

UPDATE

CORROSION PROTECTION OF PIPES IN SHIP REPAIR ENVIRONMENT

Achieving faster installation, less downtime with temporary coatings.

Pipes for the marine environment are built specially, with several types of pipe used. They are used in different mechanical operations on ships as well as in offshore systems. Harsh atmospheric conditions in marine environments expose pipes to high corrosion levels. Removable coatings are an excellent way to ensure faster installation and less downtime by keeping corrosion at bay.

Corrosion is the gradual deterioration of a material or its properties through a chemical reaction with its environment, and can be described as the destructive attack of a material by reaction with its environment. Ongoing ships travel globally, and as such they experience the extreme conditions of marine environments which greatly accelerate the decline in their material state. Corrosion resistance is extremely important in marine operations and aboard ships. In these highly corrosive environments, turning to smart corrosion protection methods is the best approach engineers can take. Corrosion protection conducted properly can enable significant savings in time and money, and even more importantly prevent hazards and accidents that can jeopardise human lives.

Corrosion affects both the pipe's interior and exterior until a pipe failure occurs and can result in a pipe rapidly losing fluid. Pipes penetrate almost every confined space above and below the waterline. Pipe failure can result in total loss in the case of engine cooling or fire suppression. It is very important therefore that engineers inspect and maintain the pipe interior and offer corrosion protection solutions to seal leaks, prevent corrosion and extend the life of pipes on vessels.

Damage from corrosion in shipbuilding or corrosion that occurs in the operation of vessels is especially harsh. Corrosion protection of such structures is a big part of the cost of the manufacturing process. Quality corrosion protection in the construction phase of a ship is of crucial importance for its functionality due to the ship's demanding and complex structure and its exposure to extremely aggressive environments. Optimal and smart corrosion protection is one of the key factors in the quality and price of the ship. Structures in shipbuilding, offshore and marine industries contain parts that are difficult to access or can even be completely inaccessible for quality and long-lasting protection. Parts of the ship structure are derived from a number of



brackets, frames, stiffeners and reinforcements which makes their proper preparation and coatings protection difficult.

Economical solution

In all these cases, the most efficient and economical technical solution is the use of Cortec's patented VpCI corrosion inhibitors. This special group of inhibitors protects the

metals from atmospheric corrosion and is able to stop corrosion at a molecular level. The organic substances vaporise and travel to all parts of the metal surfaces, reaching even inaccessible areas.

VpCIs have a very high range of application and their utilisation is the result of technological as well as economic progress, when it comes to corrosion protection in

shipbuilding. They are increasingly used in shipbuilding and marine industries due to their excellent properties, including a unique ability to protect hard-to-reach areas.

VpCI inhibitors are highly recommended for protection of inaccessible areas of marine structures. They are also highly efficient in the protection of pipelines and marine and naval equipment, as well as electrical contacts. After

contact with the metal surface, the vapour condenses and forms a thin monomolecular film that protects the metal. The protective layer re-heals and self-replenishes itself through further condensation of the vapour. VpCI reaches every area of the metal part, protecting its exterior as well as hard-to-reach interior surfaces. It provides complete product protection during storage as well as during domestic and overseas shipment.

Pipeline and tank protection

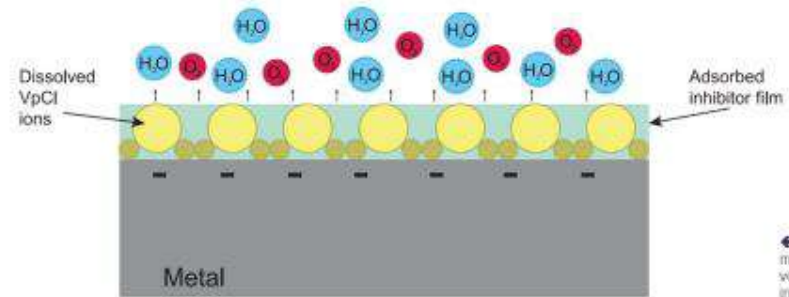
VpCI inhibitors are recommended for corrosion protection of heating and cooling systems, main and auxiliary engines, heating systems for crew and passengers, amongst many others. The economical properties of VpCI inhibitors are especially evident in recirculation systems where the VpCI is slowly consumed.

The application of VpCI inhibitors in hydrostatic testing systems is of great importance as the testing water can be aggressive to pipeline materials. VpCI inhibitors could eliminate the possibility of corrosion before use.

In the application of VpCI 645 for hydrostatic testing of ship storage tanks using seawater it is very important to use products which are environmentally friendly and have a water safety permit certificate because this allows the water to be drained into the sea after testing.

Protection of flanges

Flange faces on the end of pipes form a critical connection for pressure containment. If any of these surfaces are damaged it can jeopardise the integrity of that connection, making preservation imperative for safety and performance. Cortec recommends two removable coatings for flange face protection. VpCI-391 is a water-based temporary coating with low VOC (0.4 lbs/gal [48 g/L]). It leaves a clear non-tacky film that is virtually unnoticeable and can be easily removed with alkaline cleaners such as Cortec's VpCI-41x Series (which offers flash rust protection) before the pipe is installed. VpCI-391 provides protection in harsh, outdoor, unsheltered applications and has excellent UV resistance. Since the coating leaves a dry film, it is ideal



← The Action mechanism of volatile corrosion inhibitor

for transit applications where pipes and flanges may be repeatedly handled. For the most extreme conditions, VpCI-368 offers even heavier-duty protection. This fast-drying solvent-based coating leaves a slightly brown waxy finish and should be removed prior to flange installation using an alkaline cleaner from the VpCI-41x Series.

Removable coating advantages

As previously suggested, the main benefit of removable flange coatings is to avoid the ramifications of corrosion. Eric Uutala, Cortec's Technical Sales and Product Manager, explains

the alternative: "If a raised face is damaged, either from corrosion or mechanical impact, it can cause significant delays in construction. In the case of gramophone raised faces, the re-surfacing process can be very time consuming, which could lead to further downtime and financial loss."

By taking the removable coating route, the protective mechanism conforms directly to the surface of the metal, not requiring an additional covering (a plastic film for example) except what is needed for standard mechanical protection. In the case of VpCI-391, there is minimal change to appearance – a plus for manufacturers concerned about aesthetics – and the coating is especially easy to remove. Uutala reminds workers that flange preservation can be done at any point in the pipe's lifecycle – at the manufacturing plant, in the storage yard, or at the final site. He outlines the flange coating process as follows:

- Make sure the flange face is clean and free of rust, dirt, coatings, and any other contaminants.
- Apply either VpCI-368 (for brown, waxy film) or VpCI-391 (for clear, dry film) by brush.
- Allow to dry for one to two (or more) hours before covering with rigid flange cover or other approved mechanical protection (avoid wood covers because they absorb moisture).

Ultimately, the condition of the flange face directly affects the condition of the system and is at risk at any point up to installation. Taking preventative measures to protect vulnerable flange faces from corrosion and mechanical damage in marine environments can go a long way toward preserving flange faces in their original state. A little time spent cleaning the flange and applying a coating now could translate into many hours and dollars saved later by avoiding resurfacing delays and minimising system downtime. ■

