Protective Coatings in Water Ballast Tanks

Linked Supporting Service

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Document History

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1. General

1.1 Introduction

A serious and continual threat to the safe operation and service life of ships is excessive corrosion of internal structure in the salt water ballast spaces. This has, over the years, caused several major hull structural failures which, in many documented cases, have led to side shell failure and subsequent tragedies such as loss of life and ship or have resulted in pollution.

Since July 1991 it has been a Lloyd’s Register Rule requirement that all salt water ballast spaces having boundaries formed by the hull envelope are to have corrosion protective coatings applied in accordance with the manufacturer’s requirements, see Pt 3, Ch 2.3.6.1 of Lloyd’s Register’s Rules and Regulations for the Classification of Ships.

Experience has shown that salt water ballast spaces are the focal point for maintenance and, if this is inadequate, there is increased risk of accidental pollution and possible major structural failure. Ships which comply with SBT and protective locations (Post-MARPOL) have about three times the number of dedicated salt water ballast spaces and corresponding steel surface in relation to their predecessors (Pre-MARPOL). With new generation ships like double-hull tankers and an existing ageing fleet there is an increased awareness, within the marine industry, for a need to protect and maintain such salt water ballast spaces. This also manifests itself in the Enhanced Survey Programme for Oil Tankers and Bulk Carriers.

In the event that the ballast space protective coatings break down and are not maintained, then these spaces may be subjected to close-up inspection and thickness measurements during all class surveys to ensure that the hull structural integrity is not at risk. It is therefore essential that the durability, and hence, effectiveness of the coatings are taken into account by those agreeing the specification for the coatings and their application as this could affect the frequency of surveys and maintenance in these spaces.
1.2  Objective

The objective of this procedure, which is optional, is to demonstrate a Shipowner's clear commitment to operational safety through his awareness of the need to maintain coatings in salt water ballast tanks. This procedure is also useful for charterers in differentiating well maintained ships and also allows the Shipowner to gain recognition for prudent investment in an effective protection system.

This procedure is not intended to replace the technical aspects of any specific coating system, these being covered by the product and job specifications, which are at the discretion and under the responsibility of the Shipowners, coating manufacturers and Shipbuilders. Guidance notes on surface preparation, coating application and inspection and repair of coatings are however given in Reference 2, Lloyd’s Register’s Approvals Lists on CDLive. The Approvals Lists section of CDLive includes a list of Recognised Corrosion Control Coatings (i.e. products with satisfactory performance records) the majority of which are hard coatings recommended for new construction. There is also the Lloyd’s Register List of Recognised Maintenance Coatings for Ballast Tank Protection (Including Soft or Semi-Hard Coatings).

1.3  Notation

Ships complying with this procedure will, if the Shipowner wishes, be eligible to be assigned the descriptive note PCWBT (date). The descriptive note will be placed against the ship entry in Lloyd’s Register’s Register of Ships.

If the coatings have deteriorated below the minimum level defined by Lloyd’s Register and no effort is being made to maintain the coatings, then the descriptive note will be placed in parentheses, i.e. (PCWBT (date)). Where coatings have broken down in this way then these salt water ballast spaces will require to be inspected annually. The date in parentheses after PCWBT is the date of the last survey of the salt water ballast spaces where the coatings were found to be satisfactory.

2.  Application

For new construction all salt water ballast spaces having boundaries formed by the hull envelope are to have a corrosion protective coating applied in accordance with the manufacturer's specification, see Pt 3, Ch 2,3.6.1 of Lloyd’s Register’s Rules and Regulations for the Classification of Ships.

The durability and maintenance of the protective coatings will directly affect the frequency of inspection for salt water ballast spaces. The durability of the protective coating is directly affected by the use of recommended coatings, the surface preparation and the quality of their application.

All salt water ballast spaces are to be examined and maintained in accordance with Pt 1, Ch 3 of Lloyd’s Register’s Rules and Regulations for the Classification of Ships.

At the Shipowner’s request and provided the following are complied with to the satisfaction of Lloyd’s Register, the descriptive note PCWBT (date) may be assigned to existing Lloyd’s Register class ships:

• All spaces used for salt water ballast would be examined initially by the Lloyd’s Register Surveyor to ascertain the condition of the existing protective coatings. In this respect the existing protective
coating will be required to be in either a ‘Good’ or ‘Fair’ condition as defined in Lloyd’s Register’s Rules and Regulations for the Classification of Ships.

- Where the protective coating condition is considered to be ‘Poor’, as defined in Lloyd’s Register’s Rules and Regulations for the Classification of Ships, then repairs are to be carried out to the existing protective coatings. With regard to repairs to existing coatings, attention is drawn to Lloyd’s Register’s Guidance Notes for Surface Preparation, Application and Maintenance of Tank Coatings as indicated in Chapter 1 of Reference 2.

The most common protection is the hard type of coating, e.g. epoxy. On existing ships, during maintenance, hard coatings should be restored using the type of coating originally applied, or by a compatible hard coating recognised by Lloyd’s Register. The compatibility of coatings should normally be agreed by the coating manufacturer, and coatings should be applied in accordance with the manufacturer’s requirements.

The restoration of damaged hard coatings by compatible coatings not recognised by Lloyd’s Register will be accepted, provided such coatings are applied and maintained in accordance with the manufacturer’s specifications. Details of such coatings will be reported by the Lloyd’s Register Surveyor to the London office for information and record purposes.

Currently there are semi-hard and soft maintenance coatings which are not recognised by Lloyd’s Register and which are being proposed for the purpose of repairing hard coatings. Proposals to use this type of coating, including the manufacturer’s confirmation of their compatibility with the existing coatings, are required to be referred to the London office for consideration.

Lloyd’s Register Recognised Maintenance Coatings Listed as Class 1 are deemed to be approved by Lloyd’s Register for the purposes of IACS Rec. No.54, September 1998; Guidelines for the Acceptance, Application and Survey of Semi-hard Coatings in Ballast Tanks; Reference 3.

All maintenance coatings deemed ‘soft’ when applied in the repair of ballast tanks assessed in ‘Poor’ condition, are subject to subsequent annual survey, see Lloyd’s Register Rules. Double bottom tanks may gain exemption from the annual survey requirement.

3. Tasks

3.1 The Shipowner

The Shipowner should select and maintain a coating protection system to ensure an adequate level of protection of the structure in the sea water ballast tanks.

To this end, the coating manufacturer should give evidence of the quality of the product and its ability to satisfy the Shipowner’s requirements.

It is recommended that the durability, and hence, effectiveness of the coatings are taken into account by those agreeing the specification for the coatings and their application, as this could affect the frequency of future surveys of the salt water ballast tanks.
3.2 The Shipbuilder/Shiprepairer

The Shipbuilder or Shiprepairer should ensure that the protective coating is applied in accordance with the manufacturer’s specification.

Guidance in surface preparation, coating application and inspection and repair of coatings is given in Reference 2.

3.3 Lloyd’s Register Surveyor

For new construction, the Lloyd’s Register Surveyor shall confirm that the coatings have been applied and report the same together with details of the coatings, ‘by suitable declaration from either the shipyard or attending coating contractor’, to the London office. The declaration should include confirmation of the following points:

- Coating Location Plan.
- Types of coating applied.
- Number of coats.
- Dry film thicknesses.
- Reference number(s) of manufacturer approved application procedure used.
- Whether procedure included in yard QA plan.

The attending Surveyor is not required to independently verify the veracity of the declaration.

For existing ships, the Lloyd’s Register Surveyor will submit reports on the inspection of salt water ballast tanks, the condition of the existing coatings and any repairs. The Lloyd’s Register Surveyor will take appropriate thickness gaugings of the ship’s structure in those locations where protective coating breakdown has occurred in order to ensure permissible thickness diminutions have not been exceeded. Similarly the Lloyd’s Register Surveyor will pay particular attention to locations where previous repairs to coatings have obviously taken place.

4. Tools and equipment

4.1 Tools

A procedural document providing guidance on the preparation of surfaces, application of coatings, the inspection and repair of coatings and lists of Recognised Corrosion Control and Maintenance Coatings, are available as indicated in Reference 2.

Coatings should be applied in accordance with the manufacturer’s specification.

Survey report forms remain the same as for normal classification duties. The Lloyd’s Register Surveyor will exercise due diligence where random sampling, thickness gauging and test planning are required.
4.2 Equipment

The Lloyd’s Register Surveyor will have at his disposal the same equipment and methods as those applied during his normal classification survey duties.

5. References

1. Lloyd’s Register’s *Rules and Regulations for the Classification of Ships*.
2. Lloyd’s Register Approval Lists.