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(Feb
2013)

**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)**

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Note:

1. This UI is to be uniformly implemented by IACS Societies on ships contracted for construction on or after 1 January 2014.
2. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.

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PSPC-COT 2 DEFINITIONS

For the purpose of this Standard, the following definitions apply.

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2.6 "GOOD" condition is the condition with minor spot rusting as defined in resolution A.744(18) for assessing the ballast tank coatings for tankers.

...

Interpretation

GOOD: Condition with spot rusting on less than 5% 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: 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.

PSPC-COT 3 GENERAL PRINCIPLES

“3.2 Inspection of surface preparation and coating processes shall be agreed upon between the ship owner, the shipyard and the coating manufacturer and presented to the Administration for review. Clear evidence of these inspections shall be reported and included in the Coating Technical File (CTF) (see subsection 3.4).”

Interpretation

1. Inspection of surface preparation and coating processes agreement shall be signed by shipyard, shipowner and coating manufacturer and shall 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 shall comply with the PSPC-COT.
2. To facilitate the review, the following from the CTF, shall 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 shall be included in the CTF and shall 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 shall 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 shall 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, shall not be issued until all required corrective actions have been closed to the satisfaction of the Administration.

“3.4 Coating Technical File (CTF)

3.4.1 Specification of the cargo oil tank coating system applied, record of the shipyard's and shipowner's coating work, detailed criteria for coating selection, job specifications, inspection, maintenance and repair shall be included in the Coating Technical File required by resolution MSC.215(82).

3.4.2 New construction stage

The Coating Technical File shall contain at least the following items relating to this Standard and shall be delivered by the shipyard at new ship construction stage:

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- .1 *copy of Statement of Compliance or Type Approval Certificate;*
- .2 *copy of Technical Data Sheet, including:*
 - .2.1 *product name and identification mark and/or number;*
 - .2.2 *materials, components and composition of the coating system,*
 - .2.3 *minimum and maximum dry film thickness;*
 - .2.4 *application methods, tools and/or machines;*
 - .2.5 *condition of surface to be coated (de-rusting grade, cleanness, profile, etc.); and*
 - .2.6 *environmental limitations (temperature and humidity);*
- .3 *shipyard work records of coating application, including:*
 - .3.1 *applied actual areas (in square metres) of coating in each cargo oil tank;*
 - .3.2 *applied coating system;*
 - .3.3 *time of coating, thickness, number of layers, etc.;*
 - .3.4 *ambient conditions during coating; and*
 - .3.5 *details of surface preparation;*
- .4 *procedures for inspection and repair of coating system during ship construction;*
- .5 *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 (see annex 2);*
- .6 *shipyard's verified inspection report, including:*
 - .6.1 *completion date of inspection;*
 - .6.2 *result of inspection;*
 - .6.3 *remarks (if given); and*
 - .6.4 *inspector signature; and*
- .7 *procedures for in-service maintenance and repair of coating systems.**

**Guidelines to be developed by the Organization.*

3.4.3 *In-service maintenance and repair*

In-service maintenance and repair activities shall be recorded in the Coating Technical File in accordance with the relevant section of the Guidelines for coating maintenance and repair.

3.4.4 The Coating Technical File shall be kept on board and maintained throughout the life of the ship.”

Interpretation

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 the PSC 3.4 and the inspection of surface preparation and the coating processes agreement (see PSC-COT 3.2).

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- 3 The CTF shall be reviewed for content in accordance with the PSPC-COT 3.4.2.
- 4 Any deviations found under 3 shall 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, shall not be issued until all required corrective actions have been closed to the satisfaction of the Administration.

“3.5 Health and safety

The shipyard is responsible for implementation of national regulations to ensure the health and safety of individuals and to minimize the risk of fire and explosion.”

Interpretation

In order to document compliance with PSPC-COT 3.5, 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.

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PSPC-COT 4 COATING STANDARD**“4.5 Special application**

4.5.1 This Standard covers protective coating requirements for steel structure within cargo oil tanks. It is noted that there are other independent items that are fitted within the cargo oil tanks and to which coatings are applied to provide protection against corrosion.

4.5.2 It is recommended that this Standard is applied, to the extent practicable, to those portions of means of access provided for inspection within the areas specified in subsection 4.4 that are not integral to the ship structure, such as rails, independent platforms, ladders, etc. Other equivalent methods of providing corrosion protection for non-integral items may also be used, provided they do not impair the performance of the coatings of the surrounding structure. Access arrangements that are integral to the ship structure, such as stiffener depths for walkways, stringers, etc., are to fully comply with this Standard when located within the coated areas.

4.5.3 It is also recommended that supports for piping, measuring devices, etc., be coated as a minimum in accordance with the non-integral items indicated in paragraph 4.5.2.

Interpretation

Reference is made to the non-mandatory MSC/Circ.1279 "Guidelines for corrosion protection of permanent means of access arrangements", adopted by MSC 84 in May 2008.

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PSPC-COT 4 Table 1: Footnotes of Standards*“Footnotes:*

- 1 *Type of gauge and calibration in accordance with SSPC-PA2:2004 Paint Application Specification No.2.*
- 2 *Refer to standard ISO 8501-1: 1988/Suppl: 1994. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.*
- 3 *Refer to standard ISO 8503-1/2: 1988. Preparation of steel substrate before application of paints and related products – Surface roughness characteristics of blast-cleaned steel substrates.*
- 4 *Conductivity measured in accordance with the following standards:*
 - .1 *ISO 8502-9:1998. Preparation of steel substrate before application of paints and related products – Test for the assessment of surface cleanliness; or*
 - .2 *NACE SP0508-2010 Item no.21134. Standard practice methods of validating equivalence to ISO 8502-9 on measurement of the levels of soluble salts.*
- 5 *Refer to standard ISO 8501-3: 2001. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.*
- 6 *See footnote 2 above*
- 7 *See footnote 3 above*
- 8 *Refer to standard ISO 8502-3:1993. Preparation of steel substrate before application of paints and related products – Test for the assessment of surface cleanliness.*
- 9 *See footnote 4 above*
- 10 *See footnote 1 above”*

Interpretation

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

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PSPC-COT 4 Table 1: 1 Design of coating system**“1.3 Coating test**

Epoxy-based systems tested prior to the date of entry into force of this Standard in a laboratory by a method corresponding to the test procedure in annex 1 or equivalent, which as a minimum meets the requirements for rusting and blistering, or which have documented field exposure for 5 years with a final coating condition of not less than "GOOD", may be accepted.

For epoxy-based systems approved on or after entry into force of this Standard, testing according to the procedure in annex 1, or equivalent, is required.”

Interpretation**Procedure for Coating System Approval**

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

The Type Approval Certificate shall indicate the Product and the Shop Primer tested. The certificate shall 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, 1.1 of this UI.

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 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 shall 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 shall be documented and submitted to the Administration.

1.3.1 Type Approval tests shall 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 Res.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

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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 shall 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 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 PSPC-COT. The measured DFT shall meet the "90/10" rule and the maximum DFT shall be below the maximum DFT value specified by the manufacturer.

Method B: 5 years field exposure

1.4 Coating manufacturer's records, which shall at least include the information indicated in 1.4.1, shall 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 shall 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 vessel is to be carried out for the purpose of verification of compliance with the requirements of 1.4 and 1.9. The reporting of the coating condition in both cases shall be in accordance with the principles given in section 4 of MSC.1/Circ.1399.

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- 1.6 The selected vessel is to have cargo tanks in regular use, of which:
- At least one tank is exposed to minimum temperature of 60 degree C plus or minus 3 degree
 - 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 vessel does not meet the requirements in 1.6 then the limitations on lowest pH and Highest temperature of crude oils carried shall be clearly stated on the type approval certificate.
- 1.8 In all cases of approval by Method B, the shop primer shall 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 vessel used as a basis of the approval.
- 1.9 All ballast tanks shall 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 5% 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 given 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 shall be issued to include both the epoxy based system and the shop primer. The Type Approval Certificate shall allow the use of the epoxy based system either with the named shop primer or on bare prepared steel. The Type Approval Certificate shall 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 shall meet the requirements set out in IACS UR Z17 paragraphs 4, 5, 6 and 7, (except for 4.6) and paragraphs 1.18.1 to 1.18.6 below, which shall 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 UI.

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

1.18.2 All raw material supply must 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 must verify conformance to all requirements listed in the coating manufacturer's QC system.

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1.18.4 Drums must 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 shall 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.

"1.4 Job specification

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 CTF.

Stripe coat shall be applied by brush or roller. Roller shall be used for scallops, ratholes, etc., only.

Each main coating layer shall be appropriately cured before application of the next coat, in accordance with the coating manufacturer's recommendations.

Job specifications shall include the dry-to-recoat times and walk-on time given by the manufacturer.

Surface contaminants such as rust, grease, dust, salt, oil, etc., shall be removed prior to painting. The method to be according to the paint manufacturer's recommendations. Abrasive inclusions embedded in the coating shall be removed.

1.5 NDFT (nominal total dry film thickness)⁵

NDFT 320 µm with 90/10 rule for epoxy-based systems; other systems to the coating manufacturer's specifications.

Maximum total dry film thickness according to the manufacturer's detailed specifications.

Care shall be taken to avoid increasing the DFT in an exaggerated way. Wet film thickness shall be regularly checked during application.

Thinners shall be limited to those types and quantities recommended by the manufacturer."

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Interpretation

Wet film thickness shall 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 shall be done as part of the inspection required in PSPC-COT 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.

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PSPC-COT 4 Table 1: 2 PSP (Primary Surface Preparation)

"2. PSP (Primary Surface Preparation)

2.1 *Blasting and profile*^{2, 3}

Sa 2^{1/2}; 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.*

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, and in accordance with the coating manufacturer's recommendations.

2.2 *Water soluble salt limit equivalent to NaCl*⁴

≤ 50 mg/m² of sodium chloride.

2.3 *Shop primer*

Zinc containing inhibitor free zinc silicate based or equivalent. Compatibility with main coating system shall be confirmed by the coating manufacturer."

Interpretation

of para 2.2:

The conductivity of soluble salts is measured in accordance with 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/m² 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.

of para 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 recognised that the inspection requirements of PSPC-COT 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.

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- 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.

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PSPC-COT 4 Table 1: 3 SSP (Secondary Surface Preparation)

“3.2 *Sa 2^{1/2} on damaged shop primers and welds*

All surfaces to be coated shall be blasted to Sa 2 removing at least 70% of intact shop primer, which has not past a prequalification certified by test procedures in table 1.3.”

“3.3 *Surface treatment after erection*

Erection joints St 3 or better or Sa 2^{1/2} where practicable.

For inner bottom:

- *Damages up to 20% of the area to be coated to be treated to minimum St 3.*
- *Contiguous damages over 25 m² or over 20% of the area to be coated, Sa 2^{1/2} shall be applied.*

For underdeck:

- *Damages up to 3% of area to be coated to be treated to minimum St 3.*
- *Contiguous damages over 25 m² or over 3% of the area to be coated, Sa 2^{1/2} shall be applied.*

Coating in overlap shall be feathered.”

“3.4 *In case of full or partial blasting 30-75 µm, otherwise as recommended by the coating manufacturer.”*

Interpretation

Methods such as, but not limited to UHP Water Jetting may be considered for Secondary Surface Preparation, where it can be demonstrated that the surface conditions specified by PSPC Table 1, Section 3 can be achieved before the application of the main coatings.

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.

“3.6 *Water soluble salts limit equivalent to NaCl after blasting/grinding⁹*

≤ 50 mg/m² of sodium chloride.”

Interpretation

The conductivity of soluble salts is measured in accordance with 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/m² NaCl. If the measured conductivity is less then or equal to, then it is acceptable.

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

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PSPC-COT 4 Table 1: 4 Miscellaneous"4.3 Testing of coating¹⁰*Destructive testing should be avoided.**Sample 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."***Interpretation**

All DFT measurements shall 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 shall be calculated and confirmed, see PSPC-COT 2.8.

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(cont)**PSPC-COT 5 COATING SYSTEM APPROVAL**

“Results from pre-qualification tests (Table 1, paragraph 1.3) of the coating system shall be documented and a Statement of Compliance or Type Approval Certificate shall be issued if found satisfactory by a third party, independent of the coating manufacturer.”

Interpretation

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

PSPC-COT 6 COATING INSPECTION REQUIREMENTS**“6.1 General**

6.1.1 *To ensure compliance with this Standard, the following shall be carried out by qualified coating inspectors certified to NACE Coating Inspector Level 2, FROSIO Inspector Level III or equivalent as verified by the Administration.*

6.1.2 *Coating inspectors shall inspect surface preparation and coating application during the coating process by carrying out, as a minimum, those inspection items identified in subsection 6.2 to ensure compliance with this Standard. Emphasis shall be placed on initiation of each stage of surface preparation and coatings application as improper work is extremely difficult to correct later in the coating progress. Representative structural members shall be non-destructively examined for coating thickness. The inspector shall verify that appropriate collective measures have been carried out.*

6.1.3 *Results from the inspection shall be recorded by the inspector and shall be included in the CTF (refer to annex 2).”*

Interpretation**Procedure for Assessment of Coating Inspectors’ Qualifications**

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

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- 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 shall have an acceptable measurement of performance, such as an examination with both theoretical and practical elements. The course and examination shall 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 3.1.3.

4 Assistants to coating Inspectors

4.1 If the coating inspectors requires assistance from other persons to do the part of the inspections under the coating inspector's supervision, those persons shall 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 organisation 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 shall be available for verification if required.

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(cont)**PSPC-COT 7 COATING VERIFICATION REQUIREMENTS**

“The following shall be carried out by the Administration prior to reviewing the Coating Technical File for the ship subject to this Standard:

- .1 check that the Technical Data Sheet and Statement of Compliance or Type Approval Certificate comply with the Standard;*
- .2 check that the coating identification on representative containers is consistent with the coating identified in the Technical Data Sheet and Statement of Compliance or Type Approval Certificate;*
- .3 check that the inspector is qualified in accordance with the qualification standards in paragraph 6.1.1;*
- .4 check that the inspector’s reports of surface preparation and the coating’s application indicate compliance with the manufacturer’s Technical Data Sheet and Statement of Compliance or Type Approval Certificate; and*
- .5 monitor implementation of the coating inspection requirements.”*

Interpretation**Procedure for Verification of Application of the PSPC-COT**

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

1.1 Monitoring implementation of the coating inspection requirements, as called for in PSPC-COT 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 1.1 shall 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 shall be informed.

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

PSPC-COT 8 ALTERNATIVE COATING SYSTEMS

“8.1 All Systems that are not an epoxy-based system applied according to table 1 of this Standard are defined as an alternative system.

8.2 This Standard is based on recognized and commonly used coating systems. It is not meant to exclude other, alternative, systems with proven equivalent performance, for example non epoxy-based systems.

8.3 Acceptance of alternative systems shall be subject to documented evidence that they ensure a corrosion prevention performance at least equivalent to that indicated in this Standard, by either:

.1 testing according to this standard; or

.2 five years' field exposure with documentary evidence of continuous trading with crude oil cargoes.¹¹ The coating condition is not less than "GOOD" after five years.

¹¹ For field exposure the ship should be trading in varied trade routes and carrying substantial varieties of crude oils to ensure a realistic sample: for example, three ships on three different trade areas with different varieties of crude cargoes.

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 described in section 4, 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. Laboratory test shall be conducted in accordance with the test procedure given in annex 1 to this Standard.”

Interpretation

The definition of alternative systems

1. Normal coating systems, i.e. not alternative systems is;
 - epoxy-based system applied according to table 1 of PSPC-COT
2. Alternative systems can be coating systems which are;
 - epoxy-based systems, but not applied according to table 1 of PSPC-COT
 - non epoxy-based systems applied according to table 1 of PSPC-COT or
 - non epoxy-based systems, but not applied according to table 1 of PSPC-COT.

The requirement of coating system approval for alternative systems

1. Type Approval Certificate shall be issued subject to satisfaction of the test procedure given in annex 1 to this standard, evaluated according to the acceptance criteria for alternative systems.

The inspection of application of alternative systems

1. The coatings are to be inspected according to the coating inspection requirement in PSPC-COT.

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(cont)**The application of alternative systems**

1. The necessary conditions for application, especially for difference from conventional epoxy coating system should be specified in the coating technical file as per section 3.4. of PSPC-COT.
2. It is recommended that the work for confirmation of the suitability of application (workability, coating quality, worker's skill and so on) is demonstrated before the project starts.

PSPC-COT Annex 1: TEST PROCEDURES FOR COATING QUALIFICATION FOR CARGO OIL TANKS OF CRUDE OIL CARRIERS**Annex 1 Footnotes of Standards**

“Footnotes:

- 12 *Related test method is derived from, but not identical to, standard ISO 2812-1:2007 - Paints and varnishes - Determination of resistance to liquids - Part 1: Immersion in liquids other than water.*
- 13 *Refer to standard ISO 8217:2005 - Petroleum products - Fuels (class F) - Specifications of marine fuels.*
- 14 *Refer to standard ISO 6618:1997 - Petroleum products and lubricants - Determination of acid or base number - Colour-indicator titration method.*
- 15 *Refer to standard ASTM D1141 - 98(2008) - Standard Practice for the Preparation of Substitute Ocean Water.*
- 16 *Refer to standard ISO 2811-1/4:1997 - Paints and varnishes. Determination of density.*
- 17 *Six equally distributed measuring points are used on panels size 150 mm x 100 mm.*
- 18 *Refer to the following standards:*
- .1 ISO 4628-1:2003 - Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system;*
- .2 ISO 4628-2:2003 - Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering; and*
- .3 ISO 4628:2003 - Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of common types of defect - Part 3: Designation of degree of rusting.*
- 19 *It should be noted that the test is valid irrespective of production site, meaning that no individual testing of product from different production sites is required.*
- 20 *Refer to the following standards:*
- .1 ISO 8502-6:2006. Preparation of steel substrates before application of paints and related products - Tests for the assessment of surface cleanliness - Part 6: Extraction of soluble contaminants for analysis - The Bresle method; and*
- .2 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.*
- 21 *Both of actual specimen data and manufacturer's requirement/recommendation.*
- 22 *See footnote 12 above*

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(cont)

- 23 See footnote 16 above
- 24 Six equally distributed measuring points are used on panels size 150 mm x 100 mm.
- 25 See footnote 18 above
- 26 *It should be noted that the test is valid irrespective of production site, meaning that no individual testing of product from different production sites is required.*
- 27 See footnote 20 above
- 28 *Both of actual specimen data and manufacturer's requirement/recommendation."*

Interpretation

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

End of Document
