



NATIONAL/INTERNATIONAL LEGISLATION ON ANTIFOULING

The control of Anti-Fouling Systems (AFS) on ships: duty of Italian coast guard

The fact-finding and decision-making processes of the international community via the International Maritime Organization have led to a ban on the use of antifouling paints containing organotin compounds: the Italian Coast Guard Corps guarantee compliance with regulations through the Port State Control carried out in ports and onboard vessels

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The International Convention on the control of harmful Anti-Fouling Systems on ships, 2001

In 1992 Agenda 21, adopted by the United Nations Conference on Environment and Development, invited partner States to take measures to reduce pollution caused by organotin compounds used in anti-fouling systems.

The harmful environmental effects of organotin compounds were recognized by IMO (International Maritime Organization) in 1989. Later on IMO Resolution A.895(21), adopted by the Assembly on 25 November, 1999, urged the Organization's Marine Environment Protection Committee (MEPC) to work for the expeditious development of a global legally binding instrument to address the harmful effects of anti-fouling systems as a matter of urgency.

In October 2001, IMO adopted the International

Convention on the control of harmful Anti-Fouling System on ship (AFS 2001) [1] which, on 1st January, 2003, introduced the ban on the use of antifouling paints containing TBT and other tin components, fixing 1st January, 2008, as the deadline for the complete retirement of paints containing tin from the hulls of vessels. The convention entered into force on 17th September, 2008. Under AFS Convention, ships with Gross Tonnage (GT) greater than 400, engaged in international voyages (excluding fixed or floating platforms, FSUs and FPSOs), are required to undergo a preliminary check, carried out by the Flag State, before entering service or before the "International Anti-Fouling System" Certificate (IAFS Certificate) is issued, and inspected in the case of replacement or overhaul of the anti-fouling system on the ship.

The Italian Administration issues IAFS certificates for ships through recognized organizations (Registro Italiano Navale, Bureau Veritas, American Bureau of Shipping and Germanischer Lloyd), which perform survey and control functions relating to the certificate issue, as well as the actual issue of the certificate on behalf of the State Administration.

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Vessels longer than 24 m, but with GT less than 400, engaged in international voyages (excluding fixed or floating platforms, FSUs and FPSOs), however, in place of the certificate must possess a declaration regarding the anti-fouling system in use (Declaration on Anti-Fouling Systems), signed by the ship owner or authorized agent, to which documentation describing the type of anti-fouling product actually used must be attached.

Italian legislation on the ratification of the Convention AFS

Although Italy is already implementing the European legislation (Regulation (CE) n. 782/2003 of the European Parliament and Council on 14/4/2003 [2] and Regulation (CE) n. 536/2008 of the European Parliament and Council on 13/06/2008 [3]), concerning the ban on organotin compounds on ships, Italy has ratified the AFS Convention, thus introducing additional special rules on penalties.

In fact, by Law no. 163 of 31st August, 2012, (Accession of the Italian Republic to the International Convention on the control of harmful anti-fouling systems applied on ships, with attachments, made in London October 5, 2001, and its execution) [4], Italy has identified the authorities responsible for ensuring proper implementation of the Convention and emphasized the importance of tackling criminal violations of AFS.

The authorities responsible for carrying out the tasks of survey, inspection and control provided for in Articles 10 and 11 of the Convention, are the Ministry of the Environment and Protection of Land and Sea and the Ministry of Infrastructure and Transport, acting through a “recognised classification society” operating on behalf of the Italian government and the Coast Guard Corps for inspection and control activities.

As far as duties of surveillance and maritime policing are concerned, inspection activities are carried out by qualified personnel of the Coast Guards corps, who, during the control effected on board, are entitled to verify the existence of relevant certificates, including also the IAFS Certificate, or valid declaration as well as to provide a check for the presence of organotin compounds used in paints.

With regard to foreign ships, however, inspections and checks are carried out in accordance with “Port State Control” procedures.

Port State Control (PSC) is the power of a State, deriving from international agreements, to carry out checks on foreign ships docking in its ports, with the aim of verifying their compliance with international regulations relating to shipping safety, anti-pollution and on-board living conditions, for the purposes of eventual application of relevant corrective measures. In this context, as regards Italy the Paris Memorandum of Understanding on State Port Control (Paris MoU on PSC) is applied.

In Italy PSC inspections are implemented by qualified Coast Guard officers, in accordance with Legislative Decree 24 March 2011 n. 53 [5], transposition of Directive 2009/16/CE [6].

Port State Control - Guidelines for Port State Control officers on control of Anti-Fouling Systems (AFS) on ships

As mentioned before, the rules related to inspections of ships and detection of violations are provided in art. 11 of AFS 2001.

This Convention provides that a ship, in any port, shipyard, or offshore terminal of a Party may be inspected by officers authorized by that Party, for the purpose of determining whether the ship is in compliance with the Convention itself.

Unless there are clear grounds for believing that a ship is in violation of this Convention, any such inspection shall be limited to verifying that there is onboard a valid International Anti-Fouling System Certificate or a Declaration on Anti-Fouling System and, eventually, brief sampling of the ship’s anti-fouling system, taking into account the guidelines developed by IMO.

If there are clear grounds to believe that the ship is in violation of the Convention, a more detailed inspection may be carried out taking into account the guidelines developed by IMO.

If the ship is detected to be in violation of this Convention, the Party carrying out the inspection may take steps to warn, detain, dismiss, or exclude the ship from its ports. A Party taking such an action against a

ship that is not compliant with this Convention shall immediately inform the Administration of the ship concerned.

The guidelines for conducting these inspections are described in accordance with the relevant PSC instructions, based on IMO Resolution MEPC.104(49) [7] and MEPC.208(62) [8]. Such guidelines relate to the exercise of the right of the Port State to conduct inspections of anti-fouling systems under Article 11 of the AFS Convention (AFS 2001).

For ships required to carry an IAFS Certificate or Declaration on Anti-Fouling System, the Port State control officer (PSCO) should examine the IAFS Certificate or Declaration on Anti-Fouling System, and the attached Record of Anti-Fouling Systems, if appropriate.

The IAFS Certificate carries information on the ship's details and a series of tick boxes to indicate whether an anti-fouling system controlled under Annex I of AFS 2001 has or has not been applied, removed or been covered with a sealer coat, and if an anti-fouling system controlled under Annex I of AFS 2001 was applied on the ship prior to or after the date specified in AFS 2001.

As a preliminary check, the validity of the IAFS Certificate should be confirmed by verifying that the IAFS Certificate is properly completed and signed/endorsed by the Administration, or by a recognized organization (RO), and stating that the required survey has been performed. In reviewing the IAFS Certificate, particular attention should be paid to verifying that the initial survey matches the dry dock period listed in the ship's log(s), and that only one box should be marked. The Record of Anti-Fouling Systems should be inspected to ensure that the records are attached to the IAFS Certificate and up-to-date. The most recent Record must correlate with the correct checkbox on the front of the IAFS Certificate.

Ships of non-Parties to the AFS Convention are not entitled to be issued with an IAFS Certificate. Therefore the PSCO should ask for documentation that contains the same information as in an IAFS Certificate and take this into account in determining compliance with the requirements.

If the existing anti-fouling system is declared not to be

controlled under Annex 1 of the Convention, without being documented by an International Anti-Fouling System Certificate, verification should be carried out to confirm that the anti-fouling system complies with the requirements of the Convention. This verification may be based on sampling and/or testing and/or reliable documentation, as deemed necessary, based on the experience gained and the existing circumstances. Documentation for verification could be, e.g., MSDSs (Material Safety Data Sheets), or similar, a declaration of compliance from the anti-fouling system manufacturer, invoices from the shipyard and/or the anti-fouling system manufacturer.

The records described in Resolution MEPC.195(61) [9], can be used as examples of this types of documentation. Ships of non-Parties may have Statements of Compliance issued in order to comply with regional requirements, for example, Regulation (EC) 782/2003 as amended by Regulation (EC) 536/2008, which could be considered as providing sufficient evidence of compliance.

In all other aspects, the PSCO should be guided by the procedures for ships required to carry an IAFS Certificate, in order to ensure that no more favorable treatment is applied to ships of non-Parties to the AFS Convention.

A more detailed inspection may be carried out whenever clear grounds do exist to believe that the ship does not substantially meet the requirements of the AFS Convention.

Clear grounds for a more detailed inspection may be in case:

- a. the ship is from a flag of a non-Party to the Convention and there is no AFS documentation;
- b. the ship is from a flag of a Party to the Convention but there is no valid IAFS Certificate;
- c. the painting date shown on the IAFS Certificate does not match the dry-dock period of the ship;
- d. the ship's hull shows excessive patches of different paints.

If the IAFS Certificate is not properly completed, the following questions may be pertinent:

1. "When was the ship's anti-fouling system last applied?";
2. "If the anti-fouling system is controlled under Annex 1 to the AFS Convention and was removed,

- what was the name of the facility and date of the work performed?";
3. "If the anti-fouling system is controlled under Annex 1 of the AFS Convention and has been covered by a sealer coat, what was the name of the facility and date applied?";
 4. "What is the name of the anti-fouling/sealer products and the manufacturer or distributor for the existing anti-fouling system?";
 5. "If the current anti-fouling system was changed from the previous system, what was the type of anti-fouling system and name of the previous manufacturer or distributor?".

Action taken under the AFS Convention

Following the more detailed inspection, a violation may lead to measures of warning, detention, dismissing and exclusion.

The Port State Control Officer could decide to detain the ship following detection of deficiencies during an inspection on board.

Detention could be appropriate if certification is invalid or missing, the ship admits it does not comply (thereby removing the need to prove by sampling) or sampling proves it is non-compliant within the port jurisdiction.

Further action would depend on whether the problem is with the certification or the anti-fouling system itself. The Port State Control Officer could dismiss the ship, meaning that the Port State Control Officer requests the ship to leave the port, for example if the ship chooses not to bring the AFS into compliance but the Port State is concerned that the ship is leaching tributyltin (TBTs) into its waters.

Dismissal could be appropriate if the ship admits it does not comply or sampling proves it is non-compliant while the ship is still in the port. Since this would also be a detainable deficiency, the PSCO can detain the ship first and require rectification before releasing it. Dismissal could be appropriate if certification is invalid or missing, the ship admits it does not comply (thereby removing the need to prove by sampling) or sampling proves it is non-compliant within the port jurisdiction.

In these cases the ship would probably already have

been detained. However, detention does not force the ship to bring the AFS into compliance (only if she wants to leave the port).

In such a situation the Port State Control Officer may be concerned that the ship is leaching TBTs while it remains in its waters.

The Port State Control Officer could decide to exclude the ship to prevent her from entering its waters.

Exclusion could be appropriate if sampling proves that the ship is non-compliant but the results have been obtained after she has sailed or after she has been dismissed.

Sampling methodologies

AFS 2001 specifies that sampling of the ship's anti-fouling system that does not affect the integrity, structure, or operation of the anti-fouling system taking into account the guidelines contained in IMO resolution MEPC.104(49) and MEPC.208(62). However, the time required to process the results of such sampling shall not be used as a basis for preventing against the movement and departure of the ship.

It is to the discretion of the Port State to choose the sampling methodology. The Guidelines for brief sampling of anti-fouling systems on ships adopted by IMO allow that any scientifically recognized method of sampling and analysis of AFS controlled by the Convention other than those described in the appendix to the Guidelines may be used (subject to the satisfaction of the Administration or the Port State). The sampling methodology will depend, *inter alia*, on the surface hardness of the paint, which may vary considerably.

The amount of paint mass removed may vary correspondingly.

Sampling procedures, based on the removal of paint material from the hull, require the determination of the paint mass. It is important that: the procedures used are validated, produce unambiguous results, and contain an adequate control.

The competent Port State authority can decide to contract specialist companies to carry out sampling. In this case, the PSCO should attend the ship during the sampling procedure to ensure the liaison and arrangements mentioned above are in place.

Conducting analyses - Use of portable X-ray fluorescence analyzer

The Guidelines for brief sampling of anti-fouling systems on ships envisage a two-stage analysis of samples for both methods presented in the Guidelines. The first stage is a basic test, which can be carried out on site as in the case of Method 2. The second stage is carried out when the first stage results are positive. It is noted that in the IMO Guidelines, these stages are referred to as Steps 1 and 2, as in the case of Method 1. It is to the discretion of the Port State competent authorities to choose which analysis methods are used. The following points are presented for Port State consideration:

- approval procedure for the recognition of laboratories meeting ISO 17025 standards or other appropriate facilities should be set up by the Port State competent authorities. These procedures should define the recognition criteria. Exchange of information between Port States on these procedures, criteria and laboratories/facilities would be beneficial, i.e. for the purposes of exchange of best practices and possible cross-border recognition and provision of services;
- the company that undertakes the analysis and/or samples should comply with national regulations and be independent from paint manufacturers;
- the PSCO carrying out the AFS inspection of a ship should verify the validity of the ISO 17025 certificate and/or the recognition of the laboratory;
- if more time is needed for analysis than available considering the ship's scheduled time of departure, the PSCO shall inform the ship and report the situation to the Port State competent authority. However, the time needed for analysis does not warrant undue delay of the ship; and
- PSCOs should ensure completion of the record sheets for the sampling procedure as proof of analysis. In cases when the laboratory procedures prescribe presentation of the analyses results in a different format, this technical report could be added to the record sheets.

The first-stage analysis serves to detect the total amount of tin in the AFS applied.

It is to the discretion of the Port State competent authority

to choose the first-stage analysis methodology. However, the use of a portable X-ray fluorescence analyzer [10] or any other scientifically justified method allowing the conduction of first-stage analyses on site could be considered as best practice.

The Port State competent authority has to decide whether the first-stage analysis should be carried out by PSCOs or by contracted companies.

The Port State competent authority could provide PSCOs with this equipment (e.g., portable X-ray fluorescence analyzer) and provide them with the appropriate training.

Alternative methods. A new test for the identification and analysis of anti-fouling paints containing TBT

Gueuné and collaborators [11] have proposed a new method, based on recombinant bioluminescent bacteria, with the aim of directly identifying the presence of TBT in paints applied to hulls, by means of a simple device which does not involve invasive sampling.

Tests of microbial toxicity, based on the use of recombinant bacteria, are widely used to identify the presence of pollutants. In most cases luxAB genes are inserted downstream of a gene promoter involved in resistance to a metal, or in the biodegradation of organic compounds. In this study the *Escherichia coli* TBT3 clone was used to identify the presence of TBT in the anti-fouling paints, in view of its optimal characteristics of specificity and sensitivity towards TBT and DBT.

Onsite tests were performed by means of a simple device, consisting of a square polyethylene chamber fixed to the hull, inside which artificial marine water is forced. Once the water has come into contact with the paint on the ship's bottom, it is used as a sample for analysis with the bioluminescent bacteria.

The presence of organotin can be detected directly in less than three hours, without the need to extract or prepare the sample, and without causing delays to the ship's commercial operations. It is possible, indeed, to have a result before the ship leaves the port.

Kabiersch [12] report the development and optimization of a bioluminescent yeast assay for the detection of

organotin compounds based on the interaction with a hybrid RXR and subsequent expression of a reporter luciferase gene.

This assay is highly specific toward organotin compounds and natural ligands of the RXR. It detects tributyltin and triphenyltin in nanomolar concentrations

(detection limits were found to be 30 nM and 110 nM, respectively).

Also this method is relatively rapid (1 day of work), to allow the subsequent control procedures to be activated in the event of evidence of irregularities.



references

1. International Convention on the Control of Harmful Anti-Fouling System on Ships (AFS 2001). International Maritime Organization, London, 2001.
2. Regolamento (CE) N. 782/2003 del parlamento europeo e del consiglio del 14 aprile 2003 sul divieto dei composti organostannici sulle navi (GU L 115 del 9.5.2003).
3. Regolamento (CE) N. 536/2008 della commissione del 13 giugno 2008 recante attuazione dell'articolo 6, paragrafo 3, e dell'articolo 7 del regolamento (CE) n. 782/2003 del Parlamento europeo e del Consiglio sul divieto dei composti organostannici sulle navi e recante modifica di detto regolamento.
4. Legge 31 agosto 2012, n. 163 Adesione della Repubblica italiana alla Convenzione internazionale per il controllo dei sistemi antivegetativi nocivi applicati sulle navi, con allegati, fatta a Londra il 5 ottobre 2001, e sua esecuzione. (GU n.227 del 28-9-2012 - Suppl. Ordinario n. 187).
5. Decreto Legislativo 24 marzo 2011, n. 53 Attuazione della direttiva 2009/16/CE recante le norme internazionali per la sicurezza delle navi, la prevenzione dell'inquinamento e le condizioni di vita e di lavoro a bordo per le navi che approdano nei porti comunitari e che navigano nelle acque sotto la giurisdizione degli Stati membri.
6. Directive 2009/16/EC of the European Parliament and of the Council of 23 April 2009 on Port State control.
7. IMO Resolution MEPC.104(49) adopted on 18 July 2003. Guidelines for brief sampling of anti-fouling system on ship.
8. IMO Resolution MEPC.208(62) adopted on 15 July 2011. Guidelines for inspection of anti-fouling systems on ships.
9. IMO RESOLUTION MEPC.195(61) adopted on 1 October 2010. Guidelines for survey and certification of anti-fouling systems on ships.
10. European Patent 2 096 431 A1, Kantonen.
11. H. Gueuné, G. Thouand, M.J. Durand (2009), "A new bioassay for the inspection and identification of TBT-containing antifouling paint", *Marine Pollution Bulletin*, 58 (2009), pp. 1734–1738, Elsevier Ltd.
12. G. Kabiersch, J. Rajasärkkä, M. Tuomela, A. Hatakka, M. Virta, and K. Steffen (2013), "Bioluminescent Yeast Assay for Detection of Organotin Compounds", *Anal. Chem.* 2013, 85, 5740–5745, American Chemical Society, Washington.