

# *Polski Rejestr Statków*

## **RULES**

PUBLICATION NO. 55/P

**SURVEY OF CORROSION PROTECTION AND ANTI-FOULING SYSTEMS**

**2017**  
January

Publications P (Additional Rule Requirements) issued by Polski Rejestr Statków complete or extend the Rules and are mandatory where applicable.



GDAŃSK

*Publication No. 55/P – Survey of corrosion protection and anti-fouling systems – January 2017*, is an extension of the requirements contained in *Part II – Hull* of the *Rules for the Classification and Construction of Sea-Going Ships*, as well as in all other PRS *Rules*, in which reference to the *Publication* has been made.

The *Publication* was approved by the PRS Board on 23 November 2016 and enters into force on 1 January 2017.

The present *Publication* replaces *Publication No. 55/P – Survey of corrosion protection and anti-fouling systems – 2012*,

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## **1 GENERAL**

### **1.1 Application**

*Publication No. 55/P – Survey of corrosion protection and anti-fouling systems* applies to specific methods of corrosion protection and anti-fouling on ships which are subject to PRS survey according to the provisions of the *Rules for the Classification and Construction of Sea-going Ships* and other *PRS Rules*.

### **1.2 Definitions**

Definitions concerning general terminology applied in *PRS Rules* are contained in the *Rules*. For the purpose of this *Publication*, the following additional definitions have been adopted:

**A n o d e** – an electrode through which direct current enters an electrolyte.

**C a t h o d i c p r o t e c t i o n** – a way of protecting a steel surface from corrosion by installing sacrificial anodes, in contact with the steel in the electrochemical seawater corrosion cell.

**H a r d c o a t i n g** – a coating which chemically converts during its curing process or non-convertible air drying coating. Hard coating can be either inorganic or organic.

**A n t i - f o u l i n g c o a t i n g** – a hard coating which is used to prevent or inhibit attachment of unwanted organisms on its surface. Depending on its operating mechanism it may be smooth, non-stick or contain active agents.

### **1.3 Reference Documents**

#### **Standards**

- (1) ISO 8501-1:2007 Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
- (2) ISO 8501-3:2006 Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 3: Preparation grades of welds, edges and other areas with surface imperfections.
- (3) ISO 8502-3:1992 Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method).
- (4) ISO 8502-9:1998 Preparation of steel substrates before application of paints and related products – Tests for the assessment of surface cleanliness – Part 9: Field method for the conductometric determination of water-soluble salts.
- (5) ISO 8503-1:1988 Preparation of steel substrates before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates – Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces.
- (6) ISO 8503-2:1988 Preparation of steel substrates before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates – Part 2: Method for the grading of surface profile of abrasive blast-cleaned steel – Comparator procedure.
- (7) NACE SP0508-2010 Item no. 21134 Standard practice methods of validating equivalence to ISO 8502-9 on measurement of the levels of soluble salts.

#### **Other Documents**

- (I) International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (AFS Convention).
- (II) Regulation (EC) No 782/2003 of the European Parliament and of the Council of 14 April 2003 on the Prohibition of Organotin Compounds on Ships.

## **2 PROTECTIVE COATINGS FOR SEAWATER BALLAST TANKS**

### **2.1 Application**

**2.1.1** Chapter 2 provides technical requirements for protective coatings in dedicated seawater ballast tanks constructed of steel and specifies the principles for the protective coating inspection and maintenance.

**2.1.2** The provisions of Chapter 2 apply to seawater ballast tanks of all type of ships of 500 gross tonnage and upwards and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards.

The following tanks should not be considered to be dedicated seawater ballast tanks and should, therefore, be exempted from the application and requirements of the Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers (Resolution MSC.215(82)), provided the coatings applied in the tanks described in subparagraphs .2 and .3 below are confirmed by the coating manufacturer to be resistant to the media stored in these tanks and provided such coatings are applied and maintained according to the coating manufacturer's procedures:

- .1 ballast tanks identified as "Spaces included in Net Tonnage" in the *International Tonnage Certificate (1969)*;
- .2 seawater ballast tanks in passenger ships also designed for the carriage of gray water or black water; and
- .3 seawater ballast tanks in livestock carriers also designated for the carriage of livestock dung.

## 2.2 Definitions

The following additional definitions have been adopted for the purpose of Chapter 2:

- .1 **Ballast tanks** – tanks subjected to examination during surveys carried out in accordance with the following PRS Publications:
  - *Publication No. 36/P – Hull Surveys of Oil Tankers,*
  - *Publication No. 39/P – Hull Surveys of Bulk Carriers,*
  - *Publication No. 46/P – Hull Surveys of Chemical Tankers,*
  - *Publication No. 58/P – Hull Surveys of Double Hull Oil Tankers,*
  - *Publication No. 62/P – Hull Surveys of Dry Cargo Ships,*
  - *Publication No. 64/P – Hull Surveys of Double Skin Bulk Carriers,*
  - *Publication No. 81/P – Hull Surveys for New Construction,*
  - *Publication No. 82/P – Hull Surveys of Liquefied Gas Carriers*
- .2 **CTF** – coating technical file.
- .3 **Dew point** – the temperature at which air is saturated with moisture.
- .4 **DFT** – dry film thickness.
- .5 **Dust** – loose particle matter present on a surface prepared for painting, arising from blast-cleaning or other surface preparation processes, or resulting from action of the environment.
- .6 **Edge grinding** – the treatment of edge before secondary surface preparation.
- .7 **GOOD condition** – the condition with only minor spot rusting as defined in resolution A.1049(27) (*2011 ESP Code*), as amended. Condition with spot rusting on less than 3% of the area under consideration without visible failure of the coating. Rusting at edges or welds, must be on less than 20 % of edges or weld lines in the area under consideration.
- .8 **NDFT** – the nominal dry film thickness.
- .9 **90/10 practice** – the practice means that 90% of all thickness measurements shall be greater than, or equal to, NDFT and none of the remaining 10% measurements shall be below 90% NDFT.
- .10 **Primer coat** – the first coat of the coating system applied in the shipyard after shop-primer application.
- .11 **PSPC** – performance standard for protective coatings.
- .12 **Shop-primer** – the prefabrication primer coating applied to steel plates, often in automatic plants.
- .13 **Stripe coating** – painting, by a brush or a roller, of edges, welds, hard to reach areas, etc., to ensure good paint adhesion and proper paint thickness in critical areas.
- .14 **Target useful life** – the target value, in years, of durability for which the coating system is designed.
- .15 **Technical Data Sheet** – paint manufacturer's Product Data Sheet which contains the detailed technical instructions and information relevant to the coating and its application.

## 2.3 General

**2.3.1** The ability of the coating system to reach its target useful life depends on the type of the coating system, steel preparation, application and coating inspection and maintenance.

**2.3.2** Inspections relevant to surface preparations and coating processes shall be agreed upon between the Shipowner, the shipyard and the coating manufacturer<sup>1</sup>, in consultation with PRS. Clear evidence of the above-mentioned inspections shall be reported in an agreed format. The agreement shall be presented by the shipyard to PRS for review. To facilitate the review, the following documents shall be available to PRS:

- a) Coating specification including selection of areas (spaces) to be coated, surface preparation and coating process.
- b) *Statement of Compliance* or *Type Approval Certificate* of the coating system.  
Inspection reports shall be included in the CTF.

**2.3.3** Specifications and procedures related to the coating application process (including surface preparation) shall be strictly applied by the shipyard in order to prevent premature decay and/or deterioration of the coating system.

It is the shipyard's responsibility to identify and implement corrective actions aimed at the procedure relative to the PSPC<sup>2</sup> if any discrepancies between that procedure and PSCP were noted by PRS during the review.

**2.3.4** The coating performance can be improved by adopting measures at the ship design stage such as reducing scallops, using rolled profiles, avoiding complex geometric configurations and ensuring that the structural configuration permits easy access for tools and to facilitate cleaning, drainage and drying of the space to be coated.

**2.3.5** Coating technical file (CTF) shall contain specification of the coating system applied to the dedicated seawater tanks and double-side skin spaces, record of the shipyard's and Shipowner's coating work, detailed criteria for coating selection, job specifications, inspection, maintenance and repair.

The coating technical file (CTF) shall be submitted to PRS for review.

**2.3.6** The coating technical file (CTF) on new ship construction shall be delivered by the shipyard and shall contain at least the following:

- .1** a copy of *Type Approval Certificate* and *Statement of Compliance*;
- .2** *Technical Data Sheets* including:
  - a) product name and identification mark and/or number;
  - b) materials, components and composition of the coating system, colours;
  - c) minimum and maximum dry film thickness;
  - d) application methods, tools and/or machines;
  - e) condition of surface to be coated (de-rusting grade, cleanness, profile, etc.);
  - f) environmental limitations (temperature and humidity).
- .3** *Material Safety Data Sheets*;
- .4** shipyard work records of coating application specifying the type of the applied coating system, applied area (in square metres), time of coating, thickness, number of layers, ambient conditions (during coating), the method of surface preparation;
- .5** inspection processes agreement signed by shipyard, shipowner and coating manufacturer;
- .6** procedures for inspection and repair of coating system during ship construction;

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<sup>1</sup> The agreement shall at least cover the inspection process, including scope of inspection, who carries out the inspection, the qualifications of the coating inspector(s) and appointment of one qualified coating inspector (responsible for verifying that the coating is applied in accordance with the PSPC). Where more than one coating inspector will be used then their areas of responsibility shall be identified. (For example, multiple construction sites). The language to be used for documentation shall be determined, too.

<sup>2</sup> *Passenger Ship Safety Certificate* or *Cargo Ship Safety Certificate* or *Cargo Ship Safety Construction Certificate*, as appropriate, shall not be issued until all required corrective actions have been closed to the satisfaction of PRS.

- .7 coating log issued by the coating inspector stating that the coating was applied in accordance with the specifications to the satisfaction of the coating supplier representative and specifying deviations from the specifications;
- .8 inspection report;
- .9 procedures for in-service maintenance and repair of the coating system.

**2.3.7** The coating technical file (CTF) shall contain records of in-service maintenance, carried out repairs and partial re-coating activities.

**2.3.8** Full re-coating process shall be recorded in the coating technical file (CTF) within the scope specified in 2.3.6.

**2.3.9** The coating technical file (CTF) shall be kept on board and maintained throughout the life of the ship.

## **2.4 Coating Performance Standard**

**2.4.1** The requirements set forth in the present *Publication* intend to provide a target useful coating life of 15 years, which is considered to be the time period, from initial application, over which the coating system will remain in “GOOD” condition.

**2.4.2** Protective coatings for dedicated seawater ballast tanks of all ship types and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards shall at least comply with the requirements specified in Chapter 2 of the present *Publication*.

**2.4.3** The requirements of the present *Publication* cover protective coatings for the ship’s steel structure. This applies also to access arrangements that are integral to the ship’s structure, such as increased stiffener depths for walkways, stringers, etc.

**2.4.4** It is recommended that the requirements of Chapter 2 should be applied, to the extent possible, to permanent means of access provided for inspection, not integral to the ship’s structure, such as rails, independent platforms, ladders, etc. Other equivalent methods of providing corrosion protection for the non-integral items may also be used, provided they do not impair the performance of the coatings of the surrounding structure.

## **2.5 Basic Coating Requirements**

**2.5.1** The requirements for protective coating systems to be applied for dedicated seawater ballast tanks of all ship types and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards, meeting the criteria specified in paragraph 2.4.1, are given in Table 1.

**2.5.2** Coating manufacturers shall provide a specification of the protective coating system to satisfy the requirements of Table 1.

**2.5.3** The *Technical Data Sheet*, as well as *Type Approval Certificate* and *Statement of Compliance* for the protective coating system shall be submitted to PRS for verification.

**2.5.4** The shipyard shall apply the protective coating in accordance with the verified *Technical Data Sheet* and its own verified application procedures.



**Table 1**  
**Basic coating system requirements for dedicated seawater ballast tanks of all type of ships**  
**and double-side skin spaces of bulk carriers of 150 m in and upwards**

	Characteristic/ Reference	Requirement
1	2	3
<b>1 Design of coating system</b>		
.1	Selection of the coating system	<p>The coating system shall be selected having regard to the service conditions and planned maintenance. The following aspects shall be considered:</p> <ul style="list-style-type: none"> <li>.1 location of tank relative to heated surfaces,</li> <li>.2 frequency of ballasting and deballasting operations,</li> <li>.3 required surface,</li> <li>.4 required surface cleanliness and dryness, and</li> <li>.5 supplementary cathodic protection, if any, (where coating is supplemented by cathodic protection, the coating shall be compatible with the cathodic protection system).</li> </ul> <p>Coating manufacturers shall have products whose quality is documented by reference lists and technical data sheets. The manufacturers shall also be capable of rendering adequate technical assistance. Reference lists, technical data sheets and technical assistance (if given) shall be recorded in the coating technical file (CTF).</p> <p>Coatings for application underneath sun-heated decks or on bulkheads forming boundaries of heated spaces shall be able to withstand repeated heating and/or cooling without becoming brittle.</p>
.2	Coating type	<p>Epoxy-based system.</p> <p>A multi-coat system with each coat of contrasting colour is recommended.</p> <p>The top coat shall be of a light colour in order to facilitate in-service inspection.</p> <p>The use of other coating systems is subject to special consideration of PRS.</p>
.3	Coating prequalification test	<p>Epoxy-based systems shall be subjected to laboratory tests according to test programme agreed with PRS or have documented field exposure for 5 years with a final coating condition of not less than "GOOD".</p> <p>Other coating systems shall be subjected to laboratory tests according to test programme agreed with PRS<sup>1</sup>.</p>
.4	Job specification	<p>There shall be a minimum of two stripe coats and two spray coats, except that the second stripe coat, by way of welded seams only, may be reduced in scope where it is proven that the NDFT can be met by the coats applied, in order to avoid unnecessary over-thickness. Any reduction in scope of the second stripe coat shall be fully detailed in the coating technical file (CTF).</p> <p>Stripe coats shall be applied as a coherent film showing good film formation and no visible defects, using a brush or a roller. The roller should be used for scallops, ratholes, etc., but not for edges and welds.</p> <p>Each main coating layer shall be appropriately cured before application of the next coat, in accordance with the coating manufacturer's recommendations. Surface contaminants such as rust, grease, dust, salt, oil, etc., shall be removed prior to painting by proper method according to the paint manufacturer's recommendations. Abrasive inclusions embedded in the coating shall be removed. Job specifications shall include the dry-to-recoat times and walk-on time specified by the manufacturer.</p>
.5	NDFT (nominal total dry film thickness)	<p>NDFT 320 µm with 90/10 practice for epoxy-based coatings; other systems in accordance with the coating manufacturer's specifications.</p> <p>The maximum total dry film thickness according to the manufacturer's detailed specifications.</p> <p>Care shall be taken to avoid excessive increase in the coating thickness. Wet film thickness shall be regularly checked during application.</p> <p>Thinners shall be limited to those types and quantities which are recommended by the paint manufacturer.</p>

1	2	3
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<sup>1</sup> PRS basically assumes for such a coating prequalification test that the measured average dry film thickness (DFT) on each prepared test panel shall not exceed a nominal DFT (NDFT) of 320 µm plus 20% unless a paint manufacturer specifies a NDFT greater than 320 µm. In the latter case (NDTF > 320 µm), the average DFT shall not exceed the specified NDFT plus 20% and the coating system shall be certified to the specified NDFT if the system passes the tests according to Annex 1 of MSC 215(82). The measured DFT shall meet the "90/10" rule and the maximum DFT shall be always below the maximum DFT value specified by the manufacturer.

<b>2 PSP (primary surface preparation)</b>		
.1	Blasting and profile (1)(5)(6)	Sa 2 <sup>1/2</sup> ; with profiles between 30-75 µm Blasting shall not be carried out when: .1 the relative humidity is above 85%, or .2 the surface temperature of steel is less than 3°C above the dew point. The checking of the steel surface cleanliness and roughness profile shall be carried out at the end of the surface preparation and before the application of the primer coat, in accordance with the manufacturer's specifications.
.2	Water soluble salts limit equivalent to NaCl (4)(7)	≤ 50 mg/m <sup>2</sup> of sodium chloride. Minimum readings to be taken are one (1) per plate in the case of manually applied shop primer. In cases of shop primer application in automatic plants the assessment of surface cleanliness should be taken according to documented procedure for recording/measuring soluble salts.
.3	Shop-primer	Zinc containing inhibitor free zinc silicate based or equivalent. Compatibility with main coating system shall be confirmed by the coating manufacturer.
<b>3 Secondary surface preparation</b>		
.1	Steel condition (2)	The steel surface shall be prepared so that the coating selected can achieve an even distribution at the required NDFT and have an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contaminant. Edges shall be treated to a rounded radius of minimum 2 mm, or subjected to three pass grinding or at least equivalent process before painting.
.2	Surface treatment (1)	Sa 2 <sup>1/2</sup> ; on damaged shop-primer and welds. Sa 2; removing at least 70% of intact shop-primer, which has not passed a prequalification test procedure in accordance with item 1.3, Table 1. If the complete coating system comprising epoxy-based main coating and shop-primer has passed the pre-qualification test procedure in accordance with item 1.3, Table 1, intact shop-primer may be retained, provided the same epoxy coating system is used. The retained shop-primer shall be cleaned by sweep blasting, high-pressure water washing or an equivalent method. If a zinc silicate shop-primer has passed the pre-qualification test procedure in accordance with item 1.3, Table 1 as part of an epoxy coating system, it may be used in combination with other epoxy coatings approved in accordance with 1.3, Table 1, provided that the compatibility has been confirmed by the manufacturer by test according to test programme agreed with PRS.
.3	Surface treatment after erection (1)	Butts: St 3 or better or Sa 2 <sup>1/2</sup> , where practicable. Small damages up to 2% of total area: St 3. Contiguous damages over 25 m <sup>2</sup> or over 2% of the total area of the tank, Sa 2 <sup>1/2</sup> shall be applied. Coating in overlap shall be feathered.
.4	Profile requirements (2)(6)	In the case of full or partial blasting: 30-75 µm, otherwise as recommended by the coating manufacturer.
.5	Dust (3)	Dust quantity rating 1 for dust size class 3, 4 or 5. Lower dust size classes should be removed if visible on the surface to be coated without magnification.
.6	Water soluble salts limit equivalent to NaCl after blasting/grinding (4)(7)	≤ 50 mg/m <sup>2</sup> of sodium chloride. All soluble salts have a detrimental effect on coatings to a greater or lesser degree. The % NaCl in the total soluble salts will vary from site to site. Minimum readings to be taken are one (1) reading per block/section/unit prior to applying.
.7	Oil contamination	No oil contamination.
<b>4 Miscellaneous</b>		
.1	Ventilation	Adequate ventilation is necessary for the proper drying and curing of coating. Ventilation shall be maintained throughout the application process and for a period after application is completed, as recommended by the coating manufacturer.
.2	Environmental conditions	Coating shall be applied under controlled humidity and surface conditions, in accordance with the manufacturer's specifications. Coating shall not be applied, when: .1 the relative humidity is above 85%, or .2 the surface temperature is less than 3°C above the dew point.

1	2	3
.3	Testing of coating	Destructive tests shall be avoided in checking the coatings.

		Dry film thickness shall be measured after each coat for quality control purpose and the total dry film thickness shall be confirmed after completion of final coat, using appropriate thickness gauges. The final DFT compliance with the 90/10 practice shall be calculated and confirmed.
.4	Repair	Any defective areas, e.g., pin-holes, bubbles, voids, etc., shall be marked and appropriate repairs shall be effected. All such repairs shall be re-checked and documented.

## 2.6 Coating System Approval

The results from pre-qualification tests of the coating system (see Table 1, item 1.3) shall be documented. If found satisfactory, *Type Approval Certificate* will be issued by PRS.

## 2.7 Coating Inspection

**2.7.1** Inspections of protective coatings in ballast tanks shall be carried out only by service suppliers personnel with required qualifications according to 2.7.2.

**2.7.2** Inspection of coating shall be carried out by a qualified coating certified to NACE Coating Inspector Level 2<sup>1</sup> or FROSIO Inspector Level III<sup>2</sup>, or by the inspector having equivalent qualifications granted according to guidelines specified in Chapter 4.3 of *Publication No. 87/P*, while his assistant inspector (if any) shall have qualifications granted according to guidelines specified in Chapter 4.4 of *Publication No. 87/P*.

**2.7.3** Coating inspector shall inspect surface preparation and coating application during the coating process by carrying out, as a minimum, the inspection items specified in Table 2. Particular attention shall be paid to initiation of each stage of surface preparation and coatings application as improper work is extremely difficult to correct later in the coating process. Representative structural members shall be non-destructively examined for coating thickness. The coating inspector shall verify that appropriate collective measurements have been carried out.

**2.7.4** The results from the inspection shall be recorded by the inspector in the daily log or non-conformity report and shall be included in the coating technical file (CTF).

**Table 2**  
**Inspection items**

Construction stage		Inspection items
Primary surface preparation	1	The surface temperature of steel, the relative humidity and the dew point shall be measured and recorded before the start of the blasting process and at times of sudden changes in weather.
	2	The surface of steel plates shall be tested for soluble salt and checked for oil, grease and other contamination.
	3	The cleanliness of the steel surface shall be monitored in the shop-primer application process.
	4	The shop-primer material shall comply with the requirements of item 2.3, Table 1.
Thickness		If compatibility with the main coating system has been declared, then the thickness and curing of the zinc silicate shop-primer shall be confirmed to conform to the specified values.
Block assembly	1	After completing construction of the block and before the start of secondary surface preparation, a visual inspection of steel surface treatment, including edge treatment shall be carried out. Any oil, grease or other visible contamination shall be removed.
	2	After blasting/grinding/cleaning and prior to coating, a visual inspection of the prepared surface shall be carried out. On completion of blasting and cleaning and prior to the application of the first coat of the system, the steel surface shall be tested for levels of remaining soluble salts in at least one location per block.
	3	The surface temperature, the relative humidity and the dew point shall be monitored and recorded during the coating application and curing.

<sup>1</sup> NACE – The National Association of Corrosion Engineers

<sup>2</sup> FROSIO – The Norwegian Professional Council for Education and certification of Inspectors for Surface Treatment

	4	Inspection shall be performed of the steps in the coating application process, specified in Table 1.
	5	DFT measurements shall be taken to prove that the thickness of the coatings is consistent with the specification.
Erection	1	Visual inspection of steel surface condition and surface preparation, as well as verification of conformance to other requirements stated in Table 1 and the agreed specification shall be performed.
	2	The surface temperature, the relative humidity and the dew point shall be measured and recorded before the start of the coating and regularly during the coating process.
	3	Inspection shall be performed of the steps in the coating application process, specified in Table 1.

## 2.8 Alternative Coating Systems

**2.8.1** All coating systems that are not epoxy-based systems applied according to Table 1 are defined as alternative systems.

**2.8.2** Shop primers not containing zinc or not silicate based are considered to be alternative systems and therefore equivalency is to be established by tests according to test programme agreed with PRS.

**2.8.3** Acceptance of alternative systems will be subject to documented evidence that they ensure corrosion prevention performance at least equivalent to that required in the present *Publication*.

**2.8.4** As a minimum, the documented evidence shall consist of satisfactory performance corresponding to that of a coating system which conforms to the coating standard specified in Chapter 2 – a target useful life of 15 years in either actual field exposure for 5 years with final coating condition not less than "GOOD" or laboratory testing.

## 3 ANTI-FOULING SYSTEMS

### 3.1 General

**3.1.1** The provisions specified in Chapter 3 contain the requirements concerning anti-fouling systems on ships (I)(II) as well as the survey of their application and operation.

**3.1.2** The provisions specified in Chapter 3 do not apply to any warship, naval auxiliary or other ship used on government non-commercial service.

### 3.2 Definitions

For the purposes of Chapter 3 the following additional definitions have been adopted:

**Ship** – a vessel of any type whatsoever operating in the marine environment including hydrofoil boats, air-cushion vehicles, submersibles, fixed or floating platforms, floating storage units and floating production storage and off-loading units.

**Anti-fouling system** – a coating, paint, surface treatment, or device that is used on a ship to control or prevent attachment of unwanted organisms.

**Anti-fouling system subject to survey** – an anti-fouling system which contains tributyltin as an active biocide.

**Tributyltin** – organotin compound.

### 3.3 Requirements

**3.3.1** Organotin compounds which act as biocides in anti-fouling systems shall not be applied or re-applied on all ships.

Where an existing anti-fouling system contains organotin compounds which act as biocides, such a system is subject to survey.

**3.3.2** After 1 January 2008 coatings containing organotin compounds which act as biocides are not permitted; this applies to all ships except fixed and floating platforms, floating storage units, and floating production storage and off-loading units that had been constructed before 1 January 2003 and that have not been in dry-dock on or after 1 January 2003.

**3.3.3** After 1 January 2008 it is permitted on all ships to apply sealer that form a barrier to organotin compounds' leaching from the underlying non-compliant fouling systems; this does not apply to fixed and floating platforms, floating storage units and floating production storage and off-loading units that had been constructed before 1 January 2003 and that have not been in dry-dock after 1 January 2003.

**3.3.4** Small quantities of organotin compounds acting as a chemical catalyst (such as mono- and di-substituted organotin compounds) are allowed, provided that they are present at a level which does not provide a biocidal effect to the coating.

On a practical level, when used as a catalyst, an organotin compound shall not be present above 2.5 g total tin per kg of dry paint.

**3.3.5** A non-compliant anti-fouling system which is subject to survey as required by paragraph 3.3.1, that undergoes repair, shall be repaired or replaced with a compliant anti-fouling system.

**3.3.6** If the existing anti-fouling system is subject to survey in accordance with paragraph 3.3.1, it shall removed or covered by a sealer coat by 1 January 2008.

Prior to this date, the existing anti-fouling system may be over-coated with an anti-fouling system, which is not subject to survey in accordance with paragraph 3.3.1, without removing or sealing the existing antifouling system

#### **3.4 Inspections of Anti-fouling Systems**

**3.4.1** Ships of 400 gross tonnage and above engaged on international voyages, excluding fixed or floating platforms, floating storage units and floating production storage and off-loading units, shall be subject to anti-fouling system surveys.

**3.4.2** The survey shall be such as to ensure that the ship's anti-fouling system fully complies with the requirements specified in paragraph 3.3.1.

**3.4.3** The survey of an anti-fouling system shall be carried out on ship Owner's request.

The request shall be supplemented by a declaration and supporting information from the anti-fouling system manufacturer, confirming that the anti-fouling system applied, or intended to be applied to the ship complies with the requirements specified in paragraph 3.3.1.

**3.4.4** The survey of an anti-fouling system shall be performed on new ships and on existing ships, in connection with a drydock survey.

Dive and remotely operated vehicle (ROV) surveys can be practical options for in-water inspections, although they do have limitations regarding visibility and available dive time compared with the area to be inspected, and difficulties with effectively accessing many biofouling prone niches.

**3.4.5** The survey shall be performed after the change of an anti-fouling system or the repair affecting approximately 25% or more of the anti-fouling system.

Such surveys shall cover the same scope as in the case of a new anti-fouling system.

**3.4.6** Repairs affecting less than 25% of the anti-fouling system do not require a survey.

**3.4.7** During survey, the use of *Biofouling Management Plan* and *Biofouling Record Book* compliant with Resolution MEPC. 207(62), if available onboard, is recommended.

#### **3.5 Verification of Anti-fouling Systems**

**3.5.1** A documentation of the request for survey shall provide the following information on the anti-fouling system:

- type of anti-fouling system,

- name of anti-fouling system manufacturer,
- name and layers' colours of anti-fouling system,
- active ingredients and their CAS numbers<sup>1)</sup>.

**3.5.2** It shall be confirmed that the documentation provided with the material is in compliance with the request for anti-fouling system survey.

**3.5.3** The compliance of the anti-fouling system with the requirements specified in paragraph 3.3.1 shall be confirmed after the verification consisting in one or more of the following tasks:

- checking that the product identification on anti-fouling system containers used during the application process is identical to the system specified in the request for survey,
- sampling of the anti-fouling system,
- testing of the anti-fouling system,
- other possible checks conducted on site.

**3.5.4** The verification tasks specified above shall be conducted at any time, either before, during, or after the anti-fouling system has been applied to the ship.

No checks or tests shall affect the integrity, structure or operation of the anti-fouling system.

**3.5.5** Removal of an anti-fouling system shall also be verified.

**3.5.6** If the existing anti-fouling system is declared not to be subject to survey in accordance with the requirements specified in paragraph 3.3.1 without being documented by the *Certificate*, verification shall be conducted to confirm that the anti-fouling system fulfils these requirements.

This verification may be based on sampling and/or testing and/or reliable documentation (e.g. Material Safety Data Sheet, or similar, a declaration of compliance from the anti-fouling system manufacturer, invoices from the shipyard and/or the anti-fouling system manufacturer).

**3.5.7** If a sealer coat has been applied on existing anti-fouling system, verification shall be carried out to confirm that the name, type and colour of the sealer coat applied to the ship match those specified in the request for survey.

Drydock survey shall be performed to confirm that the existing anti-fouling system has been properly covered with that sealer coat.

## **4 CATHODIC PROTECTION**

### **4.1 Cathodic Protection of Seawater Ballast Spaces**

**4.1.1** Cathodic protection by means of sacrificial anodes may be used in combination with the coating to prevent or reduce pitting corrosion starting from local defects in the coating.

**4.1.2** The anodes shall be designed in terms of size, weight and distribution to give an adequate life commensurate with the service period. The anode distribution, type, weight and dimensions shall be shown in the relevant documents available for maintenance purposes.

**4.1.3** Once their number and size has been determined, the anodes shall be distributed evenly over all the structure with some emphasis on horizontal surfaces likely to retain water. In particular, they shall be installed close to the bottom plates of tanks which are seldom completely dry.

Cathodic protection is without effect when the tank is empty, and it requires some time (a day or more) to become effective after the tank has been filled.

**4.1.4** When designing the anodes and their distribution, the following aspects shall be considered:

- .1 size and shape of tanks and areas to be protected,
- .2 extent and location of coated and uncoated surfaces,

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<sup>1)</sup> Chemical Abstract Service Registry Number

- .3 frequency of ballasting/deballasting operations, including the percentage of time the tank is filled and level of filling; and
- .4 resistivity of water, its temperature, etc.

**4.1.5** The anode renewal shall be carried out well before the old anodes are fully consumed. The renewal periods shall be based on in-service experience.

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**List of amendments effective as of 1 January 2017**

<i>Item</i>	<i>Title/Subject</i>	<i>Source</i>
<a href="#">2.1.2</a>	Tanks exempted from the application of the Performance standard for protective coating (MSC.215(82))	MSC.1/Circ. 1539

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