the tank for leaks using gas pressurization and appropriate detection instruments to ensure it meets the required safety standards.

2. Tank Cleaning and Surface Preparation

Ventilation and Gas Removal: Use explosion-proof fans to remove any flammable gasses and confirm safe oxygen levels, allowing personnel to work in secure conditions.

High-Pressure Cleaning: Perform a thorough high-pressure wash to clear any remaining residues, ensuring a clean and dry surface for optimal membrane adhesion.

Sandblasting: Conduct internal sandblasting to prepare the tank's surface, enhancing bonding between the FRP membrane and tank.

3. FRP Membrane Placement

Marking: Create reference lines at 450 mm intervals on the tank's inner walls for precise membrane alignment.

Membrane Application: Transport the 500 mm wide FRP membrane rolls inside the tank. Peel back the protective layer and align the membrane along the marked lines, smoothing out any wrinkles or air bubbles to ensure a strong, even bond.

4. Light-Curing Process

Lamp Placement: Position curing lamps with a wavelength of 365–410 µm at approximately 10 cm intervals, as close as possible to the FRP membrane (preferably within 5 cm).

Curing Time: Cure the membrane for 20–60 minutes, adjusting the duration based on the tank's shape to achieve thorough curing.

Adhesion Check: After curing, perform a visual inspection and tap gently with a small wooden hammer to confirm adhesion and bonding integrity.

5. Seam Sealing and Curing

Overlap Sealing: Apply a putty-like FRP mix at the membrane overlaps to seal any gaps. Mix the putty with a hardener (10 cc per kg of putty) and apply evenly.

Curing: Allow the putty to cure for at least 2 hours with a fan, or 8–12 hours for natural curing. Confirm complete curing through inspection.

6. Final Checks and Documentation

Thickness and Pinhole Testing: Conduct final tests on membrane thickness and inspect for pinholes. Verify overlap quality and confirm airtightness with a pressurization test if required.

Documentation: Record each step with photographs and documentation, ensuring quality assurance and compliance with regulatory standards.

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