

STANDARD FOR CERTIFICATION

No. 2.9

Type Approval Programme No. 1-602.4

PROTECTIVE COATING SYSTEMS - CARGO OIL TANKS

MAY 2011

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FOREWORD

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The Society reserves the exclusive right to interpret, decide equivalence or make exemptions to this Standard for Certification.

Background:

- This is a new programme to account for the new IMO Performance Standard for Protective Coating of Cargo Oil Tanks of Crude Oil Tankers.

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Computer Typesetting (Adobe Frame Maker) by Det Norske Veritas

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1. Scope of services

Det Norske Veritas (DNV) Type Approval is based on the ISO/IEC Guide 2 (1991) definition:

“Approval of conformity with specified requirements on the basis of systematic examination of one or more specimens of a product representative of the production”.

The requirements are specified in Rules and/or standards referred to in this Type Approval programme.

This Type Approval programme outlines the procedure and conditions for obtaining, maintaining and renewing a Type Approval. DNV Standards for Certification No. 1.2 (2009) describes the Type Approval in general.

Type Approved products will be listed in DNV's Register of Type Approved Products available on the DNV Internet site at <http://exchange.dnv.com/>.

2. Procedure

The Type Approval procedure normally consists of the following steps:

- application for Type Approval
- quotation
- assessment of Type Approval documentation
- initial survey of product and production facilities including witnessing of Type Tests
- assessment of survey report and Type Test results
- issuance of Type Approval Certificates
- Certificate Retention Survey after two (2) years
- application for renewal after four (4) years.

Explained in detail:

2.1 Application for Type Approval

The Type Approval should be applied for in writing to DNV's local office. The application shall include Type Approval documentation as specified in Section 3.

2.2 Quotation

A quotation will be given by DNV Responsible Approval Centre, to be confirmed by the client.

2.3 Assessment of Type Approval documentation

The Type Approval documentation is assessed by DNV Responsible Approval Centre to verify that it is in conformity with the specified requirements.

2.4 Initial Survey of product and production facilities including witnessing of “Type Tests”

The objective of Initial Survey is to verify that the fabrication, quality control arrangement, product design, material composition and the product marking is according to the Type Approval documentation.

The main elements of a DNV Initial Survey shall:

- ensure that fabrication and quality control arrangement are according to requirements as specified in Section 4.3 and as stated in Type Approval documentation submitted by manufacturer
- witness Type Tests, as specified in Section 4.4
- ensure traceability between manufacturer's product marking and the type designation as stated in the application for Type Approval.

The objective of Type Tests is to verify the ability of the product to meet specified requirements by subjecting the test sample to physical, chemical, environmental or operational stresses.

Type Tests as specified in Section 4.4, shall be carried out and verified in one of the following ways:

- at a DNV laboratory
- at a recognised and independent laboratory accepted by DNV
- at the manufacturer's premises in the presence of a DNV surveyor.

The Initial Survey report and Type Test results shall be submitted to DNV Responsible Approval Centre for evaluation.

Guidance note:

A prerequisite is that the laboratory, either recognised and independent from the coating manufacturer or the coating manufacturer's own laboratory, involved with testing of coating systems in accordance with IMO Resolution MSC.288(87) and IACS UI SC XXX (to be developed) is approved as a Service Supplier in accordance with IACS UR Z17, as amended.

The DNV Approval Programme No. 414 "*Laboratories engaged in testing of coating systems (IMO PSPC)*" will be presented to those interested in obtaining such approval.

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2.5 Assessment of survey report and Type Test results

The assessment of Initial Survey report and Type Test results verifies compliance with the requirements/ determines the values to be stated on the Type Approval Certificate (if applicable).

2.6 Issuance of Type Approval Certificates

When the assessment of Type Approval documentation, Type Testing and survey of fabrication and quality control arrangement is successfully completed a Type Approval Certificate will be issued to the manufacturer of the product. The certificate is normally given a validity period of four (4) years, with a Certificate Retention Survey after two (2) years.

2.7 Certificate Retention Survey after two (2) years

The objective of the Certificate Retention Survey is to verify that the product design, material composition and the product marking are not altered since issuance of the Type Approval Certificate.

Certificate Retention Survey is to be carried out two (2) years after issuance of Type Approval Certificate.

The main elements of the Certificate Retention Survey shall:

- Ensure that Type Approval documentation is available.
- Review design, materials, performance and production process (as specified in Section 4.3) with respect to possible changes, in order to ensure compliance with Type Approval documentation and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and the DNV Type Approval Certificate as stated in Section 4.5.
- Witness tests/inspection on factory samples, selected at random from the production line (where practicable), or storage, if specified in Section 4.4.

The Certificate Retention Survey report shall conclude that either:

- a) The Type Approval Certificate shall be retained, or
- b) The Type Approval Certificate shall be modified/recalled due to the changes in the basis for approval.

The Certificate Retention Survey report to be submitted to DNV Responsible Approval Centre for evaluation.

2.8 Application for renewal after four (4) years

Application for renewal should be submitted to DNV not later than three (3) months before expiry date of the Type Approval Certificate.

The application shall include updated Type Approval documentation as specified in Section 3, item 1-5. Items 6-9 shall be submitted if changes have been implemented since last issuance of the Type Approval.

Upon receipt of the application, DNV will perform a Renewal Survey with objective to verify that the product design, material composition and the product marking are not altered since issuance of the Type Approval Certificate.

Renewal Survey should be carried out not later than four (4) years after issuance of the Type Approval Certificate.

The main elements of a Renewal Survey are the same as specified for the Certificate Retention Survey in Section 2.7.

If there, since last issuance of the Type Approval Certificate, has been any change in the relevant standards or in DNV Rules, new assessment of product and Type Tests may be required.

The Renewal Survey report will constitute part of the basis for renewal of the Type Approval Certificate.

3. Documents to be submitted

The following Type Approval documentation shall be submitted by the manufacturer at initial Type Approval and updated, at renewal. The documentation shall be in duplicate, one (1) copy for DNV local office's surveyor and one (1) copy to be submitted by DNV local office to DNV Responsible Approval Centre. The manufacturer shall keep one (1) copy of Type Approval documentation in their own file. The documentation shall be in English, if not otherwise agreed. (Please number documentation according to below list to facilitate review):

- 1) The DNV Type Approval Application Form shall be completed with the following information:
 - type designation, i.e. product name (grade) with list of variants to be included in, and stated on, the Type Approval Certificate
 - name and address of manufacturer, to be listed on Type Approval Certificate. Additionally, the following shall be specified, if applicable:
 - contact person
 - phone and fax numbers
 - e-mail and web address.
- 2) Product description (number and type of components, colour, consistence, etc.)
- 3) Field of Application and special application limitations of the product (temperature, dry film thickness, number of coats etc.)
- 4) Product specification/technical data sheet/material safety data sheet, with relevant product information.
- 5) Description of fabrication process. ¹⁾
- 6) Description of quality control arrangement. ¹⁾
- 7) Type Test results with references to standards, methods etc.
- 8) Information regarding marking of the product or package. ¹⁾
- 9) In-service experience, if available.
¹⁾To be verified during Initial Type Approval Survey prior to the issuance of the Type Approval Certificate.

4. Requirements

4.1 Basis for Type Approval

The Type Approval of Protective Coating Systems for Cargo Oil Tanks is based on:

- IMO Resolution MSC.288(87), IMO Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers (IMO PSPC-COT)
- IACS UI SC XXX²⁾ (to be developed), For Application of SOLAS Regulation II-1/3-11 Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers (PSPC-COT), adopted by Resolution MSC.288(87)
- The standards listed in the IMO Resolution MSC.288(87), and which are made mandatory via IACS UI SC XXX²⁾ (to be developed)
- IACS Recommendations No. 116, Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers, February 2011
- IACS Recommendations No. XXX²⁾, IACS Model Report for IMO Resolution MSC.288(87) (to be developed).

²⁾ The number has not been decided.

The Type Approval comprises the shop primer and main coating in liquid condition and in the condition when applied in full compliance with the manufacturer's recommendations (ref. Section 3, item 4 and 5).

Quality control during surface preparation or application of the shop primer and main coating is, however, not included in the Type Approval.

The Type Approval Certificate is invalid if the formulation of the main coating is changed to a degree deemed significant by DNV. If the formulation of any of the listed pre-qualified shop primers is changed to a degree deemed significant by DNV that shop primer cannot be used as part of the Protective Coating System.

Changes to Technical Data Sheets and Material Safety Data Sheets with basis in formulation changes shall be informed to DNV, but limited to formulation changes that are considered significant.

4.2 Scope of Type Approval

One DNV Type Approval Certificate will cover one grade of the actual product with the possibility to include variants.

For the coating system this means:

- *Grade*: Full coating system, including one or more coats (as per system definition)
- *Variants*: Colour variants, thinned variants, and similar

One DNV Type Approval Certificate is limited to one manufacturer at one production site.

The approval is solely connected to the corrosion prevention properties of the coating system. The approval does not include any evaluation of toxicity, contamination, pollution, or fire technical properties.

As the Approval of Service Supplier may be granted to laboratories either independent of the coating manufacturer or to the coating manufacturer's own laboratory there will be different follow-up from the DNV Surveyor during the testing period.

When actual testing, forming basis for test reports used to seek Type Approval from DNV, is carried out at the coating manufacturer's own laboratory the responsible DNV Surveyor shall be called in for witnessing milestones, typically:

- witnessing of sample surface preparation
- witnessing of primer application & weathering
- examination of surface and preparation prior to application of top coat
- witnessing of top coat application
- witnessing during testing
- witnessing evaluation of test.

Please refer to Appendix A for flow charts showing the involvement from Class (i.e. DNV's Surveyor).

4.3 Requirements to production and quality control arrangement

The manufacturer should have a quality system that meets ISO 9001 standards, or equivalent. If this quality standard is not fulfilled, the extent of testing and surveys will be specially considered.

The Quality Control arrangement is to be checked with respect to:

- control of incoming materials
- test equipment, test methods, test samples and reference to standards used
- traceability and marking system
- production test reports.

4.4 Requirements to material

The coating product including any variants is to be defined and documented as described under item 3 above.

The requirements to coating properties and performance in field or laboratory exposure are described below for the alternative test methods.

4.4.1 IMO Resolution MSC.288(87) test procedures

Method 1

For coating systems to be used in cargo oil tanks in crude oil tankers.

The test procedures are outlined in:

- IMO Resolution MSC.288(87), Annex 1, Appendix 1 (Gas-tight cabinet test)
- IMO Resolution MSC.288(87), Annex 1, Appendix 2 (Immersion test)
- IMO Resolution MSC.288(87), Annex 1, Appendix 3 (Precautions regarding the use of dangerous materials).

Acceptance criteria:

- Ref. IMO Resolution MSC.288(87), Annex 1, Appendix 1, Section 3 and Appendix 2, Section 3.

If Type Testing according to Method 1 has been carried out, and the results found to be satisfactory, the following will be stated on the Type Approval Certificate:

“For use in cargo oil tanks of crude oil tankers. Surface preparation and coating application as per PSPC or manufacturer's recommendations, whichever is stricter”.

4.4.2 Field exposure

Method 2

For coating systems to be used in cargo oil tanks in crude oil tankers.

The requirements to field exposure are given in IMO Resolution MSC.288(87), Table 1 item 3 (1.3).

Further, reference is given to IACS Rec. No. 116.

If field exposure according to Method 4 has been carried out, and the results found to be satisfactory, the following will be stated on the Type Approval Certificate:

“For use in cargo oil tanks of crude oil tankers. Surface preparation and coating application as per PSPC or manufacturer's recommendations, whichever is stricter.”

4.4.3 Alternative systems

Method 3

All systems that are not an epoxy based system, and/or systems not applied according to Table 1 of the IMO Resolution MSC.288(87) are defined as an alternative system.

It is not meant to exclude other alternative systems with proven equivalent performance, for example non-epoxy based systems.

Acceptance of alternative systems will be subject to documented evidence that they ensure a corrosion prevention performance at least equivalent to that indicated in the IMO Resolution MSC.288(87).

As a minimum, the documented evidence shall consist of satisfactory performance corresponding to that of a coating system which conforms to the “coating standard” described in the IMO Resolution MSC.288(87), Section 4, i.e. 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. The laboratory testing shall be carried out in accordance with the test procedures and acceptance criteria given in the IMO Resolution MSC.288(87), Annex 1, Appendix 1 (Gas-tight cabinet test) and Appendix 2 (Immersion test).

Further, reference is given to IACS UI SC XXX (to be developed).

If Type Testing according to Method 3 has been carried out, and the results found to be satisfactory, the following will be stated on the Type Approval Certificate:

“For use in cargo oil tanks of crude oil tankers. Surface preparation and coating application as per PSPC or manufacturer's recommendations, whichever is stricter.”

4.4.4 Cross-over tests - compatibility test

This section is relevant for Method 1 and 3, excluding Method 2.

If a zinc silicate shop primer has passed the pre-qualification test as part of coating system (i.e. shop primer plus epoxy main coating), it may be used in combination with other epoxy main coatings that have passed the pre-qualification test as part of another coating system, provided that the compatibility has been confirmed by the test in accordance with either;

- IMO Resolution MSC.288(87), Annex 1, Appendix 2 (Immersion test), or
- IMO Resolution MSC.215(82), Paragraph 1.7 of Appendix 1 to Annex 1 (Test on simulated ballast tank condition) without wave movement.

The cross-over tests are also to be carried out by a laboratory approved as a Service Supplier.

When cross-over tests have been carried out and reported satisfactorily the information may be included to the Type Approval Certificate.

4.5 Requirements to marking of product

The package shall be marked. The marking shall at least include the following information:

- manufacturer's name or trade mark
- production plant/place of manufacture
- type designation/product name
- production date/batch no
- storage instruction (if relevant).

The marking shall be made in such a way that it is visible, legible and indelible. The marking of products should enable traceability to the DNV Type Approval Certificate.

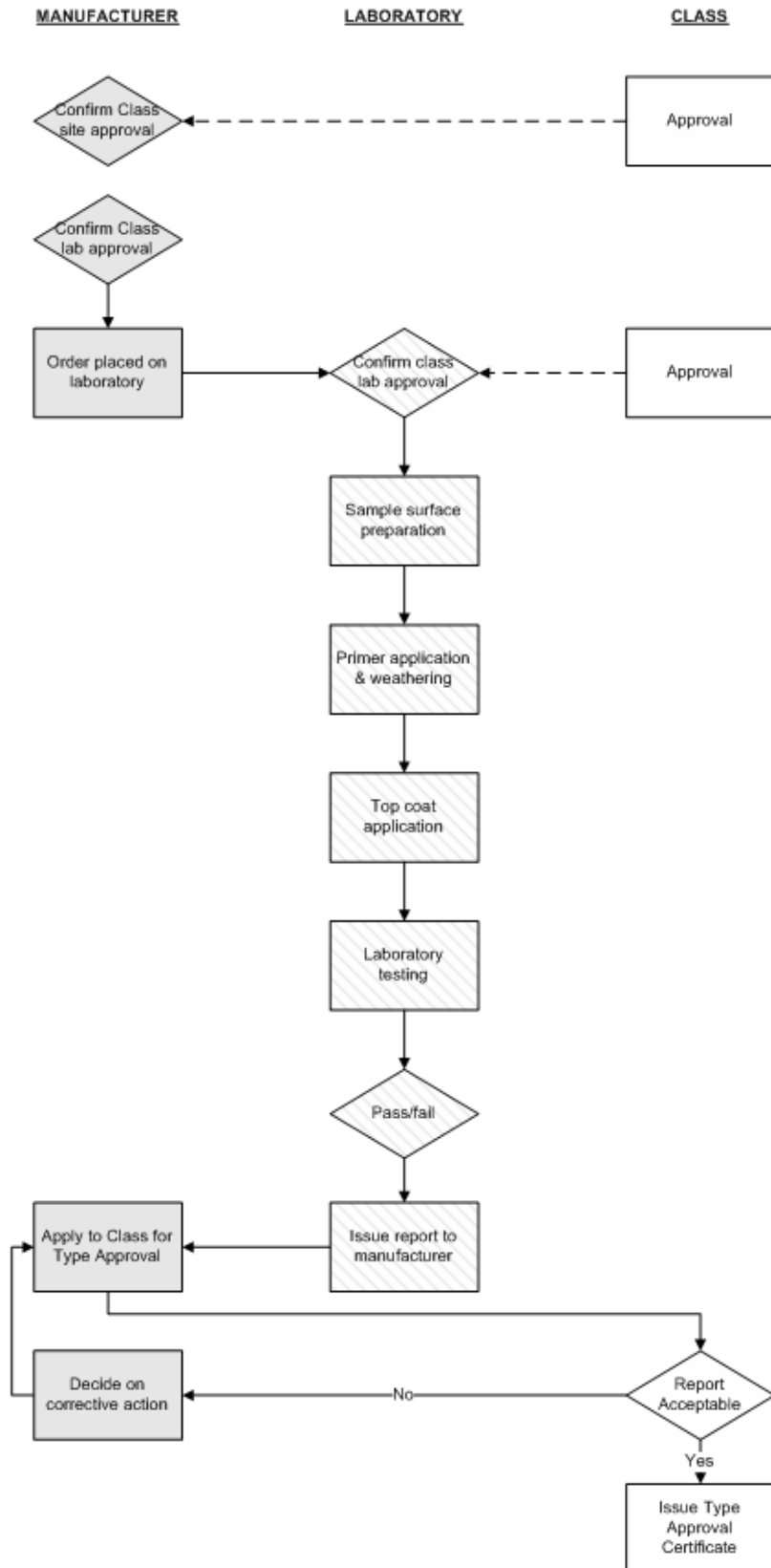
5. Suspension and Withdrawal of Type Approval Certificates

A Type Approval Certificate may be suspended or withdrawn if the Society finds it justified. Directions for suspension and withdrawal of a Type Approval Certificate are given by the DNV Standards for Certification No. 1.2 (2009).

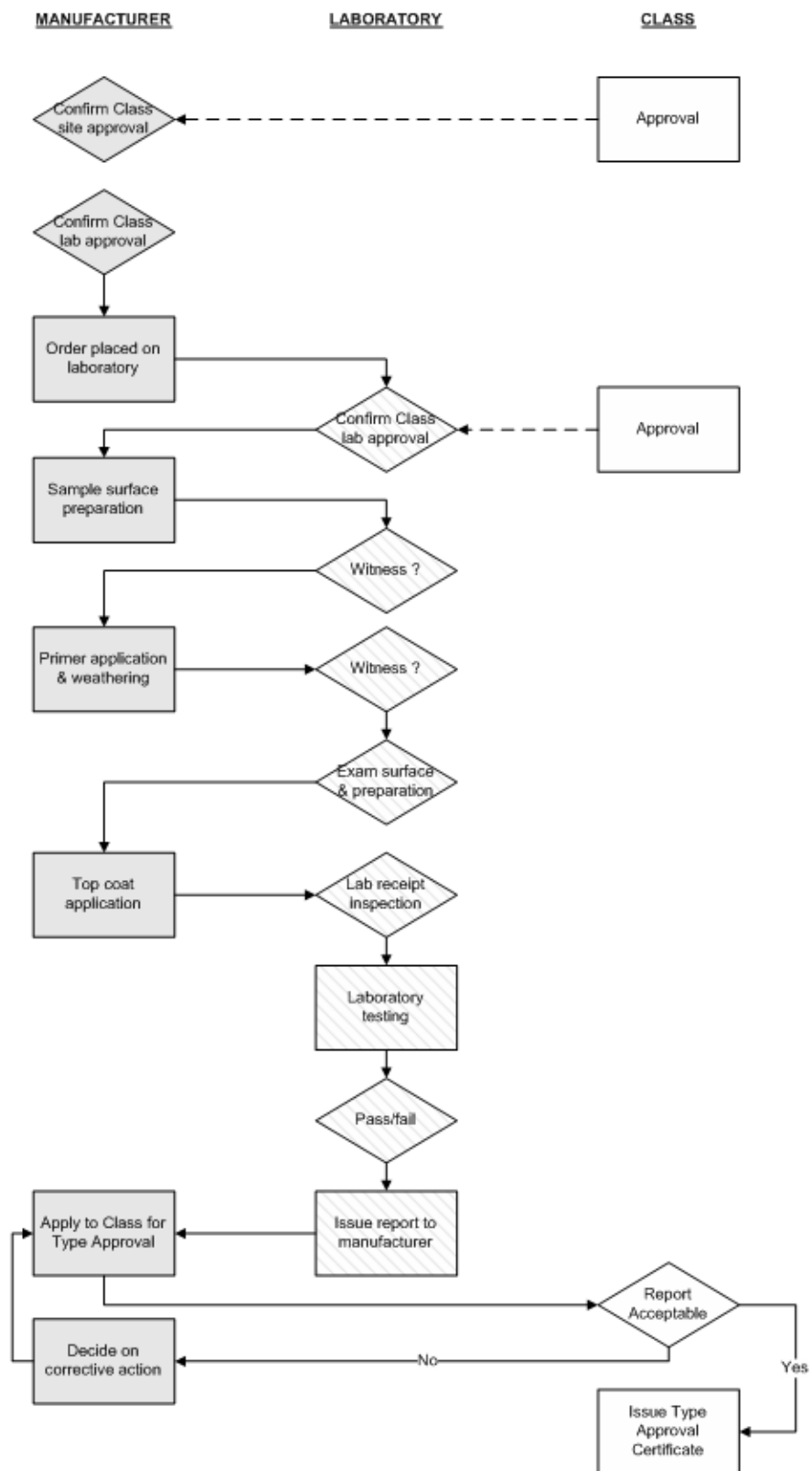
Table 5-1 Type Testing - Laboratory Testing and Field Testing (summary)						
<i>Property</i>	<i>Test Standard</i>	<i>Number and selection of parallels</i>	<i>Value</i>	<i>Definition of Value</i>	<i>Minimum level of verification</i>	<i>Frequency of verification</i>
Coating durability (visual assessment)	Method 1 IMO Resolution MSC.288(87), Annex 1, Appendix 1 and Appendix 2, Gas-tight cabinet test and immersion test cyclus	See details in 4.4.1	Acceptance criteria in IMO Resolution MSC.288(87)	See details in 4.4.1	Report by a laboratory approved as a Service Supplier	Initial Survey
	Method 2 Field exposure Field test under real life exposure conditions for min. 5 years	See details in 4.4.2 and IACS Rec. No. 116	Final coating condition not less than "GOOD"	See details in 4.4.2	Report by independent institution, or, preferably, by a DNV surveyor	
	Method 3 Alternative Systems All systems that are not an epoxy based one and/or systems not applied according to table 1 of the IMO Resolution MSC.288(87) are defined as an alternative system. The performance is to be shown in accordance with either Method 1 or 2.	See details in 4.4.3 May either be based on actual field exposure, or	Final coating condition not less than "GOOD"	See details in 4.4.3	Report by independent institution, or, preferably, by a DNV surveyor	
		Laboratory testing in accordance with IMO Resolution MSC.288(87), Annex 1	Acceptance criteria in IMO Resolution MSC.288(87)		Report by a laboratory approved as a Service Supplier	
Cross-over test IMO Resolution MSC.288(87), Annex 1, Appendix 2, Immersion test cyclus or IMO Resolution MSC.215(82), Paragraph 1.7 of Appendix 1 to Annex 1, Test on simulated ballast tank condition (without wave movement)	See details in 4.4.4	Acceptance criteria in IMO Resolution MSC.288(87), or in IMO Resolution MSC.215(82)	See details in 4.4.4	Report by a laboratory approved as a Service Supplier	Random	
Applications: Method 1 For use in cargo oil tanks of crude oil tankers Method 2 For use in cargo oil tanks of crude oil tankers Method 3 For use in cargo oil tanks of crude oil tankers						

Appendix A Work Processes

Case 1 - Independent Test Laboratory



Case 2 - Independent Test Laboratory - Manufacturer Coated Tested Plates



Case 3 - Manufacturers Approved Test Laboratory

