

## **Tough neighbourhood**

### **Ballast tanks pose particular challenges for specifiers, suppliers and appliers of coating products**

Recent high-profile sinkings of older single-hull tankers due to hull structural failure highlight the need for effective corrosion control and an increased demand for greater corrosion protection from coatings, particularly in seawater ballast tanks. The large area of ballast tank space in double-hull tankers also poses challenges for those who specify, supply and apply ballast tank coatings.

#### **Desirable coatings**

In seawater ballast tanks the ability of coatings to act as a barrier that controls and restricts the corrosion process over time is effected by physical factors such as the degree of oxygen permeability, water vapour permeability, liquid water uptake, ionic permeability, coating porosity and surface contamination.

High-build coatings with very low water and ion permeability, combined with tenacious adhesion, have a proven ability to provide an effective barrier. Coatings based upon epoxy resins which incorporate special pigments are particularly useful in this respect.

Epoxy resins can vary from low molecular weight, low viscosity liquids at room temperature, to fairly high molecular weight, high melting point solids. The addition of curing agents, such as amines, amine adducts and polyamides, causes epoxy resins to cross-link.

Liquid epoxy resins give high cross-link densities whereas solid materials have fewer reactive groups resulting in a less cross-linked film. The availability of a wide choice of resins and curing agents allows for the formulation of specific products to suit specific applications.

The addition of barrier pigments and flake pigments, such as leafing aluminium, can improve the barrier properties and further suppress the corrosion process.

The coating of ballast tanks during maintenance work poses particular challenges due to the presence of additional physical factors such as corrosion, pitting, existing coatings, restricted access and damp, humid conditions. Because such factors can compromise surface preparation, coatings application and in-service performance, specifically designed barrier coatings with engineered surface tolerance are favoured.

#### **Interbond 808 for repairs**

Interbond 808 is a tar-free liquid epoxy amine adduct coating developed by International Coatings Ltd for use in the refurbishment and repair of water ballast tanks, cofferdams, void spaces, wet spaces, bilges and crude oil tanks. The combination of adhesion promoters and special surfactants utilised in the formulation of Interbond 808 ensures the coating is damp-tolerant and can be applied in a single coat.

In a typical repair project involving the recoating of a ballast tank previously lined with a coal tar epoxy, ICL points out that it is necessary to hydroblast the areas to be repaired and then subject them to a high-pressure fresh water wash. It is permissible for the hydroblasted areas to be allowed to flash rust, but not beyond a certain level, prior to application of Interbond 808.

Once the amount of residual salt is found to be within acceptable levels, Interbond 808 can be applied. It is only necessary to stripe coat those areas that have been fully blasted. Once striped, such areas must be clean and dry prior to the application of subsequent coats.

### **Biggest ballast tanks**

One of the most notable recent orders for ballast tank coatings won by Hempel's Marine Paints was a contract for the eight-ship newbuilding programme of Hellenic Corporation in Greece. The order consisted of four ULCCs at Daewoo Shipbuilding and four VLCCs at Samsung Heavy Industries and involved the application of 2 million litres of Hempadur Multi-Strength 4575. The four VLCCs were sold during construction to Saudi Arabian interests.

Hempadur Multi-Strength 4575 is a pure epoxy which has been awarded a B-1 certificate from Marintek and which is particularly suitable for application to the dedicated ballast tanks of double-hull tanker newbuildings where a long, trouble-free service life is a prime requirement. Particular care is required during the application of Hempadur Multi-Strength 4575 to ensure this quality product provides the longest possible working life.

"Today, it is not just the quality of the coating itself which is important," states Kim Schiebel, Hempel newbuilding manager, marine marketing. "The methods and standard of steel surface preparation and coating application can often account for more than 50 per cent of whether a coating is going to prove successful and provide the robust, trouble-free service over the period of time required of it."

Surface preparation also impacts the number of coats that need to be applied. Although a minimum of two coats is required for Hempadur Multi-Strength 4575, Hempel recommends three coats for optimum results. In any case a dry film thickness of 300 microns is required.

### **Multipurpose coating**

Some of the 2 million litres of Hempadur Multi-Strength 4575 used on the eight newbuildings was applied to parts of the external hull. Hempel has taken the concept of a multipurpose coating a stage further with Hempadur Uniq 4774, a pure epoxy developed in conjunction with Daewoo.

Daewoo had been seeking a coating which could be used on as many areas as possible, including exterior hull, topsides, deck and equipment, superstructure, ballast tanks, cargo holds and tanks (excluding chemical and fresh water tanks), and still provide the levels of protection required in all these applications.

"Hempadur Uniq 4774 thus had to meet a series of demands, from being tough enough to meet likely ballast tank conditions over a long duration to being flexible enough to cover a range of other areas at the different dry film thicknesses required," adds Schiebel.

"Hempadur Uniq 4774 will mean a marginal extra cost in terms of paint material but should yield important savings for the shipyard. There will be less waste as the product will not have to be changed for the many different areas to be coated. Also, those applying the coating will become familiar with the product and be able to control the application more closely, thus providing the shipowner with a better standard of coating on the delivered ship."