APPLICATION AND INTERPRETATION OF PERFORMANCE STANDARD
FOR PROTECTIVE COATINGS
FOR CARGO OIL TANKS OF CRUDE OIL TANKERS

2015

Publications P (Additional Rule Requirements) issued by Polski Rejestr Statków
complete or extend the Rules and are mandatory where applicable
Publication No. 109/P – Application and Interpretation of Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers – 2015, was approved by PRS Board on 19 June 2015 and enters into force on 1 July 2015.

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1 GENERAL

1.1 Application

1.1.1 The requirements specified in Publication No. 109/P – Application and Interpretation of Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers apply to:
- crude oil tankers subject to the requirements of Common Structural Rules;
- crude oil tankers of 5,000 gross tonnage and upwards, contracted for construction on or after 1 January 2013.

1.2 Definitions

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

90/10 Practice – the practice means that 90% of all thickness measurements shall be greater than or equal to NDFT and none of the remaining 10% measurements shall be below 90% of the value of NDFT.

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.

Dew Point – the temperature at which air is saturated with moisture.

DFT – dry film thickness.

Dust – loose particle matter present on a surface prepared for painting, arising from blast-cleaning or other surface preparation processes, or resulting from action of the environment.

Edge Grinding – the treatment of edge before secondary surface preparation.

GOOD Condition – the 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 are less than 20% of edges or weld lines in the area under consideration.

Hard Coating – coating that chemically converts during its curing process or non-convertible air drying coating which may be used for maintenance purposes. Hard coating can be either inorganic or organic.

NDFT – nominal dry film thickness.

Primer Coat – the first coat of the coating system applied in the shipyard after shop primer application.

PSPC – performance standard for protective coatings according to the Resolution MSC.288(87).

PSPC-COT – performance standard for protective coatings for cargo oil tanks of crude oil tankers according to the Resolution MSC.288(87)

Shop Primer – the prefabrication primer coating applied to steel plates, often in automatic plants (and before the first coat of a coating system).

Stripe Coating – the painting of edges, welds, hard to reach areas, etc., to ensure good paint adhesion and proper paint thickness in critical areas.

Target Useful Life – the target value, in years, of durability for which the coating system is designed.

Technical Data Sheet – the paint manufacturer’s Product Data Sheet which contains the detailed technical instruction and information relevant to the coating and its application.

WTF – wet film thickness
1.3 Reference Documents

Standards


(8) ISO 2811-1: Paints and varnishes – Determination of density.

(9) ISO 4628-1: 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.


(12) NACE SP0508-2010 Item no. 21134 Standard practice methods of validating equivalence to ISO 8502-9 on measurement of the levels of soluble salts.

(13) NORSOK STANDARD M-501 edt.6, 2012 Surface preparation and protective coating.

Other Documents

(I) IMO Resolution MSC.288(87) Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers;

(II) IMO MSC.1/Circ. 1479 Unified Interpretation on the Application of the Performance Standard for Protective Coating for Cargo Oil Tanks of Crude Oil Tankers.
2 PROTECTIVE COATINGS FOR CARGO OIL TANKS OF CRUDE OIL TANKERS

2.1 Application

2.1.1 Chapter 2 provides technical requirements for the minimum standard for protective coatings to be applied in cargo oil tanks during the construction of new crude oil tankers.

2.2 General Principles

2.2.1 The ability of the coating system to reach its target useful life depends on the type of the coating system, steel preparation, operating environment, application and coating inspection and maintenance. All these aspects contribute to the good performance of the coating system.

2.2.2 Inspections of surface preparation and coating processes shall be agreed and signed by shipyard, shipowner and coating manufacturer, and shall be presented to PRS 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. Clear evidence of these inspections shall be reported and included in the Coating Technical File (CTF).

2.2.3 When considering the PSPC-COT provided in sub-chapter 2.4 of this Publication, the following shall be taken into account:

.1 it is essential that specifications, procedures and the various different steps in the coating application process (including, but not limited to, surface preparation) are strictly applied by the shipbuilder in order to prevent premature decay and/or deterioration of the coating system;
.2 the coating performance can be improved by adopting measures at the ship design stage such as reducing scallops, using rolled profiles, avoiding complex geometric configurations and ensuring that the structural configuration permits easy access for tools and to facilitate cleaning, drainage and drying of the space to be coated; and
.3 the coating performance standard presented in this Publication is based on experience from manufacturers, shipyards and ship operators; it is not intended to exclude suitable alternative coating systems, providing a performance at least equivalent to that specified in the PSPC-COT is demonstrated. Acceptance criteria for alternative systems are provided in sub-chapter 2.9.

2.3 Coating Technical File (CTF)

2.3.1 Coating Technical File (CTF) shall contain specification of the coating system applied to cargo oil tanks of crude oil tankers, record of the shipyard’s and shipowner’s coating work, detailed criteria for coating selection, job specifications, inspection, maintenance and repair.

2.3.2 The Coating Technical File on new ship construction stage shall be delivered by the shipyard and shall contain at least the following items:

.1 a copy of Statement of Compliance or Type Approval Certificate;
.2 a copy of Technical Data Sheets of coating system, including:
  a. product name and identification mark and/or number;
  b. materials, components and composition of the coating system, colours;
  c. minimum and maximum dry film thickness;
  d. application methods, tools and/or machines;
  e. condition of surface to be coated (de-rusting grade, cleanness, profile, etc.)
  f. environmental limitations (temperature and humidity);
.3 shipyard work records of coating application, including:
  a. applied actual areas (in square meters) of coating in each cargo oil tank;
  b. applied coating system,
  c. time of coating, thickness, number of layers, etc.;
  d. ambient conditions during coating;
  e. details of surface preparation.
.4 procedures for inspection and repair of coating system during ship construction;
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 1 for the templates of Daily Log and Non-conformity Report);

shipyard’s verified inspection report, including:
  a. completion date of inspection;
  b. results of inspection;
  c. remarks (if given);
  d. inspector signature;

procedures for in-service maintenance and repair of the coating system.

2.3.3 The CTF shall contain records of in-service maintenance, performed repairs and partial re-coating activities.

2.3.4 The CTF shall be kept on board and maintained throughout the life of the ship.

2.3.5 Procedure for Coating Technical File Review

2.3.5.1 The shipyard is responsible for compiling the CTF either in paper or electronic format, or a combination of the two.

2.3.5.2 The CTF shall contain all the information, as described above, of the PSPC and the inspection of surface preparation and the coating processes agreement.

2.3.5.3 The CTF shall be reviewed for content in accordance with the PSPC-COT.

2.3.5.4 Any deviations found shall be raised with the shipyard, which is responsible for identifying and implementing the corrective actions.

2.3.5.5 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 PRS.

2.3.6 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.

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

2.4 Coating Standard

2.4.1 The requirements specified in this Publication are intended to provide a target useful coating life of 15 years, which is considered to be the time period, from initial application, over which the coating system will remain in “GOOD” condition. The actual useful life will vary, depending on numerous variables including actual conditions encountered in service.

2.4.2 Protective coatings for cargo oil tanks applied during the construction of new crude oil tankers shall at least fulfil the requirements of this Publication.

2.4.3 An epoxy-based coating systems meeting test and physical properties (in accordance with Table 1, section 1.3 – Coating test) shall be documented and a Type Approval Certificate or Statement of Compliance shall be provided.

2.4.4 The following areas (of application) of cargo oil tanks of new crude oil tankers are the minimum areas that shall be protected in accordance with the requirements specified in Chapter 2 of this Publication:

1. Deckhead with complete internal structure, including brackets connecting to longitudinal and transverse bulkheads. In tanks with ring frame girder construction, the underdeck transverse framing to be coated down to level of the first tripping bracket below the upper faceplate.
.2 Longitudinal and transverse bulkheads to be coated to the uppermost means of access level. The uppermost means of access and its supporting brackets to be fully coated.

.3 On cargo tank bulkheads without an uppermost means of access the coating to extend to 10% of the tanks height at centreline but need not extend more than 3 m down from the deck.

.4 Flat inner bottom and all structure to the height of 0.3 m above inner bottom to be coated.

TYPICAL SECTION OF V.L.C.C.

- Marked port only to be painted

2.4.5 The requirements specified in this Publication cover 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.

2.4.6 It is recommended that this Publication is applied, to the extent practicable, to those portions of means of access provided for inspection within the areas specified in subsection 2.4.4 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., shall fully comply with the PSPC-COT standard when located within the coated areas.

2.4.7 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 2.4.6, above.

2.5 Basic Coating Requirements

2.5.1 The requirements for protective coating systems to be applied at ship construction for the cargo oil tanks of crude oil tankers meeting the performance standard specified in paragraph 2.4.1 and listed in Table 1.

2.5.2 Coating manufacturers shall provide a specification of the protective coating system to fulfil the requirements specified in Table 1 and the operating environment.

2.5.3 The Technical Data Sheet, as well as Type Approval Certificate and Statement of Compliance for the protective coating system shall be submitted to PRS for verification.
2.5.4 The shipyard shall apply the protective coating in accordance with the verified Technical Data Sheet and its own verified application procedures.

Table 2.5.1
Basic coating system requirements for cargo oil tanks of crude oil tankers

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Coating system design</td>
<td>The coating system shall be selected having regard to the service conditions and planned maintenance. The following aspects, among other things shall be considered:</td>
</tr>
<tr>
<td>.1 Selection of the coating system</td>
<td>The coating system shall be selected having regard to the service conditions and planned maintenance. The following aspects, among other things shall be considered:</td>
</tr>
<tr>
<td></td>
<td>.1 location of space relative to heated surfaces,</td>
</tr>
<tr>
<td></td>
<td>.2 frequency of cargo operations,</td>
</tr>
<tr>
<td></td>
<td>.3 required surface conditions,</td>
</tr>
<tr>
<td></td>
<td>.4 required surface cleanliness and dryness,</td>
</tr>
<tr>
<td></td>
<td>.5 supplementary cathodic protection, if any (where coating is supplemented by cathodic protection, the coating shall be compatible with the cathodic protection system),</td>
</tr>
<tr>
<td></td>
<td>.6 permeability of the coating and resistance to inert gas and acids,</td>
</tr>
<tr>
<td></td>
<td>.7 appropriate mechanical properties (flexibility, impact resistance).</td>
</tr>
<tr>
<td></td>
<td>The coating manufacturer shall supply products with documented satisfactory performance records and technical data sheets. The manufacturers shall also be capable of rendering adequate technical assistance. Performance records, technical data sheet and any manufacturer’s technical assistance provided shall be recorded in the CTF.</td>
</tr>
<tr>
<td></td>
<td>Coatings for application underneath sun-heated decks or on bulkheads forming boundaries of heated spaces shall be able to withstand repeated heating and/or cooling without becoming brittle.</td>
</tr>
<tr>
<td></td>
<td>Coatings for application underneath sun-heated decks or on bulkheads forming boundaries of heated spaces shall be able to withstand repeated heating and/or cooling without becoming brittle.</td>
</tr>
<tr>
<td></td>
<td>.2 Coating type</td>
</tr>
<tr>
<td></td>
<td>The use of other coating systems is subject to special consideration of PRS.</td>
</tr>
<tr>
<td></td>
<td>A multi-coat system with each coat of contrasting colour is recommended.</td>
</tr>
<tr>
<td></td>
<td>The top coat shall be of a light colour in order to facilitate in-service inspection.</td>
</tr>
<tr>
<td></td>
<td>Consideration shall be given to the use of enhanced coatings in way of suction bellmouths and heating coil downcomers.</td>
</tr>
<tr>
<td></td>
<td>Consideration shall be given to the use of supplementary cathodic protection where there may be galvanic issues.</td>
</tr>
<tr>
<td></td>
<td>.3 Coating test</td>
</tr>
<tr>
<td></td>
<td>Other coating systems shall be subjected to laboratory tests according to test programme agreed with PRS.</td>
</tr>
<tr>
<td></td>
<td>.4 Job specification</td>
</tr>
<tr>
<td></td>
<td>Wet film thickness shall be regularly checked during application for quality control by the Builder. PSPC-COT does not state who shall 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, sub-chapter 2.7.</td>
</tr>
<tr>
<td></td>
<td>Stripe coats shall be applied as a coherent film showing good film formation and no visible defects. The application method employed shall 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.</td>
</tr>
<tr>
<td></td>
<td>Each main coating layer shall be appropriately cured before application of the next coat, in accordance with the coating manufacturer’s recommendations.</td>
</tr>
<tr>
<td></td>
<td>Job specifications shall include the dry-to-recoat times and walk-on time stated by the manufacturer.</td>
</tr>
<tr>
<td></td>
<td>Surface contaminants such as rust, grease, dust, salt, oil, etc., shall be removed prior to painting by proper method according to the paint manufacturer’s recommendations.</td>
</tr>
<tr>
<td></td>
<td>Abrasive inclusions embedded in the coating shall be removed.</td>
</tr>
<tr>
<td></td>
<td>.5 NDFT (nominal total dry film thickness)</td>
</tr>
<tr>
<td></td>
<td>Care shall be taken to avoid increasing the DFT in an exaggerated way.</td>
</tr>
<tr>
<td></td>
<td>Wet film thickness shall be regularly checked during application.</td>
</tr>
<tr>
<td></td>
<td>Thinners shall be limited to those types and quantities recommended by the paint manufacturer.</td>
</tr>
</tbody>
</table>
### 2 PSP (primary surface preparation)

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1</td>
<td>Blasting and profile</td>
</tr>
<tr>
<td>.2</td>
<td>Water soluble salts limit equivalent to NaCl</td>
</tr>
<tr>
<td>.3</td>
<td>Shop primer</td>
</tr>
</tbody>
</table>

### 3 Secondary surface preparation

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1</td>
<td>Steel condition</td>
</tr>
<tr>
<td>.2</td>
<td>Surface treatment</td>
</tr>
<tr>
<td>.3</td>
<td>Surface treatment after erection</td>
</tr>
<tr>
<td>.4</td>
<td>Profile requirements</td>
</tr>
</tbody>
</table>

1,3 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.
.5 Dust
Dust quantity rating ‘1’ for dust size class ‘3’, ‘4’ or ‘5’.
Lower dust size classes shall be removed if visible on the surface to be coated without magnification.

.6 Water soluble salts
limit equivalent to NaCl after blasting/grinding
≤ 50 mg/m² of sodium chloride.
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/m² 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.

.7 Contamination
No oil contamination.
Paint manufacturer's recommendations shall be followed regarding any other contamination between coats.

4 Miscellaneous
.1 Ventilation
Adequate ventilation is necessary for the proper drying and curing of coating.
Ventilation shall be maintained throughout the application process and for a period after application, as recommended by the coating manufacturer.

.2 Environmental conditions
Coating shall be applied under controlled humidity and surface conditions, in accordance with the manufacturer’s specifications.
In addition coating shall not be applied, when:
.1 the relative humidity is above 85%, or
.2 the surface temperature is less than 3 °C above the dew point,
.3 any other requirements of the manufacturer are not being fulfilled.

.3 Testing of coating
Destructive testing shall be avoided.
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.
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 CTF 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 Definitions of the PSPC-COT, paragraph 1.2.

.4 Repair
Any defective areas, e.g., pinholes, bubbles, voids, etc., shall be marked up and appropriate repairs effected. All such repairs shall be re-checked and documented.

2.6 Coating System Approval
The results from pre-qualification tests of the coating system (see Table 2.5.1, item 1.3) shall be documented and, if found satisfactory, Type Approval Certificate shall be issued by PRS (independent of coating manufacturer).

2.7 Coating Inspection Requirements
2.7.1 Coatings inspection shall be performed by a qualified coating inspector certified to NACE Coating Inspector Level 2 or FROSIO Inspector Level III or equivalent as verified by PRS.

2.7.2 Coating inspectors shall inspect surface preparation and coating application during the coating process by performing, as a minimum, those inspection items specified in table 2. 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 process. Representative structural members shall be non-destructively examined for coating thickness. The coating inspector shall verify that appropriate collective measurements have been performed.

4 NACE – The National Association of Corrosion Engineers.
2.7.3 The results from the inspection shall be recorded by the inspector in the Daily Log or Non-conformity Report (Annex 1) and shall be included in the Coating Technical File (CTF).

Table 2.7.3
Inspection items

<table>
<thead>
<tr>
<th>Construction stage</th>
<th>Inspection items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary surface preparation</td>
<td>1 The surface temperature of steel, the relative humidity and the dew point shall be measured and recorded before the start of the blasting process and at times of sudden changes in weather.</td>
</tr>
<tr>
<td></td>
<td>2 The surface of steel plates shall be tested for soluble salt and checked for oil, grease and other contamination.</td>
</tr>
<tr>
<td></td>
<td>3 The cleanliness of the steel surface shall be monitored in the shop-primer application process.</td>
</tr>
<tr>
<td></td>
<td>4 The shop-primer material shall be confirmed to meet the requirements of item 2.3, Table 2.5.1.</td>
</tr>
<tr>
<td>Thickness</td>
<td>If compatibility with the main coating system has been declared, then the thickness and curing of the zinc silicate shop-primer shall be confirmed to conform to the specified values.</td>
</tr>
<tr>
<td>Block assembly</td>
<td>1 After completing construction of the block and before secondary surface preparation starts, a visual inspection of steel surface treatment, including edge treatment shall be performed. Any oil, grease or other visible contamination shall be removed.</td>
</tr>
<tr>
<td></td>
<td>2 After blasting/grinding/cleaning and prior to coating, a visual inspection of the prepared surface shall be performed. On completion of blasting and cleaning and prior to the application of the first coat of the system, the steel surface shall be tested for levels of remaining soluble salts in at least one location per block.</td>
</tr>
<tr>
<td></td>
<td>3 The surface temperature, the relative humidity and the dew point shall be monitored and recorded during the coating application and curing.</td>
</tr>
<tr>
<td></td>
<td>4 Inspection shall be performed of the steps in the coating application process, mentioned in Table 1.</td>
</tr>
<tr>
<td></td>
<td>5 DFT measurements shall be taken to prove that the coatings have been applied to the thickness as specified.</td>
</tr>
<tr>
<td>Erection</td>
<td>1 Visual inspection of steel surface condition, surface preparation and verification of conformance to other requirements in table 1 and the agreed specification shall be performed.</td>
</tr>
<tr>
<td></td>
<td>2 The surface temperature, the relative humidity and the dew point shall be measured and recorded before coating starts and regularly during the coating process.</td>
</tr>
<tr>
<td></td>
<td>3 Inspection shall be performed of the steps in the coating application process, mentioned in Table 2.5.1.</td>
</tr>
</tbody>
</table>

2.8 Coating Verification Requirements

The following shall be performed by PRS prior to reviewing the Coating Technical File for the ship subject to this Publication:

1. check that the Technical Data Sheet and Statement of Compliance or Type Approval Certificate comply with the Publication;
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 sub-chapter 2.7;
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.

2.9 Alternative Coating Systems

2.9.1 All coating systems that are not epoxy-based systems applied according to the Table 2.5.1 are defined as alternative systems.

2.9.2 Even though this Publication 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.
2.9.3 Acceptance of alternative systems will be subject to documented evidence that they ensure corrosion prevention performance at least equivalent to that required in the present *Publication*, by either:
- .1 (Method A: see paragraph 3.2 testing according to this *Publication*; or
- .2 (Method B: see paragraph 3.3 five years’ field exposure with documentary evidence of continuous trading with crude oil cargoes. The coating condition is not less than “GOOD” after five years.

3 PROCEDURE FOR COATING SYSTEM APPROVAL

3.1 Procedure

3.1.1 *Type Approval Certificate* showing compliance with the PSPC – COT shall be issued if the results of either method A+C or B+C are found satisfactory by PRS.

3.1.2 *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 undergone the cross over test in a laboratory meeting the requirements in sub-chapter 3.2 below.

3.1.3 The documents required to be submitted are identified in the following paragraphs, in addition for all type approvals the *Technical Data Sheet* showing all the information in accordance with PSPC-COT and paragraph 2.3.2 is required.

3.1.4 Winter type epoxy requires separate prequalification test including shop primer compatibility test according to PSPC – *Test Procedures for Coating Qualification for Cargo Oil Tanks of Crude Oil Tankers* (see Chapter 4 of this *Publication*). Winter and summer type coating are considered different unless infrared (IR) identification and specific gravity (SG) demonstrates that they are the same.

3.2 Method A: Laboratory Test

3.2.1 Coating pre-qualification test shall be performed by the test laboratory which is recognized by PRS.

3.2.2 Results from satisfactory pre-qualification tests (PSPC-COT, Table 1, issue 1.32) of the coating system shall be documented according to the guidelines specified in this *Publication* and submitted to PRS.

3.2.2.1 Type Approval tests shall be performed for the epoxy-based system with the stated shop primer in accordance with the PSPC – *Test Procedures for Coating Qualification for Cargo Oil Tanks of Crude Oil Tankers* (Chapter 4 of this *Publication*). If the tests are satisfactory, *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.

3.2.2.2 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 issues 2.3 and 3.2, and have been tested according to the immersion test of PSPC-COT, known as the “Crossover Test”. If the test or tests are satisfactory, *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.

3.2.2.3 Alternatively the epoxy can be tested without shop primer on bare prepared steel to the requirements of the PSPC-COT (*Test Procedures for Coating Qualification for Cargo Oil Tanks of Crude Oil Tankers*; paragraph 4 of this *Publication*). If the test or tests are satisfactory, *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 performed 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.

3.2.2.4 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 manufacturer to inform class immediately of any changes to the formulation.

3.2.2.5 For the coating pre-qualification test, the measured average DFT on each prepared test panels shall not exceed a nominal DFT (NDFT) of 320 μm plus 20% unless a paint manufacturer specifies a NDFT greater than 320 μm. In the latter case, 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 in accordance with the requirements specified in Chapter 4—PSPC-COT.

The measured DFT shall comply with the 90/10 rule and the maximum DFT shall always be below the maximum DFT value specified by the manufacturer.

3.3 Method B: 5 Years Field Exposure

3.3.1 Coating manufacturer’s records which shall at least include the information indicated in 3.3.2 are subject to examination to confirm that the coating system has 5 years field exposure, and the current product is the same as that being assessed.

3.3.2 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 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,
- Specific Gravity (SG) and Infra Red (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 manufacturer confirming the readings for the current product are the same as those of the original.

3.3.3 Either class survey records from PRS or a joint (coating manufacturer/PRS) survey of all ballast tanks of a selected vessel shall be performed for the purpose of verification of compliance with the requirements of paragraphs 3.3.1 and 3.3.7. The reporting of the coating condition in both cases shall be in accordance with Publication No. 58/P — Hull Surveys of Double Hull Oil Tankers and Publication No. 36/P Hull Survey of Oil Tankers.

3.3.4 The selected ship shall have cargo tanks in regular use, of which:
- at least one tank is exposed to minimum temperature of 60°C ± 3°C,
- for field exposure the ship shall 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 if crude cargoes.

3.3.5 In the case that the selected ship does not meet the requirements specified in 3.3.4, the limitations shall be clearly stated on the type approval certificate.

3.3.6 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.

3.3.7 All cargo tanks shall be in GOOD condition excluding mechanical damages, without touch up or repair in the prior 5 years.
3.3.8 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*.

3.3.9 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*.

3.3.10 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 manufacturer to inform class immediately of any changes to the formulation.

3.4 **Method C: Coating manufacturer**

3.4.1 The coating/shop primer manufacturer shall fulfil the requirements specified in chapters 3, 4, 5, and 6 of *Publication No 51/P.– Procedural Requirements for Laboratories* and paragraphs 3.4.2 to 3.4.7 below, what is subject to PRS verification.

3.4.2 Coating Manufacturers:

   .1 Extent of Engagement – Production of coating systems in accordance with PSPC-COT and this *Publication*.

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

   .3 The coating manufacturer shall provide PRS with the following information:
      - a detailed list of the production facilities,
      - clearly stated names and location of raw material suppliers,
      - 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.

   .4 Inspection and audit of the manufacturer’s facilities will be based on the requirements of the PSPC-COT.

   .5 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 shall 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.

   .6 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 PRS.

   .7 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.

   .8 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.

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

3.4.3 All raw material supply must be accompanied by the supplier’s *Certificate of Conformance*. The certificate will include all requirements listed in the coating manufacturer’s QC system.
3.4.4 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.

3.4.5 Drums must be clearly marked with the details as described on the Type Approval Certificate.

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

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

3.4.8 In the case that a manufacturer wishes to have products which are manufactured in different locations under the same name, 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.

3.4.9 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 manufacturer to inform class immediately of any changes to the formulation. Failure to inform class of an alteration to the formulation results in the cancellation of the certificates for that manufacturer’s products.

4 TEST PROCEDURES FOR COATING QUALIFICATION FOR CARGO OIL TANKS

4.1 Introduction

4.1.1 The tank-top and deck-head shall be applied with coating systems that have passed the full test protocol as described below.

4.1.2 Coating specification shall be defined as the specification of coating systems which include the type of coating system, steel preparation, surface preparation, surface cleanliness, environmental conditions, application procedure, inspection and acceptance criteria.

4.1.3 It is acknowledged that crude oil cargo tank on board a ship is exposed to two very different environmental conditions.

4.1.4 When the cargo tank is loaded there are three distinct vertical zones:

.1 Lowest part, and horizontal parts on stringer decks, etc., exposed to water that can be acidic and sludge that can contain anaerobic bacteria.

.2 Mid part where the oil cargo is in contact with all immersed steel.

.3 Vapour space where the air is saturated with various vapours from the loaded cargo tank such as H₂S, CO₂, SO₂, water vapour and other gases and compounds from the inert gas system.

4.1.5 When the tank is in a ballast condition:

.1 Lowest part and horizontal parts on stringer decks, etc., exposed to cargo residues and water that can be acidic and sludge that can contain anaerobic bacteria.

.2 Tank space where the air contains various vapours from the crude oil residues such as H₂S, CO₂, SO₂, water vapour and other gases and compounds from the inert gas system.

4.2 Testing

4.2.1 The tests herein are designed to simulate, as far as practicable, the two main environmental conditions to which the crude oil cargo tank coating will be exposed. The coating shall be validated by the following tests: Gas-tight Cabinet Test (see Chapter 5), simulating the vapor phase of the loaded tank, Immersion test (see Chapter 6) simulating the loaded condition of the crude oil tank.
4.3 Test Gas Composition

4.3.1 The test gas is based on the composition of the vapour phase in crude oil tanks, except that the hydrocarbon components are not included as these have no detrimental effect on epoxy coatings such as those used in cargo oil tanks.

4.3.2 The test gas composition is as follows:
- N\textsubscript{2} 83 ± 2 per cent by volume of dry gas
- CO\textsubscript{2} 13 ± 2 per cent by volume of dry gas
- O\textsubscript{2} 4 ± 1 per cent by volume of dry gas
- O\textsubscript{2} 300 ± 20 ppm
- H\textsubscript{2}S 200 ± 20 ppm

4.4 Test Liquid

4.4.1 Crude oil is a complex chemical material which is not stable over time when stocked. Crude oils can also vary in composition over time. In addition the use of crude oil has proven to create practical and HSE barriers for the involved testing institutes. To overcome this, a model immersion liquid is used to simulate crude oil.

4.4.2 The formulation of this crude oil model system is given below:
- Start with distillate Marine Fuel, DMA Grade density at 15ºC: maximum 890 kg/m\textsuperscript{3}, viscosity of maximum 6 mm\textsuperscript{2}/s at 40ºC;
- Add naphthenic acid up to an acid number of 2.5 ± 0.1 mg KOH/g;
- Add benzene/toluene (1:1 ratio) up to a total of 8.0 ± 0.2% w/w of the DMA;
- Add artificial seawater up to a total of 5.0 ± 0.2% w/w to the mixture;
- Add H\textsubscript{2}S dissolved in a liquid carrier (in order to get 5 ± 1 ppm w/w H\textsubscript{2}S in the total test liquid);
- Thoroughly mix the above constituents immediately prior to use; and
- Once the mixture is completed, it shall be tested to confirm the mixture complies with the test mixture concentrations.

To prevent the risk of H\textsubscript{2}S release into the test facility, it is recommended the a stock solution be used for steps 1 to 4, and then the test containers be filled and the test solution be completed following steps 5 and 6.

5 GAS-TIGHT CABINET TEST

5.1 Test condition

5.1.1 The vapour test shall be performed in a gas-tight cabinet. The dimensions and design of the air tight gas cabinet are not critical, provided the requirements of subparagraphs .6 to .10 below are met. The test gas is designed to simulate the actual crude oil cargo tank environment in ballast condition as well as the vapour conditions of the loaded tank.

- The exposure time is 90 days.
- Testing shall be performed using duplicate panels; a third panel shall be prepared and stored at ambient conditions to act as a reference panel during final evaluation of the test panels.
- The size of each test panel is 150 mm × 100 mm × 3 mm.
- The panels shall be treated and the coating system applied in accordance with Table 2.5.1.
- The zinc silicate shop primer, when used, shall be weathered for at least 2 months and cleaned by low pressure fresh water washing. The exact method of shop primer preparation before being over coated shall be reported, and the judgment issued for that specific system. The reverse side and edges of the test piece shall be coated appropriately, in order not to influence the test results.
- Inside the gas-tight cabinet a trough shall be present. This trough shall be filled with 2 ± 0.2 l of water. The water in the trough shall be drained and renewed prior to each time the test gas is refreshed.
The vapour spaces inside the gas-tight cabinet shall be filled with a mixture of test gas. The cabinet atmosphere shall be maintained over the period of the test. When the gas is outside the scope of the test method, it shall be refreshed. The monitoring frequency and method, and the date and time for refreshing the test gas, shall be in the test report.

The atmosphere in the test cabinet shall at all times be 95 ± 5% relative humidity.

Temperature of the test atmosphere shall be 60 ± 3°C.

A stand for the test panels shall be made of a suitable inert material to hold the panels vertically spaced at least 20 mm between panels. The stand shall be positioned in the cabinet to ensure the lower edge of the panels is at least 200 mm above the height of the water and at least 100 mm from the walls of the cabinet. If two shelves are in the cabinet, care shall be taken to ensure solution does not drip on to the lower panels.

5.2 Test result

5.2.1 Prior to testing the following measured data of each coating composing the coating system, including the zinc silicate shop primer when used under the coating system, shall be reported:

1. infrared (IR) identification of the base and hardener components of the coating;
2. specific gravity of the base and hardener components of the paint (in acc. with ISO 2811-1/4 - Paints and varnishes. Determination of density);
3. mean dry film thickness (DFT) (by using a template, panel size 150 mm x 100 mm).

5.2.2 After completion of the test duration, the panels shall be removed from the cabinet and rinsed with warm tap water. The panels shall be dried by blotting with absorbent paper and, then, evaluated for rust and blistering within 24 h of the end of the test.

5.2.3 After testing, blisters and rust shall be reported, accordingly with:

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;

5.3 Acceptance criteria

5.3.1 The test results based on paragraph 5.2 above shall satisfy the following criteria, the poorest performing of the duplicate test panels shall be used in the report:

<table>
<thead>
<tr>
<th>Item</th>
<th>Acceptance criteria for epoxy-based systems</th>
<th>Acceptance criteria for alternative systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blisters on panel</td>
<td>No blisters</td>
<td>No blisters</td>
</tr>
<tr>
<td>Rust on panel</td>
<td>Ri 0 (0%)</td>
<td>Ri 0 (0%)</td>
</tr>
</tbody>
</table>

5.3.2 When evaluating test panels, blistering or rust within 5 mm of the panel edge shall be ignored.

5.4 Test report

5.4.1 The test report shall include the information on:

1. coating manufacturers' name and manufacturing site;
2. dates of test;
3. product name/identification of each coat and, where applicable, zinc silicate, shop primer;
4. batch numbers of each component of each product;
5. details of surface preparation of steel panels, before shop primer, application, and treatment of the shop primer before over coating where relevant and at a minimum including the following:  
   a. surface treatment, or treatment of weathered shop primer, and any other important information on treatment influencing the performance;
b. water soluble salt level measured on the steel prior to application of the shop primer; 

details of coating system, including the following:

a. zinc silicate shop primer if relevant, its secondary surface pre-treatment and condition under which applied, weathering period;

b. number of coats, including the shop primer, and thickness of each;

c. mean dry film thickness (DFT) prior to testing;

d. thinner if used;

e. humidity;

f. air temperature;

g. steel temperature;

h. details of schedule for refreshing the test gas;

test results according to the paragraph 5.2 above; and

results according to the paragraph 5.3 above.

6 IMMERSION TEST

6.1 Test condition

6.1.1 The immersion test is developed to simulate the conditions in a crude oil tank in loaded condition.

1 The exposure time is 180 days.

2 The test liquid shall be made as per item 6 in the Standard – ISO 2812-1.

3 The test liquid shall be added to a container with an inside flat bottom until a column of the test liquid of height of 400 mm is reached, resulting in an aqueous phase of 20 mm. Any other alternative test set-up, using an identical test liquid, which will also result in the immersion of the test panel in 20 mm of the aqueous phase, is also accepted. This can be achieved by using, for instance, inert marbles.

4 The temperature of the test liquid shall be 60 ± 2°C and shall be uniform and maintained constant with recognized methods such as water or oil bath or air circulation oven capable of keeping the immersion liquid within the required temperature range.

5 Test panels shall be positioned vertically and fully immersed during the test.

6 Testing shall be performed using duplicate panels.

7 Inert spacers which do not cover the test area shall be used to separate test panels.

8 The size of each test panel is 150 mm x 100 mm x 3 mm.

9 The panels shall be treated according to the PSPC (Table 2.5.1, item 1.2) and the coating system applied according to Table 2.5.1, items: 1.4 and 1.5.

10 The zinc silicate shop primer, when used, shall be weathered for at least 2 months and cleaned by low pressure fresh water washing. The exact method of shop primer preparation before being over coated shall be reported, and the judgment issued for that specific system. The reverse side, and edges, of the test piece shall be coated appropriately, in order not to influence the test results.

11 After the full immersion test period is completed the panels shall be removed from the test liquid and wiped with dry clean cloth before evaluation of the panels.

12 Evaluation of the test panels shall be done within 24 h after completion of the test.

6.2 Test results

6.2.1 Prior to testing, the following measured data of each coating composing the coating system, including the zinc silicate shop primer when used under the coating system, shall be reported:

- infrared (IR) identification of the base and hardener components of the coating;

---

6 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

- specific gravity of the base and hardener components of the paint\(^7\); and
- mean dry film thickness (DFT) (by using a template panel size 150 mm x 100 mm).

6.2.2 After testing, the following measured data shall be reported: blisters and rust\(^8\).

6.3 Acceptance criteria

6.3.1 The test results based on the paragraph 6.2 shall satisfy the following criteria, the poorest performing of the duplicate test panels shall be used in the report:

<table>
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<td>Ri 0 (0%)</td>
<td>Ri 0 (0%)</td>
</tr>
</tbody>
</table>

6.3.2 When evaluating test panels, blistering or rusting within 5 mm of the panel edge shall be ignored.

6.4 Test report

6.4.1 The test report shall include the following information:

1. coating manufacturers’ name and manufacturing site;
2. dates of test;
3. product name/identification of each coat and, where applicable, zinc silicate shop primer;
4. batch numbers of each component of each product;
5. details of surface preparation of steel panels, before shop primer application, and treatment of the shop primer before over coating where relevant and at a minimum including the following:
   a. surface treatment, or treatment of weathered shop primer, and any other important information on treatment influencing the performance; and
   b. water soluble salt level measured on the steel prior to application of the shop primer\(^9\)
6. details of coating system, including the following:
   a. zinc silicate shop primer if relevant, its secondary surface pre-treatment and condition under which applied, weathering period;
   b. number of coats, including the shop primer, and thickness of each;
   c. mean dry film thickness (DFT) prior to testing;
   d. thinner if used;
   e. humidity;
   f. air temperature;
   g. steel temperature;
7. test results according to the paragraph 6.2 above; and
8. results according to the paragraph 6.3 above.

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\(^7\) Refer to standard ISO 2811-1/4:1997 - Paints and varnishes. Determination of density.

\(^8\) Refer to the following standards:

\(^9\) 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
7 PRECAUTIONS REGARDING THE USE OF DANGEROUS MATERIALS

7.1 Potentially hazardous materials

7.1.1 The test methods involve the use of materials that may be hazardous to health as follows:

.1 Sulphur Dioxide: Corrosive when wet, toxic if inhaled, causes burns, and is an irritant to eyes and respiratory system.

.2 Hydrogen Sulphide: Highly flammable (Flash point of -82°C), can form an explosive mixture with air, corrosive when wet, causes burns, has to be kept away from sources of ignition, irritant and asphyxiant, LTEL 5 ppm, STEL 10 ppm, higher concentrations can be fatal and have no odour. Repeated exposure to low concentrations can result in the sense of smell for the gas being diminished.

.3 Benzene: Highly flammable (Flash point of -11°C), can form an explosive mixture with air, toxic, carcinogenic, acute health risk.

.4 Toluene: Highly flammable (Flash point of 4°C), can form an explosive mixture with air, irritant, acute health risk, reprotoxin.

7.1.2 Special test apparatus and precautions may be required depending on the regulations in force in the country where the tests are performed.

7.1.3 Although some countries have no specific requirements preventing either of the test being carried out, it shall anyhow be required that

.1 a risk assessment of the working conditions is carried out;

.2 during the test period, the system shall be enclosed

.3 the environment shall be controlled particularly at the start and end of the tests, suitable air exhaust shall be available and personal protective equipment shall be worn.

8 PROCEDURE FOR REVIEW OF QUALITY CONTROL OF AUTOMATED SHOP PRIMER PLANTS

8.1 Procedure

8.1.1 It is recognized that the inspection requirements of PSPC-COT, described in sub-chapter 2.7, 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.

8.1.2 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.

8.1.3 When reviewing the Quality Control for automated shop primer plants the following procedures shall be included:

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

.2 Procedures recording the following: steel surface temperature, relative humidity, dew point.

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

8.1.4 Procedures for recording/measuring soluble salts.

8.1.5 Procedures for verifying thickness and curing of the shop primer conforms to the values specified in the Technical Specification.
9 PROCEDURE FOR ASSESSMENT OF COATING INSPECTORS’ QUALIFICATIONS

9.1 Inspector’s Qualifications

9.1.1 Coating inspectors required to perform inspections in accordance with the PSPC-COT, sub-chapter 2.7 shall be qualified to NACE Coating Inspector Level 2, FROSIO Inspector Level III, or an equivalent qualification. Equivalent qualifications are described in paragraph below.

9.1.2 However, only coating inspectors with at least 2 years relevant coating inspector experience and certified 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.

9.2 Equivalent Qualification

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

9.2.2 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.

9.2.3 Approved course shall have 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.

9.2.4 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 PRS.

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10 NACE – The National Association of Corrosion Engineers.
9.2.5 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 during new construction within the last 10 years, and
– has successfully completed the examination mentioned in paragraph 9.3.4.

9.3 Assistants to coatings Inspectors

9.3.1 If the coating inspector requires assistance from other persons to perform part of the inspections, those persons shall perform the inspections under the coating inspector’s supervision and shall be trained to the coating inspector’s satisfaction.

9.3.2 Such training shall 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.

9.3.3 Training records shall be available for verification.

10 PROCEDURE FOR VERIFICATION OF PSPC-COT APPLICATION

10.1 Coating compliance with PSPC-COT is subjected to PRS verification in accordance with sub-chapter 2.8.

10.1.1 Monitoring implementation of the coating inspection requirements, as called for in PSP-COT and this *Publication* (sub-chapter 2.8 item .5) of the PSPC-COT 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 PRS.

10.2 Any deviations found under 2.8 above, shall be raised initially with the coating inspector, who is responsible for identifying and implementing the corrective actions.

10.3 In the event that corrective actions are not acceptable to PRS or in the event that corrective actions are not closed out, then the shipyard shall be informed.

10.4 The Certificate of Class and Cargo Ship Safety Certificate or Cargo Ship Safety Construction Certificate shall not be issued until all required corrective actions have been closed out to the satisfaction of PRS.
## Example of Daily Log

<table>
<thead>
<tr>
<th><strong>DAILY LOG</strong></th>
<th><strong>Sheet No:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship:</td>
<td></td>
</tr>
<tr>
<td>Tank/ Hold No:</td>
<td></td>
</tr>
<tr>
<td>Part of structure:</td>
<td></td>
</tr>
</tbody>
</table>

### SURFACE PREPARATION

- **Method:**
- **Area (m²):**
- **Abrasive:**
- **Grain size:**
- **Surface temperature:**
- **Air temperature:**
- **Relative humidity (max):**
- **Dew point:**
- **Standard achieved:**
- **Rounding of edges:**
- **Comments:**

<table>
<thead>
<tr>
<th>Job No.:</th>
<th>Date:</th>
<th>Signature:</th>
</tr>
</thead>
</table>

### COATING APPLICATION

- **Method:**

<table>
<thead>
<tr>
<th>Coat No.</th>
<th>System</th>
<th>Batch No.</th>
<th>Date</th>
<th>Air temp.</th>
<th>Surf temp.</th>
<th>RH%</th>
<th>Dew point</th>
<th>DFT* meas.</th>
<th>Specified</th>
</tr>
</thead>
</table>

* measured minimum and maximum DFT. DFT readings to be attached to daily log.

- **Comments:**

<table>
<thead>
<tr>
<th>Job No.:</th>
<th>Date:</th>
<th>Signature:</th>
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</thead>
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25
Example of an Non-conformity Report

<table>
<thead>
<tr>
<th>NON-CONFORMANCE REPORT</th>
<th>Sheet No:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship:</td>
<td>Tank/ Hold No:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Part of structure:</td>
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<table>
<thead>
<tr>
<th>DESCRIPTION OF THE INSPECTION FINDINGS TO BE CORRECTED</th>
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</thead>
<tbody>
<tr>
<td>Description of findings:</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Reference document (daily log):</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Action taken:</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Job No.:</th>
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<tbody>
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