



Tank maintenance

For economical repair of corroded tank bottoms



**PPG Protective &
Marine Coatings**

Bringing innovation to the surface.™

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PPG Protective & Marine Coatings (PPG) is a world leader in protective and marine coatings.

Our global capabilities and respected protective coatings brands enable us to provide our customers with exceptional products, performance and service. Our proven and trusted products protect a wide range of assets for the most demanding markets and environments, including:

- Civil Infrastructure
- Marine
- Mining
- Offshore
- Petrochemical
- Power
- Rail

PPG has the scale and resources to deliver outstanding support with well-established operations in over 60 countries. Continuous development ensures that we provide optimum solutions for asset owners, contractors, fabricators and applicators across the globe, helping our customers to meet the challenges they face today and tomorrow.

Experience, innovation and integrity – that is what makes PPG the ideal coatings partner.

Tank bottom repair using chopped glass fiber

The degree of corrosion within storage tanks, especially those used for the storage of crude oil, has been underestimated. This is reflected by the large number of serious corrosion problems encountered at various tank farms for crude oil storage.

Storage tanks that have not been adequately protected by effective coating systems exhibit severe corrosion of tank bottoms and the lower sections of the sidewalls. During continuous crude oil service, inspection programs highlighted many incidences of severe pitting and steel loss.

Types of corrosion pitting



Open pitting (easy to fill)



Omega pitting (difficult to fill)

With severe pitting corrosion, localized perforation of a tank bottom is a distinct possibility. This situation requires special attention as serious soil contamination and environmental damage will occur through cargo leakage, leading to considerable financial loss.

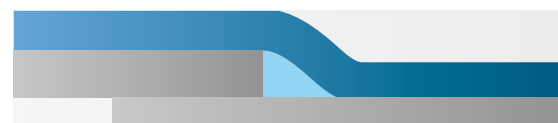
When confronted with such serious damage to the bottoms of their crude oil storage tanks, many tank farm owners realize that adequate maintenance is required to prolong the service life of these tanks. This is where our experience and expertise proves invaluable.

Maintenance

If the corrosion of the tank bottom is so severe that perforation has occurred and the general steel thickness is found to be below the recommendations of the API standard, then replacement of the tank bottom is required. However, for minor localized perforations, a coating system with chopped fiber is generally able to bridge holes. For all other pitting where a coating system alone is not sufficient, inclusion of chopped glass fiber with our solvent-free tank linings is the ideal solution.

1. Repairing of pits

Pitting can be repaired in different ways: by means of welding steel plates or using the SIGMAGUARD™ CSF 650, NOVAGUARD™ 840, or NOVAGUARD 890 products as sprayable pit fillers. The products are all solvent-free and self-caulking, offering high-build protection over critical areas and zero shrinkage in the filled pits. The coating gradually penetrates the pitting and after 5- to 10-minutes, depending on the depth of pitting and ambient conditions, the excess surface material can be scraped off using a squeegee.



Caulking compound / stripe coat

Tank lining

2. Repairing uneven areas

In some situations, even after filling the pits, a caulking compound may be required to level the uneven areas. The *NOVAGUARD* 830 product can be applied to all weld seams, lap joints, shell side joints or other surface projections to provide a smooth surface transition. It is important that an even surface is provided by the caulking compound to assist in the application of the chopped fiber laminate to the tank bottom and joint areas.



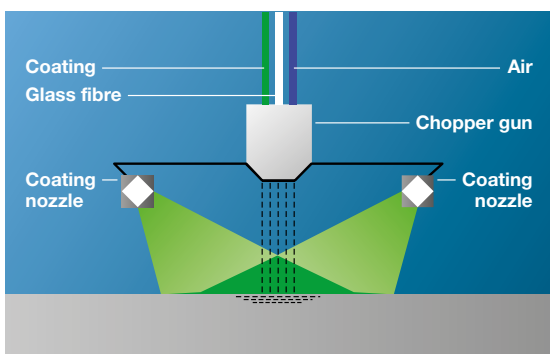
Level, uneven surfaces

3. Repairing of the tank bottom with a reinforced system

After applying a primer (optional), filling the pits, leveling the uneven areas with caulking compound and stripe coating the weld seams, the tank bottom is ready for the application of the chopped fiber system. Glass roving is fed into the rear end of a chopper gun that cuts the roving into short pieces to about 2.54 cm (1 in) in length. The special spray apparatus ensures that the chopped fiber passes through the dual spray fans so that the fiber is encapsulated by the solvent-free coating before it lands on the steel surface.

To consolidate the glass fiber laminate, any trapped air is removed by rolling the coatings soon after application with a split-washer roller. After completion of the chopped fiber application, a final full coat of solvent-free finish, without chopped fiber, is applied to seal the laminate and give a smooth, easy-to-clean surface.

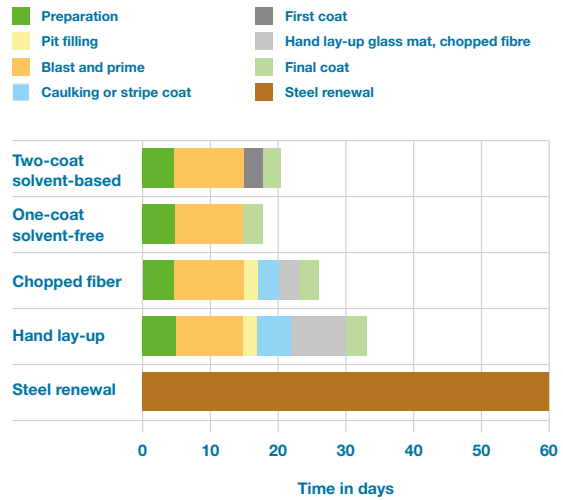
Chopped fiber application



Economics

Compared to the amount of time the tank is out of service for various maintenance options, it is clear that repairing tank bottoms with a sprayed chopped fiber laminate is extremely economical, as demonstrated in the comparison below:

**Time for maintenance: 2,750 m² (9,022 ft²) tank
30 m (98.4 ft) diameter**



Using the chopped fiber system, the table above clearly indicates at least 50% saving in time compared to steel renewal. In addition, the material and application costs of the chopped fiber system are much lower, thereby giving significant cost savings to the tank farm operator.

Products

The *SIGMAGUARD* CSF 650, *NOVAGUARD* 840 and *NOVAGUARD* 890 products can all be used as pit fillers and for the chopped fiber system. For the caulking compound, we recommend the *NOVAGUARD* 830 product due to its superior chemical resistance.

Depending on cargo storage, the appropriate tank lining must be selected. For more detailed information on the chemical resistance of our coatings you can use the online TankSelect tool (<http://tankselect.sigmacoatings.com>).

Please note that it is very important to apply the selected tank coating in accordance with the relevant product datasheet, which you can download from our website. In addition, we provide a comprehensive Tank Maintenance Manual, which is available on request by email or telephone. You can also contact your local sales representative who will be able to provide any additional advice and support you may require.



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