INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1479
19 May 2014

UNIFIED INTERPRETATION ON THE APPLICATION OF THE PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR CARGO OIL TANKS OF CRUDE OIL TANKERS (RESOLUTION MSC.288(87))

1 The Maritime Safety Committee, at its ninety-third session (14 to 23 May 2014), with a view to providing specific guidance on the application of the relevant requirements of the *Performance standard for protective coatings for cargo oil tanks of crude oil tankers*, as adopted by resolution MSC.288(87), approved the Unified interpretation on the application of the *Performance standard for protective coatings for cargo oil tanks of crude oil tankers* (resolution MSC.288(87)), prepared by the Sub-Committee on Ship Design and Construction, at its first session (20 to 24 January 2014).

2 Member Governments are invited to use the annexed Unified Interpretations as guidance when applying relevant provisions of the *Performance standard for protective coatings for cargo oil tanks of crude oil tankers* and to bring them to the attention of all parties concerned.

***

IMO CONVENTIONS EFFECTIVE IMPLEMENTATION
WORLD MARITIME DAY 2014

ANNEX

UNIFIED INTERPRETATION ON THE APPLICATION OF THE PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR CARGO OIL TANKS OF CRUDE OIL TANKERS (PSPC-COT) (RESOLUTION MSC.288(87))

Paragraph 2 – Definitions

GOOD: Condition with spot rusting on less than 3% of the area under consideration without visible failure of the coating, or no-perforated blistering. Breakdown at edges or welds should be less than 20% of edges or weld lines in the area under consideration.

Coating Technical File (CTF): A term used for the collection of documents describing issues related to the coating system and its application from the point in time when the first document is provided and for the entire life of the ship including the inspection agreement and all elements of PSPC-COT 3.4.

Paragraph 3.2 – General principles

1 Inspection of surface preparation and coating processes agreement should be signed by shipyard, shipowner and coating manufacturer and should be presented by the shipyard to the Administration for review prior to commencement of any coating work on any stage of a new building and as a minimum should comply with the PSPC-COT.

2 To facilitate the review, the following from the CTF, should be available:

a) Coating specification including selection of areas (spaces) to be coated, selection of coating system, surface preparation and coating process.

b) Statement of Compliance or Type Approval of the coating system.

3 The agreement should be included in the CTF and should at least cover:

a) 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-COT). Where more than one coating inspector will be used then their areas of responsibility should be identified. (For example, multiple construction sites).

b) Language to be used for documentation.

4 Any deviations in the procedure relative to the PSPC-COT noted during the review should be raised with the shipyard, which is responsible for identifying and implementing the corrective actions.

5 Cargo Ship Safety Certificate or Cargo Ship Safety Construction Certificate, as appropriate, should not be issued until all required corrective actions have been closed to the satisfaction of the Administration.

Paragraph 3.4 – Coating Technical File (CTF)

Procedure for Coating Technical File Review

1 The shipyard is responsible for compiling the Coating Technical File (CTF) either in paper or electronic format, or a combination of the two.

2 The CTF is to contain all the information required by paragraph 3.4 of the PSPC and the inspection of surface preparation and the coating processes agreement (see PSPC-COT, paragraph 3.2).

3 The CTF should be reviewed for content in accordance with the PSPC-COT, paragraph 3.4.2.

4 Any deviations found under paragraph 3 should be raised with the shipyard, which is responsible for identifying and implementing the corrective actions.

5 Cargo Ship Safety Certificate or Cargo Ship Safety Construction Certificate, as appropriate, should not be issued until all required corrective actions have been closed to the satisfaction of the Administration.

Paragraph 3.5 – Health and safety

In order to document compliance with paragraph 3.5 of the PSPC-COT relevant documentation from the coating manufacturer concerning health and safety aspects such as Material Safety Data Sheet is recommended to be included in the CTF for information.

Paragraph 4.5 – Special application

Reference is made to the *Guidelines for corrosion protection of permanent means of access* arrangements (MSC.1/Circ.1279), approved by MSC 84 in May 2008.

Paragraph 4, table 1 – Footnotes of standards

Only the footnoted standards referred to in PSPC-COT table 1 are to be applied, i.e. they are mandatory.

Paragraph 4, table 1, section 1.3 – Design of coating system

Procedure for coating system approval

Type Approval Certificate showing compliance with the PSPC-COT 5 should be issued if the results of either method A+C, or B+C are found satisfactory by the Administration.

The Type Approval Certificate should indicate the Product and the Shop Primer tested. The certificate should also indicate other type approved shop primers with which the product may be used which have under gone the cross over test in a laboratory meeting the requirements in Method A, paragraph 1.1 of this Unified Interpretation.

The documents required to be submitted are identified in the following sections, in addition for all type approvals the following documentation is required:

Technical Data Sheet showing all the information required by PSPC-COT, paragraph 3.4.2.2.

Winter type epoxy is required separate prequalification test including shop primer compatibility test according to PSPC-COT, annex 1. Winter and summer type coating are considered different unless Infrared (IR) identification and Specific Gravity (SG) demonstrates that they are the same.

Method A: Laboratory test

1.1 Coating pre-qualification test should be carried out by the test laboratory which is recognized by the Administration.

1.2 Results from satisfactory pre-qualification tests (PSPC-COT, table 1: 1.3) of the coating system should be documented and submitted to the Administration.

1.3.1 Type Approval tests should be carried out for the epoxy based system with the stated shop primer in accordance with the PSPC-COT, annex 1. If the tests are satisfactory, a Type Approval Certificate will be issued to include both the epoxy and the shop primer. The Type Approval Certificate will allow the use of the epoxy either with the named shop primer or on bare prepared steel.

1.3.2 An epoxy based system may be used with shop primers other than the one with which it was originally tested provided that, the other shop primers are approved as part of a system, PSPC-COT, table 1: 2.3 and table 1: 3.2, and have been tested according to the immersion test of PSPC-COT, annex 1, or in accordance with resolution MSC.215(82), which is known as the "Crossover Test". If the test or tests are satisfactory, a Type Approval Certificate will be issued. In this instance the Type Approval Certificate will include the details of the epoxy and a list of all shop primers with which it has been tested that have passed these requirements. The Type Approval Certificate will allow the use of the epoxy with all the named shop primers or on bare prepared steel.

1.3.3 Alternatively the epoxy can be tested without shop primer on bare prepared steel to the requirements of the PSPC-COT, annex 1. If the test or tests are satisfactory, a Type Approval Certificate will be issued. The Type Approval Certificate will just record the epoxy. The certificate will allow the use of the epoxy on bare prepared steel only. If in addition, crossover tests are satisfactorily carried out with shop primers, which are approved as part of a system, the Type Approval Certificate will include the details of shop primers which have satisfactorily passed the crossover test. In this instance the Type Approval Certificate will allow the use of the epoxy based system with all the named shop primers or on bare prepared steel.

1.3.4 The Type Approval Certificate is invalid if the formulation of either the epoxy or the shop primer is changed. It is the responsibility of the coating manufacturer to inform the Administration immediately of any changes to the formulation.

1.3.5 For the coating pre-qualification test, the measured average dry film thickness (DFT) on each prepared test panels should not exceed a nominal DFT (NDFT) of 320 microns plus 20% unless a paint manufacturer specifies a NDFT greater than 320 microns. In the latter case, the average DFT should not exceed the specified NDFT plus 20% and the coating system should be certified to the specified NDFT if the system passes the tests according to annex 1 of PSPC-COT. The measured DFT should meet the "90/10" rule and the maximum DFT should be always below the maximum DFT value specified by the manufacturer.

Method B: 5 years field exposure

1.4 Coating manufacturer's records, which should at least include the information indicated in paragraph 1.4.1, should be examined to confirm coating system has 5 years field exposure, and the current product is the same as that being assessed.

1.4.1 Manufacturer's records

- Original application records
- Original coating specification
- Original Technical Data Sheet
- Current formulation's unique identification (Code or number)
- If the mixing ratio of base and curing agent has changed, a statement from the coating manufacturer confirming that the composition mixed product is the same as the original composition. This should be accompanied by an explanation of the modifications made.
- Current Technical Data Sheet for the current production site
- SG and IR identification of original product
- SG and IR identification of the current product
- If original SG and IR cannot be provided then a statement from the coating manufacturer confirming the readings for the current product are the same as those of the original.

1.5 Either class survey records from an Administration or a joint (coating manufacturer and Administration) survey of cargo tanks of a selected ship is to be carried out for the purpose of verification of compliance with the requirements of paragraphs 1.4 and 1.9. The reporting of the coating condition in both cases should be in accordance with the principles given in section 4 of MSC.1/Circ.1399.

1.6 The selected ship is to have cargo tanks in regular use, of which:

- At least one tank is exposed to minimum temperature of 60^{o}C plus or minus 3^{o}C.
- For field exposure the ship should be trading in varied trade routes and carrying substantial varieties of crude oils including highest temperature and lowest pH limits to ensure a realistic sample: for example, three ships on three different trade areas with different varieties of crude cargoes.

1.7 In the case that the selected ship does not meet the requirements in paragraph 1.6 then the limitations on lowest pH and Highest temperature of crude oils carried should be clearly stated on the Type Approval Certificate.

1.8 In all cases of approval by Method B, the shop primer should be removed prior to application of the approved epoxy based system coating, unless it can be confirmed that the shop primer applied during construction, is identical in formulation to that applied in the selected ship used as a basis of the approval.

1.9 All cargo tanks should be in "GOOD" condition excluding mechanical damages, without touch up or repair in the prior 5 years.

1.9.1 "Good" is defined as: *Condition with spot rusting on less than 3% of the area under consideration without visible failure of the coating, or no perforated blistering. Breakdown at edges or welds should be less than 20% of edges or welds in the area under consideration.*

1.9.2 Examples of how to report coating conditions with respect to areas under consideration should be as those given in the principles contained in section 4 of MSC.1/Circ.1399.

1.10 If the applied NDFT is greater than required by the PSPC, the applied NDFT will be the minimum to be applied during construction. This will be reported prominently on the Type Approval Certificate.

1.11 If the results of the inspection are satisfactory, a Type Approval Certificate should be issued to include both the epoxy based system and the shop primer. The Type Approval Certificate should allow the use of the epoxy based system either with the named shop primer or on bare prepared steel. The Type Approval Certificate should reference the inspection report which will also form part of the Coating Technical File.

1.12 The Type Approval Certificate is invalid if the formulation of either the epoxy based system or the shop primer is changed. It is the responsibility of the coating manufacturer to inform the Administration immediately of any changes to the formulation.

Method C: Coating manufacturer

1.18 The coating/shop primer manufacturer should meet the requirements set out in IACS UR Z17 paragraphs 4 to 7, (except for 4.6) and paragraphs 1.18.1 to 1.18.6 below, which should be verified by the Administration.

1.18.1 Coating manufacturers

(a) Extent of engagement – Production of coating systems in accordance with PSPC-COT and this Unified Interpretation.

(b) These requirements apply to both the main coating manufacturer and the shop primer manufacturer where both coatings form part of the total system.

(c) The coating manufacturer should provide to the Administration the following information;

- A detailed list of the production facilities.
- Names and location of raw material suppliers, which should be clearly stated.
- A detailed list of the test standards and equipment to be used, (scope of approval).
- Details of quality control procedures employed.
- Details of any sub-contracting agreements.
- List of quality manuals, test procedures and instructions, records, etc.
- Copy of any relevant certificates with their issue number and/or date e.g. Quality Management System certification.

(d) Inspection and audit of the manufacturer's facilities will be based on the requirements of the PSPC-COT.

(e) With the exception of early "scale up" from laboratory to full production, adjustment outside the limitations listed in the QC instruction referred to below is not acceptable, unless justified by trials during the coating system's development programme, or subsequent testing. Any such adjustments must be agreed by the formulating technical centre.
If formulation adjustment is envisaged during the production process the maximum allowable limits will be approved by the formulating technical centre and clearly stated in the QC working procedures.

(f) The manufacturer's quality control system will ensure that all current production is the same formulation as that supplied for the Type Approval Certificate. Formulation change is not permissible without testing in accordance with the test procedures in the PSPC-COT and the issue of a Type Approval Certificate by the Administration.

(g) Batch records including all QC test results such as viscosity, specific gravity and airless spray characteristics will be accurately recorded. Details of any additions will also be included.

(h) Whenever possible, raw material supply and lot details for each coating batch will be traceable. Exceptions may be where bulk supply such as solvents and pre-dissolved solid epoxies are stored in tanks, in which case it may only be possible to record the supplier's blend.

(i) Dates, batch numbers and quantities supplied to each coating contract will be clearly recorded.

1.18.2 All raw material supply should be accompanied the supplier's "Certificate of Conformance". The certificate will include all requirements listed in the coating manufacturer's QC system.

1.18.3 In the absence of a raw material supplier's certificate of conformance, the coating manufacturer should verify conformance to all requirements listed in the coating manufacturer's QC system.

1.18.4 Drums should be clearly marked with the details as described on the "Type Approval Certificate".

1.18.5 Product Technical Data Sheets must comply with all the PSPC-COT requirements. The QC system will ensure that all Product Technical Data Sheets are current.

1.18.6 QC procedures of the originating technical centre will verify that all production units comply with the above stipulations and that all raw material supply is approved by the technical centre.

1.19 In the case that a coating manufacturer wishes to have products which are manufactured in different locations under the same name, then IR identification and SG should be used to demonstrate that they are the same coating, or individual approval tests will be required for the paint manufactured in each location.

1.20 The Type Approval Certificate is invalid if the formulation of either the epoxy based system or the shop primer is changed. It is the responsibility of the coating manufacturer to inform class immediately of any changes to the formulation. Failure to inform class of an alteration to the formulation will lead to cancellation of the certificates for that manufacturer's products.

Paragraph 4, table 1, section 1.4 – Job specification

Wet film thickness should be regularly checked during application for quality control by the Builder. PSPC-COT does not state who should check WFT, it is accepted for this to be the Builder. Measurement of DFT should be done as part of the inspection required in PSPC-COT, paragraph 6.

Stripe coats should be applied as a coherent film showing good film formation and no visible defects. The application method employed should insure that all areas that require stripe coating are properly coated by brush or roller. A roller may be used for scallops, ratholes etc. but not for edges and welds.

Paragraph 4, table 1, section 2 – PSP (Primary surface preparation)

Section 2.2:

The conductivity of soluble salts is measured in accordance with standards ISO 8502-6 and ISO 8502-9 or equivalent method as validated according to NACE SP0508-2010, and compared with the conductivity of 50 mg/m^2 NaCl. If the measured conductivity is less than or equal to, then it is acceptable. Minimum readings to be taken are one (1) per plate in the case of manually applied shop primer. In cases where an automatic process for application of shop primer is used, there should be means to demonstrate compliance with PSPC-COT through a Quality Control System, which should include a monthly test.

Section 2.3:

Shop primers not containing zinc or not silicate based are considered to be "alternative systems" and therefore equivalency is to be established in accordance with section 8 of the PSPC-COT with test acceptance criteria for "alternative systems" given in section 3.1 (right columns) of appendixes 1 and 2 to annex 1 of PSPC-COT.

Procedure for review of Quality Control of Automated Shop Primer plants

1 It is recognized that the inspection requirements of PSPC-COT, paragraph 6.2, may be difficult to apply to an automated shop primer plant and a Quality Control approach would be a more practical way of enabling compliance with the requirements of PSPC-COT.

2 As required in PSPC it is the responsibility of the coating inspector to confirm that the quality control procedures are ensuring compliance with PSPC-COT.

3 When reviewing the Quality Control for automated shop primer plants the following procedures should be included.

3.1 Procedures for management of the blasting grit including measurement of salt and contamination.

3.2 Procedures recording the following: steel surface temperature, relative humidity, dewpoint.

3.3 Procedures for controlling or monitoring surface cleanliness, surface profile, oil, grease, dust and other contamination.

3.4 Procedures for recording/measuring soluble salts.

3.5 Procedures for verifying thickness and curing of the shop primer conforms to the values specified in the Technical Specification.

Paragraph 4, table 1, section 3 – SSP (Secondary surface reparation)

Sections 3.2 to 3.4:

Usually, the fillet welding on tank boundary watertight bulkhead is left without coating on block stage (because not yet be leakage tested), in which case it can be categorized as erection joint ("butt") to be power tooled to St 3.

Section 3.6:

The conductivity of soluble salts is measured in accordance with standards ISO 8502-6 and ISO 8502-9, or equivalent method as validated according to NACE SP0508-2010, and compared with the conductivity of 50 mg/m^2 NaCl. If the measured conductivity is less than or equal to, then it is acceptable.

All soluble salts have a detrimental effect on coatings to a greater or lesser degree. The standard ISO 8502-9:1998 does not provide the actual concentration of NaCl. The percentage of 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.

Paragraph 4, table 1, section 4 – Miscellaneous

Section 4.3:

All DFT measurements should be measured. Only the final DFT measurements need to be measured and reported for compliance with the PSPC-COT by the qualified coating inspector. The Coating Technical File may contain a summary of the DFT measurements which typically will consist of minimum and maximum DFT measurements, number of measurements taken and percentage above and below required DFT. The final DFT compliance with the 90/10 practice should be calculated and confirmed, see PSPC-COT, paragraph 2.8.

Paragraph 4, table 1, section 5 – Coating system approval

See Interpretation of PSPC-COT table 1: 1 Design of coating system, 1.3 Coating prequalification test.

Paragraph 4, table 1, section 6 – Coating inspection requirements

Procedure for assessment of Coating Inspectors' qualifications

1 Coating inspectors required to carry out inspections in accordance with the PSPC-COT, paragraph 6, should be qualified to NACE Coating Inspector Level 2, FROSIO Inspector Level III, or an equivalent qualification. Equivalent qualifications are described in paragraph 3 below.

2 However, only coating inspectors with at least 2 years relevant coating inspector experience and qualified to NACE Coating Inspector Level 2 or FROSIO Inspector Level III, or with an equivalent qualification, can write and/or authorise procedures, or decide upon corrective actions to overcome non-compliances.

3 Equivalent Qualification

3.1 Equivalent qualification is the successful completion, as determined by course tutor, of an approved course.

3.1.1 The course tutors should be qualified with at least 2 years relevant experience and qualified to NACE Coating Inspector Level 2 or FROSIO Inspector Level III, or with an equivalent qualification.

3.1.2 Approved Course: A course that has a syllabus based on the issues associated with the PSPC including the following:

- Health environment and safety
- Corrosion
- Materials and design
- International standards referenced in PSPC
- Curing mechanisms
- Role of inspector
- Test instruments
- Inspection procedures
- Coating specification
- Application procedures
- Coating failures
- Pre-job conference
- MSDS and product data sheet review
- Coating Technical File
- Surface preparation
- Dehumidification
- Waterjetting
- Coating types and inspection criteria
- Specialized application equipment
- Use of inspection procedures for destructive testing and non-destructive testing instruments
- Inspection instruments and test methods
- Coating inspection techniques
- Cathodic protection
- Practical exercises, case studies.

Examples of approved courses may be internal courses run by the coating manufacturers or shipyards etc.

3.1.3 Such a course should have an acceptable measurement of performance, such as an examination with both theoretical and practical elements. The course and examination should be approved by the Administration.

3.2 Equivalent qualification arising from practical experience: An individual may be qualified without attending a course where it can be shown that the individual:

- has a minimum of 5 years practical work experience as a coating inspector of ballast tanks and/or cargo tanks during new construction within the last 10 years; and

- has successfully completed the examination given in paragraph 3.1.3.

4 Assistants to coating Inspectors

4.1 If the coating inspectors requires assistance from other persons to perform part of the inspections, those persons should perform the inspections under the coating inspector's supervision and should be trained to the coating inspector's satisfaction.

4.2 Such training should be recorded and endorsed either by the inspector, the yard's training organization or inspection equipment manufacturer to confirm competence in using the measuring equipment and confirm knowledge of the measurements required by the PSPC-COT.

4.3 Training records should be available for verification.

Paragraph 4, table 1, section 7 – Coating verification requirements

Procedure for Verification of Application of the PSPC-COT

1 The verification requirements of PSPC-COT, paragraph 7, should be carried out by the Administration.

1.1 Monitoring implementation of the coating inspection requirements, as called for in PSPC-COT, paragraph 7.5 means checking, on a sampling basis, that the inspectors are using the correct equipment, techniques and reporting methods as described in the inspection procedures reviewed by the Administration.

2 Any deviations found under paragraph 1.1 should be raised initially with the coating inspector, who is responsible for identifying and implementing the corrective actions.

3 In the event that corrective actions are not acceptable to the Administration or in the event that corrective actions are not closed out then the shipyard should be informed.

4 Cargo Ship Safety Certificate or Cargo Ship Safety Construction Certificate, as appropriate, should not be issued until all required corrective actions have been closed out to the satisfaction of the Administration.

Annex 1 – Footnotes of standards

Only the footnoted standards referred to in annex 1 are to be applied, i.e. they are mandatory.