n December 2006, the International Maritime Organization (IMO) adopted a coating standard for ballast water tanks titled *Performance Standard for Protective Coatings for Dedicated Seawater Ballast Tanks in all Types of Ships and Double-Side Skin Spaces of Bulk Carriers*. This standard, usually abbreviated as IMO PSPC (Performance Standard for Protective Coatings), was introduced after significant ship damages (and even losses of ships) due to corrosion of ballast tanks, and thus is fundamentally intended not only to protect sea vessels but also to enhance the safety of maritime personnel.

Implementing the IMO PSPC for Ballast Water Tanks

By Thorsten Lohmann, Germanischer Lloyd AG
that are newly introduced, explain the implementation dates, identify major consequences for the shipbuilding industry, and report on reference documents that may help with implementation of the standard.

Background on the IMO Coating Standard

The IMO PSPC creates new requirements that both exceed and render more precisely each classification society’s own standard as well as the existing “Unified Requirement Z8,” issued by The International Association of Classification Societies (IACS) in 1990 and revised 1995. The new standard mandates significant changes from shipyards, ship owners, coating manufacturers, and classification societies.

The specific aim of the IMO PSPC is to achieve a target service life of 15 years for the seawater ballast tank coatings. Up to now, there is no regulation that specifies the intended lifetime of a coating system in seawater ballast tanks. The future will show whether this target can be obtained by following the new standard.

The standard is designed to achieve this service life by defining concrete requirements, limit values, and control mechanisms during the construction phase. Accordingly, the coating standard also gives clearly defined surface preparation limit values for cleanliness, surface profile, salt level, dust grade, and dry film thickness. Precepts are also given for selecting the appropriate coating system, application methods, and appropriate pre-qualification tests of coating systems.

Of course, each coating system is accompanied by the manufacturer’s limit values and application requirements. However, they are usually defined by the coating manufacturers with regard to specific characteristics of the coating systems and not by an international unified standard. Moreover, in practice, verification and inspection methods for these requirements and limit values are not currently regulated in a harmonized way and are fulfilled with varying diligence.

Three Key New Requirements of the IMO PSPC

Pre-Qualification and Certification of the Coating System

According to the IMO PSPC, coating systems have to be pre-qualified in a laboratory test before being applied. The laboratory test is clearly described in the standard, including the testing facility, the panels to be tested, the test duration, and the acceptance criteria to be achieved after the testing period. The testing facility simulates the conditions in a seawater ballast tank, including ship movement, adjacent heated tanks, and different levels of filling. In the testing tank, panels coated with different coating systems are positioned. One panel is assembled with a sacrificial anode and two panels have a U-bar welded on, whereas on the other panels, the coating is artificially scribed. The testing period in the tank is 180 days.

One panel will be exposed to dry heat for 180 days to simulate boundary plating between a heated bunker tank and a ballast tank in the double bottom. Furthermore, the coating on two test
Coating Inspectors
Another big issue addressed by the IMO PSPC is the implementation of verification, inspection, and documentation items. Those items are intended to ensure that the defined limits for surface preparation, salt and dust, dry film thickness, etc. are achieved. This means that new control persons, i.e., coating inspectors, have to be included in the shipyard’s quality control system.

Coating inspectors need a special qualification that must be verified by the class society administration or another recognized organization. The coating inspectors examine and document the complete coating process of the ballast water tanks. The inspection and documentation items of the coating inspectors are clearly defined in the standard.

Currently, there is a shortage of coating inspectors with the special training and qualification. This entails a huge effort for training and certification bodies to provide sufficient personnel in a timely manner.

Coating Technical File
Documentation of each step of the coating process must be filed in a Coating Technical File (CTF), the third major new aspect of the IMO standard.

Amongst other documents, the CTF will include the reports of the coating inspector, technical data sheets of the coating system, type approval certificates, and procedures for in-service maintenance and repair of coating systems.

The CTF must remain on board of the vessel and be maintained throughout the life of the vessel. This means that inspection and maintenance of the coating, including location and work specification, must be continuously recorded.

The PSPC offers no format for the CTF that can be delivered all the way from paper version to a sophisticated electronic program. The CTF must contain all relevant information upon the delivery of the vessel to its owners. After the vessel is delivered, the continuous
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that had their keels laid or that were at a similar stage of construction on or after January 1, 2009; or
• effective July 1, 2012, for ships delivered on or after July 1, 2012.

An exception from the above mentioned dates exists for tankers and bulk carriers built under the Common Structural Rules (CSR) released by IACS. For those types of vessels, the coating standard is already mandatory since its date of adoption, December 8, 2006. This date applies to the contracting date of vessels.

Impacts and Consequences for the Industry
Below is a list of impacts and consequences the new requirements in the IMO PSPC have for each involved party.

The qualified coating inspector can be employed either by the party involved in the coating process or be independent and must be agreed upon between the involved parties.

Owners
• Care of the Coating Technical File over the lifetime of the vessel

Shipyards
• Initial issuance of the Coating Technical File

Responsibility for the provision of the Coating Inspector (the Coating Inspector does not necessarily need to come from the shipyard)

Compliance with all technical and formal requirements

Administrations and/or Recognized Organizations (usually classification societies)
• Checking and type approving of coating systems
• Checking of Coating Inspector’s qualifications
• Monitoring of the Coating Inspector at the shipyard
• Checking and approval of the Coating Technical File

Coating Manufacturer
• Supply of coating systems that are in compliance with the IMO PSPC

Reference Documents for Assistance in Implementation

IACS Unified Interpretation for the SOLAS Convention (UI SC 223)
In June 2008, with a correction in July, 2008, IACS released a “Unified Interpretation” for the implementation of the IMO PSPC.

The Unified Interpretation is to be applied by IACS members and associates for ships subject to the relevant SOLAS Chapter, which makes the IMO PSPC mandatory when acting as a recognized organization, authorized by flag state administrations to act on their behalf, unless otherwise advised, as from July 1, 2008.

IACS UI SC 223 interprets specific points in the IMO PSPC for which involved parties may have different interpretations. Some technical parts of the IMO PSPC have already led to different interpretations of specific points even before the first vessels were built in...
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The following are some major points that required interpretation and on which SC 223 focuses.
• General principles like the content and review of the Coating Technical File
• Design of the coating system, especially the coating pre-qualification test and the condition for accepting already tested and type-approved systems
• Job specifications, such as measurement of the dry film thickness
• Primary and secondary surface preparation, concerning mainly the measurement of the salt content on the surface
• Procedure for assessing the Coating Inspectors’ qualifications, as well as the conditions for the employment of assistant inspectors
• Procedure for verifying the application of the IMO PSPC

IACS Procedural Requirement PR 34
In December 2006, with the adoption of the IMO PSPC, IACS released a ‘Procedural Requirement’ (PR) on the application of the IMO PSPC under IACS Common Structural Rules (CSR) for bulk carriers and tankers. In the meantime, PR 34 has been revised several times, with the latest revision (number three) in June 2008, and its first correction in July 2008.

The PR 34 was developed to define procedures for specific requirements in the IMO PSPC. The PR 34 is to be used on all vessels built under the CSR by IACS members. The IACS CSRs are unified building rules for tankers and bulk carriers.

PR 34 defines the following procedures.
• Coating system approval
• Assessment of Coating Inspectors’ qualifications
• Inspection agreement
• Verification of the application of the PSPC
• Coating Technical File review
• Review of quality control of automated shop primer plants
• Review of coating technical specifications

Several procedures out of PR 34 were taken over to SC 223 and appear the same in both releases.

Summary
The adoption of the coating standard for dedicated seawater ballast tanks in all ship types in December 2006 represents the first great breakthrough for the implementation of an internationally valid standard in the field of corrosion protection in the marine industry. Worldwide, all the engaged parties (shipyards, owners, coating manufacturers, classification societies, etc.) have to prepare extensively to fulfill the new requirements.

Practical experience with the implementation is rare so far, because the IMO PSPC was only recently put into force. The preparation for the new requirements shows, however, the challenges for the coating manufacturers to update their type-approval certificates.
and partly retest their coating systems. Furthermore, it shows that the training and certification of the coating inspectors are major tasks because there is still a great lack of qualified personnel. An interesting part is also the provision of the CTF. Some software companies are already working on electronic versions. Fulfilling the technical requirements will require extensive changes in the coating process for some shipyards worldwide. These changes may include the installation of new painting sheds, washing facilities, storage places, and implementation of different painting schedules.

Implementation of a unified minimum coating standard is a good approach to increase a ship’s safety. Nevertheless, attention must be paid by all involved parties to practically fulfill the requirements in the standard within a given timeframe to receive the desired benefit of the standard.

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