ICS TECHNICAL INFORMATION

IMO GUIDELINES FOR MAINTENANCE AND REPAIR OF PROTECTIVE COATINGS (MSC.1/Circ.1330/Rev.1)

Introduction

This document contains guidelines for maintenance and repair of protective coating and goes into detail for subjects as coating conditions, coating maintenance, coating repairs and coating technical file (CTF).

The purpose of the guideline is to assist surveyors, ship owners, shipyards, flag Administrations and other interested parties involved in the survey, assessment and repair of protective coatings in ballast tanks.

The ability of the coating system to reach its target useful life depends on the

- Type of coating system,
- Steel preparation,
- The design of the structures,
- Application,
- Coating inspection and maintenance.

All these aspects contribute to the good performance of the coating system. These Guidelines focus on maintenance and repair procedures for coatings. Maintenance and repair of the protective coating system should be included in the ship's overall maintenance and repair scheme. The effectiveness of the protective coating system, which may include the use of anodes, should be verified during the life of a ship by the Administration or an organization recognized by the Administration.

These Guidelines apply to ships as specified in **SOLAS regulation II-1/3-2.1.1** and focus on maintenance and repair procedures for coatings in dedicated seawater ballast tanks of all types of ships and double-side skin spaces of bulk carriers, hereinafter referred to as "ballast tanks". They only cover in-service maintenance and repair of coatings. Corrosion prevention systems other than coating are not covered.

SOLAS 2006 Amend / Chapter II-1 / Reg. 3-2

This regulation applies to ships of not less than 500 gross tonnage:

- for which the building contract is placed on or after 1 July 2008; or
- in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2009; or
- the delivery of which is on or after 1 July 2012.

All dedicated seawater ballast tanks arranged in ships and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards shall be coated during construction in accordance with the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by the Maritime Safety Committee by resolution MSC.215(82), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I.

All dedicated seawater ballast tanks arranged in oil tankers and bulk carriers constructed on or after 1 July 1998, for which above paragraph is not applicable, shall comply with the requirements of regulation II-1/3-2 adopted by resolution MSC.47(66).

Maintenance of the protective coating system shall be included in the overall ship's maintenance scheme. The effectiveness of the protective coating system shall be verified during the life of a ship by the Administration or an organization recognized by the Administration, based on the **guidelines developed by the Organization**. **(MSC.1/Circ.1330/Rev.1)**

Important Definitions

For the purpose of this document, the following definitions apply:

- **Maintenance** means minor coating restoration work regularly performed by a ship's crew using normal shipboard means and tools to maintain "GOOD" or "FAIR" coating conditions.

- **Repair** means coating restoration work of a longer-term nature, usually performed during ship's dry-docking or scheduled repair period (ship idle) to restore the "FAIR" or "POOR" coating condition to "GOOD" condition.

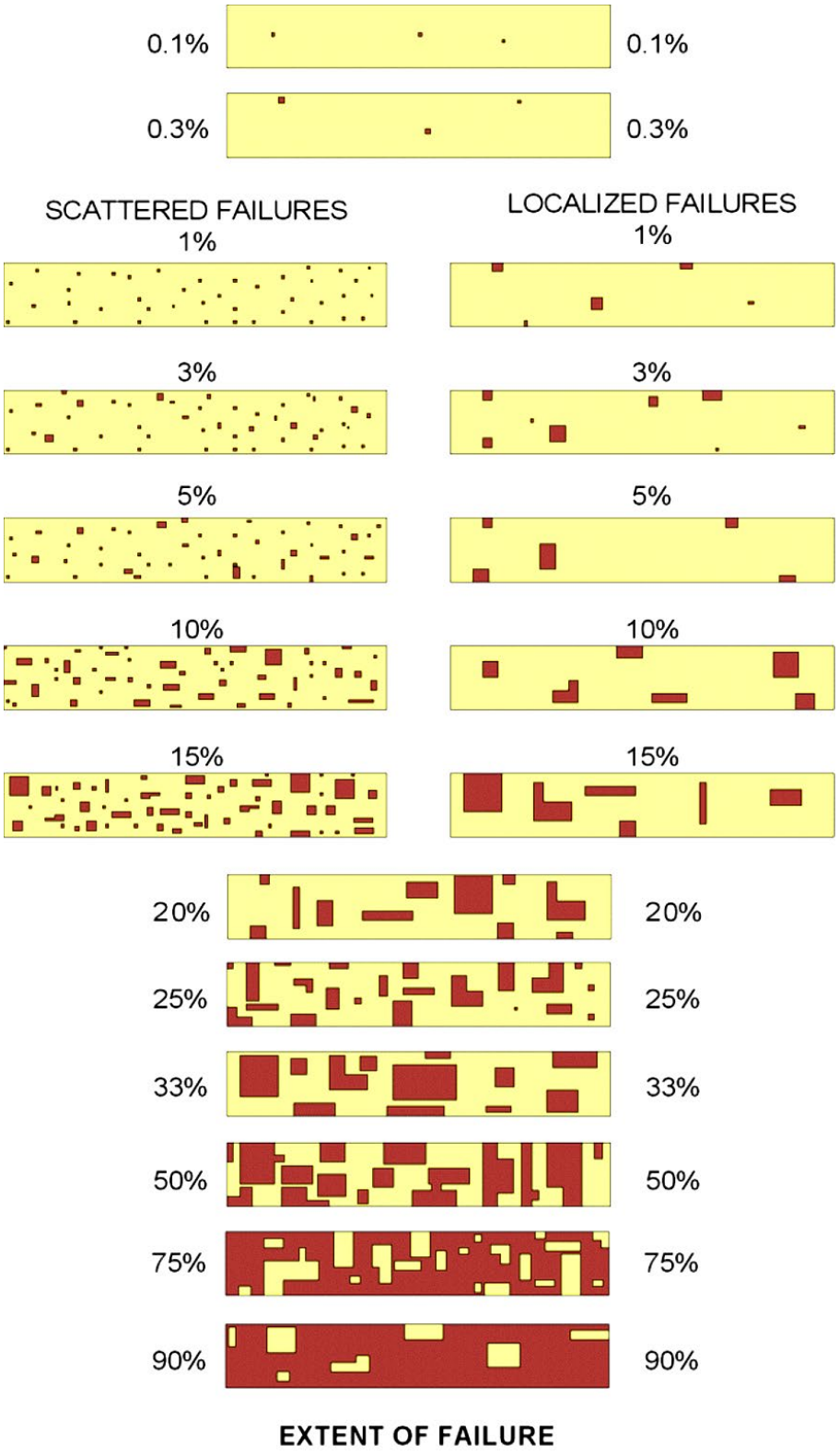
- **Coating conditions:** The condition of the coating in ballast tanks is assigned and categorized as "GOOD", "FAIR" or "POOR", based on visual inspection and estimated percentage of areas with coating failure and rusty surfaces. The definitions of coating conditions "GOOD", "FAIR" and "POOR" in the Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers (resolution A.744 (18)) are as follows:

  - **Good** condition means Condition with spot rusting on less than 3% of the area under consideration without visible failure of the coating. Rusting at edges or welds, should be on less than 20% of edges or weld lines in the area under consideration
  - **Fair** condition means Condition with breakdown of coating or rust penetration on less than 20% of the area under consideration. Hard rust scale should be less than 10% of the area under consideration. Rusting at edges or welds should be on less than 50% of edges or weld lines in the area under consideration.
  - **Poor** condition means Condition with breakdown of coating or rust penetration on more than 20% or hard rust scale on more than 10% of the area under consideration or local breakdown concentrated at edges or welds on more than 50% of edges or weld lines in the area under consideration.

	GOOD [3]	FAIR	POOR
Breakdown of coating or area rusted [1]	< 3%	3 – 20%	> 20%
Area of hard rust scale [1]	-	< 10%	≥ 10%
Local breakdown of coating or rust on edges or weld lines [2]	< 20%	20 – 50%	> 50%

1 % is the percentage calculated on basis of the area under consideration or of the "critical structural area"
2 % is the percentage calculated on basis of edges or weld lines in the area under consideration or of the "critical structural area"
3 Spot rusting, i.e. rusting in spot without visible failure of coating

The above clarifications are further exemplified in **IACS Recommendation 87** via photographs along with narrative descriptions of the condition and uniform and localized assessment scales.


0.1%
0.1%
0.3%
0.3%
SCATTERED FAILURES
LOCALIZED FAILURES
1%
1%
3%
3%
5%
5%
10%
10%
15%
15%
20%
20%
25%
25%
33%
33%
50%
50%
75%
75%
90%
90%
EXTENT OF FAILURE

Good Coating Condition

Fair Coating Condition

Poor Coating Condition

Definitions of "AREAS UNDER CONSIDERATION"

Recognizing that different areas in the tank experience different coating breakdown and corrosion patterns, the intent of this section is to subdivide the planar boundaries of the tank for evaluation of coating into areas small enough to be readily examined and evaluated by the surveyor. However, the areas subdivided should not be so small as to be structurally insignificant or too numerous to practically report on. Coating condition in each area should be reported using current practice and terminology (frame numbers, longitudinal numbers and/or strakes numbers, etc.). Each area is then rated "GOOD", "FAIR" or "POOR" and the tank rating should not be higher than the rating of its "area under consideration" having the lowest rating.

Examples of how to report coating conditions with respect to areas under consideration are given in appendix 10 of IACS Recommendation 87.

In-Service Condition Monitoring

It is recommended that all ballast tanks, especially for ships over six years of age, are inspected at least annually by the crew. Standardized reports should be used with the following information, where applicable:

1. ships name;
2. tank number;
3. inspection date;
4. inspection by whom;
5. year coated;
6. coating name/type;
7. last repaired;
8. surface area;
9. coating condition (GOOD, FAIR or POOR);
10. Pitting corrosion – Yes/No;
11. amount of rust scale (in m2 or % of areas under consideration);
12. access arrangement condition;
13. sounding pipe condition;
14. vent pipe condition;
15. ballast pipes condition;
16. structural damage, mechanical damage, location and extent; and
17. other comments.

A copy of the latest standardized report should be maintained on board for use of the owner.

Coating Maintenance

The following are the major consideration regarding the maintenance of coating:

- **Safety:** It is an absolute requirement that all of the ship's safety and tank entry procedures and policies are adhered to. In addition, it is strongly recommended that all travel coating squad members are trained in safe usage of all the equipment and tools to be used for the project on board, before being sent to the ship
- **Salt contamination:** It will cause accelerated deterioration of the maintenance coating if not removed prior to coating application.

- **Rust scale:** If not removed prior to coating application will cause early failure
- **Pitting corrosion:** It is a common problem in ballast tanks that have been exposed to seawater for some time. If it has been accepted that the pits need not be welded up, in order to prevent further accelerated damage, a coating should be applied.
- **Temperature:** When trading in cold water, it will be hard to keep the inside tank surfaces free from condensation and to cure the coating in a timely manner.
- **Condensation:** It is advisable that the crew have a good understanding about relative humidity and its relation to substrate temperature and dew point. To paint over a surface that is at or below the dew point, or that will be at or below the dew point while the coating is wet, will not perform. Ideally the temperature should be at least 3°C above the dew point.
- **Ventilation:** This is one item that clearly supports both the quality of the application and the safety of the operation.
- **Compatibility of coating systems:** To ensure compatibility of coating systems, using the same coating system as was originally employed is recommended. If this is not possible, the paint manufacturer recommendations should be followed.

Coating Repairs

The repair process follows a set series of steps which is listed below:

- Mud out (”slurry up” and pump out all mud)
- de-scaling (hand scrape off loose scale − the use of magnesium descaling can be considered)
- Fresh water rinsing
- drying
- Surface preparation (surface preparation method chosen depends on the amount of failure and the service life intended)
- Anode protection (protection of items should not be coated)
- Coating

It is recommended that the process, specification, coating application parameters, standards and time schedule are discussed and agreed upon by the parties involved and presented to the Administration for review. The Administration may, if it so requires, participate in the agreement process.

Coating repair should be inspected by qualified inspectors certified to AMPP Certified Coatings Inspector, FROSIO Inspector Level III or equivalent as verified by the Administration

Coating Technical File (CTF)

Maintenance and repair should be carried out in accordance with the procedures and recommendations provided in the Coating Technical File (CTF).

For maintenance, the CTF should contain at least the following:

- Copy of Technical Data Sheet (product name and identification mark and/or number, materials, components and composition of the coating system, colors, etc.)
- Ship maintenance records of coating application (ambient condition during coating, method of surface preparation, applied actual space and area of each compartment)
- For repairs, the CTF should contain at least the following:
- Copy of Statement of Compliance or Type Approval Certificate
- Copy of Technical Data Sheet
- Shipyard work records of coating application
- Coating log issued by the coating inspector
- Shipyard's verified inspection report including information like completion date of inspection, result of inspection, remarks and inspector signature
- Procedures for in-service maintenance and repair of coating system, if different than original coating system

References

- MSC.1-Circ.1330-Rev.1
- IACS Recommendation 87 − Guidelines for Coating Maintenance and Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil Tankers, revision 1, 2006.