Only for PSPC vessels

Tripartite agreement for Paint for Dedicated Seawater Ballast Tanks in all type of ships and Double-side Skin Spaces of Bulk Carriers

针对所有船型专用压载水舱和散货船双舷侧处所涂装三方协议

Negotiation Team

OWNER: _____

（Owner Company's Name: _____ **）**

SWS: _____

PAINT MANUFACTURER: _____

（Paint Manufacturer Company's Name: _____ **）**

1. General

总则

The agreement is for the protective coatings of dedicated seawater ballast tanks arranged in all types of ships above 500 tonnage and double-side skin spaces arranged in bulk carriers which are above 150 meters in length to which the Performance Standard for Protective Coatings (PSPC) as adopted by Resolution MSC 215(82) is applied.

此协议是针对 500 总吨以上各类型船舶专用海水压载舱和 150 米以上散货轮的双舷侧处所的保护涂层，其中 PSPC 是根据决议 MSC215（82）来执行的。

The objective of the coating inspection is to ensure that the required minimum level and quality of protective coatings by PSPC is adequately applied.

涂层检查的目的是保证保护涂层的质量标准满足 PSPC 的最低要求。

Unless expressly provided otherwise in PSPC and this Guideline, inspection by sampling should be adopted to the extent necessary for making practical judgment. This means that the extent of inspection should be varied, depending on the quality control of shipyards, to ensure that the required minimum level and quality is achieved in accordance with PSPC.

除了在 PSPC 标准和指南中已明确的部分外，可采用取样检测可做出涂层质量的判断，这意味着检查的程度是各式各样的，依靠船厂的质量控制来保证达到 PSPC 标准到要求的最低质量标准。

During paint application, when Owner、Paint manufacturer and Shipyard has dissidence to the coating inspector’s inspection result , if any two parties has an agreement, then the two parties’ inspection result as final inspection result.

在涂装施工过程中，当船东、油漆商及船厂三方对涂层检查员的检验结果有异议时，如果其中两方达成一致，则视两方结果为最终检验结果。

Owner、Shipyard and Paint Manufacturer all agree that the coating inspector satisfied with PSPC ‘s requirement shall be assigned by Shipyard, assistant by Paint Manufacturer’s TSR. And all parts sign “PSPC COATING INSPECTOR POWER OF ATTORNEY”. (See appendix 1)

船东、船厂和油漆厂商一致同意由船厂指派满足 PSPC 要求的涂层检查员，由油漆现场服务代表协助。并签订“PSPC 涂层检查员授权书”。（见附件 1）

The choice of coating inspector(s) should be part of “PSPC COATING INSPECTOR POWER OF ATTORNEY”. Any of the parties involved in the agreement have the right to request for replacement of

the inspector who is deemed unsuitable or unsatisfactory for the proper progress of the vessel's construction. If any two parties to the agreement consider that such a request is justified, the inspector shall be replaced as soon as conveniently possible by another inspector who is qualified in accordance with PSPC's requirement.

涂层检查员的选择作为“ PSPC 涂层检查员授权书 ”的一部分。当原检查员被认定为不适合或不满足船舶建造的正确流程，检查协议中的任何一方有权要求替换检查员。如果协议中的任意两方认为此需求是正当的，检查员需尽可能地立即替换为另一个符合 PSPC 资质要求的人员。

The Class shall be responsible of review the agreement, and spot check the coating inspector whether satisfied with PSPC's requirement during coating application.

船级社将负责复阅此协议，并在涂装施工中抽查涂层检查员是否满足 PSPC 的要求。

Paint Manufacturer has responsibility to provide the relevant certification and technical file of coating system to satisfy PSPC's requirement, assistant to complete the CTF.

油漆厂商负责提供符合 PSPC 要求的相关涂层系统证书及技术文件，协助完成 CTF.

The agreement shall become effective on the date when the contract has been signed.

此协议将于合同签字时生效。

2． Coating System

涂层系统

The selection of coating system shall satisfy the requirement of PSPC（MSC 215(82)/WP.3 ANNEX 1）and shall be type-approved.

涂层系统的选择须满足PSPC要求并具有型式认可。

Paint manufacturer is responsible to provide approved certification to satisfy PSPC's requirement.

油漆厂商负责提供满足要求的认可证书。

3． Coating Inspector

涂层检查员

Coating inspectors required to carry out inspections shall be qualified to NACE Coating Inspector Level 2, FROSIO Inspector Level III, or an equivalent qualification as verified by the Administration/Class. 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.

执行检查的涂层检查员需具有 NACE 2 级或 FROSIO III，或由行政部门/船级社核实的等效资质。然

而，只有拥有至少 2 年相关涂层检验经验且具有 NACE 2 级或 FROSIO III，或等效的资质的涂层检查员能写和/或认证程序，或决定修正工作以消除不符合项目。

The assistant coating inspectors do the part of the inspections shall be under the coating inspector's supervision.

助理涂层检查员需在涂层检查员的监督下完成某些检查工作。

4． Quality Control Process

质量控制程序

In order to ensure the coating quality under control，the inspection items are detailed description in the appendix 2" Quality Control Process For Protective Coatings of Ballast tanks".

为了确保涂层质量可控，检查项目具体请参见附件 2"压载舱保护涂层质量控制程序"。

5． During coating application, the detailed requirement shall be according to "Procedures for coating inspection and coating system repair during ship construction." (See appendix 3)

在涂装施工中，具体的要求按照"船舶建造中涂层检验和涂层系统修补程序"。（见附件3）

6． After the agreement is signed, if the new PSPC's guideline or other standard is issued, the signed technical file may be revised and agreed by the three parties in the agreement.

此协议签订后，如果新的PSPC指南或其他标准发布，可以对已签的技术文件进行修改并经协议三方同意。

7． If the procedure in this agreement has been modified and agreed by three parties, it shall be submitte d to Class for review.

如果协议中的程序修改且三方同意，则需提交船级社审阅。

8． Language used in all relative documentation shall be generally in English.

所有相关文件的语言一般为英语。

Appendix 1:

PSPC COATING INSPECTOR POWER OF ATTORNEY

SHIP No.	
TYPE	
OWNER	
CLASS	
BUILDING SITE	

Shipowner, Shipyard and Paint manufacturer, unanimously agree to designate the following person as the coating inspector according to PSPC (IMO MSC 215(82) of the above stated ship (s).

COATING INSPECTOR:

Title **Name:** **Certification**

❑

Assistant coating inspector(s)

Title **Name:**

❑

❑

❑

CONFIRMED BY:

Owner **Shipyard** **Paint Manufacturer**

_____ _____ _____

Appendix 2:

Quality Control Process For Protective Coatings of Ballast Tanks

压载水舱保护涂层质量控制流程

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2. General
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检验步骤

1. Definition

定义

This quality control process provides standard inspection requirements including inspection items, inspection scope and etc for the protective coatings of dedicated seawater ballast tanks arranged in all types of ships above 500 tonnage and double-side skin spaces arranged in bulk carriers which are above 150 meters in length to which the Performance Standard for Protective Coatings (PSPC) as adopted by Resolution MSC 215(82) is applied.

此质量控制流程是针对 500 总吨以上各类型船舶专用海水压载舱和 150 米以上散货轮的双舷侧处所的保护涂层。为便于实施保护涂层性能标准（PSPC）提供了检验标准（含检验项目、测试范围等），其中 PSPC 是根据决议 MSC215（82）来执行的。

The process will be agreed by the coating inspector, having been recognized by shipowner, builder and paint manufacturer as inspection standard on the ballast tanks. In addition, it will take effect as the appendix of the “Tripartite agreement for paint for dedicated seawater ballast tanks in all type of ships and double-side skin spaces of Bulk carrier”.

此流程将作为船东、船厂和油漆制造商三方认可的涂层检查员对上述范围内的压载水舱进行检验的依据同时作为“针对所有船型专用压载水舱和散货船双舷侧处所涂装三方协议“附件而生效。

2. General

概述

2.1 The coating inspector, having been agreed upon by the Owner, Shipyard and Paint Manufacturer, shall perform relevant inspection and measurement for the protective coatings, record their results and document in the Coating Technical File (CTF). The coating inspector shall have been certified to NACE Coating Inspector Level 2, FROSIO Inspector Level III or equivalent as verified by the Administration or the relevant Classification Society. The CTF shall be reviewed by the Administration or the relevant Classification Society.

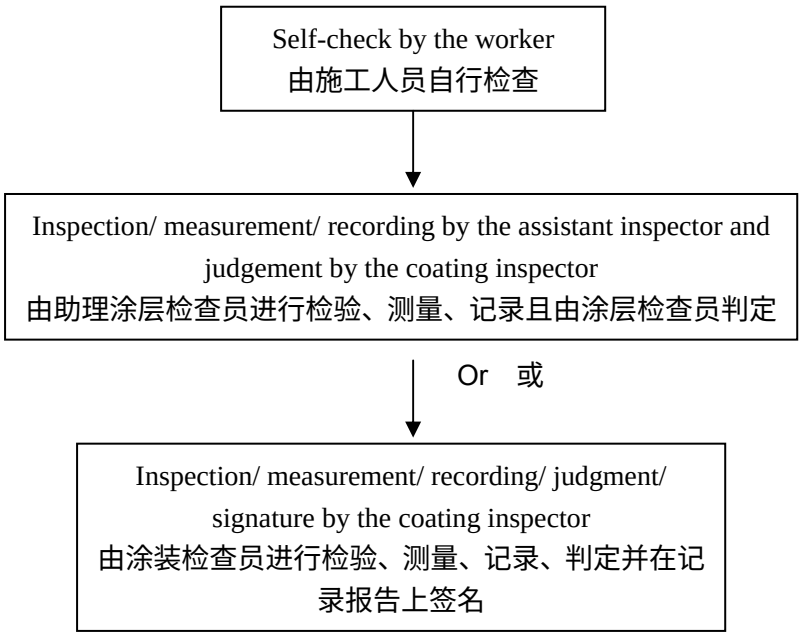
涂层检查员的资质需在经过船东、船厂和油漆制造商三方的确认后，方能进行对压载舱保护涂层的相关检验、测量，并在涂层技术文件（CTF）中记录结果和归档。其中：涂层检查员应具备 NACE 2 级或 FROSIO III 或者由行政部门或相关船级社认可的具有同等效力的资格认证。CTF 由行政部门或者相关船级社进行核查。

2.2 The coating inspector may ask assistant inspectors to do the part of the inspections under the coating inspector's supervision.

压载舱保护涂层检验可在涂层检查员的监督下，由助理涂层检查员执行部分的检验工作。

The basic procedure is as follows:

基本流程如下：



The inspection by the coating inspector may be performed by the inspection team consisting of suitable number of inspectors including the assistant inspectors.

由若干名涂层检查员组成的检验小组进行检查，小组内包括助理涂层检查员。

The assistant coating inspector is someone that performs a task to a procedure and is not involved in any tasks involving decision making or assessment.

助理涂层检查员为执行程序中某一任务的人员但不包括决定性或评估的任务。

2.3 The assistant inspectors shall satisfy one of the following qualification requirements.

助理涂层检查员应具备如下资格认证：

The assistant inspector shall satisfy the followings.

应具有以下其中一项的资质：

1）The assistant inspector shall have experience of coating related jobs for one or more years, and received a required level of training. Such training should be recorded and endorsed either by the inspector, the yard's training organization or inspection equipment manufacturer to confirm competence in using the measuring equipment and confirm knowledge of measurements required

by the PSPC. Training records shall be available for verification.

具备一年以上相关涂装工作的经验，并经过相关培训。检查员、船厂培训机构或设备厂商中的任何一方记录且认可此类培训，并确认经过培训的人员具备满足 PSPC 检查仪器的知识。需要能够出具培训记录。

2) The assistant inspector shall have NACE Coating Inspector Level 1 qualification.

具备 NACE 1 级的认证；

3）The assistant inspector shall have FROSIO Inspector Level II qualification.

具备 FROSIO II 的认证。

3. Inspection process

检验步骤

Note:

注:

The items marked with a double-circle (◎) shall be inspected by the coating inspector.

用双环(◎)标注的项目应由涂层检查员检查；

The items marked with a circle (〇) shall be inspected by the assistant inspector. **Do the part of the inspection under the coating inspector supervision.**

用单环(〇)标注的项目应由助理涂层检查员检查；**需在涂层检查员的监督下进行。**

The items marked with a triangle (△) shall be measured by the worker.

用三角形(△)标注的项目由工人自行测量。

3.1 Shot blasting and shop primer application (primary surface preparation) Table 1:

抛丸及车间底漆施工（钢材流水线预处理） **表 1**

The assistant inspector shall perform routine inspections to make sure that procedures for storage/operation of steel material, maintenance of facilities and materials for abravise/shop primer are in compliance with the shipyard's relevant standards.

助理涂层检查员进行常规检验的目的：确保钢材储存/应用，设备的维护及磨料/车间底漆材料的流程能符合船厂的相关标准。

Surface preparation and shop primer application shall be complied with coating Technical Data Sheet and PSPC as min.requirement.

表面处理及车间底漆施工须符合涂层技术说明书及 PSPC 的最小要求。

3.1.1 The management of steel plate

钢板管理

1) It is recommended that steel rust grade A or B plates to be used by way of the ballast tank areas to ensure the stipulated profiles of 30 ~ 75 micrometer are reliably obtained and the profile gauging may be reduced accordingly when these plates are used.
推荐压载舱使用锈蚀等级为 A 或 B 的钢板，以确保可得到规定的粗糙度 30 ~ 75 微米且可以减少粗糙度仪的使用。

Note that the incoming plate before blasting should be relatively clean. Oil, grease and excessive Salt contamination on the incoming plates should be removed first to the extent possible before blasting (since blasting will push these contaminants into the steel pores and profile).
注意 送进来的钢板在冲砂前需相应地清洁。钢板上的油、油脂及过量的盐分在冲砂前需清除到合适的范围（因为冲砂时会将这些污染物带入到钢板缝隙内）。

2) Where steel plate rust grade C is used then the extent of inspection should be increased focusing on profile gauging as well as salt contamination accordingly to ensure the standard is complied with.
若使用锈蚀等级 C 的钢板，需提高检验范围包括粗糙度仪及盐分污染，以确保符合标准。

3) Prior to primary surface preparation, the plate numbers and the name of Steel manufacturer shall be recorded. (The report format sees: COATING LOG (PSP))
一次表面处理前，钢板号及钢厂名称需记录。（报告形式见：涂装日志（PSP））

3.1.2 The management of Abrasive
磨料管理

1) The selection of abrasive size and type shall be based on the type, grade and surface condition of steel. When the new batch abrasive transported into the Shipyard, the batch number and date shall be recorded.
磨料的尺寸及类型的选择需基于钢板的类型，等级及表面条件。当新批次磨料运进船厂，需记录批次号和日期。

2) The abrasive shall be dry and free of oil, grease and other contamination. Visually estimate the grit size whether is according with the requirement.
磨料需干燥，无油、油脂及其他污染物。目视判断磨料尺寸是否符合要求。

3) If disqualification, this batch grit shall be not used. The eligible grit shall be stored at proper place.
如果不合格，这批磨料不能使用。合格的磨料需存放在合适的地方。

4) The cleanliness and size of recycled abrasive shall be maintained to ensure compliance with specified standard.
再循环磨料的清洁度及尺寸需维持确保符合指定的标准。

5) Prior to add new abrasive, it shall have a sampling test according to ISO 11127, allowable soluble salt 250 μs per cm maximum as determined by ISO 11127. The inspection and record shall be carried out by Shipyard's QA.

在加入新磨料前，需要按照ISO 11127对磨料取样检测，可溶性盐含量最大允许值为250μs/cm。由船厂QA进行检查并记录。

3.1.3 The management of Shop primer

车间底漆管理

1) The shop primer shall belong to zinc containing inhibitor free zinc silicate based or equivalent.
车间底漆应属于基于无机硅酸锌或相等的类型。

2) The shop primer as a part of coating system shall pass a pre-qualification certified according to PSPC and type-approved.
车间底漆作为涂层系统的一部分需根据PSPC通过合格预试验且型式认可。

3) Compatibility with main coating system shall be confirmed by the coating manufacturer before applied to the steel.
在施工到钢板前，油漆商需确认车间底漆与主油漆配套的兼容性。

4) Prior to primary surface preparation, the plate numbers and the name of Steel manufacturer shall be recorded. (The report format sees: COATING LOG (PSP))
一次表面处理前，钢板号及钢厂名称需记录。（报告形式见：涂装日志（PSP））

3.2 Steel defect treatment **Table 2**
钢结构表面缺陷处理 **表 2**

3.3 Block Stage
分段阶段

3.3.1 Secondary surface preparation(block stage) **Table 3**
分段二次表面处理 **表 3**

3.3.2 Block Painting **Table 4**
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3.3.3 Final inspection (block stage) **Table 5**
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3.4 Surface defect treatment (erection tanks) **Table 6**
合拢舱室表面缺陷处理 **表 6**

3.5 Erection Stage

合拢阶段

3.5.1 Evaluate the damage area after erection **Table 7**

合拢后舱室破损面积预估 **表 7**

The coating inspector makes the scheme for secondary surface preparation of tanks after evaluating the damage area.

通过对损坏区域面积评估计算，涂层检查员制定舱室二次表面处理的方案。

1）Power tool treatment shall be applied to small damages up to 2% of total tank area and erection joints.

当破坏率达到舱室和合拢接头总面积的 2%时，应使用动力工具处理；

2） Contiguous damages over 25 m^2 or over 2% of total tank area shall apply blast treatment, and blasting grade and surface profile shall be inspected as per Section 3.3.1

当连续破坏面积超过 25m^2 或者超过总舱室面积的 2%时应采取喷砂处理，根据 3.3.1 检查喷砂处理等级和表面粗糙度。

3.5.2 Steel treatment (erection stage)

合拢后舱室表面处理

Table 8.1 （Small damages up to 2% of total area）

表 8.1 （小破损达到整个区域 2%）

Table 8.2 （Contiguous damages over 25m^2 or over 2% of the total area of the tank）

表 8.2 （连续破损超过 25 m^2 或超过整舱面积的 2%）

3.5.3 Coating (erection stage) **Table 9**

合拢后舱室涂装 **表 9**

3.5.4 Final inspection of coating (erection stage) **Table 10**

合拢后舱室最终报验 **表 10**

Table 1 表 1 Shot blasting and shop primer application (primary surface preparation) 抛丸及车间底漆施工（钢材流水线预处理）

		Inspector/ measurer 负责人	Inspection/measurement time 检查时间点	Number/Period 数量/检验周期	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Ambient temperature and relative humidity 环境温度和相对湿度	◎	Before blasting process starts 喷砂处理开始之前	Once a month, 3 pieces of steel plate once 每月一次，一次三张	Measure the temperature and the humidity in blasting chamber and calculate the dew point. ① 测量冲砂房里的温度和湿度并计算露点。①	
	Steel surface temperature 钢材表面温度	◎			Take one steel substrate and measure its surface temperature. ① 在选定的钢板底材上测量其表面温度。①	
	Blasting grade 喷砂等级	◎	Before shop primer application 车间底漆施工之前		Take one steel substrate after blasting and compare it with the relevant reference photographs. ② 将经过冲砂后的选定钢板底材和相关的标准图片进行对比。②	ISO 8501-1**:1988**
	Surface profile 表面粗糙度	◎			Measure the steel substrate being blasted with TESTEX test paper and micrometer or comparator. ② 在经过冲砂后选定钢板底材，用 TESTEX 试纸及千分仪或比较仪进行测量。②	
	Water soluble salt 水溶性盐	◎			Measure the salt concentration of steel substrate being blasted with Bresle method. ③ 在冲砂后的选定钢板上，通过 Bresle 法测定其盐分浓度。③	ISO 8502-9**:1998** ISO 8502-6**:1995**

Continue：Table 1 Shot blasting and shop primer application (primary surface preparation) 抛丸及车间底漆施工（钢材流水线预处理）

续： 表 1

		Inspector/ measurer 负责人	Inspection/measurement time 检查时间点	Number/Period 数量/检验周期	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Dust 灰尘	◎		Once a month, 3 pieces of steel plate once 每月一次，一次三张	Take one steel substrate and evaluate its dust level by visual inspection. (not by the tape test) 在冲砂后的选定钢板上，目测其灰尘等级（不必进行胶带试验）	If any part has dissidence, the tape test can be as the evidence for final determinant result. 如果任一方有异议，胶带测试可作为最终判定结果的依据。 **ISO 8502-3:1993**
	Oil, grease and other contamination 油污，油脂及其它污染物	◎			Take one steel substrate and perform visual inspection. 在冲砂后的选定钢板上进行目测	
	Dry film thickness and defects 干膜厚度及缺陷	◎	After shop primer application 车间底漆施工之后		Take one steel substrate and perform visual inspection for defect of shop primer. Dry film thickness is measured for a test piece of smooth surface placed on the steel substrate. 在喷涂后的选定钢板上，检查车间底漆涂层的缺陷；测量零位板上涂层的干膜厚度。	According to maker's suggestion 参考油漆商的建议

① Blasting shall not be carried out when: 在下列情况下不应进行喷砂：

.1The relative humidity is above 85%; or 相对湿度超过 85%；或

.2.The surface temperature of steel is less than 3°C above the dew point. 钢板的表面温度高于露点温度少于 3°C。

② Sa 2½; with profiles between 30-75 μm. Sa 2 ½级，粗糙度介于 30-75 μm。

③ ≤ 50 mg/m^2 of sodium chloride ≤ 50 mg/m^2 氯化钠

Table 2 表 2 Steel defect treatment 钢结构表面缺陷处理

		Inspector/ measurer 负责人	Inspection/measurement time 检查时间点	Inspection/measurement area 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Edges 边口	○	Before block inspection 分段结构报验前	All blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 所有涉及专用海水压载舱和散货轮的双舷侧处所有分段	Perform visual inspection① 目测①	ISO 8501-3:**2001** Grade P2
	Welding spatters 飞溅					
	Welding beads 焊缝					
	Steel surfaces 钢材表面					

① The steel surface shall be prepared so that the coating selected can achieve an even distribution at the required NDFT and have an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contaminant.

钢板表面应加以处理，去除毛边，打磨焊道，去除焊接飞溅物和任何其他的表面污染物，以使选择的涂层能够均匀涂布，达到所要求的 NDFT 和有足够的附着力。

Edges to be treated to a rounded radius of minimum 2mm, or subjected to three pass grinding or at least equivalent process before painting.

涂装前边缘应处理成半径至少为2mm的圆角，或经过三次打磨，或至少经过等效的处理。

Table 3 表 3 Secondary surface preparation(block stage) 分段二次表面处理

		Inspector/ measurer 负责人	Inspection/measurement time 检查时间点	Inspection/measurement area 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Oil, grease and other contamination 油污，油脂及其它污染物	○	Before secondary surface preparation (block stage) 分段二次表面处理前	The blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 分段中涉及专用海水压载舱和散货轮的双舷侧处所	Perform visual inspection. ① 目测①	
	Ambient temperature and relative humidity 环境温度和相对湿度	○			Measure the temperature and the humidity and calculate the dew point. ② 测量冲砂房里温度和湿度并计算露点。②	
	Steel treatment 钢材的处理	◎	After secondary surface preparation (block stage) 分段二次表面处理后		Take sample spots appropriately and perform visual inspection. ③ 选取适当的试点并进行目测。③	ISO 8501-3**:2001** Grade P2
	Blasting grade 喷砂等级	◎			Take one steel substrate after blasting and compare it with the relevant reference photographs. ④ 将经过冲砂后钢材表面和相关的标准图片进行对比。④	ISO 8501-1**:1988**
	Surface profile 表面粗糙度	◎			Measure the steel substrate being blasted with TESTEX test paper and micrometer or comparator. ④ 在冲砂后的表面用 TESTEX 试纸及千分仪或比较仪进行测量。④	ISO 8503-1/2**:1988**

Continue：Table 3 Secondary surface preparation(block stage) 分段二次表面处理

续： 表 3

		Inspector/ measurer 负责人	Inspection time 检查时间点	Number/Period 数量/检验周期	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Dust 灰尘	◎	After secondary surface preparation (block stage) 分段二次表面处理后	The blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 分段中涉及专用海水压载舱和散货轮的双舷侧处所	Take one steel substrate and evaluate its dust level by visual inspection. (not by the tape test) ⑤ 在冲砂后的表面上，目测其灰尘等级（不必进行胶带试验）。⑤	If any part has dissidence, the tape test can be as the evidence for final determinant result. 如果任一方有异议，胶带测试可作为最终判定结果的依据。 ISO 8502-3：1993
	Water soluble salt 水溶性盐	◎			Measure the salt concentration of steel substrate being blasted with Bresle method.**(At least one location per block)** ⑥ 在冲砂后的表面上，通过 Bresle 法测定其盐分浓度。（每个分段至少一点）⑥	ISO 8502-9**:1998** ISO 8502-6**:1995**

① No oil contamination. 无油污。

② Blasting shall not be carried out when: 在下列情况下不应进行喷砂：

.1The relative humidity is above 85%; or 相对湿度超过 85%；或

.2.The surface temperature of steel is less than 3°C above the dew point. 钢板的表面温度高于露点温度少于 3°C。

③ Edges to be treated to a rounded radius of minimum 2mm, or subjected to three pass grinding or at least equivalent process before painting.
涂装前边缘应处理成半径至少为 2mm 的圆角，或经过三次打磨，或至少经过等效的处理。

④ Sa 2½; with profiles between 30-75 μm. Sa 2 ½级，粗糙度介于 30-75 μm。

⑤ Dust quantity rating “1” for dust size class “3”, “4” or “5”. 颗粒大小为“3”、“4” or “5”的灰尘分布量为 1 级。
Lower dust size classes to be removed if visible on the surface to be coated without magnification. 如不用放大镜，在待涂表面可见的更小颗粒的灰尘应去除。

⑥ ≤ 50 mg/m^2 of sodium chloride ≤ 50 mg/m^2 氯化钠

Table 4 表 4 Block Painting 分段涂装

		Inspector/ measurer 负责人	Inspection time 检查时间点	Number/Period 数量/检验周期	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Ambient temperature and relative humidity 环境温度和相对湿度	◎	Before,During coating application and curing 油漆施工及固化期间	The blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers. 分段中涉及专用海水压载舱和散货轮的双舷侧处所	Measure the temperature and the humidity and calculate the dew point. ① 测量温度和湿度以及计算露点。①	
	Steel surface temperature 钢材表面温度	◎			Measure the temperature of steel plate at one location per block. ① 选定分段上的一点，进行钢板温度测量①	
	Stripe coat 预涂	◎	After each stripe coat 每度预涂作完后		Check the proper application by visual inspection. ② 目测检查施工情况。②	
	Wet film thickness 湿膜膜厚	△	During each spray coat 喷涂每度油漆期间		Check the typical thickness using a wet film thickness gauge for the painter's self-reference so as to obtain target dry film thickness; The measurement need not be recorded. 根据数据手册，使用湿膜膜厚仪检查其中的典型膜厚以达到规定的干膜膜厚；测量时不需要记录	
	Dry film thickness 干膜膜厚	○	After drying each spray coat (except final spray coat) 每度油漆干燥之后（除面漆）		Measure the thickness for the instruction to subsequent spray coat so as to ensure that the final dry film thickness will satisfy the requirements; The measurement need not be recorded. 根据指示，测量每度涂层的膜厚以便确保最终的干膜膜厚能满足要求; 测量时不需要记录	SSPC-PA2:2004

① Blasting shall not be carried out when: 在下列情况下不应进行喷砂：

.1The relative humidity is above 85%; or 相对湿度超过 85%；或

.2.The surface temperature of steel is less than 3°C above the dew point. 钢板的表面温度高于露点温度少于 3°C。

② Stripe coats shall be applied by brush or roller. Roller to be used for scallops, ratholes, etc., only. 预涂应采用刷涂或辊涂的方法。辊涂仅用于流水孔、老鼠洞等部位。

Table 5 Final inspection (block stage) 分段最终报验

表 5

		Inspector/ measurer 负责人	Inspection time 检查时间点	Inspection scope 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Dry film thickness 干膜膜厚	○	After coating application in W.B.TK(block stage) 压载舱分段阶段涂层施工完	The blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 分段中涉及专用海水压载舱和散货轮的双舷侧处所	Measuring points shall be determined as per Annex 3 of PSPC. 根据 PSPC 的附件 3 制定测量项目	SSPC-PA2:2004
	Nominal dry film thickness 名义干膜膜厚	◎			Evaluate the measurement results by doing appropriate spot check. Judge the necessity of touch up coating including second stripe coat for welds by 90/10 rule. 在检查适当的点后评估其测量结果，根据 90/10 条例，判断涂层修补的必要性包括对焊缝的第二度预涂。	
	Coating defects (e.g. pinholes, bubbles, voids, etc.) 涂层缺陷（例如：针孔，起泡，漏涂等）	◎			Perform visual inspection. Determine appropriate repairing method for coating defects if any. 进行目测。若必要，针对涂层缺陷制定可行性修补方案	

Table 6 Surface defect treatment (erection tanks) 合拢舱室表面缺陷处理
表 6

		Inspector/ measurer 负责人	Inspection time 检查时间点	Inspection scope 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Edges 边口	○	Before the inspection of erection tanks 合拢舱室结构报验前	All tanks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 所有涉及专用海水压载舱和散货轮的双舷侧处所舱室	Perform visual inspection. ① 目测①	ISO 8501-3:**2001** Grade P2
	Welding spatters 飞溅					
	Welding beads 焊缝					
	Steel surfaces 钢材表面					

① The steel surface shall be prepared so that the coating selected can achieve an even distribution at the required NDFT and have an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contaminant.

钢板表面应加以处理，去除毛边，打磨焊道，去除焊接飞溅物和任何其他的表面污染物，以使选择的涂层能够均匀涂布，达到所要求的 NDFT 和有足够的附着力。

Edges to be treated to a rounded radius of minimum 2mm, or subjected to three pass grinding or at least equivalent process before painting.

涂装前边缘应处理成半径至少为 2mm 的圆角，或经过三次打磨，或至少经过等效的处理。

Table 7 表 7 Evaluate the damage area after erection 合拢后舱室破损面积预估

		Inspector/ measurer 负责人	Inspection time 检查时间点	Inspection scope 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Steel defect treatment 钢材结构缺陷处理	◎	Before surface preparation (erection block) 合拢舱室表面处理前	All erection joints in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 所有涉及专用海水压载舱和散货轮的双舷侧处所舱室的接头	Take sample spots appropriately and perform visual inspection ① 选取适当的试点并进行目测①	ISO 8501-3**:2001** Grade P2
	Oil , grease and other contamination 油污,油脂及其它污染物	◎			Perform visual inspection ② 目测②	
	Defects (within coating layers) 缺陷 （涂层内部）	○		All tanks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 所有涉及专用海水压载舱和散货轮的双舷侧处所舱室	Perform visual inspection 目测	
	Damages (reaching steel surface) 涂层破损(至钢材表面)	◎			Perform visual inspection and calculate the damaged area ③ 进行目测并计算损坏区域③	ISO 4628-3**:2003**

① The steel surface shall be prepared so that the coating selected can achieve an even distribution at the required NDFT and have an adequate adhesion by removing sharp edges, grinding weld beads and removing weld spatter and any other surface contaminant.

钢板表面应加以处理，去除毛边，打磨焊道，去除焊接飞溅物和任何其他的表面污染物，以使选择的涂层能够均匀涂布，达到所要求的 NDFT 和有足够的附着力。

Edges to be treated to a rounded radius of minimum 2mm, or subjected to three pass grinding or at least equivalent process before painting.

涂装前边缘应处理成半径至少为 2mm 的圆角，或经过三次打磨，或至少经过等效的处理。

② No oil contamination. 无油污。

③ Butts St 3 or better or Sa 2½ where practicable. Small damages up to 2% of total area: St 3. Contiguous damages over 25 m^2 or over 2% of the total area of the tank, Sa 2½ should be applied.

对大接缝为 St 3，或更好，或可行时为 Sa 2½。小面积破坏区域不大于总面积的 2%时为 St3。 相邻接的破坏区域的总面积超过 25 m2 或超过舱室总面积 2%，应为 Sa2½。

Table 8.1 （Small damages up to 2% of total area）

表 8.1 （小破损达到整个区域 2%）

		Inspector/ measurer 负责人	Inspection time 检查时间点	Inspection scope 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Power tool treatment grade 动力工具处理等级	◎	After surface treatment (erection tanks) 合拢舱室表面处理后	Tanks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers.(block stage) 所有涉及专用海水压载舱和散货轮的双舷侧处所舱室	Compare with the relevant reference photographs. ① 对比相应的参考照片①	ISO 8501-1:**1988**
	Dust 灰尘				Evaluate dust level by visual inspection.(not by the tape test) ② 目测评估灰尘等级（不进行胶带试验）②	If any part has dissidence, the tape test can be as the evidence for final determinant result. 如果任一方有异议，胶带测试可作为最终判定结果的依据。 ISO 8502-3：1993

① Butts St 3 or better or Sa 2½ where practicable. Small damages up to 2% of total area: St 3.
对大接缝为 St 3，或更好，或可行时为 Sa 2½。小面积破坏区域不大于总面积的 2%时为 St3。

② Dust quantity rating “1” for dust size class “3”, “4” or “5”. 颗粒大小为“3”、“4” or “5”的灰尘分布量为 1 级。
Lower dust size classes to be removed if visible on the surface to be coated without magnification. 如不用放大镜，在待涂表面可见的更小颗粒的灰尘应去除。

Table 8.2 （Contiguous damages over 25m^2 or over 2% of the total area of the tank）

表 8.2 （连续破损超过 25 m^2 或超过整舱面积的 2%）

		Inspector/ measurer 负责人	Inspection/measurement time 检查时间点	Inspection/measurement area 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Blasting grade 喷砂等级	◎	After secondary surface preparation (block stage) 分段二次表面处理后	The blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 分段中涉及专用海水压载舱和散货轮的双舷侧处所	Take one steel substrate after blasting and compare it with the relevant reference photographs. ① 将经过冲砂后钢材表面和相关的标准图片进行对比。①	ISO 8501-1**:1988**
	Surface profile 表面粗糙度	◎			Measure the steel substrate being blasted with TESTEX test paper and micrometer. ② 在冲砂后的表面用 TESTEX 试纸及千分仪进行测量。②	ISO 8503-1/2**:1988**
	Dust 灰尘	◎			Take one steel substrate and evaluate its dust level by visual inspection. (not by the tape test) 在冲砂后的表面上，目测其灰尘等级（不必进行胶带试验）③	If any part has dissidence to the inspection result, the tape test can be as the evidence for final determinant result. 如果异议，胶带测试可作为最终判定结果。ISO 8502-3：1993

Continue：Table 8.2 （Contiguous damages over 25m^2 or over 2% of the total area of the tank）

续： 表 8.2 （连续破损超过 25 m^2 或超过整舱面积的 2%）

		Inspector/ measurer 负责人	Inspection/measurement time 检查时间点	Inspection/measurement area 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Water soluble salt 水溶性盐	◎	After secondary surface preparation (block stage) 分段二次表面处理后	The blocks in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers 分段中涉及专用海水压载舱和散货轮的双舷侧处所	Measure the salt concentration of steel substrate being blasted with Bresle method. ④ 在冲砂后的表面上，通过 Bresle 法测定其盐分浓度。④	ISO 8502-9:**1998** ISO 8502-6:**1995**

① Contiguous damages over 25 m^2 or over 2% of the total area of the tank, Sa 2½ should be applied.
相邻接的破坏区域的总面积超过 25 m2 或超过舱室总面积 2%，应为 Sa2½。

② Sa 2½; with profiles between 30-75 μm. Sa 2 ½级，粗糙度介于 30-75 μm。

③ Dust quantity rating “1” for dust size class “3”, “4” or “5”. 颗粒大小为“3”、“4” or “5”的灰尘分布量为 1 级。
Lower dust size classes to be removed if visible on the surface to be coated without magnification. 如不用放大镜，在待涂表面可见的更小颗粒的灰尘应去除。

④ ≤ 50 mg/m^2 of sodium chloride ≤ 50 mg/m^2 氯化钠

Table 9 Coating (erection stage) 合拢后舱室涂装

表 9

		Inspector/measurer 负责人	Inspection time 检查时间点	Number/Period 数量/检验周期	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Ambient temperature and relative humidity 环境温度和相对湿度	◎	Before,During coating application and curing 油漆施工及固化期间	All erection area and coating damaged areas in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers (block stage) 分段中涉及专用海水压载舱和散货轮的双舷侧处所的所有合拢区域和涂层破损区域	Measure the temperature and the humidity and calculate the dew point. ① 测量温度和湿度以及计算露点①	
	Steel surface temperature 钢材表面温度	◎			Measure the temperature at one location per tank. ① 选定分段上的一点,进行钢板温度测量。①	
	Oil , grease and other contamination 油污，油脂及其它污染物	○	Before each spray coat (except first spray coat) 每度油漆喷涂前（除第一度）		Perform visual inspection. ② 目测②	
	Stripe coat 预涂	◎	After each stripe coat 每度预涂作完后		Check the proper application by visual inspection. ③ 目测检查施工情况。③	

① Blasting shall not be carried out when: 在下列情况下不应进行喷砂：

.1The relative humidity is above 85%; or 相对湿度超过 85%；或

.2.The surface temperature of steel is less than 3°C above the dew point. 钢板的表面温度高于露点温度少于 3°C。

② No oil contamination. 无油污。

③ Stripe coats shall be applied by brush or roller. Roller to be used for scallops, ratholes, etc., only. 预涂应采用刷涂或辊涂的方法。辊涂仅用于流水孔、老鼠洞等部位。

Continue：Table 9 Coating (erection stage) 合拢后舱室涂装

续： 表 9

		Inspector/measurer 负责人	Inspection time 检查时间点	Number/Period 数量/检验周期	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检 验 项 目	Wet film thickness 湿膜膜厚	△	During each spray coat 喷涂每度油漆期间	All erection area and coating damaged areas in places that dedicated seawater ballast tanks and double-side skin spaces arranged in bulk carriers (block stage) 分段中涉及专用海水压载舱和散货轮的双舷侧处所的所有合拢区域和涂层破损区域	Check the typical thickness using a wet film thickness gauge for the painter's self-reference so as to obtain target dry film thickness; The measurement need not be recorded. 根据数据手册，使用湿膜膜厚仪检查其中的典型膜厚以达到规定的干膜膜厚；测量时不需要记录	
	Dry film thickness 干膜膜厚	○	After drying each spray coat (except final spray coat) 每度油漆干燥之后（除面漆）		Measure the thickness for the instruction to subsequent spray coat so as to ensure that the final dry film thickness will satisfy the requirements; The measurement need not be recorded. 根据指示，测量每度涂层的膜厚以便确保最终的干膜膜厚能满足要求; 测量时不需要记录	SSPC-PA2:2004

Table 10 Final inspection of coating (erection stage) 合拢后舱室最终报验

表 10

		Inspector/measurer 负责人	Inspection time 检查时间点	Inspection scope 检查区域	Measuring point/procedure 检查方法/过程	Reference standard 参考标准
Inspection item 检验项目	Dry film thickness 干膜膜厚	○	W.B.TK Coating application (erection block) 压载舱合拢阶段涂层施工完	All erection area and coating damaged areas 所有合拢区域/涂层破损区域	Measuring points shall be determined as per Annex 3 of PSPC. Measurement shall be made also adjacent to the welding beads (not further than 15mm from the welds) where second stripe coat have been dispensed with. 根据 PSPC 的附件 3 制定测量项目，测量应在临近焊缝并且作过第二度预涂的位置进行（距离焊缝不超过 15mm）	SSPC-PA2:2004
	Nominal dry film thickness 名义干膜膜厚	◎			Evaluate the measurement results by doing appropriate spot check. Judge the necessity of touch up coating including second stripe coat for welds by 90/10 rule. 在检查适当的点后评估其测量结果，根据 90/10 条例，判断涂层修补的必要性包括对焊缝的第二度预涂。	
	Coating defects (e.g. pinholes, bubbles, voids, etc.) 涂层缺陷(例如 :针孔，起泡，漏涂等)	◎			Perform visual inspection. Determine appropriate repairing method for coating defects if any. 进行目测。若必要，针对涂层缺陷制定可行性修补方案	

Appendix 3:

Procedures for coating inspection and coating system repair during ship construction

for Dedicated Seawater Ballast Tanks in all type of ships
and Double-side Skin Spaces of Bulk Carriers
(based on Resolution MSC. 215(82))

2008

在建船舶涂层检验与涂层系统修补程序

针对所有船型专用压载水舱和散货船双舷侧处所

（基于 MSC. 215(82)决议）

Preface
前言

The Painting & Inspection Practice is prepared on the basis of the following:

涂装及检验基于下述内容：

1) Performance Standard for Protective Coatings(PSPC) for dedicated seawater ballast tanks in all type of ships and double-side skin spaces of bulk carriers (IMO PSPC，Resolution MSC. 215(82))

   保护涂层性能标准（PSPC）针对于所有船型专用压载水舱和散货船双舷侧处所（IMO PSPC，MSC. 215(82)决议）

2) IACS Procedural Requirements No.34 on application of PSPC

   IACS No.34 程序需求应用于 PSPC

3) IMO PSPC—Q&As and Common Interpretations by IACS

   IMO PSPC—IACS Q&As 及通用解释

4) Industry Guideline for Implementation of MSC. 215(82)

   MSC. 215(82)执行的工业指南

The procedures are a guideline on how a successful newbuilding project is to be executed, following the guidelines as indicated above.

根据上述指南，此程序作为如何成功在新造船上实行的指南。

It is expected that both owners, shipyards QC /QA and paint supplier will follow these procedures and support the selected coating inspector in compiling the Coating Technical File (CTF).

船东、船厂 QC/QA 及油漆厂商需按此程序操作并支持所选择的涂层检查员编制涂层技术文件（CTF）。

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I. SCOPE

范围

1. Purpose

目的

This practice of steel and surface preparation, coating application and inspection is prepared to present Shipyard's quality workmanship for painting work in order to assure a quality painting work for ship's steel structure based on "Performance Standard for Protective Coatings (PSPC) for dedicated seawater ballast tanks in all type ships and double-side skin spaces of bulk carriers" (IMO PSPC, Resolution MSC.215 (82))

基于保护涂层性能标准（PSPC）针对于所有船型专用压载水舱和散货船双舷侧处所（IMO PSPC，MSC. 215(82)决议），为了确保船舶钢结构涂装质量，钢材及表面处理，涂装和检验作为船厂涂装质量要求而提出。

2. Application

应用

1) This practice covers protective coating requirements for the ship's steel structure of dedicated seawater ballast tanks in all type of ships of not less than 500 gross tonnage and double-side skin spaces of bulk carriers of 150m in length and upward.

此程序适用于不小于 500 总吨船型的专用压载水舱和总长不小于 150 米的散货船双舷侧处所钢结构保护涂层需求。

It is noted that other independent items (outfitting) are fitted within the tanks to which coatings are applied to provide protection against corrosion.

舱室内其它独立项目（舾装件）需提供保护涂层以防止腐蚀。

2) All painting works shall be carried out in accordance with this practice.

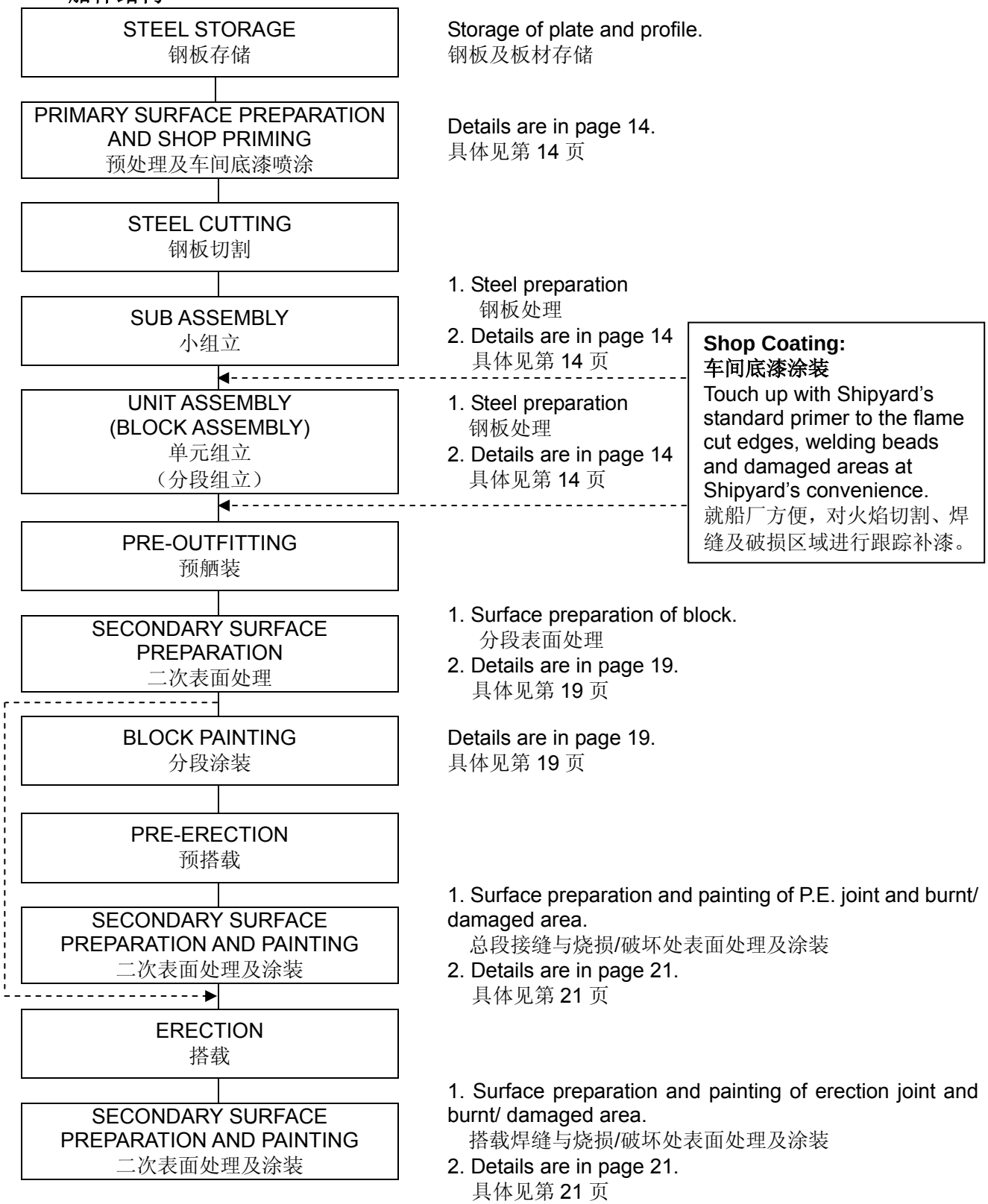
所有涂装工作需根据此程序操作。

3) In case any modification or change in this practice occurs, the modification or change shall be submitted to the relevant parties.

如果此程序发生任何修改或变化，须将修改或变化提交给相关方。

II. General procedure
通用程序

1. Hull structure
船体结构



2. Independent items (Outfitting including pipes)

独立项目（舾装件包括管子）

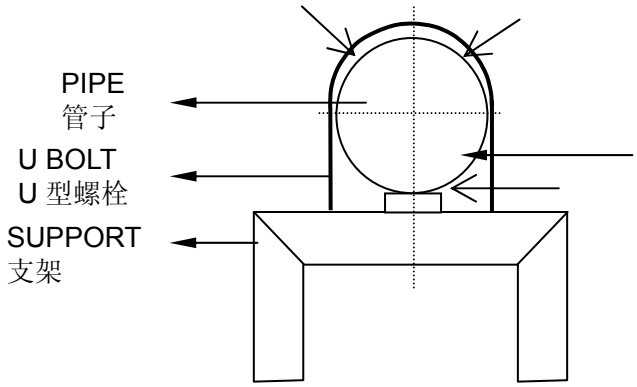
2.1. General work procedure

通用工作过程

FABRICATION 制作	
SURFACE PREPARATION 表面处理	1. Foreign matter shall be removed. 外来物质需清除。 2. Power tooling shall be used for the outfitting specified to be painted. 动力工具使用于指定的舾装件需涂装
INSPECTION 检验	Inspection shall be done by Line Q.C. under monitoring of the coating manufacturer and Shipyard's inspector. 检验需在油漆厂商及船厂检查员监督下由 Q.C.完成
PAINTING 涂装	1. Primer coating 底漆涂装 : One coat of Builder's standard epoxy primer shall be applied as a primer coat to all outfitting, unless specified to be coated with specific coating system. 对于所有的舾装件需施工一度船厂的标准环氧底漆，除非指定涂装特定的涂层系统。 2. Finish coating 面漆涂装 : Finish coat shall be applied to the specified. 面漆按指定要求施工。
INSPECTION 检验	Inspection shall be done by Line Q.C. under monitoring of the coating manufacturer and Shipyard's inspector. 检验需在油漆厂商及船厂检查员监督下由 Q.C.完成
INSTALLATION 安装	Installation of outfitting in block and hull. 舾装件安装于分段和船体。
TOUCH UP PAINTING FOR DAMAGED PARTS 破损区域修补涂装	1. The damaged parts caused by welding, burning, etc. shall be treated with power tooling at proper time after installation of each outfitting at P.E., dock and quay stage. For pipes, see Drawing 1. 在总段阶段及船坞码头阶段，所安装的各类舾装件由于焊接、烧损等引起的破坏，需在适当的时候用动力工具进行处理。 2. The condition of surface preparation and painting shall be controlled by Line Q.C. under monitoring of the coating manufacturer and Shipyard 's inspector. 表面处理及涂装条件需在油漆厂商及船厂检查员监督下由 Q.C.进行控制。

Drawing 1

Typical section of pipe & pipe support
管子及管子支撑典型截面



Pointed invisible/inaccessible areas due to touch between pipe and U-bolt, supported, not be painted.
由于管子及 U 型螺栓、支架的接触面为不可见的/无法达到的区域无需再涂装。
Contaminations will be cleaned with air blowing, etc. without dismantling.
在不分解的情况下，用空气吹干净污染物。

2.2. Treatment of installed galvanized outfitting

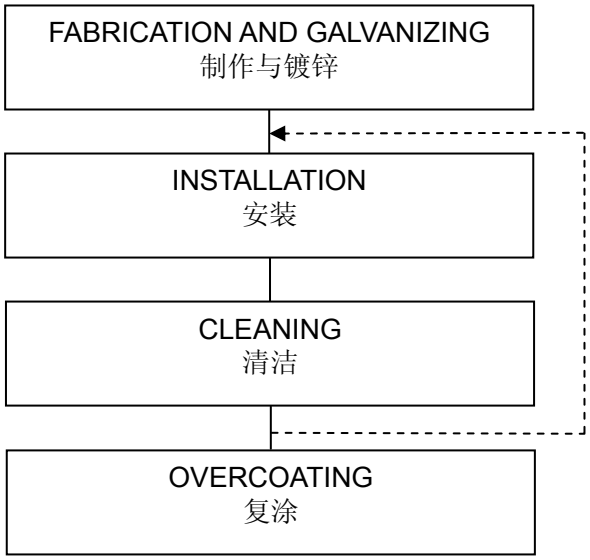
已安装的镀锌舾装件的处理方式

1) The galvanized pipes and handrails in W.B. Tank shall be treated as following procedure unless otherwise specified in the specification.

压载舱内的镀锌管子与扶手需按下述程序进行处理，除非在规格书中有其它指定。

2) Work procedure

工作流程



Installation of the galvanized outfitting during block assembly and/or pre-outfitting, and after block painting.
在分段装配和/或预舾装，及分段涂装后，镀锌舾装件安装

Oil, moisture, dust and other foreign matter shall be cleaned.
油、湿气、灰尘及其它外来物质需清理

※ Note:

备注：

- In case of applying the over coating to the galvanized outfitting before installation, touch up works shall be carried out to the damaged part only after installation.

  如果在镀锌件安装前，进行复涂，则在安装后仅需对破损处进行修补。

- One primer coat may be over coated roughly and one finish coat shall be applied with the paint of surrounding hull to the accessible area using spray without masking/etching primer for cosmetic purpose. Accordingly, the dry film thickness of the over coating may not be the specified of surrounding hull.

  大致地复涂一度底漆面漆，然或按周围船体油漆对可达到的区域进行喷涂一度面漆，为了装饰目的，不用遮盖/蚀刻底漆。因此，复涂的干膜厚可以不用达到周围船体指定的要求。

- If I.Z.S. or other special type of primer is specified, epoxy or equivalent type primer shall be used instead of I.Z.S. or other special type of primer.

  如果指定为无机硅酸锌或其它特殊的类型的底漆，环氧或同等类型的底漆需使用以代替无机硅酸锌或其它特殊的类型的底漆。

III. PROCEDURES FOR COATING INSPECTIONG
涂层检验程序

1. Reference Standard
参考标准

ISO 8501-1：1988: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings

未涂装的钢板表面及全部去除旧有涂层的锈蚀等级与表面处理等级

ISO 8501-3：2001：Preparation grades of welds, cut edges and other areas with surface imperfections

焊缝、切割边及其他表面不完整的区域的表面处理等级

ISO 8502-3：1993：Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)

涂装钢表面灰尘的评估（压敏胶带法）

ISO 8502-6：1995: Extraction of soluble contamination for analysis------Bresle method

提取可溶性污染物分析——Bresle 方法

ISO 8502-9：1998：Field method for the conductometric determination of water-soluble salts

区域法可溶性盐导电率测定

ISO 8503-1：1988：Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces

评估比较板规格与定义

ISO 8503-2：1988：Method for the grading of surface profile of abrasive blast-cleaned surfaces---- comparator procedure

磨料冲砂清洁表面的表面粗糙度等级方法——比较板程序

SSPC-PA2：2004：Measurement of Dry Paint Thickness with Magnetic Gages

使用磁性仪进行干膜厚测量

ISO 4628-3：2003: Paints and varnishes, Evaluation of degradation of coating, Designation of quantity and size of defects, and of intensity of uniform changes in appearance

Part3_Assessment of degree of rusting

涂装与装饰，涂层降级评估，缺陷数量与大小及表面统一变化强度指示， 部分 3 修饰等级评估。

2. General Principle for Inspection
检查原则

2.1 The objective of the coating inspection is to ensure that the required minimum level and quality of protective coatings by PSPC is adequately applied.

涂层检查的目的是保证保护涂层的质量标准满足 PSPC 的最低要求。

2.2 It is recognized that in practice it is almost impossible to obtain a perfect coating that has no small imperfections, even with the best execution of this standard. Such perfect coating may only be possible under laboratory conditions. With this in mind inspectors should have a common understanding of what is the acceptable minimum level of quality of protective coatings intended by the application of this standard.

应该清楚的是，实际的涂装施工做到一点缺陷没有是不可能的，应是尽可能的实施该标准。完美的涂层仅可以在实验室条件下实现。基于此，检验员应知道该标准在实施过程中的最低可接受标准，确保该标准的实施。

2.3 Unless expressly provided otherwise in PSPC and this Guideline, inspection by sampling should be adopted to the extent necessary for making practical judgment. This means that the extent of inspection could vary, depending on the quality control of shipyards, to ensure that the required minimum level and quality is achieved in accordance with PSPC..

除了在 PSPC 标准和指南中已明确的部分外，可采用取样检测做出涂层质量的判断，这意味着检查的程度是各式各样的，依靠船厂的质量控制来保证达到 PSPC 标准要求的最低质量标准。

2.4 Inspection of surface preparation and coating processes shall be agreed upon between the Owner, Shipyard and the coating manufacturer and presented to the Class for review. The Class may, if it so requires, participate in the agreement process. Clear evidence of these inspections shall be reported and be included in the Coating Technical File (CTF). The details for procedures and which coating to use should be agreed in a pre-job conference between all relevant parties.

表面处理和涂装程序的检验需经过船东、船厂和油漆公司的认可且提交船级社审阅。船级社可以，如果是要求的，参加协议过程。这些检查项目需报告且包含于涂层技术文件(CTF)。过程的细节和涂层的应用需在工前会议中由各方认可。

2.5 The Coating inspector shall be certified to NACE Coating Inspector Level 2, FROSIO Inspector Level III, or an equivalent qualification as verified by the Administration/Class..

涂层检查员须拥有 NACE 涂层检查员 2 级或 FROSIO 检查员 III 级的认证，或由行政部门/船级社核实的等效资质。。

2.6 The choice of coating inspector(s) should be part of the inspection agreement. Any of the parties involved in the inspection agreement have the right to request for replacement of the inspector who is deemed unsuitable or unsatisfactory for the proper progress of the vessel's construction. If the parties to the agreement consider that such a request is justified, the inspector shall be replaced as soon as conveniently possible by another inspector who is qualified in accordance with PSPC’s requirement.

涂层检查员的选择作为检验协议的一部分。检查协议中的任何一方有权要求替换检查员，当原检查员被认定为不适合或不满足船舶建造的正确流程。如果协议中的各方认为此需求是正当的，检

查员需尽可能地立即替换为另一个符合 PSPC 资质要求的人员。

2.7 If the coating inspector 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. The training record shall be available for verification.

如果需要助手完成一部分的检查工作,应在涂层检查员监督下，而且这些人员需经过培训并得到涂层检查员的认可。培训记录可进行查证。

2.8 Coating inspectors shall inspect surface preparation and coating application during the coating process by carrying out, as a minimum, those inspection items identified in this practice. Representative structural members shall be non-destructively examined for coating thickness.

在涂层过程执行中，涂层检查员须检查表面处理和涂层施工，例如最小值，这些测量项目在惯例中定义。典型的结构部件需进行非破坏性的膜厚测量。

2.9 Results from the inspection shall be recorded by the inspector and shall be included in the CTF.

检查员需将检查工作进行记录并将其纳入 CTF。

Where any defective areas were found at inspection, all such repairs shall be checked after rectification and recorded in non-conformity report by the coating inspector.

在检查过程中发现的有缺陷的区域，这些缺陷在修正后需检查且由涂层检查员记录在不符合报告中。

3. Coating Inspector Notice

涂层检查员须知

3.1 The agreed certified coating inspector will inspect the condition of surface preparation and quality coating work with the acceptable manner of this practice.

认可的有资质的涂层检查员需检查表面处理条件和以认可的方式进行的涂层质量施工。

3.2 The attendance of inspector

检查员出勤

Shipyard will give the coating inspector notice of daily inspection schedule for the items. The results of inspection shall be recorded on the daily log sheet, if any, with some notes for references.

船厂需提供给检查员每日检查项目计划。检查的结果须记录在施工日志上，包括任何涉及的备注。

3.3 Notice for inspection

检查须知

Shipyard shall provide a notice of inspection at the same day early in the morning when the painting inspection is scheduled to be done.

当涂装检查计划已完成，船厂须在同一天早上提供检查须知。

Considering the specific nature of painting work, Shipyard's inspector can rearrange and notify the inspection schedule for the items which are cancelled, rescheduled or supplemented by Shipyard due to unexpected yard's situation.

考虑到涂装工作的特定环境性，检查员可以重新安排及通报由于不可预料的船厂现场情况而取消，重排计划或补充的检验项目计划。

Shipyard shall use reasonable efforts to arrange painting inspection during normal working hours throughout the entire period of construction of vessel. However, if it becomes necessary in order to meet Shipyard's construction schedule to arrange the inspection beyond Shipyard's normal working hours including on weekend and/or holiday, Shipyard will inform the coating inspector of it in advance, and the coating inspector shall cooperate with Shipyard to be present at such inspection.

在整个船舶建造过程中，船厂需在正常的工作时间安排涂装检验项目。然而，如果为了满足船厂建造计划，所安排的检验在一般工作日之外包括周末和/或假期，船厂需提前通知涂层检查员，涂层检查员需配合进行检查。

3.4 Judgment of inspection result

检查结果判定

If the coating inspector requires additional test, measurement and inspection above the requirement of this practice, the coating inspector has to have clear reason and can have the right to require additional measurement.

如果涂层检查员要求进行额外的测试、测量和检查，他需由明确的理由才能有权要求额外的测量。

A reasonable inspection judgment shall be made on the basis of the PSPC and common sense, and agreed among the inspectors concerned.

合理的检验判定需基于 PSPC 及常识，且需经过相关检查员的同意。

3.5 Inspection items for coating inspector

涂层检查员的检查项目

Coating inspectors shall inspect surface preparation and coating application during the coating process by carrying out. The detailed inspection items are according to “**Quality Control Process For Protective Coatings of Ballast tanks**”.

在涂层过程执行中，涂层检查员须检查表面处理和涂层施工。具体检验项目根据《**压载水舱保护涂层质量控制流程**》 。

IV. PROCEDURE FOR COATING APPLICATION
涂装施工程序

1. PSP (Primary surface preparation)
PSP(一次表面处理)

The procedure of the primary surface preparation assembly line: cleaning, pre-heated, shot blasting, automatic painting, drying, steel plate transportation. Primary surface preparation and shop priming are carried out by automation.

钢材预处理流水线流程：清洁、预热、抛丸除锈、自动涂装、固化、钢板运输。预处理及车间底漆喷涂需自动执行。

Quality Control prior to PSP

一次表面处理前质量控制

1.1.1 The management of steel plate
钢板管理

1) It is recommended that steel rust grade A or B plates to be used by way of the ballast tank areas to ensure the stipulated profiles of 30 ~ 75 micrometer are reliably obtained and the profile gauging may be reduced accordingly when these plates are used.
推荐压载舱使用锈蚀等级为 A 或 B 的钢板，以确保可得到规定的粗糙度 30 ~ 75 微米且可以减少粗糙度仪的使用。
Note that the incoming plate before blasting should be relatively clean. Oil, grease and excessive Salt contamination on the incoming plates should be removed first to the extent possible before blasting (since blasting will push these contaminants into the steel pores and profile).
注意送进来的钢板在冲砂前需相应地清洁。钢板上的油、油脂及过量的盐分在冲砂前需清除到合适的范围（因为冲砂时会将这些污染物带入到钢板缝隙内）。
2) Where steel plate rust grade C is used then the extent of inspection should be increased focusing on profile gauging as well as salt contamination accordingly to ensure the standard is complied with.
若使用锈蚀等级 C 的钢板，需提高检验范围包括粗糙度仪及盐分污染，以确保符合标准。
3) Prior to primary surface preparation, the plate numbers and the name of Steel manufacturer shall be recorded. (The report format sees: **COATING LOG (PSP)**)
一次表面处理前，钢板号及钢厂名称需记录。（报告形式见：涂装日志（PSP））

1.1.2 The management of Abrasive
磨料管理

1) The selection of abrasive size and type shall be based on the type, grade and surface condition of steel. When the new batch abrasive transported into the Shipyard, the batch number and date shall be recorded.
磨料的尺寸及类型的选择需基于钢板的类型，等级及表面条件。当新批次磨料运进船厂，需记录批

次号和日期。

2) The abrasive shall be dry and free of oil, grease and other contamination. Visually estimate the grit size whether is according with the requirement.
磨料需干燥，无油、油脂及其他污染物。目视判断磨料尺寸是否符合要求。

3) If disqualification, this batch grit shall be not used. The eligible grit shall be stored at proper place.
如果不合格，这批磨料不能使用。合格的磨料需存放在合适的地方。

4) The cleanliness and size of recycled abrasive shall be maintained to ensure compliance with specified standard.
再循环磨料的清洁度及尺寸需维持确保符合指定的标准。

5) Prior to add new abrasive, it shall have a sampling test according to ISO 11127, allowable soluble salt 250 μs per cm maximum as determined by ISO 11127. The inspection and record shall be carried out by Shipyard's QA.
在加入新磨料前，需要按照ISO 11127对磨料取样检测，可溶性盐含最大允许值为250μs/cm。由船厂QA进行检查并记录。

1.1.3 The management of Shop primer
车间底漆管理

1) The shop primer shall belong to zinc containing inhibitor free zinc silicate based or equivalent.
车间底漆应属于基于无机硅酸锌或相等的类型。

2) The shop primer as a part of coating system shall pass a pre-qualification certified according to PSPC and type-approved.
车间底漆为涂层系统的一部分需根据PSPC通过合格预试验且型式认可。

3) Compatibility with main coating system shall be confirmed by the coating manufacturer before applied to the steel.
在施工到钢板前，油漆商需确认车间底漆与主油漆配套的兼容性。

4) Prior to primary surface preparation, the plate numbers and the name of Steel manufacturer shall be recorded. (The report format sees: **COATING LOG (PSP)**)
一次表面处理前，钢板号及钢厂名称需记录。(报告形式见：涂装日志（PSP))

1.2 Blasting
冲砂

1.2.1 Blasting shall not be carried out when the relative humidity of blasting cell is above 85% or the surface temperature of steel is less than 3°C above the dew point.

当相对湿度大于85%或钢材表面温度低于露点温度3°C，不能进行冲砂。

Where blasting is carried out in a blasting chamber the 85% humidity limit refers to the humidity

inside the chamber not the outside humidity.

在冲砂房内进行冲砂的85%湿度限制是参照冲砂房内的湿度而不是外面的湿度。

1.2.2 The steel surface shall be free of oil, grease, water and other contaminant before primary surface preparation. If the steel obverse surface has clay, carpolite, straw or other garbage, use broom or scoop to clean them. If the steel inverse surface has straw bag or other garbage, it shall pause the pretreatment roller, then clean the steel surface.

钢材表面预处理前应除去表面的油污、水分和杂物。钢材正面有泥土、石子、稻草等垃圾的，用扫把、铲子将表面垃圾清除。钢板反面存在草包等垃圾的，因先将预处理辊道暂停，再对钢板进行清理。

1.2.3 Rolled hull structural steel shall be shot blasted to Sa 2 $^1/_2$ referring to ISO 8501-1.

参照ISO 8501-1，轧钢需抛丸至Sa 2 $^1/_2$。

Sand blasting to ISO 8501-1 Sa 2 $^1/_2$ may be applied instead of shot blasting, when shot blasting is considered impractical.

当抛丸处理不可行时，冲砂至ISO 8501-1 Sa 2 $^1/_2$ 可以代替抛丸。

1.2.4 The blasted steel plate shall be with anchor pattern between 30 ~ 75 microns measured by Testex method or comparator.

冲砂后的钢板需达到30~75 微米的粗糙度，用Testex方法或比较仪进行测量

1.2.5 The steel surface of outfitting such as pipes with nominal diameter over 250A, pipe support, grating supports,etc. shall be grit blasted to the specified preparation grade.

舾装件的钢质表面例如直径大于250毫米的管子、管子支架、格栅支架等等，需冲砂至指定等级。

The pipe size mentioned above may be changed at Shipyard's discretion.

上述提到的管子尺寸可以根据船厂的判断来改变。

1.2.6 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, in accordance with the manufacturer’s recommendations.

根据油漆厂商推荐，钢表面清洁和粗糙度需在表面处理后及车间底漆施工前予以检查。

1.2.7 Before paint application is carried out NaCl (water soluble salts limit equivalent of NaCl) shall be not more than 50 mg/m^2 according to ISO 8502-6/9.

根据ISO 8502-6/9，在涂装施工前，氯化钠(等同于氯化钠的可溶性盐限制)不能超过50 mg/m^2。

When satisfy the below the condition:

需满足如下条件：

Where:

(1) Primary surface preparation is carried out at a facility where environmental condition and quality level do not change substantially, and;

一次表面处理场所的环境条件和质量水平未充分改变，且；

(2) Primary surface preparation and shop primer are carried out by automation, and;

一次表面处理和车间底漆喷涂需自动化，且；

(3) Shop primer is applied immediately after blasting.

冲砂后需立即进行车间底漆喷涂。

1.2.8 Checking surface contaminants such as dust, grease, oil, etc.

检查表面污染物例如灰尘，油脂，油，等等。

1.2.9 The primary surface preparation inspection requirements shall be satisfied by periodic spot checks (once per month, three pieces of steel plate once, in general) and this procedure shall be documented by the Coating inspector. (The report format sees: **COATING LOG (PSP)**)

在阶段性的抽检中（一般，每月一次，选取3张钢板），需满足预处理检查要求且由涂层检查员记录。（报告形式见：涂装日志（PSP））

1.2.10 Water soluble salt: spot check one time per month, each time select three(3) steel plates, measured one point on per steel plate at random, if three points all eligible, it's acceptable; if two points and over are not eligible, then it's not acceptable. When one point not eligible, select another two(2) steel plate, if two points both eligible, it's acceptable; if one point not eligible, then it's not acceptable.

其中盐分测量每张钢板随机测量1点，若3点全部合格则视为合格；若2点及2点以上不合格，则视为钢板处理不合格； 1点不合格时，将另选2张钢板进行测量，该2点全部合格可视为钢板处理合格，其中一点不合格，即判定为处理不合格。

1.3 Shop priming

车间底漆喷涂

1.3.1 Shop primer is applied immediately after blasting.

在冲砂后，需立即进行车间底漆喷涂。

1.3.2 Right after the primary surface preparation, one (1) coat of average 20 ± 5 um DFT according to the technical data sheet of inorganic zinc silicate type shop primer shall be applied on the steel.

当预处理完成后，一般在钢板上施工一度 20 ± 5 um 无机硅酸锌车间底漆。

1.3.3 Primer coating should be uniform visual inspection for defect of shop primer.

底漆涂层应均匀的并目视检查缺陷。

2. Steel Surface preparation

钢结构要求

2.1 Edges shall be treated to a rounded radius of minimum 2mm, or subjected to three pass grinding or at least equivalent process before painting.

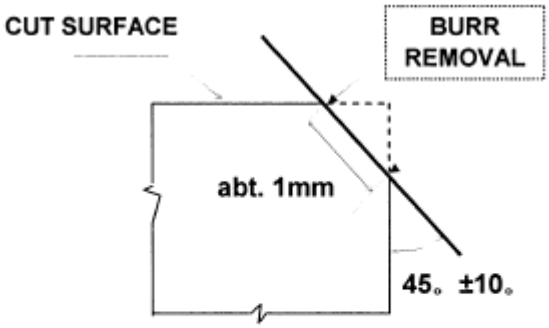
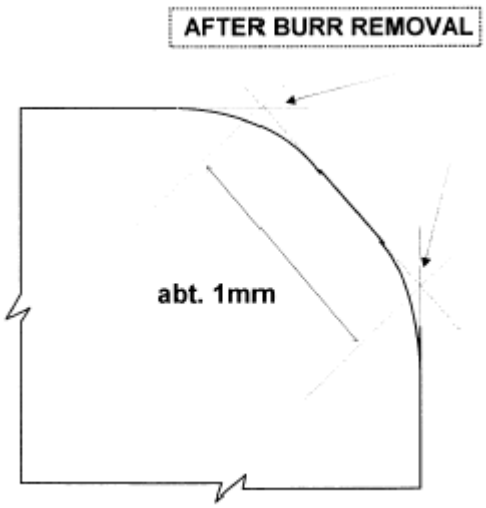
涂装前，边处理成至少为 2mm 的圆角，或经过三次打磨或至少经过等效的处理。

"Equivalent process" means a process that produces an edge profile geometrically equivalent to, or better than that usually obtained by three pass grinding which results in an effective coating performance.

“等效处理”意为处理后产生的边几何形状上的等效，或优于可产生有效涂装性能的三次打磨。

2.2 Grinding with mechanical tools shall be considered as equivalent method to the above specified Grinding with mechanical tools shall be applied as follows.

用动力工具打磨时须考虑等同于上面指定的方式。动力工具打磨见下图：

DETAIL 细节	APPLICATION RESULT 应用结果
♦ ONE(1) PASS GRINDING + BURR REMOVAL 一度打磨+去除毛口	
	
※ To minimize the burr, grinder revolving direction to be toward cut surface. 为了使毛口最小，磨具旋转方向面向切割边 ※ Burr removal method: Disc papering 毛口去除：砂皮纸	※ After burr removal, the edge to be smoothened. 毛口去除后，光顺边口

2.3 The detailed inspection items are according to “**Quality Control Process For Protective Coatings of Ballast tanks**”.

具体检验项目根据《**压载水舱保护涂层质量控制流程**》 。

2.4 The results of inspection related to this section are to be recorded by the coating inspector. (The report format sees**: COATING LOG (SSP)**)

此过程的检查结果由涂层检查员进行记录。（报告格式参见：涂装日志（二次表面处理））。

2.5 Touch up may be applied with Builder's standard primer to the flame cut edge, welding bead and damaged area as far as applicable at Shipyard's convenience.

火焰切割的边、焊缝和破损区域需尽可能地根据船厂的需求进行跟踪补漆。

3. Secondary and localized surface preparation

二次表面处理与局部表面处理

3.1. General description

概述

1) The secondary preparation grade shall be complied with IMO PSPC.
二次表面处理等级须符合 IMO PSPC。
2) Fume of welding and flame cutting shall be properly removed, but remaining trace may be visible.
焊接和火焰切割的烟雾须适当去除，但是可残留痕迹。
3) Welding defects such as the localized blow hole, etc. in welding beads found during surface preparation inspection shall either be repaired by welding or marked with tape for later repair.
当表面处理检查时，焊缝上的焊接缺陷例如局部气孔等需进行补焊或标注出来以后修补。

3.2. Surface preparation at block stage

分段阶段表面处理

1) Damaged shop primer and welds shall be blasted to Sa 2 $^1/_2$ referring to ISO 8501-1.
参照 ISO 8501-1，车间底漆破损处和焊缝需冲砂至 Sa $2^1/_2$。
"Damaged shop primer" means the areas where the condition of the shop primer in the opinion of the coating inspector or coating manufacturer of main coating system, will result in a reduced performance of the main coating system. (Example areas of burnt damage, corrosion or mechanical damages)
“破损的车间底漆”意为根据涂层检查员或主涂层油漆商意见判断车间底漆的条件，会降低主涂层性能，（例如烧损，腐蚀或机械破损区域）。
2) Intact shop primer may be retained and shall be cleaned by sweep blasting, high pressure water washing.The shop primer as a part of coating system shall pass a pre-qualification certified according to PSPC and type-approved. Compatibility with main coating system shall be confirmed by the coating manufacturer
完整的车间底漆可保留且用扫砂、高压水进行清洁。车间底漆为涂层系统的一部分需根据 PSPC 通过合格预试验且型式认可。油漆商需确认车间底漆与主油漆配套的兼容性。
3) Profile shall be 30 ~ 75 micr on in case of full or partial blasting measured by Testex method or comparator.
用 Testex 方法或比较仪进行测量，粗糙度达到 30 ~ 75 微米当采用整体或局部冲砂。
4) St 3 shall be accepted as the method of rectification for the small areas where blasting is omitted or insufficiently treated after blasting.
当冲砂后有遗漏或不补充的小区域可用 St 3 进行修正。
5) The steel surface shall be tested for levels of remaining NaCl (water soluble salts limit equivalent of NaCl) in at least one location per block.
每个分段至少一点的钢板需进行残留氯化钠(等同于氯化钠的可溶性盐限制)的含量测试。
6) NaCl (water soluble salts limit equivalent of NaCl) shall be not more than 50 mg/m^2 according to ISO 8502-6/9.

根据 ISO 8502-6/9，氯化钠(等同于氯化钠的可溶性盐限制)不能超过 50 mg/m^2。

7) After surface preparation and cleaning, visual inspection to check dust on the steel surface shall be carried out. Lower dust size classes to be removed if visible on the surface to be coated without magnification.

表面处理和清洁后，进行钢表面灰尘的可视检查。不放大的情况下，小尺寸的灰尘在待涂表面可见的话，需清除。

Dust quantity rating “1” for dust size class “3”, “4” or “5”. Lower dust size classes less than “3” are invisible on the steel surface unless they are accumulated in large quantity. Visible accumulated dust shall be removed to the extent of invisible level.

灰尘尺寸为“3”，”4”或“5”的数量等级为“1”。钢板表面上尺寸小于“3”的灰尘不可见除非大量积聚。可见的堆积灰尘需清除至不可见的程度。

If there is dispute among all parties to the inspection and any two parts agreed that it is necessary, then tape test for dust may be used according to ISO 8502-3.

如果所有检查方中有异议，且任意两方认为是必需的，则根据 ISO 8502-3，采用胶带测试法。

8) The results of inspection related to this section are to be recorded by the coating inspector. (The report format sees**: COATING LOG (SSP)**)

此过程的检查结果由涂层检查员进行记录。(报告格式参见：涂装日志（二次表面处理))。

9) If the steel plates arrived at the yard have already been shop primed from the steel plant or paint subcontractors. In such cases full blasting to Sa 2.5 for shop primed surface shall be carried out in addition to the requirements of the standard for secondary surface preparation, unless all requirements of the standard for primary surface preparation have been complied with, including the inspection requirements of mentioned in the standard. All inspections and tests should be documented by the Coating Inspector before initiating secondary surface preparation.

在某种情况下，到达船厂的钢板已在钢厂或涂装分包商处施工了车间底漆。在此情况下，车间底漆需冲砂至 Sa 2.5 除了二次表面的标准需求，除非预处理完全符合标准需求，包括标准中的检查需求。在二次表面开始前，涂层检查员需记录所有的检查与测试内容。

3.3. Surface preparation after pre-erection and erection at P.E./Dock/Quay stage (surface treatment after erection)

预搭载后及在总组/船坞/码头阶段的表面处理

1) Butts (erection joint) shall be treated to St 3 or better or Sa 2 1/2 where practicable at Shipyard's convenience. (Butt refers to the erection joint)

基于船厂施工方便，大接头（搭载焊缝）需处理至 St3 或更好或 Sa 2 1/2。（大接头参照搭载焊缝）

2) St 3 shall be applied to the small damages up to 2% of the total area of the water ballast tank. Sa 2.5 shall be applied to the contiguous damages over 25 m^2 or over 2% of the total area of the water ballast tank.

小的破坏面积达到压载舱整个面积 2% ，处理至 St3。邻近的破坏达到压载舱整个面积 25m^2 或超过 2%，则处理至 Sa 2.5。

3) Damage means the areas where the damage reaches steel surface. Otherwise, defects within coating layers shall be touched up to the specified dry film thickness after appropriate treatment of coating surface.

破坏意为破损到达钢表面。另外，涂层的缺陷在适当的表面处理后根据指定的干膜厚进行修补。

Defects are shall not be counted towards the 2% or 25m^2 assessment.

缺陷不包括在 2%或 25m^2 估算内。

4) Coating in overlap shall be feathered. Compatibility between main coatings shall be confirmed by the coating manufacturer, where a certified main coating inevitably contacts or overlaps with another type of certified main coating, e.g. partial re-coating of damaged part and coating nearby butts, where different seasonal type of coatings have to be applied due to the change in environmental condition. The selection of different seasonal type coating system shall satisfy the requirement of PSPC and shall be type-approved.

涂层叠加根据油漆厂商推荐进行处理。认可的主涂层不可避免的接触或复涂另一类型认可的主涂层，主涂层的兼容性需经油漆厂商认可，例如，涂层破损及靠近接头的局部涂层复涂将根据环境条件变化施工不同季节型的油漆。选用不同季节型涂层系统应满足 PSPC 要求并具有型式认可。

5) Inspection for the erection joint prior to coating shall mainly be visual inspection at the coating inspector's discretion.

涂装施工前，搭载焊缝的检查需在涂层检查员的判断下进行可视检查。

6) The results of inspection related to this section are to be recorded by the coating inspector. (The report format sees**: COATING LOG (SP after erection)**)

此过程的检查结果由涂层检查员进行记录。（报告格式参见：涂装日志（搭载后表面处理））。

4. Application of paint

涂装施工

4.1 Condition inspection prior to application of paint

涂装施工前条件检查

1) Painting work shall not be carried out while relative humidity is above 85% or surface temperature is less than 3°C above dew point.
当相对湿度超过 85%或表面温度低于露点温度 3°C，则不能进行涂装工作。
Moisture shall be removed until no visible moisture remains.
需去除湿气直到无可见湿气残留。

2) Oil and grease contaminants shall be removed with appropriate method according to the coating manufacturer's recommendation.
根据油漆商的推荐用适当的方法去除油和油脂。

3) Dust and mud contaminants shall be removed with rag, broom, brush, compressed air or vacuum cleaner, etc.
用抹布、扫帚、刷子、压缩空气或真空吸尘器等清除灰尘和污泥。

4) Suitable marker shall be used and not be removed, marker to be confirmed by the coating supplier.
合适的记号笔可用且不用清除，记号笔需经油漆商认可。

5) Adequate ventilation is necessary for the proper drying and curing of coating. Ventilation should be maintained throughout the application process and for a period after application is completed, as recommended by the coating manufacturer.
合适的干燥及涂层固化需要充分的通风。根据油漆厂商的推荐，在施工过程中且施工完成后的一段时间须保持通风。

6) The results of inspection related to this section are to be recorded by the coating inspector. (The report format sees：**COATING LOG (**Painting and NDFT Measurement Report**)**)
此过程的检查结果由涂层检查员进行记录。(报告格式参见：涂装日志(涂装及干膜厚检测报告))。

4.2. Painting standard

涂装标准

1) Overall/main coating

统喷

① In general, airless spray shall be applied; however, hand brush or roller may be applied where it is more suitable than airless spray.

一般情况下，采用无气喷涂；然而，手工刷或辊涂也可用于当此类方法比无气喷涂适合的区域。

② The factors such as recoating interval, mixing ratio, etc. shall be in accordance with the coating manufacturer's recommendation.

例如复涂间隔、混合率等要素需根据油漆商的推荐。

③ Minor sags and runs (covering less than ½ m^2) are allowed unless they are excessive and/or cover large area extensively or is running over welding seam or edges building up dry film thickness to above the maximum specified dry film thickness.

小流挂（覆盖不超过½ m^2）可保留除非流挂严重且/或覆盖范围广或流到焊缝处或边缘导致干膜厚大于指定的干膜厚的最大值。

④ The difference of color due to the different coating stage/time and aging of coating shall be considered as natural state and it shall be left as it is, unless the performance and quality of the coating are affected.

由于不同涂装阶段/时间而产生的色差认为是自然状态，且可保留，除非涂层性能和质量受到影响。

⑤ The small damaged part for galvanized steel, mainly incurred from welding and mechanical damage, may be touched up with surrounding paint or equivalent.

镀锌表面的破损区域，主要由于焊接及机械损伤，可以修补与周围环境相同或相等的油漆。

⑥ Wet film thickness of each coating is typically checked by the painter for reference to achieve objectives of dry film thickness.

每度涂层的湿膜厚由油漆工进行检查已达到指定干膜厚的目的。

⑦ Representative dry film thickness shall be measured after each coat except for final coat for reference as guidance for subsequent work, and the total dry film thickness after completion of final coat shall be confirmed.

为了指导后续工作，除最后涂层外，每一度涂层施工后需测量干膜厚，总膜厚在最后一度施工完后须得到确认。

⑧ NDFT 320 μm with 90/10 rule shall be applied.

应用 90/10 测定名义干膜厚 320 μm。

⑨ Maximum total dry film thickness shall be in according to the coating manufacturer's detailed specifications.

总膜厚的最大值需根据油漆商具体规格书。

Meanwhile, care shall be taken to avoid increasing the thickness in an exaggerated way.

同时，需注意避免超范围的测量膜厚。

⑩ Thinner shall be applied as per coating manufacturer's recommendation.

稀释剂的使用需根据油漆商的推荐。

⑪ The top coat shall be of a light color in order to facilitate in-service inspection.

面漆需为浅色以便于保养期内的检验。

Light color means a color that reflects light to an extent that a simple flash light (hand torch) will make inspection easy and fast. Normally light grey, buff, off-white, swimming pool blue/green, etc. are easily distinguishable from rust.

浅色意为颜色可在一定范围内反射光线即简易闪光易于快速检查。通常为浅灰色、浅黄色、游泳池兰/绿等，易于与锈蚀区别。

2) Stripe coat (touch up)

预涂（修补）

① Stripe coats should be applied as a coherent film showing good film formation and no visible defects. The application method employed should ensure that all areas that require stripe coating are properly coated by brush or roller.

预涂需提供连续的良好的漆膜且无可见缺陷。预涂方式的采用需确保所有需预涂的区域用刷子或辊筒进行合适的涂装。

② Stripe coating is painting of edges, welds, hard to reach areas, etc., to ensure good paint adhesion and proper paint thickness in critical areas.

边、焊缝、难以到达的区域等需预涂，以确保关键区域良好的涂层结合力及合适的膜厚。

③ There shall be a minimum of two stripe 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.

除了对焊缝进行第二度预涂，两度预涂在一定范围内可减少，当确保通过涂装施工，名义干膜厚能够满足，以避免不必要的超膜厚。任何（第二度）的预涂需在 CTF 中充分描述。

To dispense the (second) stripe coat in scope, the DFT measurement adjacent to the welds, not further than 15mm from the welds, is acceptable. Statistical sampling measurement similar to those for flat surface is acceptable for the verification of NDFT. Welded seams mean both butt and fillet welds.

确立（第二度）预涂范围，干膜厚测量靠近焊缝，但不远于焊缝 15mm，是可接受的。名义干膜厚的确认可类似抽样测量靠近平面区域。焊缝包括接头与密性焊缝。

④ The reduction of 2nd stripe coat on the welds shall be decided by Shipyard, approved and documented by Coating Inspector. This is subject to the satisfaction of the actual dry film thickness.

焊缝的第二道预涂减少需由船厂决定并得到涂层检查员的认可。

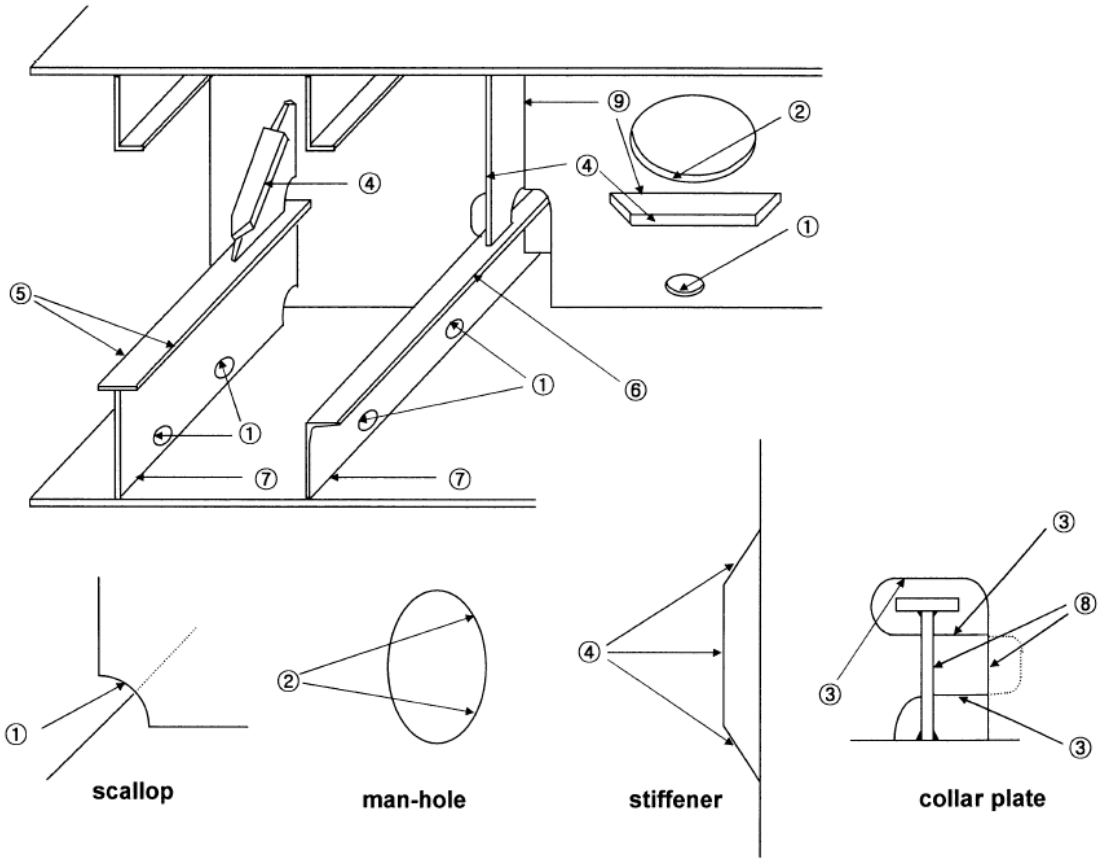
⑤ In case two (2) stripe coats to be applied, the colour of 1st stripe coat will be different from 1st main coat and 2nd stripe coat can be same as final main coat.

如果施工 2 度预涂，第一度预涂的颜色不同于第一度主要涂层，第二度预涂需同最后一度主要涂层。

⑥ Stripe coats shall be applied as follows.
预涂如下：

Item 项目	Sub-item 子项目	Treatment 处理方式	Example of area 区域		No. in sketch 图号	Stripe coating 预涂	Remark
Edge 边	Flame-cut edge 火焰割边	By grinding 打磨	Hole edge 洞边缘	Small hole 小洞	①	**1st stripe coat** ☐ Before 1st full coat ☐ After 1st full coat **2nd stripe coat** ☐ Before 2nd full coat ☐ After 2nd full coat	
				Large hole 大洞	②		
			Free edge 自由边	Collar plate 围圈板	③		
				Stiffener 加强筋	④		
		By rolling machine 轧机器	T-bar longi. T 排		⑤		
	Rolled edge 轧边	By rolling machine 轧机器	Angle-longi., Rolled flat bar 角纵材，轧平板		⑥		
Welding seam 焊缝	Automatic welding 自动焊	By welding machine /equipment 用焊接机器/设备	Joint of longi. and plate 纵材板接缝		⑦		O
	Manual welding 手工焊	By hand welding 手工焊接	Joint of collar plate (where it is impracticable to obtain sufficient DFT by spraying) 围圈板的接缝（统喷可得到足够的膜厚的区域）		⑧		O
			Joint of stiffener (where it is practicable to obtain sufficient DFT by spraying) 加强筋的接缝（统喷可得到足够的膜厚的区域）		⑨		O

Remark： Mark "O": Unless NDFT is not proved, Two stripe coat shall be applied.
备注：标准"O"：除非名义膜厚未被证实。须提供两度预涂。


⑨
②
④
④
①
⑤
①
⑥
①
⑦
⑦
①
scallop
②
man-hole
④
stiffener
③
⑧
③
③
collar plate

5. Treatment of paint failure

涂装缺陷处理方式

- The paint failure shall be treated as follows.

油漆缺陷处理如下：

Failure 缺陷	Treatment 处理方式
Blistering 气泡	1) Scraping blister. 擦掉气泡 2) Power tool cleaning the surface and coating as original coating. 动力工具清洁表面且施工原有涂层
Exceeding of overcoat interval 复涂间隔期超期	1) Roughening the surface with sand paper or disc sander. 用砂皮纸或砂轮片拉毛表面 2) Applying subsequent coating. 施工后续配套
Blushing 变暗	1) Minor extent or confined space shall be accepted as it is. 小范围或小区域可接受 2) Visible space with major extent shall be treated with thinner wiping. 大区域的可见范围需用溶剂擦拭 3) If necessary, recoating may be done. 如必要，可重新涂装
Cracking 开裂	1) Disc sweeping the area to which reaches. 砂轮扫过开裂达到的区域 2) Applying coats as the Specification. 按规格书施工配套
Peeling off 脱皮	1) Scraping off affected film surface. 刮擦受到影响的涂层表面 2) Power tool cleaning and coating as original system. 动力工具清洁表面且施工原有涂层
Sagging / Running Wrinkling 流挂，起皱	1) Leaving it as it is unless it is excessive and covers large area. 保留原样除非严重及大面积覆盖 2) If necessary, touching up the area. 如必要，修补此区域
Bleeding 褪色	Leaving it as it is. 保留原样

※ Note: Detailed repair shall be done as per Shipyard's work procedure and Coating manufacturer's recommendation.

备注：具体的修补按船厂工作流程及油漆商的推荐。

6. Inspection standard of DFT measurement

膜厚测量检验标准

6.1. General

通则

1) Magnetic or electromagnetic dry film thickness gauges shall be used to measure dry film thickness.

   干膜厚测量需使用磁性或电子测膜仪。

2) Total dry film thickness shall be measured after completion of the final coat. Representative dry film thickness shall be measured after each coat except for final coat for reference as guidance for subsequent work.

   最后涂层施工完后，需进行最终膜厚测量。除最后一度之外，作为后续工作的指导，每度的典型膜厚需进行测量。

3) No measurement shall be made for the edge of structural members and section of holes, etc. where stripe coating is generally applied and/or measurement is difficult or impracticable to avoid error sources.

   结构的边缘及孔的部件等不用测量，一般对其进行预涂和/或测量困难或无法进行，以避免得到错误的信息。

4) Confirmation that the measured DFT meets the requirements of PSPC shall be made for each tank or unit smaller than a tank, e.g., part/area of a section. At least the following items shall be recorded.

   对于每个舱室或小于舱室的单元，例如部件的局部/区域，需确认测试的干膜厚须满足 PSPC 的要求。至少以下项目须记录：

   (1) Date and signature of the coating inspector

   涂层检查员的数据及签名。

   (2) Name of the tank (Name of part/area of the section, if smaller unit than the whole tank)

   舱室的名称（区域的名称/部件的名称，如果是比舱室小的单元）

   (3) Coating specification (NDFT, max. and min. thickness etc.)

   涂层规格书（名义干膜厚度，最大和最小膜厚等）

   (4) Number of measurements, minimum, maximum, average

   测量的数量，最小值、最大值、平均值

6.2 Requirement DFT measurement and acceptance criteria

干膜厚测量要求及认可准则

In principle, number of measurement shall be as follows;

原则上，测量如下：

1) One gauge reading per 5 m^2 of flat surface areas.

   平面上每 5 m^2 测量一个数据。

2) One gauge reading at 2 to 3 m interval and as close as possible to tank boundaries, but not further than 15mm from edges of tank boundaries.

在尽可能靠近压载舱的边界，但距边界不小于 15mm，每隔 2 到 3 米测量一个数据。

Tank boundaries means the extreme longitudinal, transverse, and vertical corner welds of the tank boundary plates, and gauge readings shall be taken adjacent to the welds, not further than 15mm from the welds.

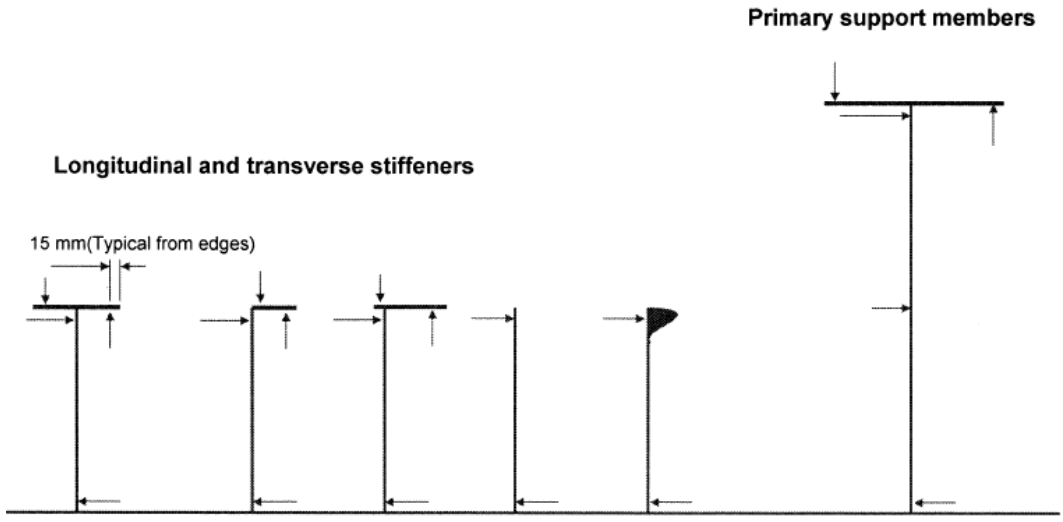
舱室边界意为纵向、横向、垂直角焊缝的顶端，测量仪器需尽量接近焊缝，但需离焊缝 15mm 远。

3) Longitudinal and transverse stiffener member

对纵向、横向扶强材

One set of gauge readings as shown below, taken at 2 to 3 m run and not less than two sets between primary support members.

按下图，每间隔 2 到 3 米进行一组数据测量，，在主要支撑结构之间至少测量 2 组数据。



Figure

※ Note: Arrows of diagram indicate critical areas and should be understood to mean indication for both sides.

备注：图示箭头方向为关键区域，应理解为指示两侧。

4) 3 gauge readings for each set of primary support members and 1 or 2 gauge readings for each set of other members as indicated by the arrows in the diagram.

(1 gauge reading to be taken for the bulb & flat bar longitudinal)

对主要支撑件，每一组取 3 个读数，其他构件每一组取 1 到 2 个读数。（

5) For primary support members (Longitudinal girder and transverse web) one set of gauge readings for 2 to 3 m run shown in figure 3 above but not less than three sets.

对于主要支撑件（纵向梁及横向肋板），如图 3 所示，每隔 2 到 3 米测量一组数据，且不少于 3 组。

Longitudinal girder and transverse web in double skin structure shall be measured as flat surface areas i.e. one gauge reading per 5 m^2 and at least one reading per Longitudinal girder or transverse web.

双翼结构内的纵向梁及横向肋板作为平面进行测量，例如每 5 平方米测一点且每一纵向梁或横向肋至少测一点。

6) Around openings one gauge reading from each side of the opening

Opening means 400mm or above in diameter.

开口周围，开口每一面测一个数据。开口意为直径大于等于 400mm。

7) Five gauge readings per square meter (m^2) but not less than three gauge readings taken at complex areas(i.e. large brackets of primary support members)

在复杂的区域（例如主要支撑件的大肘板），每平方米测量 5 点，且不少于 3 个点。

8) Additional spot checks to be taken to verify coating thickness for any area considered necessary by the coating inspector.

涂层检查员出于任何必须的考虑，可进行额外的抽检以检验膜厚。

6.3 Acceptance criteria

认可准则

1) 90/10 rule to be applied.

90/10 检验规则

2) Discard any unusually high or low gauge reading that can not be repeated consistently.

去除非连续性的不寻常的高或低的读数。

Ⅴ. Coating Log

涂装日志

COATING LOG (PSP)
涂装日志（预处理）

Position 地点： Test Date 日期： Serial No.序列号：

Name/No. Of Ship 船名/编号：		**Database 文件编号：**	
Plate Numbers 钢板编号			
Name Of Shipyard/Steel Manufacturer 船厂/钢厂			

Test Enviroment （Requirement：R.H.(%)＜85%；S.T.(ºC)-D.P(ºC)＞3ºC）
测试环境（要求：相对湿度＜85%；钢板温度-露点温度＞3º C）

	Before 施工前	Weather Changes 天气突然变化			Remarks: 备注
Measured Time 测量时间					
Air Temp. 气温(℃)					
Relative Humidity 相对湿度 (%)					
Dew Point 露点(℃)					
Surface Temp. 表面温度(℃)					

Primary Surface Preparation（Requirement：Surface Profile：Sa2.5，30~75μm； Sodium Chloride≤50mg/m2)
预处理(要求：表面粗糙度：30~75μm；可溶性盐≤50mg/m2 NaCl)

Water Soluble Salts 盐分(mg/m^2)		Oil/Grease 油/油脂	
		Dust 灰尘	
Surface Profiles (μm)表面粗糙度			
Surface Cleanliness 钢表面清洁度			
Remarks:备注			

Shop Primer 车间底漆	Manufacturer 涂料生产商		App. Method 施工方法：	
Product Name 涂料名称				Remarks: 备注
Identification Mark/Number 产品标识/编号:				
Product Batch No.涂料批号				
Recommended D.F.T. 标准干膜厚度				
Measured D.F.T.干膜厚度测量值：				
curing 固化				

Inspected By 检查人员	**Comments 意见**	**Conclusion 结论**	**Signature 签名**	**Date/Time 日期/时间**
Coating Inspector's Name 涂层检查员：				

COATING LOG (SSP)
涂装日志（二次表面处理）

Position 地点： Test date 测试日期： Serial No.序列号：

Name/No. Of Ship 船名/编号：			**Tank/Block No.: 舱/分段号**		
Team：施工劳务队		Team Foreman: 带班人员		Inter Qc: 内检Qc	

Steel Structure Condition（Requirement：ISO8501-3, P2; Edge to be treated to a rounded radius of 2mm(min.) or three pass）**钢板结构条件**（要求：ISO8501-3, P2；边缘处理成至少为2mm半径的圆角，或经三次打磨）

Type of defect 缺陷类型	Repair Method 修补方式	Repair Confirm/Date 修补确认/日期

Test Environment （Requirement：R.H.(%)＜85%；S.T.(ºC)-D. P(ºC)＞3ºC
测试环境（要求：相对湿度＜85%；钢板温度-露点温度＞3º C）

Measured Time 测量时间					
Air Temp. 气温(℃)					
Relative Humidity 相对湿度 (%)					
Dew Point 露点(℃)					
Surface Temp. 表面温度(℃)					

Remarks:备注

Secondary Surface Preparation 二次表面处理

Water Soluble Salts 盐分(mg/m^2) *		Oil/Grease 油/油脂	Yes 有 No 无
		Dust 灰尘**	
Surface Profiles (μm)表面粗糙度			
Surface Cleanliness 钢表面清洁度			

Remarks:备注：(* Measurement realised under ISO 8502-9. 测量参考 ISO 8502-9；** Dust rating evaluation conducted under ISO8502-3 测量参考 ISO8502-3.)

Inspected By 检查人员	**Comments 意见**	**Conclusion 结论**	**Signature 签名**	**Date/Time 日期/时间**
Coating Inspector's Name 涂层检查员：				

COATING LOG (Painting and NDFT Measurement Report)

涂装日志（涂装及干膜厚检测报告）

Position 地点： Test date 测试日期： Serial No.序列号：

Name/No. Of Ship 船名/编号：			**Tank/Block No.:舱/分段号**		
Team：施工劳务队		Team Foreman: 带班人员		Inter Qc: 内检Qc	
Manufacturer 涂料生产商		First Coat 第一道涂层		Second Coat 第二道涂层	
Product Name Of Coating 涂料名称					
Product ID/ Number 产品标识号/编号					
Product Batch No. 涂料批号					

	FIRST COAT 第一度		SECOND COAT 第二度	
	BEFORE 之前	AFTER 之后	BEFORE 之前	AFTER 之后
Measure Date/Time 测量时间				
S.T.(ºC) 钢板温度				
Dry Temp.(ºC) 干温				
R.H.(%) 相对湿度				
D.P(ºC) 露点				
Oil Contamination 油污染		×		×
Stripe Coats 预涂				

DFT Requirement 干膜厚要求	1st Coat		2nd Coat		Position 位置	Final coat's NDFT（μm） 最终涂层		
	Numb. of point 测量数量	Ratio 百分比	Numb. of point 测量数量	Ratio 百分比		Min. NDFT 最小膜厚	Max. NDFT 最大膜厚	Ave. NDFT 平均膜厚
＜90% NDFT					Flat Area 平面			
90% NDFT~NDFT					Frame 肋位			
≥NDFT					Outfitting 舾装件			
TOTAL								

Final Coating Condition Confirm 最后涂层状况确认

Type of defect 缺陷类型	Repair Method 修补方式	Repair Confirm/Date 修补确认/日期

Remark 备注：(附测量数据表)

Inspected By 检查人员	Comments 意见	Conclusion 结论	Signature 签名	Date/Time 日期/时间
COATING INSPECTOR'S NAME 涂层检查员：				

COATING LOG (SP after erection)
涂装日志（合拢表面处理）

Position 地点： Test date 测试日期： Serial No.序列号：

Name/No. Of Ship 船名/编号：			**Tank/Block No.: 舱/分段号**		
Team: 施工劳务队		Team Foreman: 带班人员		Inter Qc: 内检Qc	

Steel Structure Condition（Requirement：ISO8501-3, P2）**钢结构条件**（要求：ISO8501-3, P2）

Type of defect 缺陷类型	Repair Method 修补方式	Repair Confirm/Date 修补确认/日期

Surface Preparation after erection 大合拢表面处理 *		The total area of tanks（㎡）：舱室面积	
Requirement 要求	Surface Cleanliness 表面清洁度	Surface Profiles (μm) 表面粗糙度	Remarks 备注
Butts（St3） 接头		–	* Damaged Area See Measured report 破损面积见测量报告 ** Other requirement refer to SSP 其他要求参考二次表面处理
Contiguous damages up to 25m2 or up to 2% of total area （St3）** 邻近区域的破坏面积小于25m2或破损面积不超过2%.		–	
Contiguous damages over 25m2 or over 2% of total area （Sa2.5）** 邻近区域的破坏面积小于25m2或破损面积超过2%.			
Oil/Grease 油/油脂		**Dust 灰尘**	

Test Environment（Requirement：R.H.(%)＜85%；S.T.(ºC)-D. P(ºC)＞3ºC）
测试环境（要求：相对湿度＜85%；钢板温度-露点温度＞3º C）

Measured Time 测量时间					
Air Temp. 气温(℃)					
Relative Humidity 相对湿度 (%)					
Dew Point 露点(℃)					
Surface Temp. 表面温度(℃)					

Remarks:备注

Inspected By 检查人员	**Comments 意见**	**Conclusion 结论**	**Signature 签名**	**Date/Time 日期/时间**
Coating Inspector's Name 涂层检查员：				

NON CONFORMANCE REPORTS (NCR)
不合格报告（NCR）

HULL No. 船号		Block/Tank's No. 分段/舱室号		INSPECTION DATE 检查日期	
PART OF STRUCTURE: 结构部分					
DESCRIPTION OF FINDINGS: 具体描述					
REFERENCE DOCUMENT (daily log) 参照文件（日报）					
DISTRIBUTION PART: 分配部门			RECEIPT: 接收		
ACTION TAKEN: 采取行动：					

Inspected By **检查人员**	**Signature** **签名**	**Date/Time** **日期/时间**
Coating Inspector's Name 涂层检查员：		