中 国 船 级 社

钢质海船入级与建造规范

RULES AND REGULATIONS FOR THE CONSTRUCTION AND CLASSIFICATION OF SEA-GOING STEEL SHIPS

修 改 通 报

(AMENDMENTS)

2004

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Section 1 GENERAL REQUIREMENTS

New paragraphs 2.1.2.6 and 2.1.2.7 are added as follows:

"2.1.2.6 The side shell doors and stern doors of all existing ro-ro passenger ships constructed before 30 June 1996 are to comply with IACS UR S15, see Appendix 6 of this PART.

2.1.2.7 The bow doors and inner doors of all existing ro-ro passenger ships constructed before 30 June 1996 are to comply with IACS UR S16, see Appendix 7 of this PART."

Section 2 DEFINITIONS

The existing subparagraph 2.2.1(13) is replaced by the following:

"(13) A container ship is a ship constructed or adapted for the carriage of standard containers in holds and on deck."

The existing subparagraph 2.2.1(19) is replaced by the following:

(19) A new ship means a ship the plan approval of which is applied on or after the date of coming into force of the Rules.

A new subparagraph 2.2.1(21) is added as follows:

"(21) Date of "contract for construction":

① The date of "contract for construction" of a ship is the date on which the contract to build the ship is signed between the prospective owner and the shipbuilder. This date is normally to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

② The date of "contract for construction" of a series of sister ships, including specified optional ships for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this subparagraph, sister ships are ships built to the same approved plans for classification purposes. The optional ships will be considered part of the same series of sister ships if the option ① is exercised not later than 1 year after the contract to build the series was signed.

③ If a contract for construction is later amended to include additional ships or additional options, the date of "contract for construction" for such ships is the date on which the amendment to the contract is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which ① and ② above apply."

A new footnote ① is added as follows:

"① "the option" means that an option for building additional ships to the same approved plans is given in the contract for construction signed between the owner and the shipbuilder."

Section 3 CHARACTERS OF CLASSIFICATION AND CLASS NOTATIONS

The existing paragraph 2.3.1.1 is replaced by the following:

第 1 篇　入级与检验

第 2 章　检验与证书

第 1 节　一般规定

新增 2.1.2.6 和 2.1.2.7 如下：

2.1.2.6　1996 年 6 月 30 日以前建造的所有现有客滚船，其舷门和尾门应符合 IACS UR S15 的规定，见本篇附录 6。

2.1.2.7　1996 年 6 月 30 日以前建造的所有现有客滚船，其首门和内门应符合 IACS UR S16 的规定，见本篇附录 7。

第 2 节　定 义

2.2.1(13) 改为：
(13) 集装箱船：指建造成或改装成适合于在货舱内和甲板上载运标准集装箱的船舶。

2.2.1(19) 改为：

（19） 新船：指本规范生效之日及以后申请图纸审查的新建造船舶。

新增 2.2.1(21) 如下：

(21) “建造合同”日期：

① 船舶的“建造合同”日期就是未来船东和船厂签订建造合同之日的日期。该日期通常是由申请授予新船船级的一方向船级社提出的。

② 姐妹船系列的“建造合同”日期（包括最终可以实施建造的指定可选船舶）就是未来船东和船厂签订建造系列船合同的日期。就本款而言，姐妹船就是按经审核认可的相同图纸建造的系列入级船舶。如果系列船建造合同在签订后不到一年的时间内进行续建选择①，则选择续建的船舶将被视为同一系列的姐妹船。

③ 如果后来对建造合同进行修改，增加了船舶或选项，这类船的“建造合同”日期就是未来船东和船厂签订该合同修改部分的日期。该合同的修改内容应被视为“新合同”。上述①和②均适用于该新合同。

新增脚注①如下：

①“续建选择”系指船东与船厂的建造合同中具有继续建造与否的选择权。

第 3 节　入级符号与附加标志

2.3.1.1 改为：

"2.3.1.1 The hull (including equipment) of a ship classed with the Society will be assigned one of the following characters of classification as appropriate according to different conditions:

★ CSA
★ CSA

The meanings of the characters of classification are:

★ — indicating that the ship has been constructed under the supervision of the Society in accordance with its rules and complies with the relevant provisions of the Rules;

★ — indicating that the ship has not been constructed under the supervision of the Society in accordance with its rules, but it has been found after survey by the Society to be in compliance with the relevant provisions of the Rules;

CSA — indicating that the structure of the ship is fully fit for operation at sea."

A new paragraph 2.3.1.4 is added as follows:

"2.3.1.4 Characters of classification for ships are referred to in Appendix 8 of this PART."

The existing paragraph 2.3.2.1 is replaced by the following:

"2.3.2.1 Details of class notations of hull (including equipment) are referred to in Appendix 8 of this PART."

In paragraph 2.3.2.2:

"Bulk carrier Bulk Carrier" is replaced by
"Single side skin bulk carrier Single Side Skin Bulk Carrier
Double side skin bulk carrier Doublele Side Skin Bulk Carrier"

The existing paragraph 2.3.2.5 is replaced by the following:

"2.3.2.5 Special features notation: A notation indicating that the ship incorporates special features which significantly affect the design. Examples:

Strengthened for heavy cargoes	Strengthened for Heavy Cargoes
Holds Nos. ××× may be empty	Holds Nos. ××× may be Empty
Direct strength assessment for hull structure	CCSS (CCS COMPASS-Structure)
Fatigue strength assessment for hull structure	CCSF (CCS COMPASS-Fatigue)

In paragraph 2.3.2.7:

"Ice service notation" is replaced by "Ice service notation ①".

A new footnote is added as follows:

"① The ice service notations B1*、B1、B2、B3 as specified above correspond respectively to IA Super, IA, IB, IC in the Finnish-Swedish Ice Class Rules."

The existing paragraph 2.3.2.8 is replaced by the following:

"2.3.2.8 In-water survey notation: This notation (In-Water Survey) will be assigned to a ship complying with the requirements in 4.8.3.1 of this PART."

The existing paragraph 2.3.2.10 is replaced by the following:

"2.3.2.10 Enhanced Survey Programme (ESP) notation: Oil tankers (single and double hull), bulk carriers (single and double side skin), ore/oil carriers, oil/bulk/ore carriers and chemical tankers are to be subject to an enhanced survey programme in accordance with the Rules. The Society will assign the notation of ESP (Enhanced Survey Programme) to these ships subjected to an enhanced survey programme."

The existing paragraph 2.3.3.1 is replaced by the following:

"2.3.3.1 Details of notations for machinery (including electrical installations) are referred to in Appendix 8 of this PART."

2.3.1.1　凡船舶的船体（包括设备）经批准入本社船级，将根据不同情况授予下列入级符号：

★ CSA
★ CSA

入级符号含义如下：
★ —— 表示船舶在建造时由本社按照其规范进行检验，且符合规范规定。
★ —— 表示船舶在建造时不是由本社按照其规范进行检验，其后经本社进行检验认为其符合本社规范的相关规定。
CSA —— 表示船舶的结构完全适合于海上作业。

新增 2.3.1.4 如下：

2.3.1.4　船舶入级符号见本篇附录 8。

2.3.2.1 改为：

2.3.2.1　船体（包括设备）的附加标志，详见本篇附录 8。

2.3.2.2 中“散装货船 Bulk Carrier”改为：

单舷侧散装货船 Single Side Skin Bulk Carrier
双舷侧散装货船 Double Side Skin Bulk Carrier

2.3.2.5 改为：

2.3.2.5　特殊性能附加标志：船舶在结构上具有特殊性能设计。如：

重货加强	Strengthened for Heavy Cargoes
可以 ××× 舱空舱	Holds Nos. ××× may be Empty
船体结构直接强度评估	CCSS（CCS COMPASS-Structure）
船体结构疲劳强度评估	CCSF（CCS COMPASS-Fatigue）

2.3.2.7 中“冰区航行附加标志”改为“冰区航行附加标志①”

新增脚注①如下：

① 上述规定的冰区航行附加标志 Ice class B1*、B1、B2、B3 分别对应于芬兰——瑞典冰级规则的 IA Supper、IA、IB、IC。

2.3.2.8 改为：

2.3.2.8　水下检验附加标志：符合本篇 4.8.3.1 规定的船舶，将授予水下检验附加标志 In-Water Survey。

2.3.2.10 改为：

2.3.2.10　加强检验程序附加标志：对油船（单壳 / 双壳）、散装货船（单舷侧 / 双舷侧）、矿 / 油兼用船、油 / 散货 / 矿兼用船和化学品船，根据规范规定接受加强检验程序，本社将授予加强检验程序附加标志 ESP(Enhanced Surrey Programme)。

2.3.3.1 改为：

2.3.3.1　轮机（包括电气设备）的附加标志，详见本篇附录 8。

Section 4 CERTIFICATES

In paragraph 2.4.1.3:

The words "…as well as with no powered propelling unit…" are replaced by "…as well as the notation of Non-Propulsion indicating no powered propelling unit…".

In paragraph 2.4.1.4:

The words "at the request of Owners" are deleted.

CHAPTER 3 INITIAL SURVEYS

Section 1 GENERAL REQUIREMENTS

A new paragraph 3.1.1.4 is added as follows:

"3.1.1.4 The Party applying for plan approval of a newbuilding on or after 1 January 2005 is to declare the date of "contract for construction"."

Section 2 INITIAL SURVEYS OF NEWBUILDINGS

The second sentence of 3.2.1.1 is replaced by the following:

"Copies of the plans to be submitted for approval to sister ships may be reduced or such submission exempted according to the specific conditions. Sister ships may have minor design alterations provided such alterations do not affect matters related to classification."

The existitng paragraph 3.2.3.6 is replaced by the following:

"3.2.3.6 The requirements for tests

(1) The tightness tests of compartments are to be in accordance with the relevant requirements in Section 7 of this Chapter."

(2) Where the ambient temperature is below 0℃ during test, suitable means is to be provided against icing.

(3) Tightness test for machineries, boilers, pressure vessels and piping is to be carried out after installation. The duration of test is in general to be 3 to 5 min, with the test pressure as required in PART THREE of the Rules.

(4) Mooring and sea trials are to be carried out in accordance with the approved test program."

A new Section 7 is added as follows:

"Section 7 TIGHTNESS TESTING OF COMPARTMENTS

3.7.1 General requirements

3.7.1.1 The requirements in this Section apply to the following compartments and structures:

(1) Gravity tanks, excluding independent tanks of less than 5 m^3 in capacity;

(2) Watertight or weathertight structures.

第 4 节 证　书

2.4.1.3 中“注明无动力推进装置和”改为“加注无动力推进装置 Non-propulsion 附加标志和注明”

2.4.1.4 中“船东要求的”字样删除。

第 3 章 初次检验

第 1 节　一般规定

新增 3.1.1.4 如下：

3.1.1.4　2005 年 1 月 1 日或以后申请的新建船舶的图纸审查，申请方应提供相应的“建造合同”日期。

第 2 节　新建船舶的初次检验

3.2.1.1 第二段改为：

姐妹船可根据不同情况免除或减少提交审查图纸的份数。在不影响船级的条件下，姐妹船允许有轻微的修改。

3.2.3.6 改为：

3.2.3.6　试验要求：

(1)　舱室密性试验按本章第 7 节的有关规定。

(2)　试验时，若外界气温低于 0℃，则应采取适当的防冻措施。

(3)　机械设备、锅炉、压力容器和管系安装后应进行密性试验。试验时间一般为 3 ～ 5min，试验压力按本规范第 3 篇的有关要求。

(4)　系泊试验和航行试验按批准的试验大纲进行。

新增第 7 节

第 7 节　舱室密性试验

3.7.1　一般要求

3.7.1.1　本节规定适用于下列舱室和结构：

(1)　重力液舱，不包括容积 5m³ 以下的独立液舱；

(2)　水密或风雨密结构。

The purpose of these tests is to check the tightness and/or the strength of structural elements at time of ships construction and on the occasion of major repairs.

3.7.1.2 Tests are to be carried out in the presence of the Surveyor at a stage sufficiently close to completion so that any subsequent work would not impair the strength and tightness of the structure.

3.7.1.3 Testing requirements for all ships are given in Table 3.7.4.1. Additional requirements for testing of spaces within cargo area of certain types of ships are given in Table 3.7.4.2(1).

3.7.2 Definitions

3.7.2.1 The following defitions apply in this Section:

(1) Shop primer is a thin coating applied after surface preparation and prior to fabrication as a protection against corrosion during fabrication.

(2) Protective coating is a final coating protecting the structure from corrosion.

(3) Structural testing is a hydrostatic test carried out to demonstrate the tightness of the tanks and the structural adequacy of the design. Where practical limitations prevail and hydrostatic testing is not feasible (for example when it is difficult, in practice, to apply the required head at the top of the tank), hydropneumatic testing may be carried out instead. When a hydropneumatic testing is performed, the conditions should simulate, as far as practicable, the actual loading of the tank.

(4) Hydropneumatic testing is a combination of hydrostatic and air testing, consisting in filling the tank with water up to its top and applying an additional air pressure. The value of the additional air pressure is to be not less than 0.015 MPa.

(5) Leak testing is an air or other medium test carried out to demonstrate the tightness of the structure.

(6) Hose testing is carried out to demonstrate the tightness of structural items not subjected to hydrostatic or leak testing and to other components which contribute to the watertight or weathertight integrity of the hull.

3.7.3 Testing methods

3.7.3.1 Structural testing

(1) Structural testing may be carried out after application of the shop primer.

(2) Structural testing may be carried out after the protective coating has been applied, provided that one of the following two conditions is satisfied:

① All the welds are completed and carefully inspected visually to the satisfaction of the Surveyor prior to the application of the protective coating;

② Leak testing is carried out prior to the application of the protective coating.

(3) In absence of leak testing, protective coating should be applied after the structural testing of:

① all erection welds, both manual and automatic；

② all manual fillet weld connections on tank boundaries and manual penetration welds.

(4) The requirements for structural testing are given in Table 3.7.4.1.

3.7.3.2 Leak testing

这些试验的目的是检验船舶在建造和重要修理期间结构件的密性和／或强度。

3.7.1.2　试验应在充分接近完成的阶段，在验船师在场时进行，并且任何后续工作都不会削弱结构的强度和密性。

3.7.1.3　所有船舶的试验要求见表 3.7.4.1 的规定。某些类型船舶货物区域内舱室附加试验要求见表 3.7.4.2（1）的规定。

3.7.2　定义

3.7.2.1　本节有关定义如下：

(1)　车间底漆：系指用于表面处理后和分段装配之前的一种防腐蚀薄涂层。

(2)　防护涂层：系指防护结构腐蚀的最终涂层。

(3)　结构试验：系指水静力试验，以证实液舱的密性和结构强度的设计是足够的。如实际限制使水静力试验不可行（例如，实际中液舱顶部很难施加要求的压力），可采用液压气动试验来代替。当进行液压气动试验时，应尽可能使假定的状态与液舱实际载荷相同。

(4)　液压气动试验：系指水静力和空气试验的组合，在液舱内充水至液舱顶并附加空气压力。附加的空气压力值应不小于 0.015MPa。

(5)　渗漏试验：系指用空气或其他介质进行试验，以证实结构的密性。

(6)　冲水试验：系指为证实结构部件密性的试验，这些结构部件不适于接受水静力试验或渗漏试验。冲水试验有利于检测船体水密和风雨密的完整性。

3.7.3　试验方法

3.7.3.1　结构试验

(1)　结构试验可以在涂车间底漆后进行。

(2)　结构试验可以在涂防护涂层后进行，但应满足下列两个条件之一：

①　所有焊接都已完成并在涂防护涂层之前经验船师仔细目视检查满意。

②　在涂防护涂层之前进行了渗漏试验。

(3)　当不做渗漏试验时，下述部位必须在结构试验后涂防护涂层：

①　所有装配焊缝，包括手工和自动焊缝。

②　所有液舱边界的手工填角焊缝和手工深熔焊缝。

(4)　结构试验的要求见表 3.7.4.1 的规定。

3.7.3.2　渗漏试验

(1) Where leak testing is carried out in accordance with Table 3.7.4.1, an air pressure of 0.015 MPa is to be applied during the test.

Prior to inspection, it is recommended that the air pressure in the tank is raised to 0.02 MPa and kept at this level for about 1 hour to reach a stabilized state, with a minimum number of personnel in the vicinity of the tank, and then lowered to the test pressure.

Welds are to be coated with an efficient indicating liquid.

(2) A U-tube filled with water up to a height corresponding to the test pressure is to be fitted to avoid overpressure of the compartment tested and verify the test pressure. The U-tube should have a cross section larger than that of the pipe supplying air.

In addition, the test pressure is also to be verified by means of one master pressure gauge.

The Society may accept alternative means which are considered to be equivalently reliable.

(3) Leak testing is to be carried out, prior to the application of a protective coating, on all fillet weld connections on tank boundaries, penetrations and erection welds on tank boundaries excepting welds made by automatic processes. Selected locations of automatic erection welds and pre-erection manual or automatic welds may be required to be similarly tested at the discretion of the Surveyor taking account of the quality control procedures operating in the shipyard. For other welds, leak testing may be carried out, after the protective coating has been applied, provided that these welds were carefully inspected visually to the satisfaction of the Surveyor.

(4) Any other recognized method may be accepted to the satisfaction of the Surveyor.

3.7.3.3 Hose testing

When hose testing is required to verify the tightness of the structures, as defined in Table 3.7.4.1, the minimum pressure in the hose, at least equal to 0.2 MPa, is to be applied at a maximum distance of 1.5 m. The nozzle diameter is not to be less than 12 mm.

3.7.3.4 Hydropneumatic testing

When hydropneumatic testing is performed, the same safety precautions as for leak testing are to be adopted.

3.7.3.5 Other testing methods

Other testing methods may be accepted, at the discretion of the Society, based upon equivalency considerations.

3.7.4 Testing requirements

3.7.4.1 Testing requirements for all ships are given in Table 3.7.4.1.

3.7.4.2 Additional requirements for special type vessels/tanks

(1) In addition to the requirements of Table 3.7.4.1, particular requirements for testing of certain spaces within the cargo area of:

① liquefied gas carriers,

② edible liquid carriers,

③ chemical carriers,

are given in Table 3.7.4.2.

(2) These requirements intend generally to verify the adequacy of the structural design of the tank, based on the loading conditions which prevailed when determining the tank structure scantlings.

(1) 按表 3.7.4.1 进行渗漏试验时，试验期间的空气压力应为 0.015MPa。

检查之前，建议将液舱内的压力升到 0.02MPa，并在这个水平保持大约 1h 以达到稳定状态，在液舱附近的人员尽可能少，随后降低到试验压力。

焊缝要涂上一层有效的显示液。

（2） 应装设一个充水相当于试验压力高度的 U 型管，以避免试验舱段超压和核实试验压力。该 U 型管的横截面积要大于供气管的横截面积。

此外，试验压力还应用一个标准压力表进行验证。
本社可接受其他等效的方法。

（3） 除自动焊之外，液舱边界上的所有填角焊缝、深熔焊缝和装配焊缝应在防护涂层涂装前进行渗漏试验。在考虑到船厂的质量控制体系的运行情况后，验船师可要求对自动装配焊和预装配手工焊或自动焊选择位置做类似的试验。对其他焊缝，验船师对其进行仔细目视检查满意后，在防护涂层后进行渗漏试验。

（4） 经验船师同意的任何其他公认的方法都可以接受。

3.7.3.3 冲水试验

按表 3.7.4.1 的规定，冲水试验是为证实结构的密性，试验时喷嘴处压力应至少为 0.2MPa，最大距离应不大于 1.5m，喷嘴的直径应不小于 12mm。

3.7.3.4 液压气动试验

当进行液压气动试验时，应采取与渗漏试验同样的安全预防措施。

3.7.3.5 其他试验方法

经本社判定作为等效考虑的其他试验方法也可以接受。

3.7.4 试验要求

3.7.4.1 所有船舶的试验要求见表 3.7.4.1 的规定。

3.7.4.2 特殊船型 / 液舱的附加要求：

（1） 除表 3.7.4.1 的规定外，对下列船舶货物区域内的某些舱室的附加试验要求见表 3.7.4.2（1）的规定：

① 液化气体运输船；

② 食用液体运输船；

③ 化学品运输船。

(2) 这些要求用以验证基于确定液舱结构尺寸时的载荷工况的结构设计的合理性。

Testing Requirements for All Ships **Table 3.7.4.1**

Item No.	Structure to be tested	Type of testing	Structural test pressure	Remarks
1	Double bottom tanks	Structural testing ①	The greater of the following: (1) Head of water up to the top of overflow (2) Head of water up to the margin line	Tank boundaries tested from at least one side
2	Double side tanks	Structural testing ①	The greater of the following: (1) Head of water up to the top of overflow (2) 2.4 m head of water above highest point of tank	Tank boundaries tested from at least one side
3	Tank bulkheads, deep tanks	Structural testing ①	The greater of the following ② : (1) Head of water up to the top of overflow (2) 2.4 m head of water above highest point of tank (3) Setting pressure of the safety relief valves, where relevant	Tank boundaries tested from at least one side
	Fuel oil bunkers	Structural testing		
4	Ballast holds in bulk carriers	Structural testing ①	The greater of the following: (1) Head of water up to the top of overflow (2) 0.90 m head of water above top of hatch	
5	Fore peak and after peak used as tank	Structural testing	The greater of the following: (1) Head of water up to the top of overflow (2) 2.4 m head of water above highest point of tank	Test of the after peak carried out after the stern tube has been fitted
	Fore peak not used as tank	Refer to SOLAS ch Ⅱ -1 Reg.14		
	After peak not used as tank	Leak testing		
6	Cofferdams	Structural testing ③	The greater of the following: (1) Head of water up to the top of overflow (2) 2.4 m head of water above highest point of tank	
7	Watertight bulkheads	Refer to SOLAS ch Ⅱ -1 Reg.14 ④		
8	Watertight doors below freeboard or bulkhead deck	Refer to SOLAS ch Ⅱ -1 Reg.18		
9	Double plate rudders	Leak testing		
10	Shaft tunnel	Hose testing		
11	Shell doors	Hose testing		
12	Watertight hatchcovers of tanks in bulkcarriers	Hose testing		
	Watertight hatchcovers of tanks in combination carriers	Structural testing ①	The greater of the following: (1) 2.4 m head of water above the top of hatchcover (2) Setting pressure of the safety relief valves, where relevant	At least every 2nd hatch cover to be tested
13	Weathertight hatchcovers and closing appliances	Hose testing		
14	Chain locker (if aft of collision bulkhead)	Structural testing	Head of water up to the top	
15	Independent tanks	Structural testing	Head of water up to the top of overflow, but not less than 0.9 m	
16	Ballast ducts	Structural testing	Ballast pump maximum pressure	

Notes: ① Leak or hydropneumatic testing may be accepted under the conditions specified in 3.7.3.2 of this Section, provided that at least one tank for each type is structurally tested. In general, structural testing need not be repeated for subsequent vessels of a series of identical newbuildings constructed in the same shipyard. This relaxation does not apply to cargo space boundaries in tankers and combination carriers and tanks for segregated cargoes or pollutants. If the structural test reveals weakness or severe faults not detected by the leak test, all tanks are to be structurally tested.

② Where applicable, the highest point of tank is to be measured to the deck and excluding hatches. In holds for liquid cargo or ballast with large hatch covers, the highest point of tank is to be taken at the top of the hatch.

③ Leak or hydropneumatic testing may be accepted under the conditions specified in 3.7.3.2 of this Section when, at the Society's discretion, the latter is considered significant also in relation to the construction techniques and the welding procedures adopted.

④ When hose test cannot be performed without damaging possible outfitting (machinery, cables, switchboards, insulation, etc.) already installed, it may be replaced, at the Society's discretion, by a careful visual inspection of all the crossings and welded joints; where necessary, dye penetrant test or ultrasonic leak test may be required.

所有船舶的试验要求　　表 3.7.4.1

序号	试验的结构	试验型式	结构试验压力	备注
1	双层底液舱	结构试验①	取下列之大者： (1) 至溢流管顶的水压头； (2) 至限界线的水压头	至少从液舱边界一侧进行试验
2	两舷侧液舱	结构试验①	取下列之大者： (1) 至溢流管顶的水压头； (2) 至液舱最高点以上 2.4m 的水压头	至少从液舱边界一侧进行试验
3	液舱舱壁 深舱	结构试验①	取下列之大者②： (1) 至溢流管顶的水压头； (2) 至液舱最高点以上 2.4m 的水压头； (3) 安全阀的设定压力，如设有	至少从液舱边界一侧进行试验
	燃油舱	结构试验		
4	散装货船用于压载的货舱	结构试验①	取下列之大者： (1) 至溢流管顶的水压头； (2) 至舱口顶以上 0.9m 的水压头	
5	用作液舱的首尾尖舱	结构试验	取下列之大者： (1) 至溢流管顶的水压头； (2) 至舱顶最高点以上 2.4m 的水压头	尾尖舱试验要在尾轴管安装后进行
	首尖舱不作液舱	参见 SOLAS ch Ⅱ -1Reg.14		
	尾尖舱不作液舱	渗漏试验		
6	隔离舱	结构试验③	取下列之大者： (1) 至溢流管顶的水压头； (2) 至舱顶最高点以上 2.4m 的水压头	
7	水密舱壁	参见 SOLAS ch Ⅱ -1Reg.14④		
8	干舷甲板或舱壁甲板以下的水密门	参见 SOLAS ch Ⅱ -1Reg.18		
9	双板舵	渗漏试验		
10	轴隧	冲水试验		
11	舷门、首门、尾门	冲水试验		
12	散装货船液舱的水密舱口盖	冲水试验		
	兼用船液舱的水密舱口盖	结构试验①	取下列之大者： (1) 至舱盖顶以上 2.4m 的水压头； (2) 安全阀的设定压力，如设有	至少每第 2 个（每隔 1 个）舱口盖应作试验
13	风雨密舱口盖和关闭装置	冲水试验		
14	位于防撞舱壁后的锚链舱	结构试验	水压头至舱顶	
15	独立液舱	结构试验	至溢流管顶的水压头，但不小于 0.9m	
16	压载管道	结构试验	压载泵的最大压力	

注：① 如果每种类型的液货舱至少对 1 个舱进行过结构试验且合格，则在本节 3.7.3.2 的规定状态下可以接受渗漏试验或液压气动试验。一般来说，对同一船厂同一系列新建船舶的结构试验不需要重复。这种放宽不适用于油船和兼用船的货舱边界以及分隔货物或污染物的液舱。如结构试验发现了渗漏试验未能发现的缺点或严重缺陷，则所有液舱应作结构试验。

② 当适用时，液舱的最高点应量到甲板，不包括舱口。对装液体货的货舱或有大舱盖的压载货舱，液舱的最高点应量到舱口的顶部。

③ 在本节 3.7.3.2 的规定状态下，本社考虑了采用的建造技术和焊接工艺的情况后，可以接受渗漏试验或液压气动试验。

④ 如冲水试验可能会损坏已安装的舾装件（机械、电缆、配电板、绝缘材料等）时，本社可采用对所有接头和焊缝进行仔细目视检查来代替冲水试验。必要时，可要求着色渗透试验或超声波渗漏试验。

Additional Testing Requirements for Spaces within the Cargo Area of Certain Types of Ships **Table 3.7.4.2(1)**

Item No.	Type of ships	Structure to be tested	Testing requirements	Structural test pressure
1	Liquefied gas carriers	Integral tanks	Refer to IGC Code 4.10.6	
		Hull structure supporting membrane or semimembrane tanks	Refer to IGC Code 4.10.7	
		Independent tanks type A	Refer to IGC Code 4.10.10.1	
		Independent tanks type B	Refer to IGC Code 4.10.10.2	
		Independent tanks type C	Refer to IGC Code 4.10.10.3	
2	Edible liquid carriers	Independent tanks	Structural testing	Head of water up to the top of overflow without being less than 0.9 m
3	Chemical carriers	Integral or independent tanks	Structural testing of cargo tanks boundaries from at least one side	The greater of the following ①: (1) 2.4 m head of water above highest point of tank (2) Setting pressure of the safety relief valves, where relevant

Note: ① For chemical tankers, the density of cargo loaded is to be considered."

CHAPTER 4 MAINTENANCE OF CLASSIFICATION SURVEYS (FOR SHIPS IN SERVICE)

Section 2 TYPES OF SURVEYS

The existing paragraph 4.2.3.1 is replaced by the following:

"4.2.3.1 Intermediate surveys are to be carried out on all ships at the second or third annual survey, after completion, commissioning or special survey, as appropriate. Such an intermediate survey is to replace an annual survey. The surveys are to be carried out in accordance with the relevant requirements of Sections 3 to 7 of this Chapter."

In paragraph 4.2.4.6:

The words "… of 15 years of age and over …" is replaced by "… exceeding 15 years of age and …"; the words "… of less than 15 years of age, …" is replaced by "… of 15 years of age and less, …".

The existing paragraph 4.2.5.1 is replaced by the following:

"4.2.5.1 Special surveys of hull and machinery (including electrical installations) are to be carried out at 5-years intervals after completion, commissioning or the previous special survey of the ship."

The existing paragraph 4.2.8.2 is replaced by the following:

"4.2.8.2 When the continuous surveys are carried out, the various items for special surveys specified in 4.2.8.1 of this Chapter are to be examined in rotation, distributed within 5 years. If any examination during the continuous survey reveals defects, the Surveyor may shorten the interval of surveys."

A new paragraph 4.2.8.5 is added as follows:

"4.2.8.5 For general dry cargo ships, the changeover from continuous survey to special survey is to be carried out as early as possible and no later than the due date of the first intermediate survey or the due date of the end of the special survey, whichever comes first after 1 July 2005."

Section 3A HULL AND EQUIPMENT SURVEYS FOR GENERAL DRY CARGO SHIPS

New subparagraphs 4.3A.1.1(8) and (9) are added as follows:

某些类型船舶货物区域内舱室附加试验要求　　表 3.7.4.2（1）

序号	船舶类型	试验的结构	试验要求	结构试验压力
1	液化气体运输船	整体液舱	参见 IGC Code 4.10.6	
		船体结构支承薄膜或半薄膜液舱	参见 IGC Code 4.10.7	
		A 型独立液舱	参见 IGC Code 4.10.10.1	
		B 型独立液舱	参见 IGC Code 4.10.10.2	
		C 型独立液舱	参见 IGC Code 4.10.10.3	
2	食用液体运输船	独立液舱	结构试验	至溢流管顶的水压头，但不小于 0.9m
3	化学品运输船	整体或独立液舱	至少从液舱边界一侧进行结构试验	取下列之大者 (1)： 1）　至舱顶最高点以上 2.4m 的水压头 2）安全阀的设定压力，如设有

注（1）化学品运输船应考虑装载货物的密度。

第 4 章　保持船级检验（营运中检验）

第 2 节　检验种类

4.2.3.1 改为：

4.2.3.1　所有船舶应经受中间检验。中间检验应于船舶完工、投入使用或特别检验（按其适用情况）后的第 2 次或第 3 次年度检验时进行。该次中间检验替代 1 次年度检验。检验内容见本章第 3 节至第 7 节的有关要求。

4.2.4.6 中：“船龄 15 年及以上”改为“船龄 15 年以上”；“船龄小于 15 年”改为“船龄 15 年及以下”。

4.2.5.1 改为：

4.2.5.1　船体和轮机（包括电气设备）应经受特别检验。特别检验应于船舶完工、投入使用或特别检验后的 5 年间隔期内进行。

4.2.8.2 改为：

4.2.8.2　当实行循环检验时，应将本节 4.2.8.1 规定的特别检验项目分配在 5 年内轮流检查。但检验时发现有缺陷，验船师可缩短其检验间隔期。

新增 4.2.8.5 如下：

4.2.8.5　从 2005 年 7 月 1 日以后第 1 次中间检验或特别检验到期日起（先到期者为准），普通干货船船体不再执行循环检验。

第 3A 节　普通干货船的船体与设备检验

新增 4.3A.1.1(8) 和 (9) 如下：

" (8) livestock carriers;

(9) dock/deck ships ① ."

A new foot note is added as follow:

" ① A ship that is designed to carry cargo exclusively above deck without any access for cargo below deck."

In paragraph 4.3A.1.5:

The words "…, and of the securing of windlasses …" are deleted.

Section 4 HULL AND EQUIPMENT SURVEYS FOR OIL TANKERS

In paragraph 4.4.1.9:

The words "…, and of the securing of windlasses …" are deleted.

A new paragraph 4.4.1.10 is added as follows

"4.4.1.10 The side shell frames and brackets of cargo holds bounded by the single side shell of Oil/Bulk/Ore(OBO) carriers engaged on international voyages, which were not built in accordance with Section 8, Chapter 8 of PART TWO of the Rules, are to be assessed as required in 4.5.1.9 of this Chapter according to the following schedule:

(1) For ships which will be 15 years of age or more on 1 July 2005 by the due date of the first intermediate or special survey after that date;

(2) For ships which will be 10 years of age or more on 1 July 2005 by the due date of the first special survey after that date;

(3) For ships which will be less than 10 years of age on 1 July 2005 by the date on which the ship reaches 10 years of age.

Completion prior to 1 July 2005 of an intermediate or special survey with a due date after 1 July 2005 cannot be used to postpone compliance. However, completion prior to 1 July 2005 of an intermediate survey the window for which straddles 1 July 2005 can be accepted."

The following text is added at the end of 4.4.2.1 as a new line:

"Prior to the commencement of any part of the Special and Intermediate Survey a survey planning meeting is to be held between the attending Surveyor(s), the Owner's Representative in attendance and the TM company representative, where involved."

In Table 4.4.6.6(2) ① :

1. The third item "A" as counted downward in column "Special Survey No.3" is replaced by the following:

   "A minimum of 30% of all complete transverse web frame rings in each remaining cargo wing tank."

2. The item "E" in column "Special Survey No.3" is replaced by the following:

   "A minimum of 30% of deck and bottom transverses including adjacent structural members in each cargo centre tank"

3. A new note ① is added as follows:

   "Note 1: The 30% is to be rounded up to the next whole integer."

(8) 牲畜运输船；

(9) 坞式 / 甲板船[①]。

新增脚注①如下：

① 这种船除拟在甲板以上载运货物外，没有任何通道进入货物甲板以下。

4.3A.1.5 中“和锚机的固定”的文字删除。

第 4 节 油船的船体与设备检验

4.4.1.9 中“和锚机的固定”的文字删除。

新增 4.4.1.10 如下：

4.4.1.10 对不按本规范第 2 篇第 8 章第 8 节要求建造的国际航行的单舷侧结构的矿 / 散货 / 油 (OBO) 船，其货舱内的舷侧肋骨和肘板应按下列时间要求进行评估，评估的要求与本章 4.5.1.9 的要求相同。

(1) 2005 年 7 月 1 日船龄满 15 年或以上的船舶，应在该日期后第 1 次中间检验或特别检验到期日；

(2) 2005 年 7 月 1 日船龄满 10 年或以上的船舶，应在该日期后第 1 次特别检验到期日；

(3) 2005 年 7 月 1 日船龄未满 10 年，在其船龄满 10 年时。

2005年7月1日后到期而于2005年7月1日前完成的中间检验或特别检验，不能推迟实施本条要求。然而，2005 年 7 月 1 日前完成的检验期限跨越 2005 年 7 月 1 日的中间检验，可予以接受。

4.4.2.1 最后另起一行增加一段：

在特别检验和中间检验的任何部分开始之前，应召开有现场验船师、船东代表和测厚公司代表参加的检验计划会议。

表 4.4.6.6(2) ①的修改如下：

1、表中第 3 列（第 3 次特别检验）中从上往下第 3 个 A) 改为：

A) 所有完整的横向环状框架中至少 30%[①]（在其余的每个货油边舱内）。

2、表中第 3 列（第 3 次特别检验）中的 E) 改为：

E) 甲板和底部横材至少 30%[①]，包括邻接的结构件（在每一个中央货油舱内）。

3、表下面新增注①如下：

① 30% 应园整到下一个完整的整数。

The existing subparagraph 4.4.4.3(1) ④ is replaced by the following:

"④ examination of cargo, crude oil washing, bunker and vent piping systems and their flame screens, including vent masts and headers."

Subparagraph 4.4.6.3 (4):

The words "of single hull oil tankers" are inserted after "The survey extent of combined ballast/cargo tanks …".

Section 5 HULL AND EQUIPMENT SURVEYS FOR BULK CARRIERS

The existing paragraph 4.5.1.1 is replaced by the following:

"4.5.1.1 This Section applies to surveys of hull and equipment for self-propelled single or double side skin bulk carriers with enhanced survey program notation ESP."

In paragraph 4.5.1.7:

The words "…, and of the securing of windlasses …" are deleted.

A new paragraph 4.5.1.10 is added as follows:

"4.5.1.10 Except as expressly stated otherwise, the requirements in this Section apply to single or double side skin bulk carriers."

The following text is added at the end of 4.5.2.1 as a new line:

"Prior to the commencement of any part of the Special and Intermediate Survey a survey planning meeting is to be held between the attending Surveyor(s), the Owner's Representative in attendance and the TM company representative, where involved."

The existing subparagraph 4.5.3.1(2) is replaced by the following:

"(2) Transverse Section:

① A Transverse Section of a single side skin bulk carrier includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom, hopper sides, longitudinal bulkheads and bottom plating of top side tanks.

② A Transverse Section of a double side skin bulk carrier includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom, inner sides, hopper sides and top wing inner sides."

A new subparagraph 4.5.3.1(4) is added as follows:

"(4) A Ballast Tank of a double side skin bulk carrier is a tank which is being used solely for water ballast, or, where applicable, a space which is used for both cargo and ballast will be treated as a Ballast tank when substantial corrosion has been found in that space. A Double Side Tank is to be considered as a separate tank even if it is in connection to either the topside tank or the hopper side tank."

The existing subparagraph 4.5.4.3(1) ② is replaced by the following:

" ② Where portable covers, wooden or steel pontoons are fitted in a single side skin bulk carrier, checking the satisfactory condition of:"

4.4.4.3(1) ④改为：

④ 检查货油、原油洗舱、燃油和透气管系，以及阻焰器，包括透气桅和集管。

4.4.6.3（4）句前加“单壳油船”

第 5 节 散装货船的船体与设备检验

4.5.1.1 改为：

4.5.1.1 本节规定适用于具有加强检验程序附加标志 ESP 的自航单舷侧散装货船或双舷侧散装货船的船体与设备的各种检验。

4.5.1.7 中“和锚机的固定”的文字删除。

4.5.1.8 中“确认首垂线 0.25*L* 范围内（第 1 和第 2 货舱）的舱口盖（箱形舱口盖除外）”改为“确认全部或部分位于首垂线 0.25*L* 范围内的第 1 和第 2 货舱舱口盖（箱形舱口盖除外）”。

新增 4.5.1.10 如下：

4.5.1.10 除条款中另有说明外，本节各条款对单舷侧散装货船或双舷侧散装货船均适用。

4.5.2.1 最后另起一行增加一段：

在特别检验和中间检验的任何部分开始之前，应召开有现场验船师、船东代表和测厚公司代表参加的检验计划会议。

4.5.3.1(2) 改为：

(2) 横剖面：

① 单舷侧散装货船横剖面：系指包括所有纵向构件，如板、纵骨和在甲板、舷侧外板、船底板、内底板上的纵桁、底边舱斜板、纵舱壁和顶边舱底板。

② 双舷侧散装货船横剖面：系指包括所有纵向构件，如板、纵骨和在甲板、舷侧外板、船底板、内底板上的纵桁、内壳板、底边舱斜板和顶边舱斜板。

新增 4.5.3.1(4) 如下：

(4) 双舷侧散装货船压载舱：系指主要用于水压载的舱，或可用于装货和压载的处所，当发现其显著腐蚀时，将视为压载舱。两舷边舱即使与顶边舱或底边舱相连，该两舷边舱应被认为一个独立舱。

4.5.4.3(1) ②改为：

② 单舷侧散装货船，对活动舱口盖、木质或钢质箱形舱口盖，检查下列部件处于满意状态；

The following item A is added at the end of 4.5.4.3(2) ① as a new line:

"A. Single side skin bulk carriers"

A new subparagraph 4.5.4.3(2) ① B. is added as follows:

"B. Double side skin bulk carriers

a. Overall survey of two selected cargo holds.

b. When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Tables 4.5.6.8(3) ② a ~ d in this Section. These extended thickness measurements are to be carried out before the survey is credited as complete. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken."

The following item A is added at the end of 4.5.4.3(2) ② as a new line:

"A. Single side skin bulk carriers"

A new subparagraph 4.5.4.3(2) ② B. is added as follows:

"B. Double side skin bulk carriers

a. Overall survey of all cargo holds.

b. When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Tables 4.5.6.8(3) ② a ~ d in this Section. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

c. All piping and penetrations in cargo holds, including overboard piping, are to be examined."

The existing subparagraph 4.5.4.3(3) is replaced by the following:

"(3) Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Tables 4.5.6.8(3) ① a ~ e for single side skin bulk carriers or Tables 4.5.6.8(3) ② a ~ d for double side skin bulk carriers. These extended thickness measurements are to be carried out before the survey is credited as complete.

Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken."

The following item A) is added at the end of 4.5.5.3(3) ① B as a new line:

"A) Single side skin bulk carriers"

A new subparagraph 4.5.5.3(3) ① B.B) is added as follows:

"B) Double side skin bulk carriers

4.5.4.3(2) ①下面另起一行，增加 A. 如下：

A. 单舷侧散装货船

新增 4.5.4.3(2) ① B. 如下：

B. 双舷侧散装货船

a. 选择 2 个货舱作全面检验。

b. 当验船师认为需要或存在普遍腐蚀时，则应进行测厚。如测厚结果显示显著腐蚀，则测厚范围应按本节表 4.5.6.8(3) ② a~d 的规定。测厚应在检验完成之前进行。上次特别检验确认的显著腐蚀区域应测厚。

4.5.4.3(2) ②下面另起一行，增加 A. 如下：

A. 单舷侧散装货船

新增 4.5.4.3(2) ② B. 如下：

B. 双舷侧散装货船

a. 所有货舱作全面检验。

b. 当验船师认为需要或存在普遍腐蚀时，则应进行测厚。如测厚结果显示显著腐蚀，则测厚范围应按本节表 4.5.6.8(3) ② a~d 的规定。测厚应在检验完成之前进行。上次特别检验确认的可疑区域应检查；上次特别检验确认的显著腐蚀区域应测厚。

c. 货舱内所有管路和贯穿件，包括舷外排放管路应作检查。

4.5.4.3(3) 改为：

(3) 压载舱的检查，当特别检验和中间检验的结果有要求时，压载舱应予检查。当验船师认为需要或存在普遍腐蚀时，则应进行测厚。如测厚结果显示显著腐蚀，则测厚范围：单舷侧散装货船应按本节表 4.5.6.8(3) ① a~e 的规定；双舷侧散装货船应按本节表 4.5.6.8(3) ② a~d 的规定。测厚应在检验完成之前进行。

上次特别检验确认的可疑区域应予检查。上次特别检验确认的显著腐蚀区域应测厚。

4.5.5.3(3) ① B. 下面另起一行，增加 A) 如下：

A) 单舷侧散装货船

新增 4.5.5.3(3) ① B.B) 如下：

B) 双舷侧散装货船

a. An overall survey of all cargo holds is to be carried out.

b. Where considered necessary by the Surveyor as a result of the overall survey as described in a, the survey is to be extended to include a close-up survey of those areas of structure in the cargo holds selected by the Surveyor."

In subparagraph 4.5.5.3(3) ① C.b:

The words "Tables 4.5.6.8(3) ① ~ ⑤ " are replaced by "Tables 4.5.6.8(3) ① a ~ e"。

The following item A) is added at the end of 4.5.5.3(3) ① C as a new line:

"A) Single side skin bulk carriers"

A new subparagraph 4.5.5.3(3) ① C.B) is added as follows:

"B) Double side skin bulk carriers

a. Thickness measurements are to be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey, where required as per 4.5.5.3(3) ① B.B)b, and as provided in 4.5.5.3(3) ① A.C.

b. Where Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with the requirements of Tables 4.5.6.8(3) ② a~d.

These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

c. For areas where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurements according to a. may be specially considered."

A new subparagraph 4.5.5.3(4) is added as follows:

"(4) The survey extent of double side skin bulk carriers is to be in accordance with 4.5.5.3(3) of and Table 4.5.5.3(4) of this Section.

Minimum Requirements for Overall and Close-Up Survey and Thickness Measurements at Intermediate Survey of Double Side Skin Bulk Carriers **Table 4.5.5.3(4)**

5 < age ⩽ 10	**10 < age ⩽ 15**	**age > 15**
Overall survey of Representative ballast tanks selected by the attending surveyor (the selection is to include fore and aft peak tanks and three other tanks)	The requirements of the previous special survey	The requirements of the previous special survey
Overall and close-up survey of Suspect Areas identified as previous (intermediate or special) surveys		
Overall survey of all cargo holds		
Thickness measurements to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey at those areas found to be affected by Substantial Corrosion at the previous special surveys		
(A), (B), (C), (D) and (E) are areas to be subjected to close-up surveys and thickness measurements (see Figure 4.5.5.3(4)) (A): Transverse web frame or watertight transverse bulkhead in topside and double side ballast tanks (B): Ordinary transverse frame in double side tanks (C): Cargo hold transverse bulkheads plating, stiffeners and girders (D): Cargo hold hatch covers and coamings (E): Deck plating and underdeck structure inside line of hatch openings between cargo hold hatches Note: Close-up survey of transverse bulkheads to be carried out at four levels: Level (a): Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool; Level (b): Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates; Level (c): About mid-height of the bulkhead; Level (d): Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.		

a. 所有货舱应作全面检验。

b. 如上述 a 全面检验的结果，验船师认为需要，检验应扩展到选择的货舱中那些结构区域的近观检验。

4.5.5.3(3) ①C.b. 中“表 4.5.6.8(3) ① ~ ⑤”改为“表 4.5.6.8(3) ①a ~ e”。

4.5.5.3(3) ①C. 下面另起一行，增加 A) 如下：

A）单舷侧散装货船

新增 4.5.5.3(3) ①C.B) 如下：

B) 双舷侧散装货船

a. 4.5.5.3(3) ①B.B)b 要求的近观检验区域应进行足够范围的测厚及 4.5.5.3(3) ①A.C. 规定的测厚，以确定总体腐蚀和局部腐蚀的程度。

b. 如发现显著腐蚀，则测厚范围应按本节表 4.5.6.8(3) ②a~d 的规定。

测厚应在检验完成之前进行。上次特别检验确认的可疑区域应检查。上次特别检验确认的显著腐蚀区域应测厚。

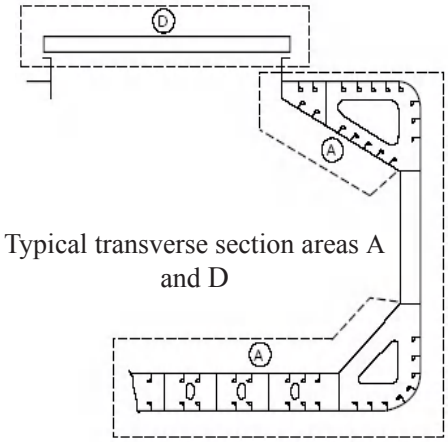
c. 如发现区域内保护涂层良好，则上述 a 的测厚范围可予特别考虑。

新增 4.5.5.3(4) 如下：

(4) 双舷侧散装货船的检验范围应按本节 4.5.5.3(3) 及表 4.5.5.3(4) 的规定。

双舷侧散装货船在中间检验时全面检验、近观检验和厚度测量的最低要求　　表 4.5.5.3(4)

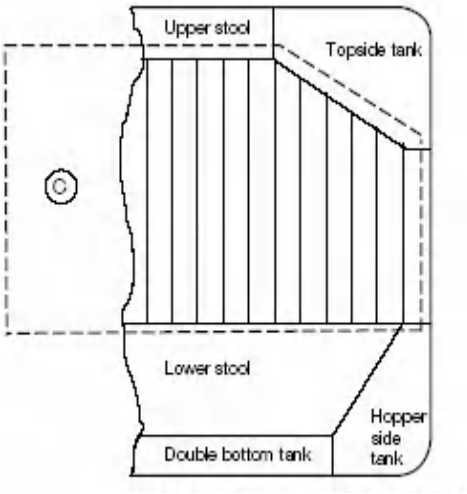
5 年＜船龄≤ 10 年	10 年＜船龄≤ 15 年	船龄＞ 15 年
选择代表性压载舱（应包括首尾尖舱和 3 个其他液舱）作全面检验	上次特别检验的要求	上次特别检验的要求
上次（中间或特别）检验确认的可疑区域作全面检验和近观检验		
所有货舱作全面检验		
近观检验区域应经受足够范围的测厚，以确定该区域的普遍腐蚀和局部腐蚀的程度，上次特别检验发现的显著腐蚀也应测厚。		
(A)、(B)、(C)、(D) 和 (E) 是近观检验和测厚的范围（见图 4.5.5.3(4)） (A)：顶边舱和两舷边压载舱内的横向强框架或水密横舱壁 (B)：两舷边液舱内普通肋骨 (C)：货舱横舱壁板、扶强材和纵桁 (D)：货舱舱口盖和舱口围板 (E)：货舱口之间货舱开口边线内的甲板板和甲板下结构 注：横舱壁近观检验应在以下 4 个水平面进行： 水平面 (a)：对无底凳船直接在内底板以上，封槽板（如设有）以上和卸货板以上； 水平面 (b)：对有底凳船直接在底凳顶板以上和卸货板以上； 水平面 (c)：大约在舱壁高度的一半处； 水平面 (d)：直接在上甲板以下和顶边舱附近及有顶凳船的顶凳底板以下或直接在顶边舱以下。		



Typical transverse section areas A and D

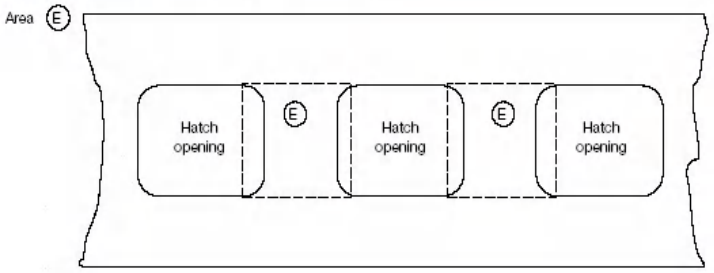
Thickness of longitudinal members at transverse sections,thickness of transverse structural members, thickness of miscellaneous structural members and thickness of cargo hold transverse frames to be reported as appropriate

A cargo hold, transverse bulkhead Area C

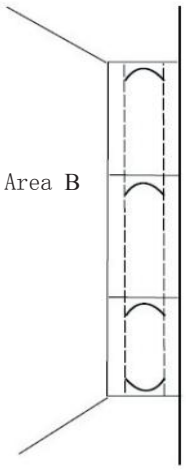


Thickness of cargo hold transverse bulkheads to be reported

Typical areas of deck plating and underdeck structure inside line of hatch openings between cargo hold hatches



Thickness of miscellaneous structural members to be reported



Ordinary transverse frame in double side skin tank

Figure 4.5.5.3(4) Close-up Survey and Thickness Measurement Areas"

The existing paragraph 4.5.6.5(3) is replaced by the following:

"(3) Where the protective coating in cargo holds of a single side skin bulk carrier is found to be in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered."

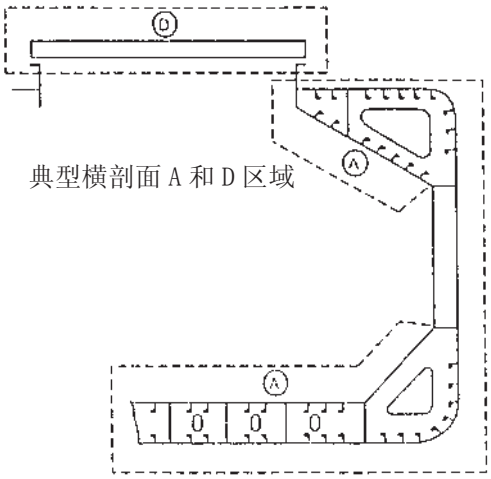
The existing paragraph 4.5.6.7 is replaced by the following:

"4.5.6.7 Extent of overall and close-up surveys

(1) Single side skin bulk carriers

① An overall survey of all tanks and spaces, excluding fuel oil, lub. oil and freshwater tanks, is to be carried out.

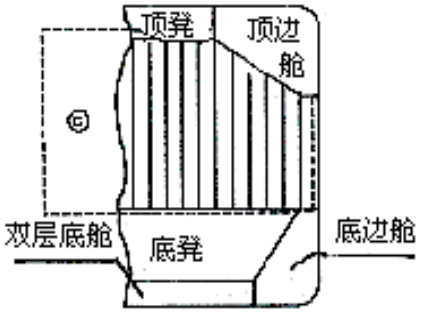
② Each special survey is to include a close-up examination of sufficient extent to establish the condition of the shell frames and their end attachments in all cargo holds and sea water ballast tanks. The minimum requirements for close-up surveys are given in Table 4.5.6.7(1) ② .



典型横剖面 A 和 D 区域

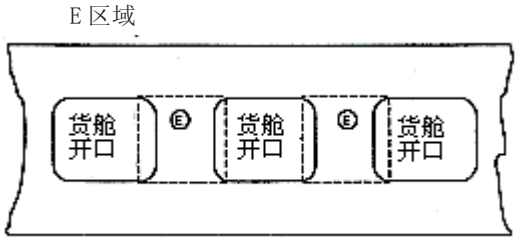
横剖面上纵向构件厚度、横向结构件厚度、
其他结构件厚度和货舱舷侧肋骨厚度测量报告的厚度

货舱横舱壁 c 区域

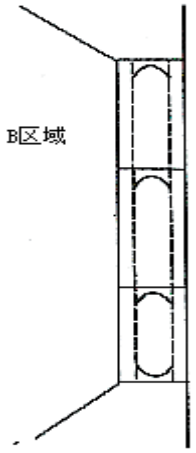


货舱横舱壁厚度测量报告的厚度

货舱口之间货舱开口边线内的
甲板及甲板下结构的典型区域



其他构件厚度测量报告的厚度



双舷侧舱内的普通肋骨

图 4.5.5.3(4)　近观检验和测厚区域

4.5.6.5（3）改为：

（3） 单舷侧散装货船，如发现货舱内保护涂层状态良好，则近观检验和厚度测量的范围可予特别考虑。

4.5.6.7 改为：

4.5.6.7　全面检验和近观检验的范围：

(1) 单舷侧散装货船

① 每次特别检验应对所有液舱和处所进行全面检验，但不包括燃油舱、滑油舱和淡水舱。

② 每次特别检验应包括足够范围的近观检验，以确定所有货舱内的肋骨及其端部附件和压载舱状况。近观检验的最低要求按本节表 4.5.6.7(1) ②的规定。

(2) Double skin bulk carriers

① An overall survey of all tanks and spaces is to be carried out. The requirements for surveys of fuel oil tanks in the cargo length area are given in Table 4.5.6.7(2) ① .

Internal Examination of Fuel Oil Tanks in the Cargo Length Area Table 4.5.6.7(2) ①

age ⩽ 5	**5 < age ⩽ 10**	**10 < age ⩽ 15**	**age > 15**
None	One	Two (3)	Half (minimum Two)(3)

Notes:
(1) Tanks considered are of the integral (structural) type.
(2) If a selection of tanks is accepted to be examined, then different tanks are to be examined at each special survey, on a rotational basis.
(3) One deep tank is to be included, if fitted.

② The minimum requirements for close-up surveys are given in Table 4.5.6.7(2) ② .

③ For close-up surveys of wing ballast tanks of ore carriers, the survey requirements of wing ballast tanks for oil tankers apply.

④ The Surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the spaces under survey, the condition of the corrosion prevention system and where spaces have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information.

⑤ For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table 4.5.6.7(2) ② may be specially considered by the Society.

The existing Table 4.5.6.7(2) is renumbered as Table 4.5.6.7(1) ② , with the title being replaced by "Minimum Requirements for Close-up Survey at Special Hull Survey of Single Side Skin Bulk Carriers". The Table is amended as follows:

1. The text of item A in the third column (Special Survey No.3) is replaced by the following:

A) All shell frames in the forward and one other selected cargo hold and 50% of frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating"

2. The items C), D) and E) in the third column (Special Survey No.3) are replaced by the following:

"Areas (C), (D) and (E) as for Special Survey No.2".

(2) 双舷侧散装货船

① 每次特别检验应对所有液舱和处所进行全面检验。货物区域内的燃油舱按表 4.5.6.7（2）① 要求检验：

货物区域内燃油舱内部检查　　表 4.5.6.7（2）①

船龄≤ 5 年	5 年＜船龄≤ 10 年	10 年＜船龄≤ 15 年	船龄＞ 15 年
——	1 个	2 个 (3)	一半（至少 2 个）(3)
注：(1) 考虑的液舱应是完整的（结构）类型。 (2) 如选择 1 个液舱作检查，那么在每次特别检验时应轮流检查不同的液舱。 (3) 应包括 1 个深舱（如设有）。			

② 特别检验时近观检验的最低要求按本节表 4.5.6.7(2) ②的规定。

③ 矿砂船边压载舱的近观检验与油船边压载舱的近观检验相同。

④ 根据所检验的处所维护保养及防腐蚀保护系统的状况、现有资料与处所的结构布置或细节、类似的处所或类似的船上出现了缺陷，验船师认为需要，可扩大近观检验的范围。

⑤ 如检查发现处所内保护涂层状态良好，则本节表 4.5.6.7(2) ②规定的近观检验范围本社可予特别考虑。

原“表 4.5.6.7(2) ”改为“表 4.5.6.7(1) ②”；表题改为“单舷侧散装货船在特别检验时近观检验的最低要求”。表内容修改如下：

1. 表中第 3 列（第 3 次特别检验）的 A) 改为：

A) 第 1 货舱及选择的其他一个货舱的所有肋骨和其余的每个货舱肋骨的 50%，包括其端部附件和附连的外板。

2. 表中第 3 列（第 3 次特别检验）的 C)、D) 和 E) 三项合并为“以下同第 2 次特别检验中的 C) 至 E)”。

Minimum Requirements for Close-Up Survey at Special Hull Survey of Double Side Skin Bulk Carriers **Table 4.5.6.7(2) ②**

Special Survey No.1 age ≤ 5	**Special Survey No.2 5 < age ≤ 10**	**Special Survey No.3 10 < age ≤ 15**	**Special Survey No.4 and subsequent age > 15**
One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (This is to include the foremost topside and double side ballast tanks on either side) **(A)**	One transverse web with associated plating and longitudinals as applicable in each ballast tank (i.e. topside, hopper side, double bottom, double side and peak tanks) **(A)** Forward and aft transverse bulkheads including stiffening system in a transverse section including topside, hopper side and double side ballast tanks **(A)**	All transverse web with associated plating and longitudinals as applicable in each ballast tank (i.e. topside, hopper side, double bottom, double side and peak tanks) **(A)** All transverse bulkheads including stiffening system in each ballast tank. **(A)**	All transverse web with associated plating and longitudinals as applicable in each ballast tank (i.e. topside, hopper side, double bottom, double side and peak tanks) **(A)** All transverse bulkheads including stiffening system in each ballast tank. **(A)**
	25% of ordinary transverse web frames in the foremost double side tanks **(B)**	25% of ordinary transverse web frames in all double side tanks **(B)**	All ordinary transverse web frames in all double side tanks **(B)**
Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted **(C)**	One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools, where fitted **(C)**	All cargo hold transverse bulkhead, including internal structure of upper and lower stools, where fitted **(C)**	Areas **(C)** ~ **(E)** as for age interval 10 to 15 years
All cargo hold hatch covers and coamings (platings and stiffeners) **(D)**	All cargo hold hatch covers and coamings (platings and stiffeners) **(D)**	All cargo hold hatch covers and coamings (platings and stiffeners) **(D)**	
	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches **(E)**	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches **(E)**	

(A), (B), (C), (D) and (E) are areas to be subjected to close-up surveys and thickness measurements (see Figure 4.5.5.3(4) of this section).
(A): Transverse web frame or watertight transverse bulkhead in topside, hopper side and double side ballast tanks. In fore and aft peak tanks transverse web frame means a complete transverse web frame ring including adjacent structural members
(B): Ordinary transverse frame in double side tanks
(C): Cargo hold transverse bulkheads plating, stiffeners and girders
(D): Cargo hold hatch covers and coamings
(E): Deck plating inside line of hatch openings between cargo hold hatches

Note: Close-up survey of transverse bulkheads to be carried out at four levels:
Level (a): Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.
Level (b): Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.
Level (c): About mid-height of the bulkhead.
Level (d): Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

”

The existing subparagraph 4.5.6.8(1) is replaced by the following:

“(1) Minimum requirements for thickness measurements

① The minimum requirements for thickness measurements at Special Surveys of single side skin bulk carriers are given in Table 4.5.6.8(1) ① in this Section and Table 4.3.5.3(18) ① in this Chapter.

② The minimum requirements for thickness measurements at Special Surveys of double side skin bulk carriers are given in Table 4.5.6.8(1) ② in this Section and Table 4.3.5.3(18) ① in this Chapter.”

The existing Table 4.5.6.8(1) is renumbered as Table 4.5.6.8(1) ① , with the title being replaced by “Minimum Requirements for Thickness Measurements at Special Hull Survey of Single Side Skin Bulk Carriers”. The Table is amended as follows:

1. A new point 5 is added in the second column (Special Survey No.2) as follows:

“5. Frames ② complying with 4.5.1.9 of this Section.”

双舷侧散装货船在特别检验时近观检验的最低要求　　表 4.5.6.7(2) ②

第 1 次特别检验 船龄≤ 5 年	第 2 次特别检验 5 年＜船龄≤ 10 年	第 3 次特别检验 10 年＜船龄≤ 15 年	第 4 次及以后特别检验 船龄＞ 15 年
每种类型（应包括最前面的顶边舱和任何一边的两舷边压载舱）2 个代表性压载舱内各一个横向强框架及附连的板和纵骨 (A)	如适用在每个压载舱（即顶边舱、底边舱、双层底舱、两舷边舱和尖舱）内一个横向强框架及附连的板和纵骨 (A) 在一个横剖面包括顶边舱、底边舱和两舷边压载舱内前后横舱壁，包括其扶强材系统 (A)	如适用在每个压载舱（即顶边舱、底边舱、双层底舱、两舷边舱和尖舱）内所有横向强框架及附连的板和纵骨 (A) 在每一压载舱内的所有横舱壁，包括其扶强材系统 (A)	如适用在每个压载舱（即顶边舱、底边舱、双层底舱、两舷边舱和尖舱）内所有横向强框架及附连的板和纵骨 (A) 在每一压载舱内的所有横舱壁，包括其扶强材系统 (A)
	最前面的两舷边舱内普通肋骨的 25%(B)	所有两舷边舱内普通肋骨的 25%(B)	所有两舷边舱内的所有普通肋骨 (B)
选择 2 个货舱横舱壁，包括顶凳、底凳的内部结构（当设有）(C)	每个货舱内 1 道横舱壁，包括顶凳、底凳的内部结构（当设有）(C)	所有货舱横舱壁，包括顶凳、底凳的内部结构（当设有）(C)	以下与第 3 次特别检验中的 (C)~(E) 相同
所有货舱舱口盖和舱口围板（板和扶强材）(D)	所有货舱舱口盖和舱口围板（板和扶强材）(D)	所有货舱舱口盖和舱口围板（板和扶强材）(D)	
	所有货舱口之间，货舱开口边线内的所有甲板板和甲板下结构 (E)	所有货舱口之间，货舱开口边线内的所有甲板板和甲板下结构 (E)	

(A)、(B)、(C)、(D) 和 (E) 是近观检验和测厚的范围（见本节图 4.5.5.3(4)）
(A)：顶边舱、底边舱和两舷边压载舱内的横向强框架或水密横舱壁。首尾尖舱内的横向强框架，意味着一个完整的横向环状强框架，包括邻接的结构件
(B)：两舷边舱内的普通肋骨
(C)：货舱横舱壁板、扶强材和纵桁
(D)：货舱舱口盖和舱口围板
(E)：货舱口之间货舱开口边线内甲板板

注：横舱壁近观检验应在以下 4 个水平面进行：
水平面 (a)：对无底凳船直接在内底板以上、封槽板（如设有）以上和卸货板以上；
水平面 (b)：对有底凳船直接在底凳顶板以上及以下和卸货板以上；
水平面 (c)：大约在舱壁高度的一半处；
水平面 (d)：直接在上甲板以下和顶边舱附近及有顶凳船的顶凳底板以下或直接在顶边舱以下。

4.5.6.8(1) 改为：

(1) 厚度测量的最低要求

① 单舷侧散装货船在特别检验时厚度测量最低要求按本节表 4.5.6.8(1) ①及本章表 4.3.5.3(18) ①的规定。
② 双舷侧散装货船在特别检验时厚度测量最低要求按本节表 4.5.6.8(1) ②及本章表 4.3.5.3(18) ①的规定。

原“表 4.5.6.8(1)”改为“表 4.5.6.8(1) ①”；表题改为“单舷侧散装货船在特别检验时厚度测量的最低要求”；表内容修改如下：

1、表中第 2 列（第 2 次特别检验）中新增 5. 如下：

5. 符合本节 4.5.1.9 规定的肋骨②

2. A new point 7 is added in the third column (Special Survey No.3) as follows:

"7. Point 5 as for Special Survey No.2."

3. In the fourth column (Special Survey No.4 and subsequent):

The words "Points 3, 4, 5 and 6…" in the second last line are replaced by "Points 3, 4, 5, 6 and 7…"

4. A new note ② is added for the Table as follows:

" ② The requirements for thickness measurements of side shell frames and brackets complying with 4.5.1.9 of this Section are given in Appendix 5 of this PART."

Minimum Requirements for Thickness Measurements at Special Hull Survey of Double Side Skin Bulk Carriers **Table 4.5.6.8(1) ②**

Special Survey No.1 age ⩽ 5	**Special Survey No.2 5 < age ⩽ 10**	**Special Survey No.3 10 < age ⩽ 15**	**Special Survey No.4 and subsequent age > 15**
Suspect area	Suspect area	Suspect area	Suspect area
	Within the cargo length: ▪ two transverse sections of deck plating outside line of cargo hatch openings	Within the cargo length: ▪ each deck plate outside line of cargo hatch openings ▪ two transverse sections outside line of cargo hatch openings ① ▪ all wind and water strakes	Within the cargo length: ▪ each deck plate outside line of cargo hatch openings ▪ three transverse sections outside line of cargo hatch openings ① ▪ each bottom plate ▪ all wind and water strakes
	Wind and water strakes in way of the two transverse sections considered above	Selected wind and water strakes outside the cargo length area	Selected wind and water strakes outside the cargo length area
	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table 4.5.6.7(2) ②	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table 4.5.6.7(2) ②	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table 4.5.6.7(2) ②

Note: ① At least one section should be within 0.5L amidships."

The existing subparagrap 4.5.6.8(3) is replaced by the following:

"(3) The Surveyor may further extend the thickness measurements as deemed necessary.

① Provisions for extended measurements for areas with Substantial Corrosion of single side skin bulk carriers are given in Table 4.5.6.8(3) ① a~e. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous Special or Intermediate Surveys are to have thickness measurements taken.

② Provisions for extended measurements for areas with Substantial Corrosion of doublele side skin bulk carriers are given in Table 4.5.6.8(3) ② a~d. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken."

The existing Tables 4.5.6.8(3) ① ~ ⑤ are renumbered as Table 4.5.6.8(3) ① a ~ e, with the text in brackets of the title being replaced by "Special Survey of Single Side Skin Bulk Carriers within the Cargo Area".

2、表中第 3 列（第 3 次特别检验）中新增 7. 如下：

7. 同第 2 次特别检验中的第 5 点

3、表中第 4 列（第 4 次及以后特别检验）中最后的“第 6 点”改为“第 7 点”。

4、表下面新增注②如下：

② 符合本节 4.5.1.9 规定的肋骨及其肘板的测厚要求见本篇附录 5。

双舷侧散装货船在特别检验时厚度测量的最低要求　　表 4.5.6.8(1) ②

第 1 次特别检验 船龄≤ 5 年	第 2 次特别检验 5 年＜船龄≤ 10 年	第 3 次特别检验 10 年＜船龄≤ 15 年	第 4 次及以后特别检验 船龄＞ 15 年
可疑区域	可疑区域	可疑区域	可疑区域
	货物区域内： •货舱开口边线外甲板板的 2 个横剖面	货物区域内： •货舱开口边线外每块甲板板 •货舱开口边线外 2 个横剖面① •所有轻、重载水线间舷侧外板	货物区域内： •货舱开口边线外每块甲板板 •货舱开口边线外 3 个横剖面① •每块船底板 •所有轻、重载水线间舷侧外板
	上述 2 个横剖面处的轻、重载水线间舷侧外板	货物区域外选择的轻、重载水线间舷侧外板	货物区域外选择的轻、重载水线间舷侧外板
	按本节表 4.5.6.7(2) ②经受近观检验的构件的测量点，供总体评定并作记录腐蚀形式用	按本节表 4.5.6.7(2) ②经受近观检验的构件的测量点，供总体评定并作记录腐蚀形式用	按本节表 4.5.6.7(2) ②经受近观检验的构件的测量点，供总体评定并作记录腐蚀形式用

注：①在船中 0.5L 范围内至少有 1 个剖面。

4.5.6.8(3) 改为：

(3) 如验船师认为需要，则厚度测量范围可以扩大。对显著腐蚀区域的厚度测量范围：

① 单舷侧散装货船显著腐蚀的厚度测量范围按本节表 4.5.6.8(3) ①ａ ~ ｅ的规定。测厚应在检验完成之前进行。上次特别检验确认的可疑区域应检查。上次特别检验或中间检验确认的显著腐蚀区域应测厚。

② 双舷侧散装货船显著腐蚀的厚度测量范围按本节表 4.5.6.8(3) ②ａ ~ ｄ的规定。测厚应在检验完成之前进行。上次特别检验确认的可疑区域应检查。上次检验确认的显著腐蚀区域应测厚。

原“表 4.5.6.8(3) ① ~ ⑤”改为“表 4.5.6.8(3) ①ａ ~ ｅ”；表题括号内改为“单舷侧散装货船货物区域内特别检验”。

Requirements for Extent of Thickness Measurements at Those Areas of Substantial Corrosion
(Special Survey of Double Side Skin Bulk Carriers within the Cargo Area)
Bottom, Inner Bottom and Hopper Structure Table 4.5.6.8(3) ② a

Structural member	Extent of measurement	Pattern of measurement
Bottom, inner bottom and hopper structure plating	Minimum of three bays across double botton tank, including aft bay Measurements around and under all suction bell mouths	Five-point pattern for each panel between longitudinals and floors
Bottom, inner bottom and hopper structure longitudinals	Minimum of three longitudinals in each bay where bottom plating measured	Three measurements in line across flange and three measurements on the vertical web
Bottom girders, including the watertight ones	At fore and aft watertight floors and in centre of tanks	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements
Bottom floors, including the watertight ones	Three floors in the bays where bottom plating measured, with measurements at both ends and middle	Five-point pattern over two square metre area
Hopper structure web frame ring	Three floors in bays where bottom plating measured	Five-point pattern over one square metre of plating Single measurements on flange
Hopper structure transverse watertight bulkhead or swash bulkhead	lower 1/3 of bulkhead	five-point pattern over one square metre of plating
	upper 2/3 of bulkhead	five-point pattern over two square metre of plating
	stiffeners (minimum of three)	For web, five-point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span
Panel stiffening	Where applicable	Single measurements

Requirements for Extent of Thickness Measurements at Those Areas of Substantial Corrosion
(Special Survey of Double Side Skin Bulk Carriers within the Cargo Area)
Deck Structure
(Including Cross Strips, Main Cargo Hatchways, Hatch Covers, Coamings and Topside Tanks)
Table 4.5.6.8(3) ② b

Structural member	Extent of measurement	Pattern of measurement
Cross Deck Strip plating	Suspect Cross Deck Strip plating	Five-point pattern between underdeck stiffeners over 1 metre length
Underdeck Stiffeners	Transverse members	Five-point pattern at each end and mid span
	Longitudinal members	Five-point pattern on both web and flange
Hatch Covers	Side and end skirts, each three locations	Five-point pattern at each location
	Three longitudinal bands, outboard strakes (2) and centerline strake (1)	Five-point measurement each band
Hatch Coamings	Each side and end of coaming, one band lower 1/3, one band upper 2/3 of coaming	Five-point measurement each band (i.e. end or side coaming)
Topside Ballast Tanks	a) watertight transverse bulkheads: - Lower 1/3 of bulkhead - Upper 2/3 of bulkhead - Stiffeners	 Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 metre length
Topside Ballast Tanks	b) two representative swash transverse bulkheads: - Lower 1/3 of bulkhead - Upper 2/3 of bulkhead - Stiffeners	 Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 metre length
Topside Ballast Tanks	c) three representative bays of slope lating: - Lower 1/3 of tank - Upper 2/3 of tank	 Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 sq. metre of plating
Topside Ballast Tanks	d) Longitudinals, suspect and adjacent	Five point pattern on both web and flange over 1 metre length
Main Deck Plating	Suspect plates and adjacent (4)	Five-point pattern over 1 sq. metre of plating
Main Deck Longitudinals	Suspect plates	Five point pattern on both web and flange over 1 metre length
Web Frames/Transverses	Suspect plates	Five-point pattern over 1 sq. metre

显著腐蚀区域测厚范围要求（双舷侧散装货船货物区域内特别检验）

船底、内底和底边舱结构　　表 4.5.6.8(3) ② a

结构件	测量范围	测量形式
船底板、内底板和底边舱斜板	双层底舱全舱宽，至少 3 个肋板间距，包括后舱壁至肋板间距。所有吸口的周围和下面测量	在纵骨和肋板之间的每个板格上作 5 点形测量
船底、内底和底边舱斜板纵骨	在底板测量的范围内每个肋板间距内至少 3 根纵骨	在纵骨折边同一横截线上测量 3 点，在纵骨腹板垂直方向上测量 3 点
船底纵桁，包括水密纵桁	在前、后水密肋板处和各舱中心处	腹板同一垂线上单个测量，在每一个板格扶强材之间测 1 点，或至少测 3 点
船底肋板，包括水密肋板	在底板测量的范围内 3 块肋板，在肋板两端和中部测量	在 2m² 的面积上作 5 点形测量
底边舱的横向环状强框架	在底板测量的范围内 3 块肋板	在 1m² 的板上作 5 点形测量折边上单个测量
底边舱水密横舱壁或制荡舱壁	舱壁下部 1/3	1m² 的板上作 5 点形测量
	舱壁上部 2/3	2m² 的板上作 5 点形测量
	扶强材（至少 3 根）	腹板，跨距内作 5 点形测量（在每端横截线上测 2 点，跨距中点测 1 点）；折边，在每端和跨距中点单个测量
板格扶强材	如适用	单个测量

显著腐蚀区域测厚范围要求（双舷侧散装货船货物区域内特别检验）

甲板结构

（包括横向甲板条、主货舱口、舱口盖、舱口围板和顶边舱）　表 4.5.6.8(3) ② b

结构件	测量范围	测量形式
横向甲板条	可疑的横向甲板条	在 1m 长的甲板下扶强材之间作 5 点形测量
甲板下扶强材	横向构件	在跨距两端和中点作 5 点形测量
	纵向构件	在腹板和折边上作 5 点形测量
舱口盖	裙板 3 个位置，纵向 3 条带：向舷外 2 列，中心线处 1 列	每个位置作 5 点形测量 每条带测量 5 个点
舱口围板	围板的每边和每端：下部 1/3 处 1 条带，上部 2/3 处 1 条带	每 1 条带（即边围板或端围板）测量 5 个点
顶边压载水舱	a) 水密横舱壁： ——舱壁下部 1/3 ——舱壁上部 2/3 ——扶强材	 在约 1m² 板面上作 5 点形测量 在约 1m² 板面上作 5 点形测量 在 1m 长度上作 5 点形测量
顶边压载水舱	b) 2 个代表性制荡舱壁： ——舱壁下部 1/3 ——舱壁上部 2/3 ——扶强材	 在约 1m² 板面上作 5 点形测量 在约 1m² 板面上作 5 点形测量 在 1m 长度上作 5 点形测量
顶边压载水舱	c) 3 处代表性的强肋骨之间的斜板： ——舱下部 1/3 ——舱上部 2/3	 在约 1m² 板面上作 5 点形测量 在约 1m² 板面上作 5 点形测量
顶边压载水舱	d) 可疑的纵骨和邻接纵骨	在 1m 长的腹板和折边上作 5 点形测量
主甲板板	可疑的板和邻接的 4 块板	在约 1m² 板面上作 5 点形测量
主甲板纵骨	可疑的板	在约 1m² 腹板和折边上作 5 点形测量
强肋骨 / 横向构件	可疑的板	在约 1m² 板面上作 5 点形测量

Requirements for Extent of Thickness Measurements at Those Areas of Substantial Corrosion
(Special Survey of Double Side Skin Bulk Carriers within the Cargo Area)
Structure in Double Side Ballast Tanks Table 4.5.6.8(3) ② c

Structural member	Extent of measurement	Pattern of measurement
Side shell and inner plating: • upper strake and strakes in way of horizontal girders • all other strakes	• Plating between each pair of transverse frames / longitudinals in a minimum of three bays (along the tank) • Plating between every third pair of longitudinals in same three bays	• Single measurement • Single measurement
Side shell and inner side transverse frames/ longitudinals on: • upper strake • all other strakes	• Each transverse frame/longitudinal in same three bays • Every third transverse frame/longitudinal in same three bays	• Three measurements across web and 1 measurement on flange • Three measurements across web and 1 measurement on flange
Transverse frames/Longitudinals - brackets	Minimum of three at top, middle and bottom of tank in same three bays	Five-point pattern over area of bracket
Vertical web and transverse bulkheads: • strakes in a way of horizontal girders • other strakes	• Minimum of two webs and both transverse bulkheads • Minimum of two webs and both transverse bulkheads	• Five-point pattern over approx. two square metrearea • Two measurements between each pair of vertical stiffeners
Horizontal girders	Plating on each girder in a minimum of three bays	Two measurements between each pair of longitudinal girder stiffeners
Panel stiffening	Where applicable	Single measurements

Requirements for Extent of Thickness Measurements at Those Areas of Substantial Corrosion
(Special Survey of Double Side Skin Bulk Carriers within the Cargo Area)
Transverse Bulkheads in Cargo Holds Tabke 4.5.6.8(3) ② d

Structural member	Extent of measurement	Pattern of measurement
Lower stool, where fitted	• Transverse band within 25mm of welded connection to inner bottom • Transverse band within 25mm of welded connection to shelf plate	• Five-point pattern between stiffeners over one metre length • Five-point pattern between stiffeners over one metre length
Transverse bulkheads	• Transverse band at approximately mid height • Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools)	• Five-point pattern over one square metre of plating • Five-point pattern over one square metre of plating

”

The existing subparagraph 4.5.6.8(4) is replaced by the following:

“(4) For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurements according to Table 4.5.6.8(1) ① and Table 4.5.6.8(1) ② may be specially considered.”

The existing paragraph 4.5.6.9 is replaced by the following:

“4.5.6.9 Extent of Tank Testing

(1) Single side skin bulk carriers

① All boundaries of sea water ballast tanks, deep tanks and cargo holds used for sea water ballast within the cargo area length are to be pressure tested. For fuel oil tanks, only the representative tanks are to be pressure tested.

② The Surveyor may extend the tank testing as deemed necessary.

③ Tanks to be tested with a head of liquid to the top of the hatches for ballast/cargo holds or top of air pipes for ballast tanks or fuel tanks.

显著腐蚀区域测厚范围要求（双舷侧散装货船货物区域内特别检验）

双舷侧压载舱的结构　　表 4.5.6.8(3) ② c

结构件	测量范围	测量形式
舷侧外板和内壳板： •顶列板和水平桁材处列板 •所有其他列板	•（沿舱长）至少 3 个强构件间距内每对肋骨／纵骨之间的板 •在同样 3 个强构件间距内，每第 3 对纵骨之间的板	•单个测量 •单个测量
舷测外板和内壳板在下列位置上的肋骨／纵骨： •顶列板 •所有其他列板	•在同样 3 个强构件间距内的每根肋骨／纵骨 •在同样 3 个强构件间距内每第 3 根肋骨／纵骨	•腹板同一横截线上测 3 点，折边上测 1 点 •腹板同一横截上测 3 点，折边上测 1 点
肋骨／纵骨——肘板	在同样 3 个强构件间距内液舱顶部、中部和底部至少 3 处	在肘板上作 5 点形测量
垂直桁材和横舱壁： •水平桁材处列板 •其他列板	•至少 2 个垂直桁材和 2 个横舱壁 •至少 2 个垂直桁材和 2 个横舱壁	•约 2m² 面积上作 5 点形测量 •每对垂直扶强材之间测 2 点
水平桁材	至少 3 个强构件间距内每根桁材的板	每对纵桁扶强材之间测 2 点
板格扶强材	如适用	单个测量

显著腐蚀区域测厚范围要求（双舷侧散装货船货物区域内特别检验）

货舱内横舱壁　　表 4.5.6.8(3) ② d

结构件	测量范围	测量形式
底凳（如设有时）	•与内底板的连接焊缝处 25mm 以内的横带 •与底凳顶板的连接焊缝处 25mm 以内的横带	•在 1m 长扶强材之间作 5 点形测量 •在 1m 长扶强材之间作 5 点形测量
横舱壁	•在约半高处的横带 •在邻近上甲板或顶凳底板以下（对设有顶凳的船）的横带	•在约 1m² 板面上作 5 点形测量 •在约 1m² 板面上作 5 点形测量

4.5.6.8(4) 改为：

(4)　如处所内区域的保护涂层状态良好，则本节表 4.5.6.8(1) ①及表 4.5.6.8(1) ②规定的厚度测量范围可予特别考虑。

4.5.6.9 改为：

4.5.6.9　液舱试验的范围

(1) 单舷侧散装货船

①　海水压载舱、深舱和货舱区域内用于海水压载的货舱的所有边界面应作压力试验。对燃油舱仅应对代表性舱作压力试验。

②　如验船师认为需要，液舱的试验范围可以扩大。

③　对压载／装货交替使用舱，试验液体压头至舱口顶部；对压载舱或燃油舱，试验液体压头至空气管顶部。

(2) Double side skin bulk carriers

① All boundaries of sea water ballast tanks, deep tanks and cargo holds used for sea water ballast within the cargo area length are to be pressure tested. For fuel oil tanks in the cargo length area, tank testing may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

② The Surveyor may extend the tank testing as deemed necessary.

③ Tanks to be tested with a head of liquid to the top of the hatches for ballast/cargo holds or top of air pipes for ballast tanks. For fuel oil tanks, the boundaries of these tanks are to be tested with a head of liquid to the maximum filling level of the tank."

Section 6 SURVEYS FOR MACHINERY

The existing subparagraph 4.6.4.3(15) is replaced by the following:

"(15) For diesel engines, the following parts (if fitted) are to be disassembled/opened up for examination:"

Section 8 DOCKING SURVEYS AND IN-WATER SURVEYS

The existing paragraph 4.8.3 is replaced by the following:

"**4.8.3 In-water surveys**

4.8.3.1 Conditions for in-water surveys

(1) Details (including necessary descriptions) of underwater portion and appendages of the hull are to be submitted for examination. These drawings are to cover:

a. all openings of shell (locations to be indicated);

b. stem and stern post;

c. rudder and attachments;

d. propeller, including indentification of each blade;

e. anodes, including their fixtures (locations to be indicated);

f. bilge keel (location to be indicated).

(2) The interval of screwshaft and tubeshaft surveys is five years.

(3) The underwater portion of the hull is protected by a high resistant paint.

(4) Permanent markings are to be provided on flat portions of the bottom for orientation and localization of divers during survey.

(5) Rudder and tubeshaft are to be so designed that their clearance may be examined while the ship is afloat, and the specifications for clearance measurement and the means of measurement are to be submitted for approval.

(6) The above drawings and information are to be kept on board for use during in-water surveys.

4.8.3.2 Requirements for in-water surveys

(1) Application for in-water surveys is to be submitted in advance to the Society for agreement.

(2) No report is made for requesting repair or examination of underwater portions of shell plating, rudder, propeller or propeller shaft, sea chest, stop valve and non-return valve of screwshaft.

(2) 双舷侧散装货船

① 海水压载舱、深舱和货物区域内用于海水压载的货舱的所有边界应作压力试验。对货舱区域内的燃油舱，根据液舱边界外部检查的合格结果和船长所述压力试验得到满足要求的结果的证据，液舱试验可特别考虑。

② 如验船师认为需要，液舱试验范围可以扩大。

③ 对压载 / 装货交替使用舱，试验液体压头至舱口顶；对压载舱试验液体压头至空气管顶。对燃油舱，其试验液体压头至该舱灌充的最大液位。

第 6 节　机械检验

4.6.4.3(15) 改为：

(15) 船上设置柴油机，则应对下列部件（如设有时）拆开 / 打开并进行检验：

第 8 节　坞内检验与水下检验

4.8.3 全部改为：

4.8.3　水下检验

4.8.3.1　水下检验的条件

(1) 应提交水线以下船体及其附件的详图（包括必要的说明）供审查。这些图纸应包括：

a. 所有外板开口（标明位置）；
b. 首、尾柱；
c. 舵和附件；
d. 螺旋桨，包括每个叶片的标识；
e. 阳极，包括紧固装置（标明位置）；
f. 舭龙骨（标明位置）。

(2) 螺旋桨轴和尾管轴检验的间隔期为 5 年。

(3) 船体水线以下部分用高效防腐涂层保护。

(4) 船底平坦部分应设置供潜水员在检验过程中识别方向及定位的永久性标记。

(5) 舵和尾轴装置的设计应使其在船舶浮态下间隙能检查，并提交间隙测量说明书和测量设施。

(6) 上述图纸资料应保存在船上，供水下检验时使用。

4.8.3.2　水下检验的要求

(1) 水下检验应事先向本社提出申请，并应取得本社同意。

(2) 不应有要求水线以下部分的船壳板、舵、螺旋桨或螺旋桨轴、海底阀箱、截止阀和止回阀修理或检查的报告。

(3) The in-water survey is to provide the information normally obtained from a docking survey, so far as practicable.

(4) The In-water Survey is to be carried out with the ship at light draught in sheltered water and preferably with weak tidal streams and currents.The in-water visibility is to be good and the hull below waterline is to be sufficiently clean to permit meaningful examination.

(5) The In-water Survey is to be carried out by one or more qualified divers under surveillance of a Surveyor. The divers are to be employed by a firm approved as a service supplier according by the Society. Upon completion of an in-water survey, a detailed report together with a video tape and photos showing main parts under survey are to be submitted to the Surveyor.

(6) The Surveyor is to be satisfied with the method of pictorial representation, and a good two-way communication between the Surveyor and divers is to be provided.

(7) If the In-water Survey reveals damage or deterioration that requires early attention, the Surveyor may require that the ship be drydocked in order that a detailed survey can be undertaken and the necessary repairs carried out."

Section 10 BOILER SURVEYS

In paragraph 4.10.3.1:

The words "… the following items of boilers, superheaters, economizers and air heaters:" are replaced by "… boilers, superheaters, economizers and air heaters as well as following relevant items:"

The existing subparagraph 4.10.3.1(5) is deleted.

The existing subparagraphs 4.10.3.1(6) ～ (10) are renumbered as 4.10.3.1(5) ～ (9).

Appendix 1

CORROSION AND ABRASION CONTROL OF HULL STRUCTURE OF SHIPS IN SERVICE

A new paragraph 2.1 is added as follows:

"2.1 For a ship constructed in accordance with the Rules of the Society and the keel of which was laid before 15 January 1983, the thickness reduction of hull plating and structural members caused by corrosion and abrasion is not to be more than the value obtained by multiplying their fabricated thickness and the relevant percentage shown in the following table:

Structural member	Corrosion & abrasion limit %		
	Unrestricted servide	Greater coastal service	Coastal service
Strength deck, side and bottom shell	25%	30%	35%
continuous longitudinal strength members and web frames	25%	30%	35%
Foundations of main engines, cranes and windlasses	25%	25%	25%
Other structural members defined in the Rules	30%	40%	45%

"

The existing paragraph 2.1 is replaced by the following:

"2.2 For a ship constructed in accordance with the Rules of the Society and the keel of which was laid on or after 15 January 1983, the thickness reduction of hull plating and structural members caused by corrosion and abrasion is not to be more than the value obtained by multiplying their fabricated thickness and the relevant percentage shown in the following table:

(3)　水下检验应尽可能提供通常能在坞内检验时获得的资料。

(4)　水下检验应在遮蔽的平静水域中和船舶处于空载吃水状态下进行。水下能见度应良好，且船体水线以下部分足够清洁，使检验可以进行。

(5)　水下检验应由 1 名或多名合格的潜水员在验船师的监督下进行。该潜水员应为本社认可的服务商的雇员。水下检验完成后应提交 1 份详细的检验报告给验船师，报告应包括录像带和检验的主要部分的照片。

(6)　水下检验图象摄取方法应使验船师满意。验船师与潜水员之间应有良好的双向通讯设备。

(7)　如水下检验发现有需要及早注意的损坏或恶化情况，验船师可要求船舶进坞，以便进行详细的检验和必要的修理。

第 10 节　锅炉检验

4.10.3.1 中“空气加热器的下列项目”改为“空气加热器及其相关的下列项目”。

删除 4.10.3.1(5)

4.10.3.1(6) ～ (10) 分别改为 4.10.3.1(5) ～ (9)

附录 1　营运船舶船体结构腐蚀磨耗控制值

新增 2.1 条 ：

2.1　对于 1983 年 1 月 15 日前安放龙骨的按本社规范建造的船舶，船体各板材和构件的腐蚀磨耗厚度应不大于原建造厚度乘以下表所列的百分数：

结构项目	腐蚀磨耗极限		
	无限航区	近海航区	沿海航区
强力甲板、舷侧和船底外板	25%	30%	35%
纵向连续强力构件和强肋骨	25%	30%	35%
主机、起重机、锚机底座	25%	25%	25%
规范规定的其余构件	30%	40%	45%

原 2.1 条改为 ：

2.2　对于 1983 年 1 月 15 日及以后安放龙骨的按本社规范建造的船舶，船体各板材和构件的腐蚀磨耗厚度应不大于原建造厚度乘以下表所列的百分数：

Structural member	Corrosion & abrasion limit	
	L ⩾ 90m	L< 90m
① Strength deck plating, side shell, top strake, bilge strake, bottom shell, flat plate keel, inner bottom, continuous longitudinal bulkhead, hopper tank and topside tank plating; ② Main longitudinal continuous members, e.g. deck girders, hatch side girders, side girders, bottom girders, bulkhead girders, continuous hatch coamings; ③ Main transverse members, e.g. side frame webs, deck transverses, double plate floors, bulkhead webs, watertight and oiltight transverse bracket plates, etc.; ④ Transverse bulkhead plating in holds, upper and lower bulkhead stool sloping plating, watertight bulkhead plating in deep tanks	20%	25%
Other plating and members, e.g. deck within line of openings, deck longitudinals, side longitudinals, bottom longitudinals, inner bottom longitudinals, bulkhead longitudinals, face plates of frames, brackets of members, etc.	25%	30%
Note: For bulk carriers designed in accordance with the Rules and assigned the class notation of "Strengthened for Heavy Cargoes", the corrosion and abrasion limit of inner bottom may be taken as 25%.		

"

The existing paragraphs 2.2, 2.3, 2.4 and 2.5 are renumbered as 2.3, 2.4, 2.5 and 2.6.

In paragraph 2.6:

The text "…, sand blasting, coating and reinforcements are to be done." is replaced by "…, sand blasting, coating and reinforcements are to be done and the coating is to be maintained in "as-new" or an equivalent condition (i.e. without breakdown or rusting) at Special and Intermediate Surveys."

A new Appendix 5 is added as follows:

"Appendix 5 GUIDELINES FOR THE GAUGING OF SIDE SHELL FRAMES AND BRACKETS IN SINGLE SIDE SKIN BULK CARRIERS REQUIRED TO COMPLY WITH UR S31

1 General

Gauging is necessary to determine the general condition of the structure and to define the extent of possible steel renewals or other measures for the webs and flanges of side shell frames and brackets for verification of the compliance with UR S31.

2 Zones of side shell frames and brackets

For the purpose of steel renewal, sand blasting and coating, four zones A, B, C and D are defined, as shown in Figure 1. Zones A & B are considered to be the most critical zones.

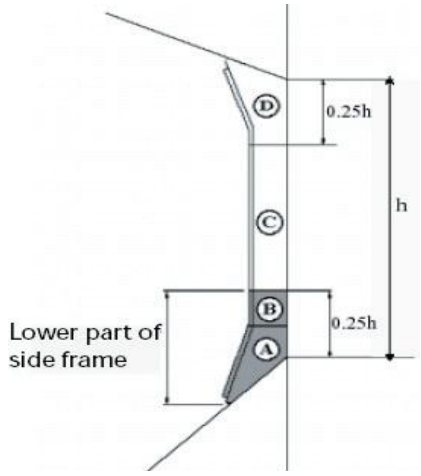


Figure 1 Zones of Side Shell Frames and Brackets

3 Pitting and grooving

结构项目	腐蚀磨耗极限	
	L ≥ 90m	L ＜ 90m
① 强力甲板板、舷侧外板、舷顶列板、舭列板、船底外板、平板龙骨、内底板、连续纵舱壁、底边舱斜板、顶边舱斜板； ② 纵向连续主要构件，如甲板纵桁、舱口纵桁、舷侧纵桁、船底纵桁、舱壁纵桁、连续舱口围板等； ③ 横向主要构件，如舷侧肋骨腹板、强横梁、双层底实肋板、舱壁桁材、水密油密横隔板等； ④ 货舱内横舱壁板、舱壁顶凳底凳斜板、深舱的水密舱壁板	20%	25%
其他板和构件，如开口线内甲板、甲板纵骨、舷侧纵骨、船底纵骨、内底纵骨、舱壁纵骨、舷侧肋骨面板、构件肘板等	25%	30%
注：按本规范设计并授予“重货加强”附加标志的散货船，其内底板的腐蚀磨耗极限可取为 25%。		

原 2.2,2.3,2.4,2.5 依次改为 2.3,2.4,2.5,2.6。

2.6 中“可对货舱舷侧肋骨喷砂除锈敷设涂层并采取加强措施。”改为“可对货舱舷侧肋骨喷砂除锈敷设涂层并采取加强措施，且在特别检验和中间检验时保持涂层“如新”状态或等效状态（即无涂层脱落或无锈）。”

新增附录 5 如下：

附录 5　符合 URS31 要求的单舷侧散装货船舷侧肋骨和肘板的测量指南

1　通则

为验证符合 UR S31 的要求，测量是为确认结构的总体状态和对舷侧肋骨及肘板的腹板和折边确定可能的构件换新或采取其他措施的范围所必需的。

2　舷侧肋骨和肘板的区域

就钢构件换新、喷砂处理和涂层而言，应确定 A、B、C 和 D4 个区域，如图 1 所示。A 和 B 区域应视为最关键的区域。

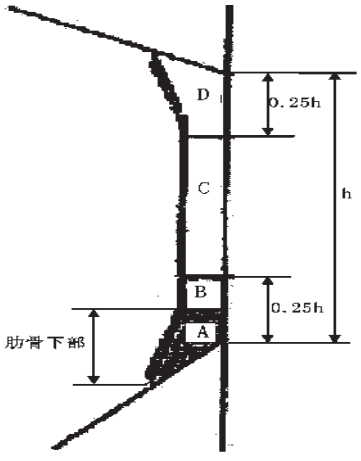


图 1　舷侧肋骨和肘板的区域

3　点腐蚀和缝隙腐蚀

—— Pits can grow in a variety of shapes, some of which would need to be ground before assessment.

—— Pitting corrosion may be found under coating blisters, which must be removed before inspection.

—— To measure the remaining thickness of pits or grooving the normal ultrasonic transducer (generally 10mm diameter) will not suffice. A miniature transducer (3 to 5 mm diameter) must be used. Alternatively the gauging firm must use a pit gauge to measure the depth of the pits and grooving and calculate the remaining thickness.

3.1 Assessment based upon Area

This is the method specified in S31.2.5 and is based upon the intensity determined from Figure 2 below.

If pitting intensity is higher than 15% in an area (see Figure 2), then thickness measurements are to be taken to check the extent of the pitting corrosion. The 15% is based upon pitting or grooving on only one side of the web.

In cases where pitting is evident as defined above (exceeding 15 %) then an area of 300 mm diameter or more, at the most pitted part of the frame, is to be cleaned to bare metal, and the thickness measured in way of the five deepest pits within the cleaned area. The least thickness measured in way of any of these pits is to be taken as the thickness to be recorded.

The minimum acceptable remaining thickness in any pit or groove is equal to:

- 75% of the as built thickness, for pitting or grooving in the cargo hold side frame webs and flanges.
- 70% of the as built thickness, for pitting or grooving in the side shell, hopper tank and topside tank plating attached to the cargo hold side frame, over a width up to 30 mm from each side of it.

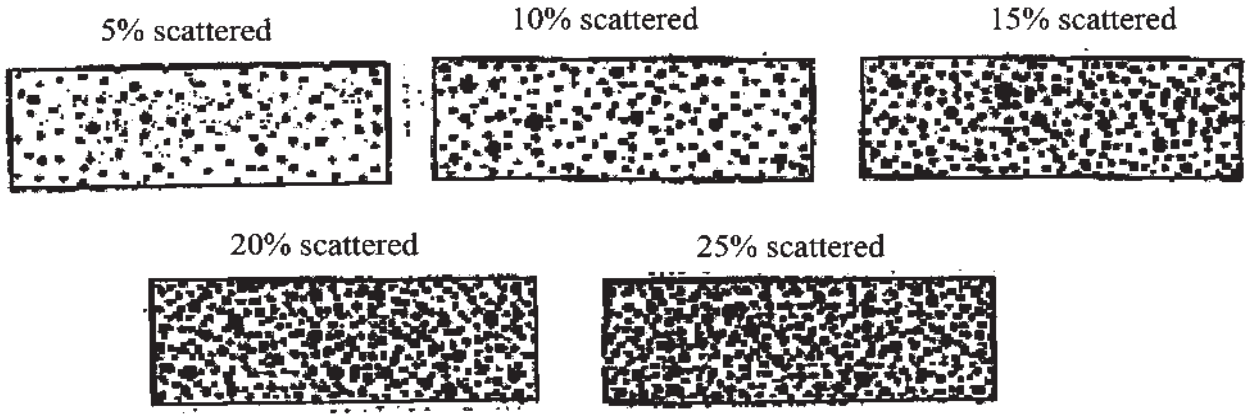


Figure 2 Pitting Intensity Diagrams (from 5% to 25% intensity)

4 Gauging methodology

Numbers of side frames to be measured are equivalent to those of Special Survey or Intermediate Survey corresponding to the ship's age. Representative thickness measurements are to be taken for each zone as specified below.

Special consideration to the extent of the thickness measurements may be given by the Classification Society, if the structural members show no thickness diminution with respect to the as built thicknesses and the coating is found in "as-new" condition (i.e., without breakdown or rusting).

Where gauging readings close to the criteria are found, the number of hold frames to be measured is to be increased.

——锈斑能形成各式各样的形状，其中一些需要在评估之前予以磨平。

——点腐蚀可以在涂层气泡下发现，故鼓泡的涂层必须在检查之前铲除。

——测量点蚀或缝隙腐蚀的剩余厚度通常用超声波传感器（一般 10mm 直径）是不够的，必须用一种袖珍传感器（3 ~ 5mm 直径）。测量公司必须使用锈斑规测量点蚀和缝隙腐蚀的深度，并计算剩余厚度。

3.1 基于面积的评估

这是 S31.2.5 规定的方法，应根据以下图 2 的密度确定。

如在一个区域（见图 2）内点腐蚀密度大于 15%，那么应作测厚以检查点蚀的范围。15% 是根据仅在腹板一面的点腐蚀或槽沟。

假使按上述定义的点腐蚀很明显（超过 15%），则在肋骨点腐蚀最多部位应将 300mm 直径或更大的区域清洁出白（裸金属），且在清洁区域内 5 个最深点腐蚀处测厚。至少这些点腐蚀的任何一点均应作测厚并作记录。

任何点蚀或缝隙腐蚀的最小可接受的剩余厚度应为：

——对在货舱内的肋骨腹板和折边的点蚀或缝隙腐蚀为建造厚度的 75%。

——对在附连货舱肋骨的舷侧板、底边舱和顶边舱斜板，从肋骨每边等于 30mm 宽度的板上的点蚀或缝隙腐蚀为建造厚度的 70%。

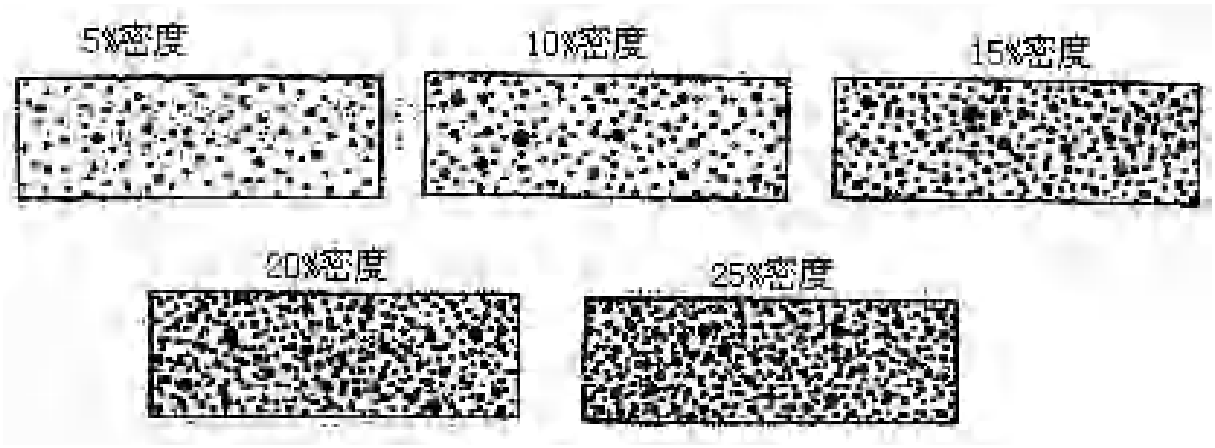


图 2 点腐蚀密度图表（密度从 5% ~ 25%）

4 测量方法

测量的肋骨数量应等于与那些特别检验或中间检验相称的船龄。应按如下规定对每一区域应作代表性测量。

如结构件相对于建造厚度未显示厚度减小并且发现涂层仍在“如新”的状态（即无涂层脱落或无锈），则船级社可以对测厚范围给予特别考虑。

当发现测量读数接近临界值时，测量的肋骨数应予增加。

If renewal or other measures according to S31 are to be applied on individual frames in a hold, then all frames in that hold are to be gauged.

There is a variety of construction methods used for side shell frames in bulk carriers. Some have faceplates (T sections) on the side shell frames, some have flanged plates and some have bulb plates. The use of faceplates and flanged sections is considered similar for gauging purposes in that both the web and faceplate or web and flange plate are to be gauged. If bulb plate has been used, then web of the bulb plate is to be gauged in the normal manner and the sectional modulus has to be specially considered if required.

4.1 Gaugings for Zones A, B & D

Web plating

The gauging pattern for Zones A, B & D are to be a five point pattern. See figure 3. The five-point pattern is to be over the depth of the web and the same area vertically(w × w). The gauging report is to reflect the average reading.

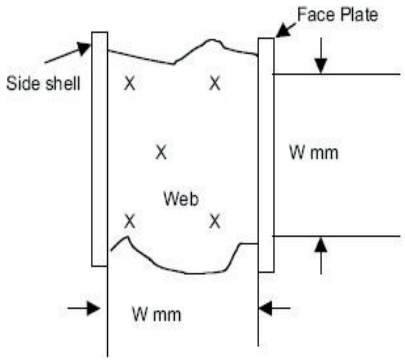


Figure 3 Typical 5 point pattern on the web plate

4.2 Gaugings for Zone C

Web plating

Depending upon the condition of the web in way of Zone C, the web may be measured by taking 3 readings over the length of Zone C and averaging them. The average reading is to be compared with the allowable thickness. If the web plating has general corrosion then this pattern should be expanded to a five-point pattern as noted above.

4.3 Gaugings for sections a) and b) (flanges and side shell plating)

Where the lower bracket length or depth does not meet the requirements in UR S12(Rev.3), gaugings are to be taken at sections a) and b) to calculate the actual section modulus required in UR S31.3.4. See Figure 4. At least 2 readings on the flange/faceplate are to be taken in way of each section. At least one reading of the attached shell plating is to be taken on each side of the frame (i.e. fore and aft) in way of sections a) and section b).

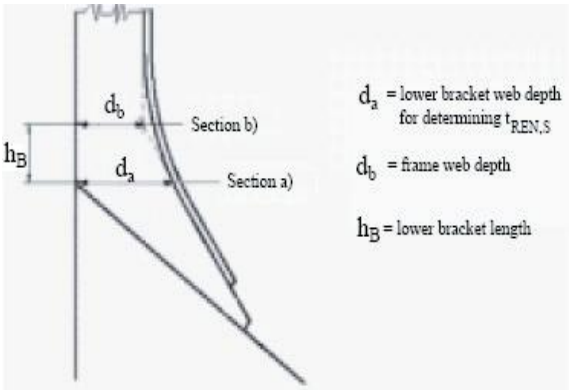


Figure 4 Sections a) and b)

5 Report on thickness measurement of cargo hold frames

如按照 S31 应对某一货舱内个别肋骨进行换新或采取其他措施，那么该货舱内所有肋骨应予测量。

散装货船舷侧肋骨可使用各种构造方式。有些肋骨有面板 (T 型剖面)，有些肋骨有折边，有些肋骨有球缘板 (球扁钢)。使用面板和折边型材应认为是相似的，为了测量目的，腹板和面板或腹板和折边两者都应测量。如使用球缘板，则应用通常的方法测量球缘板的腹板，且如有要求，其剖面模数要特别考虑。

4.1　A、B 和 D 区域的测量

腹板

对 A、B 和 D 区域的测量形式应用 5 点型，见图 3。5 点型是在腹板的高度和垂直方向上与高度相同的长度面积 (w×w) 内测 5 点。测量报告应反映平均读数。

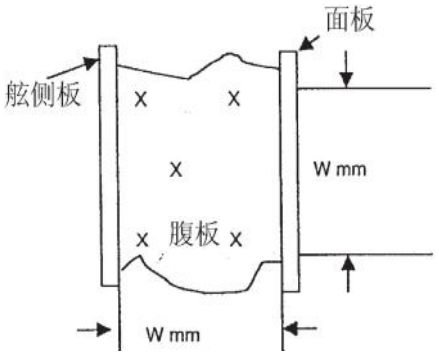


图 3 腹板上典型的 5 点型

4.2　对 C 区域的测量

腹板

根据 C 区域处腹板的状况，腹板可以在 C 区域长度上测量 3 个点的读数，并取其平均值。该平均值应与可允许的厚度比较。如腹板已普遍腐蚀，那么这个形式应扩大到如上述的 5 点型。

4.3　对剖面 a) 和剖面 b)(折边和舷侧板) 的测量

当下肘板长度或深度不满足 UR S12(Rev.3) 要求时，应对剖面 a) 和剖面 b) 作测量，以计算 UR S31.3.4 要求的实际剖面模数，见图 4。在每一剖面处的折边 / 面板上至少应测取 2 个点的读数。在剖面 a) 和剖面 b) 处肋骨 (即前和后) 的每一边附连的舷侧板上至少应取一个读数。

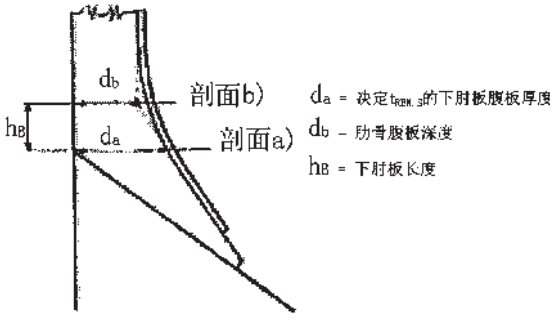


图 4　剖面 a) 和剖面 b)

5　货舱舷侧肋骨厚度的测量报告

"

Report on THICKNESS MEASUREMENT OF CARGO HOLD SIDE SHELL FRAMES

TM7-BC S31

Ship's Name …… Class identity No. …… Report No. ……..

CARGO HOLD NO.: Side: (Port / stb.)

FRAME NO	ZONE A						ZONE B						ZONE C						ZONE D					
	Org. Thk.	t_{REN}	t_{COAT}	t_M	Diminution		Org. Thk.	t_{REN}	t_{COAT}	t_M	Diminution		Thk.	t_{REN}	t_{COAT}	t_M	Diminution		Org. Thk.	t_{REN}	t_{COAT}	t_M	Diminution	
	mm	mm	mm	mm	mm	%	mm	mm	mm	mm	mm	%	mm	mm	mm	mm	mm	%	mm	mm	mm	mm	mm	%

Operators Signature Surveyors Signature

TM7-BC S31　　货舱舷侧肋骨厚度测量报告

船名 ..... 船级识别号 ..... 报告号 .....

货舱号：							舷侧：						（左舷 / 右舷）											
区域 A							区域 B						区域 C						区域 D					
框架号	原始厚度	t_{REN}	t_{COAT}	t_M	减少		原始厚度	t_{REN}	t_{COAT}	t_M	减少		原始厚度	t_{REN}	t_{COAT}	t_M	减少		原始厚度	t_{REN}	t_{COAT}	t_M	减少	
	mm	mm	mm	mm	mm	%	mm	mm	mm	mm	mm	%	mm	mm	mm	mm	mm	%	mm	mm	mm	mm	mm	%

测量者签名：..... 验船师签名：.....

A new Appendix 6 is added as follows:

"Appendix 6

S15 SIDE SHELL DOORS AND STERN DOORS RETROSPECTIVE APPLICATION OF UR-S9 TO EXISTING RO-RO PASSENGER SHIPS

(1996) (Rev.1, Nov. 2003)

1. The structural condition of side shell doors and stern doors, especially the primary structure, the securing and supporting arrangements and the hull structure alongside and above the doors, are to be specially examined and any defects rectified.

2. The following measures are to be complied with by all existing ro-ropassenger ships with the date of building before the 30th June 1996, including, when not differently deliberated by the competent flag Administrations, ships only engaged on domestic sea voyages.

a) The structural arrangement of securing devices and supporting devices of inwards opening doors in way of these securing devices and, where applicable, of the surrounding hull structure is to be reassessed in accordance with the applicable requirements of S9.5 and modified accordingly.

b) The securing and locking arrangements for side shell doors and stern doors which may lead to the flooding of a special category space or ro-ro spaces as defined in S9.1.3, are to comply with the following requirements:

- Separate indicator lights and audible alarms are to be provided on the navigation bridge and on each operating panel to indicate that the doors are closed and that their securing and locking devices are properly positioned.
- The indication panel is to be provided with a lamp test function. It shall not be possible to turn off the indicator light.
- The indication panel on the navigation bridge is to be equipped with a mode selection function "harbour/ sea voyage", so arranged that audible alarm is given if the vessel leaves harbour with side shell or stern doors not closed or with any of the securing devices not in the correct position.
- A water leakage detection system with audible alarm and television surveillance is to be arranged to provide an indication to the navigation bridge and to the engine control room of any leakage through the doors.

3. Documented operating procedures for closing and securing side shell and stern doors are to be kept on board and posted at the appropriate places."

A new Appendix 7 is added as follows:

"Appendix 7

S16 BOW DOORS AND INNER DOORS - RETROSPECTIVE APPLICATION OF UR-S8, AS AMENDED 1995, TO EXISTING RO-RO PASSENGER SHIPS

(1995) (Rev.1 Nov. 2003) (Corr.1 Aug 2004)

1. The structural condition of bow doors and inner doors, especially the primary structure, the securing and supporting arrangements and the hull structure alongside and above the doors, are to be specially examined and any defects rectified.

2. The requirements of S8.8 concerning operating procedures of the bow door and inner door are to be complied with.

3. The following measures are to be complied with by all existing ro-ro passenger ships with the date of building before the 30th June 1996, including, when not differently deliberated by the competent flag Administrations, ships only engaged on domestic sea voyages.

新增附录 6 如下：

附录 6

S15 舷门和尾门

（1996）（2003 年 11 月 Rev.1）

UR-S9 对现有客滚船的追溯应用

1. 对舷门和尾门的结构状况，尤其是主要构件、紧固和支持装置以及沿门和门以上的船体结构，应进行特别检查并矫正所有缺陷。

2. 建造日期为 1996 年 6 月 30 日以前的所有现有客滚船（如果船旗国当局无另行规定，还包括仅从事国内海上航行的船舶），应遵守下列措施。

a) 紧固装置的结构布置和这些装置内开启门的支持装置以及周围船体结构的支持装置（如适用），应按照 S9.5 的适用要求进行重新评估并作相应修改。

b) 可能引起特种处所或滚装处所（如 S9.1.3 定义）进水的舷门和尾门的紧固和锁紧布置应遵守下列要求：

-- 在驾驶室和每个操作控制板处应设独立的指示灯及声响报警器，以显示门已关闭及其紧固和锁紧装置已处于适当的位置。

-- 指示板应具有试灯功能，且指示灯应不能关闭。

-- 在驾驶室的指示板上应设有“在港 / 在航”工况选择功能。若船离港时舷门或尾门未关闭或任一紧固装置不在正确位置上时，则应给出声响报警。

-- 应配置带声响报警和电视监视的水渗漏探测系统，向驾驶室和机舱控制室显示门的渗漏情况。

3. 舷门和尾门的关闭和紧固书面操作程序应保持在船上，并在适当的部位张贴。

附录 7

S16 首门和内门－ 1995 年修正后的 UR-S8 对现有客滚船的追溯应用

(1995)(2003 年 11 月 Rev.1)

1. 对首门和内门的结构状况，尤其是主要构件、紧固和支持装置以及沿门和门以上的船体结构，应进行特别检查并矫正所有缺陷。

2. 应符合 S8.8 关于首门和内门操作程序的要求。

3. 建造日期为 1996 年 6 月 30 日以前的所有现有客滚船（如果船旗国当局无另行规定，还包括仅从事国内海上航行的船舶），应符合下列措施。

a) The location and arrangement of inner doors are to comply with the applicable requirements of the SOLAS Convention and with S8.1.2d.

b) Ships with visor door are to comply with S8.6.2g requiring redundant provision of securing devices preventing the upward opening of the bow door. In addition, where the visor door is not self closing under external loads (i.e. the closing moment M_y calculated in accordance with S8.3.1c is less than zero) then the opening moment M_o is not to be taken less than $-M_y$. If drainage arrangements in the space between the inner and bow doors are not fitted, the value of M_o is to be specially considered.

Where available space above the tanktop does not enable the full application of S.8.6.2g, equivalent measures are to be taken to ensure that the door has positive means for being kept closed during seagoing operation.

c) Ships with visor door are to comply with S8.6.2h requiring securing and supporting devices excluding hinges to be capable of bearing the vertical design force (F_z - 10W) without exceeding the permissable stresses given in S8.2.1a.

d) For side-opening doors, the structural arrangements for supporting vertical loads, including securing devices, supporting devices and, where applicable, hull structure above the door, are to be re-assessed in accordance with the applicable requirements of S8.6 and modified accordingly.

e) The securing and locking arrangements for bow doors and inner doors which may lead to the flooding of a special category space or ro-ro space as defined in the S8.1.3 are to comply with the following requirements:

- Separate indicator lights and audible alarms are to be provided on the navigation bridge and on each panel to indicate that the doors are closed and that their securing and locking devices are properly positioned.
- The indication panel is to be provided with a lamp test function. It is not to be possible to turn off the indicator light.
- The indication panel on the navigation bridge is to be equipped with a mode selection function "harbour/ sea voyage", so arranged that audible alarm is given if the vessel leaves harbour with the bow doors or inner doors not closed or with any of the securing devices not in the correct position.
- A water leakage detection system with audible alarm and television surveillance are to be arranged to provide an indication to the navigation bridge and to the engine control station of any leakage through the doors.

A new Appendix 8 is added as follows:

"Appendix 8

LIST OF CHARACTERS OF CLASSIFICATION AND CLASS NOTATIONSFOR SEA-GOING SHIPS

CCS' characters of classification and class notations for sea-going ships are listed in this Appendix for reference and application.

Ships or machineries (including electrical installations) constructed or manufactured in accordance with relevant rules issued by CCS or other equivalent regulations accepted by it will be assigned appropriate characters of classification and class notations by CCS.

Characters of classification consisting of a pentacle and some letters, e.g. ★ CSA, ★ CSM, are one or more specific and feature symbols assigned by the Society, as appropriate, to hull (including equipment) and machinery (including electrical installations) of ships classed with the Society, to represent their main characteristics.

Class notations are classified representation of various characteristics of ships, including single or a group of symbols for type, cargo, special duties, special features, service restriction or other meanings. Class notations are marked after characters of classification.

Characters of classification and class notations are generally given in the following sequence:

Types of characters of classification and class notations	★	CSA CSM	Type of vessel	Service restriction	Special duties	Cargo	Special features	Special survey	Special equipment	Automation	Environmental protection	Refrigerated cargo installation	SMS certification
Table	Tab. A	Tab.A	Tab.B	Tab.C	Tab.D	Tab.E	Tab.F	Tab.G	Tab.H	Tab.I	Tab.J	Tab.K	Tab.L

a) 内门的位置和布置应符合 SOLAS 公约的适用要求和 S8.1.2d。

b) 具有罩壳式门的船舶应符合 S8.6.2g 对紧固装置的余量要求，以避免首门向上开启。并且，如果首门在外载荷作用下不自动关闭（即按照 S8.3.1c 计算出的关闭力矩 My 小于零），则开启力矩 Mo 应不小于 -My。如果内门和首门之间的处所未安装排泄装置，应特别考虑 Mo 值。

如果舱顶以上的可用空间不能完全适用 S8.6.2g，应采取等效措施保证在海上航行操作时有有效方式使门保持关闭。

c) 具有罩壳式门的船舶应符合 S8.6.2h 对紧固和支持装置的要求，不包括在不超过 S8.2.1a 规定的许用应力下，能够承受垂向设计力 (Fz - 10W) 的铰链。

d) 对于边铰链式门，支持垂向载荷的结构布置，包括紧固装置、支持装置和门以上的船体结构（如适用），应按照 S8.6 的适用要求进行重新计算并作相应修改。

e) 可能引起特种处所或滚装处所（如 S8.1.3 定义）进水的首门和内门的紧固和锁紧布置应遵守下列要求：

-- 在驾驶室和每个操作控制板处应设独立的指示灯及声响报警器，以显示门已关闭及其紧固和锁紧装置已处于适当的位置。

-- 指示板应具有试灯功能，且指示灯应不能关闭。

-- 在驾驶室的指示板上应设有“在港 / 在航”工况选择功能。若船离港时首门或内门未关闭或任一紧固装置不在正确位置上时，则应给出声响报警。

-- 应配置带声响报警和电视监控的水渗漏探测系统，向驾驶室和机舱控制室显示门的渗漏情况。

附录 8 海船入级符号与附加标志一览表

本附录列出了 CCS 海船入级符号与附加标志，供参照应用。

按 CCS 颁布的有关规范和接受的其他等效规定建造的船舶和轮机装置（包括电气设备），CCS 将授予相应的入级符号与附加标志。

入级符号是本社对批准入级的船舶的船体（包括设备）和轮机（包括电气设备），根据其适用条件所授予的本社特定的一个或多个特征符号，其船舶主要特性的表述，由五角星和缩写字母组成，例如★ CSA、★ CSM 等。

附加标志是船舶不同特点的分级表述，包括船舶类型、货物特性、特殊任务、特殊的特征、航区、航线限制以及其他含义的一个或一组标志。附加标志加注在入级符号之后。

一般按下列次序给出入级符号和附加标志：

入级符号或附加标志的分类	★	**CSA CSM**	船舶类型	航区或航线限定	特殊任务	货物特性	特殊性能	特殊检验	特殊设备	自动控制	环境保护	货物冷藏装置	安全管理体系认证
对应表格	表 A	表 A	表 B	表 C	表 D	表 E	表 F	表 G	表 H	表 I	表 J	表 K	表 L

For example, in respect to a container ship constructed under supervision of the Society according to its rules, engaged in non-restricted service and service in floating ice condition, with hull structure strength being assessed by CCS through COMPASS-Structure direct analysis, with loading computer for calculation of overall strength and intact stability, machinery space periodically unattended, screwshaft condition monitoring and subject to in-water survy, the following characters of classification and class notations are to be assigned:

★ **CSA Container Ship, CCSS, Ice Class B, Loading Computer S.I, In-water survey**

★ **CSM AUT-0, SCM**

Characters of Classification **Table A**

Characters of classification	Description	Rules or regulations to be complied with
★ CSA	Hull structure and related equipment constructed under supervision of the Society according to its rules and found in compliance with the rules and fully fit for operation at sea in unrestricted service	Ch.2, Pt.1 of the Rules*
★ CSA	Hull structure and related equipment constructed not under supervision of the Society according to its rules, but found after survey by the Society to be in compliance with relevant requirementss of its rules and fully fit for operation at sea in unrestricted service	Ch.2, Pt.1 of the Rules
★ CSM	Ship's propulsion and essential auxiliary machinery constructed, installed and tested under supervision of the Society according to its rules and found in compliance with the rules and fully fit for operation at sea in unrestricted service	Ch.2, Pt.1 of the Rules
★ CSM	Ship's propulsion and essential auxiliary machinery constructed not under supervision of the Society according to its rules, however the whole of the machinery installed and tested under supervision of the Society according to its rules and found in compliance with the rules and fully fit for operation at sea in unrestricted service	Ch.2, Pt.1 of the Rules
★ CSM	Ship's propulsion and essential auxiliary machinery constructed and installed not under supervision of the Society according to its rules, but the existing machinery and its arrangement surveyed and tested by the Society according to its rules and found acceptable to it and fully fit for operation at sea in unrestricted service	Ch.2, Pt.1 of the Rules

* The term "the Rules" means CCS' Rules and Regulations for the Construction and Classification of Sea-Going Steel Ships, which applies to all following tables of this Appendix.

Type Notation **Table B**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
普通干货船	General Dry Cargo Ship	Ships carrying mainly dry cargo, and also liquid cargo contained in vessels, excluding bulk carriers, container ships, ro-ro cargo ships, refrigerated cargo ships, cement carriers, livestock carriers, dock/deck ships	Ch.2, Pt.2 of the Rules
客船	Passenger Ship	Ships carrying more than 12 passengers	Ch.2, Pt.2 of the Rules
滚装船	RO/RO Ship	Ships with multi-tier decks and double bottom, carriying vehicles or cargo in pallet form or in containers and loaded/unloaded by wheeled vehicles	Ch.9, Pt.2 of the Rules
客滚船	RO-RO Passenger Ship	Ro-ro ships carrying more than 12 passengers	Ch.9, Pt.2 of the Rules
铁路车辆客滚船	Train/RO-RO Passenger Ship	Ro-ro ships carrying more than 12 passengers and capable of carrying trains	Ch.9, Pt.2 of the Rules
渡船	Ferry	Ships having a continuous deck and fit for short-distance and regular ferrying of vehicles and/or passengers.	Ch.5, Pt.8 of the Rules
散货船	Bulk Carrier	Ships carrying mainly dry cargo in bulk, including ore carriers, combination carriers, etc.	Ch.8, Pt.2 of the Rules
单舷侧散装货船	Single Side Skin Bulk Carrier	Normally constructed with single deck, topside tanks and hopper tanks in cargo spaces, cargo holds bounded by side shell	Ch.8, Pt.2 of the Rules
双舷侧散装货船	Double Side Skin Bulk Carrier	All cargo holds bounded by double side skin	Ch.8, Pt.2 of the Rules

例如，一艘集装箱船由本社按照规范进行建造检验，无限航区航行，按 CCS COMPASS-Structure 船体结构直接计算强度评估，小块漂流浮冰况区域航行，总强度和完整稳性计算装载仪，水下检验，机器处所周期性无人值班，螺旋桨轴状况监控。授予下列入级符号及附加标志：

★ CSA Container Ship，CCSS，Ice Class B，Loading Computer S.I，In-water survey
★ CSM AUT-O，SCM

入级符号 **表 A**

入级符号	说明	满足规范或规定
★ CSA	船体结构及有关设备在建造时由本社按照其规范进行检验，且符合规范规定，完全适合于海上无限航区作业	《钢质海船入级与建造规范》Pt.1 Ch2
★ CSA	船体结构及有关设备在建造时，不是由本社按照其规范进行检验，其后经本社进行检验认为其符合本社规范的相关规定，完全适合于海上无限航区作业	《钢质海船入级与建造规范》Pt.1 Ch2
★ CSM	船舶的推进机械和重要用途的辅助机械的制造、安装和试验均由本社按照其规范进行检验，且符合规范规定，完全适合于海上无限航区作业	《钢质海船入级与建造规范》Pt.1 Ch2
★ CSM	船舶的推进机械和重要用途的辅助机械的制造不是由本社按照其规范进行检验，但整个机械的安装和试验均由本社按照其规范进行检验，且符合规范规定，完全适合于海上无限航区作业	《钢质海船入级与建造规范》Pt.1 Ch2
★ CSM	船舶的推进机械和重要用途的辅助机械的建造和安装均不是由本社按照其规范进行检验，但现有船上的机械装置及其布置已由本社按照其规范进行检验和试验，经本社审查认为可以接受，完全适合于海上无限航区作业	《钢质海船入级与建造规范》Pt.1 Ch2

船舶类型附加标志（Type notation） **表 B**

附加标志		说明	规范、指南、标准的特殊要求
中文	英文		
普通干货船	General dry Cargo Ship	以载运干货为主，也可装运成桶液货的船舶。但不包括散货船、集装箱船、滚装货船、冷藏货船、水泥运输船、牲畜运输船、坞式甲板船	《钢质海船入级与建造规范》Pt.2 Ch2
客船	Passenger Ship	载运乘客超过 12 人的船舶	《钢质海船入级与建造规范》Pt.2 Ch 2
滚装船	RO/RO Ship	多层甲板、双层底、能装载车辆或使用车辆装卸集装箱或托盘货的船舶	《钢质海船入级与建造规范》Pt.2 Ch9
客滚船	RO-RO Passenger Ship	载运乘客超过 12 人的滚装船	《钢质海船入级与建造规范》Pt.2 Ch9
铁路车辆客滚船	Train/RO-RO Passenger Ship	载运乘客超过 12 人，又能载运铁路车辆的客滚船	《钢质海船入级与建造规范》Pt.2 Ch9
渡船	Ferry	具有全通甲板结构，适用于短途、定班期车辆和 / 或乘客摆渡特点的船舶	《钢质海船入级与建造规范》Pt.8 Ch5
散货船	Bulk Carrier	主要用于运输散装干货的船舶，包括诸如矿砂船和兼装船等船型	《钢质海船入级与建造规范》Pt2.Ch8
单舷侧散装货船	Single Side Skin Bulk Carrier	在装货处所通常具有单甲板、顶边舱和底边舱，货舱边界为舷侧壳板	《钢质海船入级与建造规范》Pt2.Ch8
双舷侧散装货船	Double Side Skin Bulk Carrier	所有货舱边界均为双舷侧结构的散货船	《钢质海船入级与建造规范》Pt.2 Ch8

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
矿砂船	Ore Carrier	Ships constructed with single deck, 2 logitudinal bulkheads and double bottom in cargo spaces, with only center holds used for carrying ore	Ch.8, Pt.2 of the Rules
运水船	Water Tanker	Ships carrying fresh water	Ch.5 & 6, Pt.2 of the Rules
油船	Oil Tanker	Carrying crude oil or oil products	Ch.5 & 6, Pt.2 of the Rules
单壳油船	Single Hull Oil Tanker	Single hull, carrying crude oil or oil products	Ch.6, Pt.2 of the Rules
双壳油船	Double Hull Oil Tanker	Double hull, single deck and simall-size hatches, carrying crude oil or oil products	Ch.5, Pt.2 of the Rules
植物油运输船	Vegetable Oil Tanker	Tankers carrying vegetable oil	Ch.5 & 6, Pt.2 of the Rules
兼用船	Combination Carrier	Tankers carrying oil or alternatively solid cargoes in bulk, similar as bulk carriers (including ore carriers) in design, but fitted with piping, pumps and inert gas systems for loading and unloading of oil in specified spaces	Ch.5, Ch.6 & Ch.8, Pt.2 of the Rules
矿／油船	Ore/Oil Carrier	Single hull, single deck, 2 logitudinal bulkheads and double bottom, all or most of center holds used for carrying ore, side or side and some centre holds used for carrying oil	Ch.5, Ch.6 & Ch.8 of Pt.2 of the Rules
矿／散／油船	Ore/Bulk/Oil Carrier	Double hull, single deck, double bottom, topside tanks and hopper tanks, carrying oil or dry bulk cargo (including ore)	Ch.5, Ch.6 & Ch.8 of Pt.2 of the Rules
集装箱船	Container Ship	Double bottom and double side skin construction with torsion box girders fitted at top sides, large deck openings, carrying containers, or as alternative, single side skin construction with double bottom and torsion box girders or equivalent structure	Ch.7, Pt.2 of the Rules
敞口集装箱船	Open-Top Container Ship	Double bottom and double side skin construction with torsion box girders fitted at top sides, large deck openings, carrying containers, or as alternative, single side skin construction with double bottom and torsion box girders or equivalent structure, but no hatch covers for holds	Ch.7, Pt.2 of the Rules Interim Guideline for Survey of Open Hatch Container Ships
运木船	Timber Carrier	Dedicated log or timber carriers, provided with securing equipment	Ch.2, Pt.2 of the Rules
运畜船	Cattle Carrier	Dedicated cattle carriers, with holds divided into enclosures	Ch.2, Pt.2 of the Rules
驳船	Barge	Ships with flat bottom and large deck area, generally not provided with main propulsion	Ch.12, Pt.2 of the Rules
油驳	Oil Barge	Barges carrying crude oil or oil products within holds	Ch.12, Pt.2 of the Rules
箱形驳	Pontoon Barge	Square barges carrying water-resistant cargoes on deck	Ch.12, Pt.2 of the Rules
载驳船	Barge Carrier	Dedicated cargo barge and heavy cargo carriers with large deck area	Ch.2, Pt.2 of the Rules
桥吊运输船	Bridge Crane and Heavy Equipment Carrier	Dedicated bridge crane and heavy equipment carriers with large deck area	Ch.2, Pt.2 of the Rules
活鱼运输船	Live Fish Carrier	Fitted with live fish holds, provided with water cycling or exchanging, in some cases provided with devices for increasing oxygen, purifying water and reducing temperature, dedicated to carry live fish	Ch.2, Pt.2 of the Rules
半潜船	Semi-Submersible Vessel	Capable of being semi-submersible when needed during loading and unloading or operation	Ch.13, Pt.8 of the Rules

附加标志		说明	规范、指南、标准的特殊要求
中文	英文		
矿砂船	Ore Carrier	在装货处所具有单甲板、两道纵舱壁、双层底，仅仅中心舱用于运输矿砂的船舶	《钢质海船入级与建造规范》Pt.2 Ch8
运水船	Water Tanker	载运淡水的船舶	《钢质海船入级与建造规范》Pt.2 Ch5&6
油船	Oil Tanker	载运原油或石油产品的船舶	《钢质海船入级与建造规范》Pt.2 Ch5&6
单壳油船	Single Hull Oil Tanker	单壳、载运原油或石油产品的船舶	《钢质海船入级与建造规范》Pt.2 Ch6
双壳油船	Double Hull Oil Tanker	双壳，单甲板小尺度舱口，载运原油或石油产品的船舶	《钢质海船入级与建造规范》Pt.2 Ch5
植物油运输船	Vegetable Oil Tanker	载运植物油的船舶	《钢质海船入级与建造规范》Pt.2 Ch5&6
兼用船	Combination Carrier	载运散装油类或交替载运散装固体货物的液货船。其设计类似于散货船包括矿砂船，但装设了管系、泵和惰性气体装置以便能够装卸指定处所油类货物	《钢质海船入级与建造规范》Pt.2Ch5、Ch6、Ch8
矿 / 油船	Ore/Oil Carrier	单壳、单甲板、两道纵舱壁、双层底、全部或大部中间货舱装矿，边舱或边舱和部分中舱装油的船舶	《钢质海船入级与建造规范》Pt.2、Ch5、Ch6、Ch8
矿 / 散 / 油船	Ore/Bulk/Oil Carrier	双壳、单甲板、双层底、顶边舱和底边舱，载运油或散装干货（包括矿砂）的船舶	《钢质海船入级与建造规范》Pt.2、Ch5、Ch6、Ch8
集装箱船	Container Ship	双层底、双壳、舷顶设抗扭箱、甲板开口大，载运集装箱或用双层底、有抗扭箱或其他等效的单层壳舷侧结构代替的船舶	《钢质海船入级与建造规范》Pt.2 Ch7
敞口集装箱船	Open-Top Container Ship	双层底、双壳、舷顶设抗扭箱、甲板开口大，载运集装箱或用双层底、有抗扭箱或其他等效的单层壳舷侧结构代替，但货舱无舱口盖的船舶	《钢质海船入级与建造规范》Pt.2 Ch7 《敞口集装箱船检验暂行规则》
运木船	Timber Carrier	专运原木和木材，备有系固设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch2
运畜船	Cattle Carrier	专门运载牲畜，舱内设置分隔围栏的船舶	《钢质海船入级与建造规范》Pt.2 Ch2
驳船	Barge	平底，具有较大的甲板面积的船舶。一般不具备主推进设备	《钢质海船入级与建造规范》Pt.2 Ch12
油驳	Oil Barge	舱内装载原油或石油产品的驳船	《钢质海船入级与建造规范》Pt.2 Ch12
箱形驳	Pontoon Barge	方形，甲板上装载不易受水侵蚀的货物的驳船	《钢质海船入级与建造规范》Pt.2 Ch12
载驳船	Barge Carrier	具有较大的甲板面积，专运货驳和重型设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch2
桥吊运输船	Bridge Crane and Heavy Equipment Carrier	具有较大的甲板面积，专运桥吊和重型设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch2
活鱼运输船	Live Fish Carrier	设有活鱼舱，采用循环水或换水方式，有些还备有增氧、净水和 / 或降温等装置，专用于运输活鱼的船舶	《钢质海船入级与建造规范》Pt.2 Ch2
半潜船	Semi-Submersible Vessel	在装卸作业或操作需要时能呈半潜状态的船舶	《钢质海船入级与建造规范》Pt.8Ch13

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
拖船	Tug	Fitted with towing equipment, dedicated to towing ships or other floating objects on water	Ch.10, Pt.2 of the Rules
化学品液货船	Chemical Tanker	Similar as oil tankers, provided with cargo containment system, dedicated to carry liquid cargoes as listed in Chapter 17 of IBC Code	Rules for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
液化气体运输船	Liquefied Gas Carrier	Provided with cargo containment system, dedicated to carry liquefied gases or other flammable liquid cargos as listed in Chapter 19 of IGC Code	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
LPG 运输船	LPG Carrier	Ships carrying liquefied petroleum gas	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
LNG 运输船	LNG Carrier	Ships capable of carrying liquefied natural gas	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
CNG 运输船	CNG Carrier	Ships carrying compressed natural gas	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
沥青运输船	Asphalt Carrier	Fitted with independent or integral cargo tanks, dedicated to carrying asphalt	Guidelines for Survey of Asphalt Tankers
近海供应船	Offshore Supply Ship	Dedicated to supplying food, stores, etc. to installations and ships engaged in offshore operations	Ch.11, Pt.2 of the Rules
近海供应拖船	Offshore Tug/supply Ship	Capable of operating as offshore supply ships and of towing operaions	Ch.10 & 11, Pt.2 of the Rules
守护船	Stand-by Ship	Ships standing by for rescue operations for offshore installations	Ch.10, Pt.2 of the Rules & standards acceptable to the Society
浮船坞	Floating Dock	Fitted with buoyant boxes at bottom, both sides constructed as bulwarks, for repairing hoisted ships	Rules and Regulations for the Construction and Classification of Floating Docks
布缆船	Cable Layer	Provided with cable laying machinery and other special equpment	Ch.12 & 13, Pt.2 of the Rules
铺管船	Pipe Laying Vessel	Provided with special equipment for laying pipes	Ch.12 & 13, Pt.2 of the Rules
化学品 / 油液货船	Chemical/Oil Tanker	Tankers capable of carrying both chemicals and oil products	Rules for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
多用途拖船	Tug/Supply/Fire Fighting Ship	Tugs with moer than 3 functions (to be clearly stated)	Ch.10 & 11, Pt.2 /Ch.3, Pt.8 of the Rules
渔船	Fishing Vessel	Provided with fishing equipment	Ch.7, Pt.8 of the Rules
起重船	Floating Crane	Fitted with hoisting appliances on deck, dedicated to hoising operations on water	Ch.13, Pt.2 of the Rules
打捞船	Salvage Ship	Provided equipment for salvaging sunken ships or other objects	Ch.2 & Ch.13, Pt.2 of the Rules
救助船	Rescue Ship	Engaged in rescue operations at sea for ships and crew in distress	Ch.2, Pt.2 of the Rules
打桩船	Pile Driving Barge	Fitted with pile driving equipment at end or centre of deck, dedicated to pile driving in water	Ch.12, Pt.2 of the Rules
耙吸式挖泥船	Trailing Suction Dredger	Fitted with drag head and other dredging equipment	Ch.14, Pt.2 of the Rules
铰吸式挖泥船	Cutter Suction Dredger	Fitted with cutter head and other dredging equipment	Ch.14, Pt.2 of the Rules
链斗式挖泥船	Bucket Dredger	Fitted with bucket and other dredging equipment	Ch.14, Pt.2 of the Rules
抓斗式挖泥船	Grab Dredger	Fitted with one or more grab machines	Ch.14, Pt.2 of the Rules

附 加 标 志		说明	规范、指南、标准的特殊要求
中 文	英 文		
拖船	Tug	设有拖曳设备，专用于在水上拖曳船舶或其他浮体的船舶	《钢质海船入级与建造规范》Pt.2 Ch10
化学品液货船	Chemical Tanker	类似油船，设有货物围护系统，专运 IBC 规则第 17 章中所列的液体货品的船舶	《散装运输危险化学品船舶构造与设备规范》
液化气体运输船	Liquefied Gas Carrier	设有货物围护系统，专运 IGC 规则第 19 章中所列的液化气体或其他易燃液货的船舶	《散装运输液化气体船舶构造与设备规范》
LPG 运输船	LPG Carrier	运载液化石油气的船舶	《散装运输液化气体船舶构造与设备规范》
LNG 运输船	LNG Carrier	能够载运液化天然气的船舶	《散装运输液化气体船舶构造与设备规范》
CNG 运输船	CNG Carrier	载运压缩天然气的船舶	《散装运输液化气体船舶构造与设备规范》
沥青运输船	Asphalt Carrier	设有独立液货舱或整体液货舱，专运沥青的船舶	《沥青船检验指南》
近海供应船	Offshore Supply Ship	专为近海作业的海上设施或船舶供应物资和食品等补给的船舶	《钢质海船入级与建造规范》Pt.2 Ch11
近海供应拖船	Offshore Tug/supply Ship	既有近海供应船的特征，亦具有拖曳作业能力的船舶	《钢质海船入级与建造规范》Pt.2 Ch10、Ch11
守护船	Stand-by Ship	为海上设施救助、待命的船舶	《钢质海船入级与建造规范》Pt.2 Ch10 及本社接受的标准
浮船坞	Floating Dock	具有底部浮箱，两舷为坞墙，供抬起船舶进行修理的船舶	《浮船坞入级与建造规范》
布缆船	Cable Layer	设有布缆机等专用设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch12、Ch13
铺管船	Pipe Laying Vessel	设有铺管专用设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch12、Ch13
化学品 / 油液货船	Chemical/Oil Tanker	既可装运化学品亦可装运石油产品的船舶	《散装运输危险化学品船舶构造与设备规范》
多用途拖船	Tug/Supply/Fire Fighting Ship	具有三种以上功能的拖船 (但应明确加注上具备的功能)	《钢质海船入级与建造规范》Pt.2 Ch10, Ch11 Pt.8 Ch3
渔船	Fishing Vessel	具有捕鱼设备的船舶	《钢质海船入级与建造规范》Pt.8 Ch7
起重船	Floating Crane	甲板上有起重设备，专供水上作业起吊重物	《钢质海船入级与建造规范》Pt.2 Ch13
打捞船	Salvage Ship	设有打捞设备，用于打捞水下沉船、沉物	《钢质海船入级与建造规范》Pt.2 Ch2、Ch13
救助船	Rescue Ship	担负海上防险救助任务、搜救失事船舶及船员	《钢质海船入级与建造规范》Pt.2 Ch2
打桩船	Pile Driving Barge	在甲板端部或中部设有打桩设备，专为水上工程打桩用	《钢质海船入级与建造规范》Pt.2 Ch12
耙吸式挖泥船	Trailing Suction Dredger	具有耙头等挖泥设备	《钢质海船入级与建造规范》Pt.2 Ch14
铰吸式挖泥船	Cutter Suction Dredger	具有铰刀等挖泥设备	《钢质海船入级与建造规范》Pt.2 Ch14
链斗式挖泥船	Bucket Dredger	具有链斗挖泥设备	《钢质海船入级与建造规范》Pt.2 Ch14
抓斗式挖泥船	Grab Dredger	具有一台或多台抓斗机挖泥设备	《钢质海船入级与建造规范》Pt.2 Ch14

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
铲斗式挖泥船	Dipper Dredger	Fitted with dippers	Ch.14, Pt.2 of the Rules
吹泥船	Reclamation Craft	Fitted with suction pipes, nozzles, etc.	Ch.14, Pt.2 of the Rules
对开式挖泥船	Split Hopper Dredger	Entire main hull to be opened along longitudinal centerline for unloading	Ch.14, Pt.2 of the Rules
泥驳	Hopper Barge	Barges dedicated to carrying mud	Ch.14, Pt.2 of the Rules
对开式泥驳	Split Hopper Barge	Entire main hull to be opened along longitudinal centerline for unloading	Ch.14, Pt.2 of the Rules
高速船	HSC (High Speed Craft)	Ships with maximum speed not less than 3.7 ▽ 0.1667 m/s	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft/Rules for Classification of Coastal Craft
高速客滚船	RO/RO Passenger HSC	High speed craft carrying passengers and cars	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
穿浪船	Wave Pierce Craft	A special type of catamaran high speed craft with large aspect ratio and small waterplane area	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
全垫升气垫船	Air Cushion Craft	High speed craft wholly supported by air cushion	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
水面效应船	Surface Effect Craft	High speed craft with air cushioin being wholly or partially maintained by submerged permanent hard structure	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
双体高速船	Catamaran HSC	Upper parts of two parallel hulls being connected by strength framing	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
单体高速船	Mono-Hull HSC	High speed craft with one hull	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
A 类客船	Passenger A	All passengers anc crew to be rescued within least time in case of distress at any point of its route, carrying not more than 450 passengers	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
B 类客船	Passenger B	Passenger ships other than Category A	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
小水线面双体高速船	SWATH-HSC (Small Waterplane Area Twin Hull HSC)	A special type of catamaran high speed craft with small waterplane area, and with underwater portions of hulls being formed in shape of torpedo	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
小水线面双体船	SWATH（Small Waterplane Area Twin Hull）	A special type of catamaran with small waterplane area, and with underwater portions of hulls being formed in shape of torpedo	Standards acceptable to the Society
高速货船	Cargo HSC	High speed craft carrying cargoes	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
水翼船	Hydrofoil Craft	Supported completely clear above water surface in non-displacement mode by hydrodynamic forces generated on foils	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
地效翼船	Wing In Ground Craft	Supported by using ground effect above the water or some other surface, without constant contact with such a surface and supported in the air, mainly, by an aerodynamic lift generated on a wing (wings) which are intended to utilize the ground effect action.	Guidelines for Survey of Wing-in-Ground Craft
A 类地效翼船	Wing In Ground Craft A	Certified for operation only in ground effect	Guidelines for Survey of Wing-in-Ground Craft
B 类地效翼船	Wing In Ground Craft B	Certified to temporarily increase its altitude to a limited height outside the influence of ground effect but not exceeding a certain distance	Guidelines for Survey of Wing-in-Ground Craft
游艇	Yacht	Pleasure motorboats not engaged in trade	Technical Specifications for Survey of Pleasure Craft
液化石油气作燃料动力游艇	LPG Tourist Boat	Using liquefied petroleum (LPG) as fuel (in power plant)	Interim Provisions for Survey of LPG Pleasure Craft
小型客船	Passenger Boat	Passenger ships less than 20 m in length	Rules for Classification of Coastal Craft

附加标志		说明	规范、指南、标准的特殊要求
中文	英文		
铲斗式挖泥船	Dipper Dredger	具有铲斗挖泥设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch14
吹泥船	Reclamation Craft	具有吸管、吸嘴等设备的船舶	《钢质海船入级与建造规范》Pt.2 Ch14
对开式挖泥船	Split Hopper Dredger	整个主船体可从纵中剖面处打开而达到卸泥目的的船舶	《钢质海船入级与建造规范》Pt.2 Ch14
泥驳	Hopper Barge	专输送泥浆的驳船	《钢质海船入级与建造规范》Pt.2 Ch14
对开式泥驳	Split Hopper Barge	整个主船体可从纵中剖面处打开而达到卸泥目的的驳船	《钢质海船入级与建造规范》Pt.2 Ch14
高速船	HSC (High Speed Craft)	最大航速不小于 3.7 ▽ 0.1667 m/s 的船舶	《海上高速船入级与建造规范》、《沿海小船入级规范》
高速客滚船	RO/RO Passenger HSC	载客且载小客车的高速船	《海上高速入级与建造规范》
穿浪船	Wave Pierce Craft	具有大宽长比，小水线面面积的一种特殊船型的双体高速船	《海上高速入级与建造规范》
全垫升气垫船	Air Cushion Craft	能借助气垫支承其全部重量的高速船	《海上高速船入级与建造规范》
水面效应船	Surface Effect Craft	借助浸在水中的永久性硬结构完全或部分保持气垫的高速船	《海上高速船入级与建造规范》
双体高速船	Catamaran HSC	具有两个相互平行的船体，其上部用强力构架联成一个整体的高速船	《海上高速船入级与建造规范
单体高速船	Mono-Hull HSC	只有一个船体的高速船	《海上高速船入级与建造规范》
A 类客船	Passenger A	在其航线的任何地点出事，能在最短时间内救出旅客及船员，且载客不超过 450 人的客舶	《海上高速船入级与建造规范》
B 类客船	Passenger B	A 类以外的客船	《海上高速船入级与建造规范》
小水线面双体高速船	SWATH-HSC (Small Waterplane Area Twin Hull HSC)	具有小水线面面积，且片体水下部分呈鱼雷状的一种特殊船型的双体高速船	《海上高速船入级与建造规范》
小水线面双体船	SWATH（Small Waterplane Area Twin Hull）	具有小水线面面积，且片体水下部分呈鱼雷状的一种特殊船型的双体船	符合本社接受的标准
高速货船	Cargo HSC	载货的高速船	《海上高速船入级与建造规范》
水翼船	Hydrofoil Craft	非排水状态航行时，能被水翼产生的水动升力支承在水面以上的船舶	《海上高速船入级与建造规范》
地效翼船	Wing In Ground Craft	重量由机翼利用其与贴近水表面或其他表面之间的地面表面效应所产生气动升力支持的船舶	《地效翼船检验指南》
A 类地效翼船	Wing In Ground Craft A	只能在地效区内飞行的地效翼船	《地效翼船检验指南》
B 类地效翼船	Wing In Ground Craft B	能在地效区以外瞬时增加飞行高度并飞行一段有效距离的地效翼船	《地效翼船检验指南》
游艇	Yacht	用于娱乐休闲的非营业性机动艇	游艇检验技术要求
液化石油气作燃料动力游艇	LPG Tourist Boat	用液化石油气作燃料 (LPG)(放入动力装置中) 的游艇	《液化石油气动力游艇检验暂行规定》
小型客船	Passenger Boat	船长 20m 以下的客船	《沿海小船入级规范》

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
小型货船	Cargo Boat	Cargo ships less than 20 m in length	Rules for Classification of Coastal Craft
非公约船舶	Non-Convention Ship	Ships not covered by international conventions	Guidelines for Survey of Non-Convention Ships
非机动船舶	Non-Propulsion Ship/ Boat	Ships not propelled by their own mechnical power	The Rules/Rules for Classification of Coastal Craft
水下观光潜水艇	Passenger Submersible Craft	Self-propelled free submersibles transporting or carrying passengers and capable of underwater sightseeing	Rules for the Construction and Classification of Diving Systems and Submersibles
水下式观光半潜水艇	Passenger Semi-submersible Craft	Self-propelled free semi-submersibles transporting or carrying passengers and capable of underwater sightseeing, with some portion of their structure above water surface while submerging	Standard(s) acceptable to the Society

Service Restriction Notation **Table C**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
近海航区	Greater Coastal Service	Sea area within 200 n miles off the shore	The Rules
沿海航区	Coastal Service	Sea area within 20 n miles off the shore	The Rules
遮蔽航区	Sheltered Water Service	Sea area between the island and the shore with a distance of less than 10 n miles	The Rules
近海航区营运限制	Greater Coastal Service Restriction	Service restriction for high speed craft	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
沿海航区营运限制	Coastal Service Restriction	Service restriction for high speed craft	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft
遮蔽航区营运限制	Sheltered Water Service Restriction	Service restriction for high speed craft and coastal craft	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft/ Rules for Classification of Coastal Craft
平静水域营运限制	Calm Water Service Restriction	Service restriction for high speed craft and coastal craft	Rules and Regulations for the Construction and Classification of Sea-going High Speed Craft/Rules for Classification of Coastal Craft
营运气象限制 I	Weather Restriction I	Weather restriction for wing-in-ground craft	Guidelines for Survey of Wing-in-Ground Craft
营运气象限制 II	Weather Restriction II	Weather restriction for wing-in-ground craft	Guidelines for Survey of Wing-in-Ground Craft
营运气象限制 III	Weather Restriction III	Weather restriction for wing-in-ground craft	Guidelines for Survey of Wing-in-Ground Craft
营运气象限制 IV	Weather Restriction IV	Weather restriction for wing-in-ground craft	Guidelines for Survey of Wing-in-Ground Craft
最严重冰况区域航行	Ice Class B1*	Extreme ice conditions. Full load and ballast draughts fore and aft, ice strengthening and minimum main engine output to be stated in classification certificate	Ch.4, Pt.2/Ch.14, Pt.3 of the Rules
严重冰况区域航行	Ice Class B1	Severe ice conditions. Full load and ballast draughts fore and aft, ice strengthening and minimum main engine output to be stated in classification certificate	Ch.4, Pt.2/Ch.14, Pt.3 of the Rules
中等冰况区域航行	Ice Class B2	Intermediate ice conditions. Full load and ballast draughts fore and aft, ice strengthening and minimum main engine output to be stated in classification certificate	Ch.4, Pt.2/Ch.14, Pt.3 of the Rules
轻度冰况区域航行	Ice Class B3	Light ice conditions. Full load and ballast draughts fore and aft, ice strengthening and minimum main engine output to be stated in classification certificate	Ch.4, Pt.2/Ch.14, Pt.3 of the Rules
小块漂流浮冰况区域航行	Ice Class B	Floating ice condition	Ch.4, Pt.2 of the Rules

附　加　标　志		说明	规范、指南、标准的特殊要求
中　文	英　文		
小型货船	Cargo Boat	船长 20m 以下的货船	《沿海小船入级规范》
非公约船舶	Non-Convention Ship	公约规定以外的船舶	《非公约尺度船检验指南》
非机动船舶	Non-Propulsion Ship/ Boat	不是依靠船舶本身机械动力航行的船舶	《钢质海船入级与建造规范》、《沿海小船入级规范》
水下观光潜水艇	Passenger Submersible Craft	用于运送或搭载乘客，并能在水下观光旅游的自由自航的潜水艇	《潜水系统和潜水器入级与建造规范》
水下式观光半潜水艇	Passenger Semi-submersible Craft	用于运送或搭载乘客，并能在水下观光旅游的自由自航的半潜水艇。其特点是可下潜到水下运行，但部分结构仍露出水面的机动船	按本社接受的标准

航区限制附加标志（Service restriction notation）　　表 C

附　加　标　志		说明	满足规范、指南、标准的特殊要求
中　文	英　文		
近海航区	Greater Coastal Service	距岸不超过 200 海里	《钢质海船入级与建造规范》
沿海航区	Coastal Service	距岸不超过 20 海里	《钢质海船入级与建造规范》
遮蔽航区	Sheltered Water Service	海岸与岛屿之间不超过 10 海里	《钢质海船入级与建造规范》
近海航区营运限制	Greater Coastal Service Restriction	高速船营运限制	《海上高速船入级与建造规范》
沿海航区营运限制	Coastal Service Restriction	高速船营运限制	《海上高速船入级与建造规范》
遮蔽航区营运限制	Sheltered Water Service Restriction	高速船及小船营运限制	《海上高速船入级与建造规范》、《沿海小船入级规范》
平静水域营运限制	Calm Water Service Restriction	高速船及小船营运限制	《海上高速船入级与建造规范》、《沿海小船入级规范》
营运气象限制 I	Weather Restriction I	地效翼船营运气象限制	《地效翼船检验指南》
营运气象限制 II	Weather Restriction II	地效翼船营运气象限制	《地效翼船检验指南》
营运气象限制III	Weather Restriction III	地效翼船营运气象限制	《地效翼船检验指南》
营运气象限制IV	Weather Restriction IV	地效翼船营运气象限制	《地效翼船检验指南》
最严重冰况区域航行	Ice Class B1*	最严重冰况。船首和船尾的满载吃水和压载吃水以及冰区加强及主机最小功率在船级证中标明	《钢质海船入级与建造规范》Pt.2 Ch4、Pt.3 Ch14
严重冰况区域航行	Ice Class B1	严重冰况。船首和船尾的满载吃水和压载吃水以及冰区加强及主机最小功率在船级证中标明	《钢质海船入级与建造规范》Pt.2 Ch4、Pt.3 Ch14
中等冰况区域航行	Ice Class B2	中等冰况。船首和船尾的满载吃水和压载吃水以及冰区加强及主机最小功率在船级证中标明	《钢质海船入级与建造规范》Pt.2 Ch4、Pt.3 Ch 14
轻度冰况区域航行	Ice Class B3	轻度冰况。船首和船尾的满载吃水和压载吃水以及冰区加强及主机最小功率在船级证中标明	《钢质海船入级与建造规范》Pt.2 Ch4、Pt.3 Ch14
小块漂流浮冰况区域航行	Ice Class B	漂流浮冰	《钢质海船入级与建造规范》Pt.2 Ch4

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
在遮蔽海域作业	Dredging Within Sheltered Water Area	Restricted service area for dredgers	Ch.14, Pt.2 of the Rules
在沿海海域内作业	Dredging Within Coastal Area	Restricted service area for dredgers	Ch.14, Pt.2 of the Rules
在近海海域内作业	Dredging Within Greater Coastal Area	Restricted service area for dredgers	Ch.14, Pt.2 of the Rules

Special Duties Notation **Table D**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
特殊用途船	Special Purpose Ship	Carrying on board more than 12 special persons and engaged in research, expeditions, survey, training of marine personnel or fish processing without catching	Ch.4, Pt.8 of the Rules
训练船	Training Ship	For teaching and practice at sea	Ch.4, Pt.8 of the Rules
鱼类加工船	Fish Factory Ship	Specialiazed for fish processing	Ch.4, Pt.8 of the Rules
调查船	Research Ship	Specialized for marine research and study, survey, exploration, etc.	Ch.4, Pt.8 of the Rules
浮油回收船	Oil Recovery Ship	Provided with oil recovery and storage means	Guidelines for Survey of Oil Recovery Ships
A 类浮油回收船	Oil Recovery Ship A	Capable of operating within areas under influence of fire and explosion of spilling oil source	Guidelines for Survey of Oil Recovery Ships
B 类浮油回收船	Oil Recovery Ship B	Operating not within areas under influence of fire and explosion of spilling oil source	Guidelines for Survey of Oil Recovery Ships
消防船	Fire Fighting	Provided with fire-fighting equipment to extinguish fires of other shps	Ch.3, Pt.8 of the Rules
1 类消防船	Fire Fighting Ship 1	For early stage fire fighting	Ch.3, Pt.8 of the Rules
2 类消防船	Fire Fighting Ship 2	For large fire fighting	Ch.3, Pt.8 of the Rules
3 类消防船	Fire Fighting Ship 3	For large or oil fire fighting	Ch.3, Pt.8 of the Rules
交通船	Traffic Ship	For transporting personnel, but not as passenger transport service	Ch.2, Pt.2 of the Rules
公务船	Business Affair Ship	Ships owned or operated by government and used only for non-commercial services	

附　加　标　志		说明	满足规范、指南、标准的特殊要求
中　文	英　文		
在遮蔽海域作业	Dredging Within Sheltered Water Area	挖泥船限定海域	《钢质海船入级与建造规范》Pt.2 Ch14
在沿海海域内作业	Dredging Within Coastal Area	挖泥船限定海域	《钢质海船入级与建造规范》Pt.2 Ch14
在近海海域内作业	Dredging Within Greater Coastal Area	挖泥船限定海域	《钢质海船入级与建造规范》Pt.2 Ch14

特殊任务附加标志（Special duties notation）　　表 D

附　加　标　志		说明	满足规范、指南、标准的特殊要求
中　文	英　文		
特殊用途船	Special Purpose Ship	载有 12 名以上特殊人员从事科研、考察、测量、海事人员训练、鱼类或海生物加工的船舶	《钢质海船入级与建造规范》Pt.8 Ch4
训练船	Training Ship	用于海上教学和实习的船舶	《钢质海船入级与建造规范》Pt.8 Ch4
鱼类加工船	Fish Factory Ship	专用于加工鱼类的船舶	《钢质海船入级与建造规范》Pt.8 Ch4
调查船	Research Ship	专用于海洋科学考察研究，测量勘探等的船舶	《钢质海船入级与建造规范》Pt.8 Ch4
浮油回收船	Oil Recovery Ship	具有油回收设备及贮存舱的船舶	《浮油回收船检验指南》
A 类浮油回收船	Oil Recovery Ship A	可在溢油源的失火和爆炸影响的区域作业的船舶	《浮油回收船检验指南》
B 类浮油回收船	Oil Recovery Ship B	不在溢油源的失火和爆炸影响的区域作业的船舶	《浮油回收船检验指南》
消防船	Fire Fighting	具有消防设备用于扑灭他船火灾的船舶	《钢质海船入级与建造规范》Pt.8 Ch3
1 类消防船	Fire Fighting Ship 1	具有扑灭初期火灾的能力的消防船	《钢质海船入级与建造规范》Pt.8 Ch3
2 类消防船	Fire Fighting Ship 2	具有扑灭大火的能力的消防船	《钢质海船入级与建造规范》Pt.8 Ch3
3 类消防船	Fire Fighting Ship 3	具有扑灭大火及油类火灾的能力的消防船	《钢质海船入级与建造规范》Pt.8 Ch3
交通船	Traffic Ship	不属客运业务范围，用以运送人员的船舶	《钢质海船入级与建造规范》Pt.2 Ch2
公务船	Business Affair Ship	由政府部门拥有或经营，并仅用于政府执行公务的非商业性服务的船舶	

Cargo Notation **Table E**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
散装货船协调附加标志 BC-A	BC-A	Designed to carry dry bulk cargoes of cargo density 1.0 t/m^3 and above with specified holds empty at maximum draught in addition to BC-B conditions	Ch.8, Pt.2 of the Rules
散装货船协调附加标志 BC-B	BC-B	Designed to carry dry bulk cargoes of cargo density of 1.0 t/m^3 and above with all cargo holds loaded in addition to BC-C conditions	Ch.8, Pt.2 of the Rules
散装货船协调附加标志 BC-C	BC-C	Designed to carry dry bulk cargoes of cargo density less than 1.0 t/m^3	Ch.8, Pt.2 of the Rules
最大货物密度（t/m^3）	Max. Cargo Density (1.0t/m^3)	The restriction "(maximum cargo density (in t/m3))" is to be added if maximum cargo density is less than 3.0 t/m^3. This notation is applicable only to BC-A and BC-B.	Ch.8, Pt.2 of the Rules
无多港口装卸货物	no MP	The restriction (no MP) is to be added when the vessel has not been designed for loading and unloading in multiple ports in accordance with the Rules. This notation is applicable to all harmonized notations (BC-A, BC-B, BC-C).	Ch.8, Pt.2 of the Rules
允许空舱组	Allowed Combination of Specified Empty Holds	This notation is to be added if specified empty holds are allowed in design. The notation is applicable only to BC-A	Ch.8, Pt.2 of the Rules
闪点超过 60℃	F.P. ＞ 60℃	Crude oil and oil products having a flashpoint exceeding 60ºC	Ch.5 & 6, Pt.2 of the Rules
闪点不超过 60℃	F. P.≤ 60℃	Crude oil and oil products having a flashpoint not exceeding 60ºC	Ch.5 & 6, Pt.2 of the Rules
货物温度不超过×××℃	Cargo Temperature ≤ ×××℃	Maximum temperature limit for asphalt cargo	Guidelines for Survey of Asphalt Tankers
最大压力 ××× MPa 和最高温度 ×××℃	Max.Pressure××× MPa and Max. Temperature××× ℃	Cargo vapour pressure and temperature limits applicable to ships carrying chemicals in bulk	Rules for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
1 型	Type 1	Carrying chemicals with very severe environmental and safety hazards and provided with integral and independent tanks	Rules for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
2 型	Type 2	Carrying chemicals with appreciably severe environmental and safety hazards and provided with integral and independent tanks	Rules for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
3 型	Type 3	Carrying chemicals with sufficiently severe environmental and safety hazards and provided with integral and independent tanks	Rules for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
1G 型	Type 1G	Carrying products requiring maximum preventive measures to preclude escape of such cargo	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
2G 型	Type 2G	Carrying products requiring significant preventive measures to preclude escape of such cargo	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
2PG 型	Type 2PG	150 m or less in length and carrying products requiring significant preventive measures to preclude escape of such cargo, with a MARVS of at least 0.07 MPa gauge and a cargo containment system design temperature of － 55℃ or above	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
3G 型	Type 3G	Carrying products requiring moderate preventive measures to preclude escape of such cargo	Rules for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk

货物特性附加标志（Cargo notation）　　表 E

附加标志		说明	满足规范、指南、标准的特殊要求
中文	英文		
散装货船协调附加标志 BC-A	BC-A	设计装载货物密度为 1.0t/m³ 及以上的干散货；最大吃水工况中有指定空舱组；装载工况中包括 BC-B 的要求	《钢质海船入级与建造规范》Pt.2 Ch8
散装货船协调附加标志 BC-B	BC-B	设计装载货物密度为 1.0t/m³ 及以上的干散货；所有舱装货；装载工况中包括 BC-C 的要求	《钢质海船入级与建造规范》Pt.2 Ch8
散装货船协调附加标志 BC-C	BC-C	设计装载货物密度小于 1.0t/m³ 干散货货物	《钢质海船入级与建造规范》Pt.2 Ch8
最大货物密度 (t/m³)	Max. Cargo Density (1.0t/m³)	当设计的最大货物密度小于 3.0 t/m³ 时，在协调标志后注明此项限制，并在括号内标明允许装载的最大货物密度，该附加标志权适用于 BC-A 和 BC-B 协调标志	《钢质海船入级与建造规范》Pt.2 Ch8
无多港口装卸货物	no MP	当散装货船设计中未按规范中对多港口装 / 卸货物提出要求时，在协调标志后注明此项限制标志。该附加标志适用于所有协调标志 (BC-A、BC-B、BC-C)	《钢质海船入级与建造规范》Pt.2 Ch8
允许空舱组	Allowed Combination of Specified Empty holds	当散货船设计中允许空舱时，在协调附加标志后加注该附加标志。该附加标志仅适用于 BC-A 协调标志	《钢质海船入级与建造规范》Pt.2 Ch8
闪点超过 60℃	F. P. ＞ 60℃	原油和石油产品闪点超过 60℃	《钢质海船入级与建造规范》Pt.2 Ch5, Ch6
闪点不超过 60℃	F. P. ≤ 60℃	原油和石油产品闪点不超过 60℃	《钢质海船入级与建造规范》Pt.2 Ch5, Ch6
货物温度不超过 ×××℃	Cargo Temperature ≤ ×××℃	使用于沥青货物最高限制温度值	《沥青船检验指南》
最大压力 ××× MPa 和最高温度 ×××℃	Max.Pressure××× MPa and Max. Temperature×××℃	货物蒸气压力和温度限制。适用于散化船	《散装运输危险化学品船舶构造与设备规范》
1 型	Type 1	载运对环境或安全有非常严重危险的化学品，货舱形式包括为整体液舱和独立液舱	《散装运输危险化学品船舶构造与设备规范》
2 型	Type 2	载运有相当严重危险的化学品，货舱形式包括为整体液舱和独立液舱	《散装运输危险化学品船舶构造与设备规范》
3 型	Type 3	载运有足够严重危险的化学物，货舱形式包括为整体液舱和独立液舱	《散装运输危险化学品船舶构造与设备规范》
1G 型	Type 1G	采用最严格防漏保护措施的货物	《散装运输液化气体船舶构造与设备规范》
2G 型	Type 2G	采用相当严格防漏保护措施的货物	《散装运输液化气体船舶构造与设备规范》
2PG 型	Type 2PG	适用 L ≤ 150m，采用相当严格防漏保护措施的货物，且释放阀最大调定值至少为 0.07MPa，设计温度为－ 55℃或以上	《散装运输液化气体船舶构造与设备规范》
3G 型	Type 3G	采用中等防漏保护措施的货物	《散装运输液化气体船舶构造与设备规范》

Special Features Notation **Table F**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
重货加强	Strengthened For Heavy Cargoes	Longitudinal framing for strength deck and bottom within cargo area, and double bottom and strengthening for bottom framing within cargo area	Ch.2, Pt.2 of the Rules
可以 ××× 舱空舱	Holds Nos. ××× may be Empty	Specified empty or alternate empty holds	Ch.8, Pt.2 of the Rules
增强残存能力	Enhanced Survivability	Criteria for longitudinal strength of single hull bulk carriers and strength of their corrugated transverse watertight bulkheads and permissible loading of their holds under flooded conditions	Ch.8, Pt.2 of the Rules
船体结构直接计算强度评估	CCSS（CCS COMPASS-Structure）	Hull structure strength assessed through direct calculation by CCS COMPASS-Structure	Guidelines for Direct Strength Analysis of Ship Structure
船体结构疲劳强度评估	CCSF（CCS COMPASS-Fatigue）	Hull structure fatigue strength assessed by CCS COMPASS-Fatigue	Guidelines for Fatigue Strength of Ship Structure
应急响应服务	ERS（Emergency Response Service）	Hull lines and structural data entered into database for obtaining assistance through special computer program in case of limited damage	CCS COMPASS system
坐底作业船底加强	Bottom Strengthened for Operating Aground	Bottom of dredgers strengthened for operating aground	Ch.14, Pt.2 of the Rules

Special Survey Notation **Table G**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
加强检验程序	ESP（Enhanced Survey rogramme）	Survey programme required for oil tankers, oil/bulk carriers, oil/bulk/ore carriers, chemical tankers, bulk carriers	Ch.4, Pt.1 of the Rules
水下检验	In-Water Survey	In lieu of docking survey under certain conditions	Ch.4, Pt.1 of the Rules/ Rules for Survey of Coastal Craft
船体循环检验	CHS (Continuous Hull Surveys)	Items for special surveys to be examined in rotation and distributed meanly within 5 years in lieu of those to be internally surveyed and tested during special surveys, except tankers and bulk carriers	Ch.4, Pt.1 of the Rules
轮机循环检验	CMS (Continuous Machinery Surveys)	Items for special surveys to be examined in rotation and distributed meanly within 5 years in lieu of those to be internally surveyed and tested during special surveys	Ch.4, Pt.1 of the Rules
螺旋桨轴状态监控	SCM (Screwshaft Condition Monitoring)	Propeller shafts tested and analyzed throught lub oil to know wear of bearings and determine deterioration of lub oil	Guidelines for Screwshaft Condition Monitoring System
柴油机滑油状态监控	ECM	Components of diesel engines tested and analyzed through lub oil to determine whether an overhaul is necessary according to results of oil analysis and other parameters	Guidelines for Diesel Engine Lub Oil Condition Monitoring System
机械计划保养系统	PMS (Planned Maintenance System)	Maintenance plans for machineries on board being developed according to CCS rules and Manufacturers' instructions and implemented	Guidelines for Survey of Planned Maintenance Scheme (PMS) for Machinery

特殊性能附加标志（Special features notation）　　表 F

附加标志		说明	满足规范、指南、标准的特殊要求
中　文	英　文		
重货加强	Strengthened For Heavy Cargoes	货舱区域的强力甲板和船底骨架均为纵骨架式，并货舱区域设置双层底、船底骨架加强	《钢质海船入级与建造规范》Pt.2 Ch2
可以 ××× 舱空舱	Holds Nos. ××× may be Empty	可指定空舱或间隔空舱装载	《钢质海船入级与建造规范》Pt.2 Ch8
增强残存能力	Enhanced Survivability	单壳散货船在进水状态下的总纵强度、水密槽型横舱壁强度及货舱许用装载量的标准	《钢质海船入级与建造规范》Pt.2 Ch8
船体结构直接计算强度评估	CCSS（CCS COMPASS-Structure）	按 CCS COMPASS-Structure 船体结构直接计算强度评估	《船体结构强度直接计算指南》
船体结构疲劳强度评估	CCSF（CCS COMPASS-Fatigue）	按 CCS COMPASS- Fatigue 船体结构疲劳强度评估	《船体结构疲劳强度指南》
应急响应服务	ERS（Emergency Response Service）	该船的线型与结构数据已经录入数据库，以在特别计算机程序的辅助下当遭到有限破损后提供帮助	CCS COMPASS 计算系统
坐底作业船底加强	Bottom strengthened for Operating Aground	挖泥船坐底作业加强	《钢质海船入级与建造规范》Pt.2 Ch14

特殊检验附加标志（Special Survey notation）　　表 **G**

附加标志		说明	满足规范、指南、标准的特殊要求
中　文	英　文		
加强检验程序	ESP（Enhanced Survey Programme）	油船、油 / 散、油 / 散 / 矿、化学品、散装货船应经受的检验程序	《钢质海船入级与建造规范》Pt.1 Ch4
水下检验	In-Water Survey	一定条件下替代坞内检验	《钢质海船入级与建造规范》Pt.1 Ch4 《沿海小船入级规范》
船体循环检验	CHS (Continuous Hull Surveys)	除液货船和散货船外的船舶，将特别检验项目均匀分配在 5 年内轮流检查，以替代特别检验时需作内部检验和试验项目	《钢质海船入级与建造规范》Pt.1Ch4
轮机循环检验	CMS (Continuous Machinery Surveys)	将特别检验项目均匀分配在 5 年内轮流检查，以替代特别检验时需作内部检验和试验项目	《钢质海船入级与建造规范》Pt.1Ch4
螺旋桨轴状态监控	SCM (Screwshaft Condition Monitoring)	对螺旋桨轴在用润滑油进行各种测试分析掌握轴承磨损状态，确定润滑油的劣化状态	《螺旋桨轴状况监控系统指南》
柴油机滑油状态监控	ECM	对柴油机零部件在用润滑油进行各种测试分析、掌握滑油分析结果及其他性能参数等情况，决定是否拆检	《柴油机滑油状态监控系统指南》
机械计划保养系统	PMS (Planned Maintenance System)	对船舶机械，根据 CCS 规范及制造厂的说明书规定，制订维修保养计划，并付之贯彻和实施	《船舶机械计划保养系统检验指南》

Special Equipment Notation **Table H**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
集装箱系固件	Equipped with Container Securing Arrangement	Provided with securing arrangements of containers	Ch.8, Pt.8 of the Rules
应急拖带装置	Emergency Towing Arrangements	Provided with emergency towing arrangements	Ch.3, Pt.2 of the Rules
装载仪 S	Loading Computer S	Capable of calculating and checking overall hull strength	Guidelines for Survey of Loading Computers
装载仪 I	Loading Computer I	Capable of calculating and checking intact stability	Guidelines for Survey of Loading Computers
装载仪 G	Loading Computer G	Capable of calculating and checking stability of grain in bulk	Guidelines for Survey of Loading Computers
装载仪 D	Loading Computer D	Capable of calculating and checking damage stability	Guidelines for Survey of Loading Computers
装载仪	Loading Computer S.I.D.G	Capable of calculating and checking overall hull strength, intact and damage stability and stability of grain in bulk	Guidelines for Survey of Loading Computers
单点系泊	Single Point Mooring	Mooring and transferring arrangements providing a connection between submarine pipelines and mooring ships (offshore floating units, oil tankers, etc.) and if necessary, transferring liquid cargo. Ships may be moored to such arrangements and moored ships can turn around the mooring poing under environmental loading	Appendix A of Rules for the Construction and Classification of Offshore Single Point Mooring Installations
惰性气体系统	Inert Gas Systems(IGS)	Using inert gas to keep atmosphere within cargo tanks from burning at any time	Pt.6 of the Rules
直升机甲板设施	Helicopter Facilities	Applicable to areas and structures for takeoff and landing of helicopters, and storage, fire protection and oil supply facilities for helicopters	Ch.9, Pt.8 of the Rules
Z 向推进系统	Z － Propulsion	Fitted with z-propulsion system	Standard(s) acceptable to the Society
侧推装置	Thruster	Fitted with thrusters	Standard(s) acceptable to the Society
电力推进系统	Electrical Propulsion System	Fitted with electrical propulsion system	Ch.2, Pt.4 of the Rules
可调螺旋桨	Controllable Pitch Propeller	Fitted with controllable pitch propeller	Standard(s) acceptable to the Society
液化石油气为燃料	LPG Fuel System	Using liquefied petroleum gas as fuel	Standard(s) acceptable to the Society
喷水推进装置	Water Jet Units	Fitted with water jet units	Standard(s) acceptable to the Society
非机动推进	Non-propulsion	No propulsion	Ch.12, Pt.2 of the Rules
自卸货系统	Cargo Handling by Conveyer System	Fitted with belt-driving conveyors for cargo handling	Standard(s) acceptable to the Society
蒸汽控制系统	VCS(Vapour Control System)	Fitted with systems for control of vapour emission from tanks in compliance with the Rules (excluding requirements forVCS-T)	Ch.12, Pt.8 of the Rules
蒸汽控制系统	VCS-T (Vapour Control System-Transfer)	Fitted with systems for control of vapour emission from tanks in compliance with the Rules	Ch.12, Pt.8 of the Rules
在 ×× 舱内载运冷藏集装箱。AC －风冷式冷藏集装箱；f －制冷装置的同时使用系数；WC －水冷式冷藏集装箱。	Carriage of refrigerated containers in ×× hold(s), AC f/WC。	Fitted with cargo holds for carrying refrigerated containers	Ch.10, Pt.8 of the Rules

特殊设备附加标志（Special equipment notation）　　表 H

附加标志		说明	满足规范、指南、标准的特殊要求
中　文	英　文		
集装箱系固件	Equipped with Container Securing Arrangement	配备了集装箱系固装置	《钢质海船入级与建造规范》Pt.8 Ch8
应急拖带装置	Emergency Towing Arrangements	配备了应急拖带装置	《钢质海船入级与建造规范》Pt.2 Ch3
装载仪 S	Loading Computer S	具有船体总强度计算和校核的功能	《装载仪检验指南》
装载仪 I	Loading Computer I	具有完整稳性计算和校核的功能	《装载仪检验指南》
装载仪 G	Loading Computer G	具有散装谷物稳性计算和校核的功能	《装载仪检验指南》
装载仪 D	Loading Computer D	具有破损稳性计算和校核的功能	《装载仪检验指南》
装载仪	Loading Computer S.I.D.G	具有船体总强度、完整稳性、破损稳性、散装谷物稳性计算和校核的功能	《装载仪检验指南》
单点系泊	Single Point Mooring	系泊和转运装置，在海底管道和系泊船舶 (海上浮式装置、油船等) 间提供一种联系，需要时可供输送流体货物用，船舶可系固在上面，且在环境载荷作用下，所系船舶能绕系泊点转动。	《海上单点系泊装置入级与建造规范》附录 A
惰性气体系统	Inert Gas Systems(IGS)	使用惰性气体，保持货油舱内的大气在任何时候不能燃烧	《钢质海船入级与建造规范》Pt.6
直升机甲板设施	Helicopter Facilities	适用于具有直升机起降场地、结构、储存、消防、供油等设施	《钢质海船入级与建造规范》Pt.8 Ch9
Z 向推进系统	Z － Propulsion	装有 Z 向推进系统	符合本社接受的标准
侧推装置	Thruster	装有侧推进装置	符合本社接受的标准
电力推进系统	Electrical Propulsion System	装有电力推进系统	《钢质海船入级与建造规范》Pt.4 Ch2
可调螺旋桨	Controllable Pitch Propeller	螺旋桨为可调桨	符合本社接受的标准
液化石油气为燃料	LPG Fuel System	以液化石油气为燃料	符合本社接受的标准
喷水推进装置	Water Jet Units	装有喷水推进装置	符合本社接受的标准
非机动推进	Non-propulsion	无推进设备	《钢质海船入级与建造规范》Pt.2 Ch12
自卸货系统	Cargo Handling by Conveyer System	散货船装备有皮带传送设备，能自卸货物	符合本社接受的标准
蒸汽控制系统	VCS(Vapour Control System)	装备符合规范要求 (除 VCS-T 附加要求外) 的液货舱货物蒸汽控制系统	《钢质海船入级与建造规范》Pt.8 Ch12
蒸汽控制系统	VCS-T (Vapour Control System-Transfer)	装备符合有关规范要求的液货舱货物蒸汽控制系统	《钢质海船入级与建造规范》Pt.8 Ch12
在 ×× 舱内载运冷藏集装箱。AC －风冷式冷藏集装箱；f －制冷装置的同时使用系数；WC －水冷式冷藏集装箱。	Carriage of refrigerated containers in ×× hold(s), AC f/WC。	具有舱内载运冷藏集装箱的货舱	钢质海船入级与建造规范》Pt.8 Ch10

Machinery Notation **Table I**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
机舱自动化－无人值班	AUT-0 (Automation-0)	Main propulsion machinery remotely controlled from BCS, machinery space including CCS periodically unattended	Ch.3, Pt.7 of the Rules
机器处所集中控制	MCC (Machinery Centralized Control)	CCS constantly attended by watch-keepers	Ch.4, Pt.7 of the Rules
驾驶室遥控	BRC (Bridge Remote Control)	Main propulsion machinery remotely controlled from BCS	Ch.4, Pt.7 of the Rules
动力定位系统	Dynamic Position System	Position of ships automatically kept in specified operating fields by dynamic positioning systems	Guidelines on Surveys for Dynamic Positioning System
一人驾驶	One Man Bridge Operated Ship	One man operating a ship at bridge	Ch.6, Pt.8 of the Rules

Evironmental Protection Notation **Table J**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
洁净	Clean	Environmental protection	MARPOL, ISM to be complied with, plans for management of ballast water, fuel oil and garbage available. Oil tankers to be of double hull
船舶压载水管理计划	Ballast Water Management Plan	Protection of water areas	Standard(s) acceptable to the Society

Refrigerated Cargo Installation Notation **Table K**

Class notation		Description	Special requirements of rules, guidelines and standards
Chinese	English		
×× 货舱－ ××℃，海水最高温度 ××℃	××holds-××℃ with sea temperature ××℃ max	Minimum temperature(s) to be maintained by the installation with maximum sea water temperature stated	Pt.5 of the Rules
制冷空气温度－×××℃供应 ××× 只有证绝热集装箱，集装箱的平均热传导为 ××W/℃，海水最高温度为 ××℃	Refrigerating air at -×××℃ is supplied to ××× certified insulated containers with an average thermal transmittance per container of ×× W/℃ and with sea water temperature ××℃ max	For refrigerated cargo installations aboard container ships with refrigerating plant and arrangements to supply refrigerated air ducting to insulated containers, the notation assigned will additionally specify maximum number and characteristics of the containers	Pt.5 of the Rules
气体再液化	LG	Reliquefaction and refrigeration equipment aboard liquefied gas carriers	Pt.5 of the Rules
水果保鲜	CF	Refrigerated installations for cargo fruits	Pt.5 of the Rules
速冻	Quick Freezing	Refrigerated cargo installations having a quick-freezing capability for fishing vessels	Pt.5 of the Rules

SMS Certification Notation **Table L**

Class notation		Description	Requirements of rules or provisions
Chinese	English		
船舶安全管理体系	ISM (International Safety Management)	Ships under a company implementing safety management system and holding ISM certificate	Rules for Certification of Safety Management System for Safe Operation of Ships and Pollution Prevention
国内船舶安全管理体系	NSM (National Safety Management)	Ships under a company implementing safety management system and holding NSM certificate	Relevant requirements of flag State Administration

自动控制附加标志（Machinery notation） 表 I

附加标志		说明	满足规范、指南、标准的特殊要求
中文	英文		
机舱自动化 - 无人值班	AUT-0 (Automation-0)	推进装置由驾驶室控制站遥控，机器处所包括机舱集控站（室）周期性无人值班	《钢质海船入级与建造规范》Pt.7Ch3
机器处所集中控制	MCC (Machinery Centralized Control)	机舱集控站（室）有人值班对机电设备进行监控	《钢质海船入级与建造规范》Pt.7Ch4
驾驶室遥控	BRC (Bridge Remote Control)	推进装置由驾驶室控制站控制	《钢质海船入级与建造规范》Pt.7Ch4
动力定位系统	Dynamic Position System	依靠自动控制的动力定位系统，使船保持所需位置以进行作业	《动力定位系统检验指南》
一人驾驶	OMBO(One Man Bridge Operated Ship)	仅 1 人在桥楼操纵船舶	《钢质海船入级与建造规范》Pt.8 Ch6

环境保护附加标志（Evironmental protection notation） 表 J

附加标志		说明	满足规范、指南、标准的特殊要求
中文	英文		
洁净	Clean	环境保护	满足 MARPOL、ISM 并具备压载水排放、燃油和垃圾的管理计划。如为油船，需为双壳
船舶压载水管理计划	Ballast Water Management Plan	水域保护	CCS 接受的标准

货物冷藏装置附加标志（Refrigerated cargo installation notation） 表 K

附加标志		说明	满足规范、指南、标准的特殊要求
中文	英文		
×× 货舱－ ××℃，海水最高温度 ××℃	××holds-××℃ with sea temperature ××℃ max	冷藏装置在海水最高温度下能维持的最低温度或其范围	《钢质海船入级与建造规范》Pt.5
制冷空气温度 - ××℃供应 ××× 只有证绝热集装箱，集装箱的平均热传导为 ××W/℃，海水最高温度为 ××℃	Refrigerating air at -××℃ is supplied to ××× certified insulated containers with an average thermal transmittance per container of ×× W/℃ and with sea water temperature ××℃ max	集装箱船上的冷藏装置以管道向保温集装箱供应制冷空气，对货物进行冷藏，加注保温集装箱的数量及其保温特性	《钢质海船入级与建造规范》Pt.5
气体再液化	LG	液化气体运输船的再液化或制冷设备	《钢质海船入级与建造规范》Pt.5
水果保鲜	CF	载运水果货物的冷藏装置	《钢质海船入级与建造规范》Pt.5
速冻	Quick Freezing	渔船的具有速冻能力的制冷装置。	《钢质海船入级与建造规范》Pt.5

安全管理体系认证附加标志 表 L

附加标志		说明	满足规范或规定
中文	英文		
船舶安全管理体系	ISM(International Safety Management)	船公司实行安全管理体系且取得国际船舶安全管理证书的船舶	《船舶安全管理体系认证规范》
国内船舶安全管理体系	NSM(National Safety Management)	船公司实行安全管理体系且取得国内船舶安全管理证书的船舶	船旗国主管机关有关规定

PART TWO HULL

CHAPTER 1 GENERAL PROVISIONS

Section 2 HULL STRUCTURAL MEMBERS

The existing paragraph 1.2.1.1 is replaced by the following:

"1.2.1.1 Except where otherwise stated, the Rule section modulus or moment of inertia in this PART is the minimum required value of the section in association with attached plating, and the attached plating is assumed as being normal to the web. When the attached plating is not normal to the web and the angle between them is less than 75°, the sectional characteristics (moment of inertia, section modulus and shear area) are to be calculated in respect to the axis parallel to the attached plating. When a structural member is of rolled section(s), its actual section modulus may be approximately determined by the following formula:

$$W = W'\sin\alpha \qquad \text{cm}^3$$

where: W' —— actual section modulus with the attached plating assumed as being normal to the web, in cm^3;

α —— angel between web and attached plating, in degrees."

The existing paragraph 1.2.1.5 is replaced by the following:

"1.2.1.5 As commercialized marine plates and rolled sections are not produced in sequential size series and for the purpose of providing an economic and reasonable structural requirement without compromising structural strength, the rounding tolerance for selecting steel plates according to the sizes of structural members as required in this PART are to be based on the following principles:

(1) Where the decimal part of the calculated plate thickness in this PART is 0.25 mm or less, it may be neglected; where it is greater than 0.25 mm but less than 0.75 mm, it is to be taken as 0.5 mm; where it is 0.75 mm or more, a round number of 1 mm is to be taken;

(2) For a structural member made of rolled section(s), its section modulus with the effective attached plate being taken into account, may be 3% less than the value required in this PART;

(3) When same sizes are taken during construction for a group of members of a same type made of rolled sections adjacent to each other in the same area, their respective section moduli with their effective attached plates being taken into account, are not to be less than the mean value of the values respectively required in this PART for individual members of the group. However, this mean value is not to be less than 95% of the greatest value required in this PART for an individual member of the group;

(4) The above principles (2) and (3) are not to be applied together."

The existing paragraph 1.2.4.2 is replaced by the following:

"1.2.4.2 Where the thickness of both face plate and attached plate of T sections is not greater than 1/10 of web depth, section modulus W and moment of inertia I for T sections with attached plating (see Fig. 1.2.4.2) are to be calculated by the following formulae:

$$W = \frac{d_W}{10}\left[a + \frac{f_s}{6}\left(1 + \frac{2(A-a)}{2A+f_s}\right)\right] \qquad \text{cm}^3$$

$$I = \frac{d_W^2}{100}\left[\frac{1}{3}f_s + \frac{Aa - 0.25f_s^2}{A+a+f_s}\right] \qquad \text{cm}^4$$

where: a —— sectional area of face plate, in cm^2;

A —— sectional area of attached platin, in cm^2; where $A < a$, it is taken as $A = a$;

f_s —— sectional area of web plate, in cm^2;

d_w —— depth of web, in mm.

第 2 篇　船　体

第 1 章　通则

第 2 节　船体构件

1.2.1.1 改为：

“1.2.1.1　除另有规定外，本篇内所要求的构件剖面模数和惯性矩均为连同带板的最小要求值，且假定带板是与构件的腹板相垂直的。当构件的腹板与带板不垂直，且其腹板与带板的夹角小于 75° 时，其剖面特征（惯性矩、剖面模数和剪切面积）应相对于与带板平行的轴进行计算。当构件为轧制型材时，其实际剖面模数可按下式近似地确定：

$$W = W'\sin\alpha \qquad \text{cm}^3$$

式中：W' —— 假定构件的腹板垂直于带板时的构件实际剖面模数，cm^3；
α —— 构件的腹板与带板之间的夹角，(°)。”

1.2.1.5 改为：

“1.2.1.5　考虑到商品化的船用板材、轧制型材是尺寸不连续的产品系列，为了在保证结构强度的前提下提供一个经济、合理的结构要求，在根据本篇所要求的构件尺寸选取钢材产品时，其舍入容差按下述原则确定：

（1）　规范要求的板材厚度，如小数小于或等于 0.25mm 可予不计；大于 0.25mm 且小于 0.75mm 时，应取为 0.5mm；大于或等于 0.75mm 时，应进为 1.0mm；

（2）　对于采用轧制型材的构件，其包括有效带板的剖面模数可比规范要求的值小 3%；

（3）　对于同一区域、位置相邻的一组采用轧制型材的同类构件，当在建造时选用相同尺寸时，其包括有效带板的剖面模数应不小于该组各单独构件规范要求值的平均值，但这一平均值应不小于该组中单个构件最大规范要求值的 95%；

（4）　上述（2）、（3）两原则不可同时使用。”

1.2.4.2 改为：

“1.2.4.2　如果 T 型材的面板和带板的厚度不大于 1/10 的腹板高度，T 型材连同带板的剖面模数 W 和惯性矩 I（见图 1.2.4.2）可按下列各式计算：

$$W = \frac{d_W}{10}\left[a + \frac{f_s}{6}\left(1 + \frac{2(A-a)}{2A+f_s}\right)\right] \qquad \text{cm}^3$$

$$I = \frac{d_W^2}{100}\left[\frac{1}{3}f_s + \frac{Aa - 0.25f_s^2}{A+a+f_s}\right] \qquad \text{cm}^4$$

式中：a —— 面板剖面积，cm^2；
A —— 带板剖面积，cm^2；如果带板 A 小于面板 a 时，取 A 等于 a；
f_s —— 腹板剖面积，cm^2；
d_w —— 腹板高度，mm。

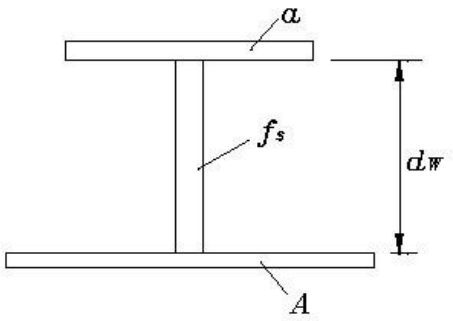


Figure 1.2.4.2"

Section 3 STEEL FOR HULL STRUCTURES

The existing paragraph 1.3.6.1 is replaced by the following:

"1.3.6.1 The use of aluminium alloy is permitted for superstructures, deckhouses, hatch covers and other simililar structures based on equivalent strength instead of marine structural steel as required in the Rules."

Section 4 WELD DESIGN FOR HULL STRUCTURES

In subparagraph 1.4.4.2(1):

The sentence "Where an approved automatic deep penetration procedure is used, w_τ may be 85% of the value given in the table." in the eighth line is replaced by "Where an approved automatic single-weld deep penetration procedure is used, w_τ may be 85% of the value given in the table."

Section 7A STRENGTH REQUIREMENTS FOR FORE DECK FITTINGS AND EQUIPMENT

The existing paragraph 1.7A.1.1 is replaced by the following:

"1.7A.1.1 This Section provides strength requirements for the following items located within the forward quarter length of ships engaged on international voyages: air pipes, ventilator pipes and their closing devices, the securing of windlasses. However, these requirements do not apply to the cargo tank venting systems and the inert gas systems of oil tankers."

Section 8 SIDE SHELL AND STERN DOORS, SIDE SCUTTLES AND WINDOWS

The existing paragraph 1.8.1.1 is replaced by the following:

"1.8.1.1 The requirements in 1.8.1 ～ 1.8.7 of this Section apply to ro-ro ships. The side shell and stern doors of this Section cover the cargo and service doors in the ship side abaft the collision bulkhead and stern area leading to enclosed spaces."

Paragraph 1.8.1.6:

The title is replaced by "Securing device, supporting device, locking device, ro-ro passenger ship, ro-ro spaces and special category spaces".

The following new subparagraphs are added:

"(4) Ro-ro passenger ship is a passenger ship with ro-ro spaces or special category spaces.

(5) Ro-ro spaces: are spaces not normally sub-divided in any way and extending to either a substantial length or the entire length of the ship, in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or, other receptacles) can be loaded and unloaded normally in a horizontal direction.

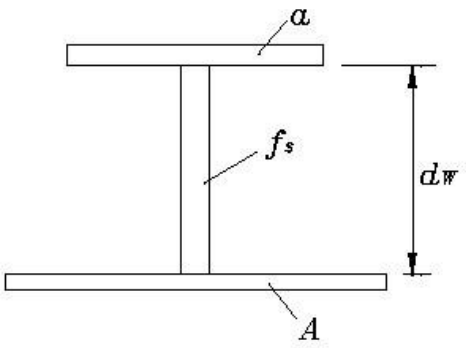


图 1.2.4.2”

第 3 节　船体结构用钢

1.3.6.1 改为：

“1.3.6.1　钢质船上的上层建筑、甲板室和舱口盖等类似结构，允许使用铝合金材料等效代替本规范要求的船体结构钢。”

第 4 节　船体结构的焊缝设计

1.4.4.2(1) 的第 8 行中：“……。当采用认可的自动深熔焊工艺时，w_τ 可取为表值的 85%。……”改为：“……。当采用认可的单道自动深熔焊工艺时，w_τ 可取为表值的 85%。……”

第 7A 节　船首甲板装置与设备的强度要求

1.7A.1.1 改为：

“1.7A.1.1 本节是对国际航行船舶位于距船首 0.25L 区域内的空气管、通风管及其关闭装置、锚机固定的强度要求，但不适用于油船的货油舱透气系统与惰性气体系统。”

第 8 节　舷门、尾门、舷窗和窗

1.8.1.1 改为：

“1.8.1.1 本节中 1.8.1 ～ 1.8.7 的要求适用于滚装船。本节的舷门和尾门是指布置在防撞舱壁后的舷侧和尾部区域通向封闭处所的装货门和日常出入门。”

1.8.1.6 标题改为“紧固、支持和锁紧装置、客滚船、滚装处所和特种处所”并新增：

(4)　客滚船：指具有滚装处所或特种处所的客船。

(5)　滚装处所：指非正常分隔的并延伸至船舶大部分长度或整个长度的处所，该处所能以水平方向正常装卸油箱内备有自用燃油的机动车或者货物（包装或散装、用于公路或铁路装载的有车厢和无车厢车辆，包括公路或铁路油槽车、拖车、集装箱、货盘、可拆箱柜、类似装载装置或其他容器）。

(6) Special category spaces are those enclosed vehicle spaces above or below the bulkhead deck, into and from which vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.”

The existing paragraph 1.8.4.9 is replaced by the following:

“1.8.4.9 Scantlings of the primary members are generally to be supported by direct strength calculations in association with the design forces given in 1.8.3.1 and permissible stresses given in 1.8.2.1. Normally, formulae for simple beam theory may be applied to determine the bending stresses. Members are to be considered to have simply supported end connections.”

The existing paragraph 1.8.5.6 is replaced by the following:

“1.8.5.6 All load transmitting elements in the design load path, from the door through securing and supporting devices into the ship’s structure, including welded connections, are to be to the same strength standard as required for the securing and supporting devices. These elements include pins, support brackets and back-up brackets.”

The existing paragraph 1.8.6.4 is replaced by the following:

“1.8.6.4 For the indicating/monitoring system for doors, see relevant requirements in Section 9, Chapter 2 of PART FOUR.”

The existing paragraphs 1.8.6.5 to 1.8.6.8 are deleted.

The existing paragraph1.8.7.1 is replaced by the following:

“1.8.7.1 An Operating and Maintenance Manual for the side shell and stern doors is to be provided on board and is to contain necessary information on:

(1) main particulars and design drawings;
special safety precautions;
details of vessel, class and statutory certificates;
equipment and design loading (for ramps);
key plan of equipment (doors and ramps);
manufacturer’s recommended testing for equipment;
description of equipment: bow doors, inner bow doors, bow ramp/doors, side doors, stern doors, central power pack, bridge panel, engine control room panel.

(2) service conditions;
limiting heel and trim of ship for loading/unloading;
limiting heel and trim for door operations;
doors/ramps operating instructions;
doors/ramps emergency operating instructions.

(3) maintenance;
schedule and extent of maintenance;
trouble shooting and acceptable clearances;
maufacturer’s maintenance procedures.

(4) register of inspections and repairs, including inspection of locking, securing and supporting devices, repairs and renewals.

This Manual is to be submitted to the Society for approval that the above mentioned items are contained in the OMM and that the maintenance part includes the necessary information with regard to inspections, troubleshooting and acceptance/rejection criteria. ① ”

① It is recommended that inspections of the door supporting and securing devices be carried out by the ship’s staff at monthly intervals or following incidents that could result in damage, including heavy weather or contact in the region of side shell and stern doors, and recorded by the master. Any damage recorded during such inspections is to be reported to the Society.

(6)　特种处所：指在舱壁甲板以上或以下能让车辆驾驶进出，并有乘客可以进入通道的围蔽处所，此处所可包括多层甲板，容纳净高不超过 10m 的机动车辆。

1.8.4.9 改为：

“1.8.4.9　主要构件的尺寸应按本节 1.8.3.1 规定的设计力和 1.8.2.1 规定的许用应力标准，用直接计算确定。通常可用两端简支的单跨梁计算弯曲应力。”

1.8.5.6 改为：

“1.8.5.6　在设计载荷轨迹中所有传力部件，从门通过紧固和支持装置至船体结构，包括焊接，其强度标准应与紧固和支持装置的要求相同。传力部件应包括销子和肘板。”

1.8.6.4 改为：

“1.8.6.4　门的指示 / 监控系统见第 4 篇第 2 章第 9 节的有关规定。”

删除 1.8.6.5 ～ 1.8.6.8。

1.8.7.1 改为：

“1.8.7.1　船上应备有舷门和尾门的操作和维护手册。操作和维护手册应包含下列必要的资料：

(1)　主要数据和设计图纸；
特殊安全防范措施；
船舶详细资料、船级和法定证书；
跳板设备和设计载荷；
门和跳板的设备平面图；
制造商建议的设备试验；
设备描述：首门、内门、首跳板 / 门、舷门、尾门、中央电源单元；驾驶室控制屏，机舱控制室控制屏。

(2)　使用条件；
船舶装 / 卸载时的横倾与纵倾限制；
操作门时的横倾与纵倾限制；
门 / 跳板操作指示；
门 / 跳板应急操作指示。

(3)　维护和功能试验；
维护范围与维护计划；
故障解答和可接受的偏差；
制造商维护程序。

(4)　检验和修理记录，包括锁门装置、锁紧装置和支承装置的检验、维修和换新。

该手册应提交本社审批，确保上述资料包含在操作和维护手册中，并且维护部分包括维修所需要的信息和故障解答。①”

① 建议门支承装置和锁紧装置的维护手册由船长每月记录一次，包括可能导致损坏的事件（恶劣海况、舷侧或尾门的触碰）。上述损坏记录应报告本社。

A new Section 9 is added as follows:

"Section 9 ARRANGEMENT OF MEANS OF ACCESS FOR INSPECTIONS

1.9.1 General requirements

1.9.1.1 This section applies to oil tankers of 500 gross tonnage and over and bulk carriers of 20,000 gross tonnage and over, engaged on international voyages,constructed on or after 1 January 2005.

1.9.1.2 Access to and within spaces in, and forward of, the cargo area of oil tankers and bulk carriers is to be in compliance with Regulation II-1/3-6 of the International Convention for the Safety of Life at Sea, 1974, as amended, and appropriate technical provisions for means of access for inspections.

1.9.2 Safe access for cargo holds, cargo tanks, ballast tanks and other spaces

1.9.2.1 Safe access ① to cargo holds, cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area are to be direct from the open deck and such as to ensure their complete inspection. Safe access to double bottom spaces or fore ballast tank may be from a pump-room, deep cofferdam, pipe tunnel, cargo hold, double hull space or similar compartment not intended for the carriage of oil or hazardous cargoes.

1.9.2.2 Tanks, and subdivisions of tanks, having a length of 35 m or more, are to be fitted with at least two access hatchways and ladders, as far apart as practicable. Tanks less than 35 m in length are to be served by at least one access hatchway and ladder. When a tank is subdivided by one or more swash bulkheads or similar obstructions which do not allow ready means of access to the other parts of the tank, at least two hatchways and ladders are to be fitted.

1.9.2.3 Each cargo hold is to be provided with at least two means of access as far apart as practicable, In general, these accesses should be arranged diagonally, for example one access near the forward bulkhead on the port side, the other one near the aft bulkhead on the starboard side.

1.9.3 General technical specifications

1.9.3.1 For access through horizontal openings, hatches or manholes, the dimensions are to be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening is not to be less than 600 mm × 600 mm. When access to a cargo hold is arranged through the cargo hatch, the top of the ladder is to be placed as close as possible to the hatch coaming. Access hatch coamings having a height greater than 900 mm are also to have steps on the outside in conjunction with the ladder.

1.9.3.2 For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening is to be not less than 600 mm × 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other foot holds are provided.

1.9.3.3 For oil tankers of less than 5,000 tonnes deadweight, the Administration may approve, in special circumstances, smaller dimensions for the openings referred to in paragraphs 1.9.3.1 and 1.9.3.2, if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Administration."

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① Refer to the Recommendations for entering enclosed spaces aboard ships, adopted by IMO by resolution A.864(20).

新增：

“第 9 节 检查通道布置

1.9.1 一般要求

1.9.1.1 本节适用于 2005 年 1 月 1 日或以后建造的国际航行 500 总吨及以上的油船和 20000 总吨及以上的散货船。

1.9.1.2 进入油船和散货船装货区域及其前方处所的出入通道及内部通道应符合《1974 年国际海上人命安全公约》第 II-1/3-6 条规定及相应的检查通道技术规定。

1.9.2 货舱、液货舱、压载舱和其他处所的安全通道

1.9.2.1 为确保全面的检查，应直接从开敞甲板安全进入[①]货舱、隔离空舱、压载水舱、液货舱和货物区域的其他处所。可从泵舱、深隔离空舱、管隧、货舱、双壳处所或不装油或危险货物的类似处所安全进入双层底或首压载舱。

1.9.2.2 长度为 35m 或以上的液货舱或液货舱的分舱，应至少设置 2 个出入舱口和梯子，并根据实际情况尽可能远离。长度小于 35m 的液货舱应至少设置 1 个出入舱口和梯子。当 1 个液货舱被 1 道或多道制荡舱壁或类似的阻隔所分开，导致不易于从舱的一端到另一端的通道，则至少应设置 2 个出入舱口和梯子。

1.9.2.3 每个货舱应至少设置 2 个尽可能远的出入通道。通常出入通道应对角线布置，即 1 个出入通道布置在左舷靠近货舱前端舱壁处，另 1 个出入通道布置在右舷靠近货舱后端舱壁处。

1.9.3 一般技术规定

1.9.3.1 通过水平开口、舱口或人孔的通道尺寸应足以保证穿戴自储式呼吸装置和保护设备的人员上下梯子不受阻碍，而且净孔尺寸应便于将负伤人员从舱底提升上来。最小的净孔尺寸应不小于 600mm×600mm。如通过货舱口进入货舱，梯子的顶部应尽可能靠近舱口围板；如舱口围板的高度超过 900mm，则在梯子同一位置的舱口围板外侧应设置踏板。

1.9.3.2 如通过制荡舱壁、肋板、纵桁和强肋骨上的垂向开口和人孔到达该处所长度或宽度范围，这些开孔的最小尺寸应不小于 600mm×800mm，除非设有格栅或踏板，否则这些开孔应位于从船底板量起不超过 600mm 的高度处。

1.9.3.3 对于载重量小于 5000 吨的油船，在特殊情况下，如主管机关对这些开口的通行和转移伤员的能力感到满意，可允许设置尺寸小于上述 1.9.3.1 和 1.9.3.2 要求的开口。”

① 参考 IMO A.864(20) 决议通过的“进入船上围蔽处所的建议案”。

CHAPTER 2 HULL STRUCTURES

Section 3 SHELL PLATING

The existing paragraph 2.3.3.2 is replaced by the following:

"2.3.3.2 Where both the bottom and side shell are framed longitudinally and the bilge longitudinals are omitted, and where transverse strength members or corresponding bilge brackets are fitted in accordance with the provisions of 2.6.15.5 of this Chapter, the thickness of the bilge strake is neither to be less than $\frac{rF_b}{165K}$ (r being the radius of bilge, in mm, K being conversion factor of material and F_b being reduction factor of bottom), nor to be less than that of the adjacent bottom plating."

The existing paragraph 2.3.5.1 is replaced by the following:

"2.3.5.1 The width of the sheer strake is not to be less than:

$$b = 800 + 5L \quad \text{mm, but not greater than 1800 mm}$$

where: L —— length of ship, in m."

Section 6 DOUBLE BOTTOMS

The existing paragraph 2.6.2.1 is replaced by the following:

"2.6.2.1 Centre girders are to be provided in way of the central longitudinal section of the ship. The depth h_o of centre girders is not to be less than:

$$h_0 = 25B + 42d + 300 \quad \text{mm, nor less than 650 mm}$$

where: B —— breadth of ship, in m;

d —— draught, in m.

For double hull ships (with double bottom and double side skin), the distance B_e from midpoint between outer and inner shells at one side to that at the other side may be taken as equivalent breadth in lieu of the breadth B of ship (see Figure 2.6.2.1). B_e is not to be less than $0.9B$, and if the double bottom strength is in compliance with the Society's criteria for direct strength calculations, not to be less than $0.8B$.

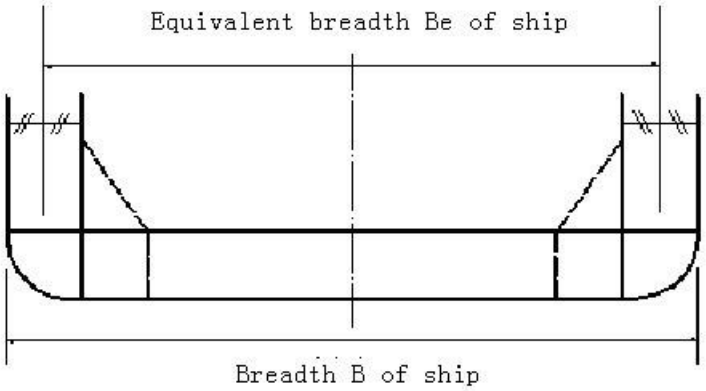


Figure 2.6.2.1"

第 2 章　船体结构

第 3 节　外板

2.3.3.2 改为：

“2.3.3.2　当船底和舷侧均为纵骨架式，而舭部不设纵骨，横向强力构件或相当舭肘板的设置符合本章 2.6.15.5 的要求时，舭列板的厚度应不小于 $\frac{rF_b}{165K}$（r 为舭部半径，mm，K 为材料换算系数，F_b 为船底折减系数），且应不小于相邻船底板的厚度。”

2.3.5.1 改为：

“2.3.5.1　舷顶列板的宽度应不小于：

$$b = 800 + 5L \quad \text{mm，但也不必大于 1800 mm}$$

式中：L —— 船长，m。”

第 6 节　双层底

2.6.2.1 改为：

“2.6.2.1　在船体中纵剖面处应设置中桁材。中桁材高度 h_0 应不小于：

$$h_0 = 25B + 42d + 300 \quad \text{mm，且不小于 650 mm}$$

式中：B —— 船宽，m；
d —— 吃水，m。

对于双壳结构的船舶（设有双层底和双舷侧结构），可用内外壳中点之间的距离 Be 作为等效船宽代替式中的船宽 B（见图 2.6.2.1）。B_e 的取值一般应不小于 $0.9B$，如双层底的强度符合本社的直接计算强度标准，B_e 的取值应不小于 $0.8B$。

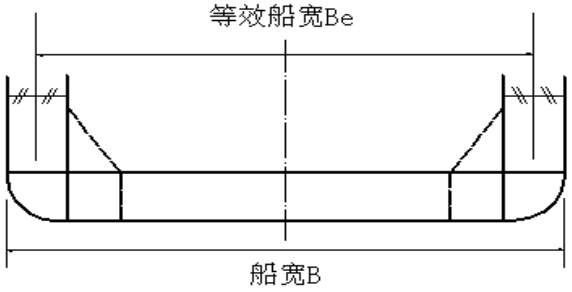


图　2.6.2.1”

Section 8 DECK FRAMING

The existing paragraph 2.8.1.1 is replaced by the following:

"2.8.1.1 The design heads of decks are to be determined according to Table 2.8.1.1. For decks in deep tanks, the relevant requirements in Section 13 of this Chapter are also to be complied with.

Design Heads of Decks **Table 2.8.1.1**

Name and location of deck	Design head h (m)	Design cargo load (kPa)
Weather decks (minimum sizes of structural members):		
Forward of 0.075L from F.P.	Primary members: $h_0 + 3$; Secondary members: $1.5\ h_0$	8.5
Between 0.075L and 0.15L from F.P.	Primary members: $h_0 + 2$; Secondary members: $1.25\ h_0$	8.5
Aft of 0.15L from F.P.	h_0	8.5
Weather decks (specified cargo load):		
Forward of 0.075L from F.P.	$0.49p + h_0 - 1.2$	p ($\geqslant$ 8.5)
Between 0.075L and 0.15L from F.P.	$0.37p + h_0 - 1.2$	p ($\geqslant$ 8.5)
Aft of 0.15L from F.P.	$0.14p + h_0 - 1.2$	p ($\geqslant$ 8.5)
Cargo decks not exposed to weather	0.14p, but not to be less than mean height H, in m, of 'tween decks	Max (p, 7.06H)
Accommodation decks	1.2	————
Decks for stores	2.0	————
Decks for E.R. platform, workshop and stores	2.6	————
Superstructure decks:		
1st tier	0.90, increased for exposed portion (h_0-1.2)	————
2nd tier	0.60, increased for exposed portion (h_0-1.2)	————
3rd tier and above	0.45, increased for exposed portion (h_0-1.2)	————
Forecastle deck forward of 0.2L from F.P.	Same as weather decks in corresponding locations	————

Notes: ① h_o in the Table is to be not less than that obtained from the following formula, but it is neither to be less than 1.2 m, nor greater than 1.5 m:

$$h_0 = 1.20 + \frac{2}{1000}\left(\frac{100 + 3L}{D - d} - 150\right) \quad \text{m}$$

where: L —— length of ship, in m;
D —— moulded depth, in m;
d —— draught, in m.

② For ships less than 90 m in length, the design head of primary members within the fore and aft ends of ships may be appropriately reduced, but not less than that of secondary members at the same location.

③ The superstructure deck is defined in 2.17.1.6 of this Chapter."

Section 14 STEMS, STERNFRAMES, BULBOUS BOW, PROPELLER SHAFT BRACKETS AND RUDDER HORNS

In paragraphs 2.14.3 and 2.14.3.1:

The words "rudder posts" are replaced by "propeller posts".

The existing paragraph 2.14.6.2 is deleted, and the existing paragraphs 2.14.6.3 and 2.14.6.4 are renumbered as 2.14.6.2 and 2.14.6.3.

The existing Section 17 is replaced by the following:

第 8 节　甲板骨架

2.8.1.1 改为：

“2.8.1.1　甲板的计算压头应符合表 2.8.1.1 的规定。对于深舱处的甲板还应满足本章第 13 节的相关要求。

甲板计算压头　　**表 2.8.1.1**

甲板名称及位置	计算压头 h(m)	设计货物载荷（kPa）
露天甲板（最小构件尺寸）：		
距首垂线 0.075L 以前	主要构件：h_0+3；次要构件：1.5 h_0	8.5
距首垂线 0.075L ～ 0.15L 之间	主要构件：h_0+2；次要构件：1.25 h_0	8.5
距首垂线 0.15L 以后	h_0	8.5
露天甲板（规定货物载荷）：		
距首垂线 0.075L 以前	0.49p+ h_0-1.2	p （≥8.5）
距首垂线 0.075L ～ 0.15L 之间	0.37p+ h_0-1.2	p （≥8.5）
距首垂线 0.15L 以后	0.14p+ h_0-1.2	p （≥8.5）
非露天货物甲板	0.14p，但不小于甲板间的平均高度 H	max（p,7.06H）
居住处所的甲板	1.2	————
仓库处所的甲板	2.0	————
机舱平台以及修理间和机舱物料间处所的甲板	2.6	————
上层建筑甲板：		
第 1 层	0.90，露天部分增加（h_0-1.2）	————
第 2 层	0.60，露天部分增加（h_0-1.2）	————
第 3 层及以上	0.45，露天部分增加（h_0-1.2）	————
距首垂线 0.2L 以前的首楼甲板	同相应位置的露天甲板	————

注：① 表中 h_0 应不小于按下式计算所得之值，但应不小于 1.2m，也不必大于 1.5m：

$$h_0 = 1.20 + \frac{2}{1000}\left(\frac{100+3L}{D-d} - 150\right) \quad \text{m}$$

式中：L —— 船长，m；

D —— 型深，m；

d —— 吃水，m。

② 对于船长小于 90m 的船舶，可适当减小其首尾端区域的主要构件的计算压头，但应不小于相同位置的次要构件的计算压头。

③ 上层建筑甲板的定义见本章 2.17.1.6。”

第 14 节　首尾柱、球鼻首、尾轴架、挂舵臂

2.14.3 和 2.14.3.1 中的“舵柱”改为“推进器柱”。

2.14.6.2 删除，原 2.14.6.3 和 2.14.6.4 分别改为 2.14.6.2 和 2.14.6.3。

第 17 节改为：

"Section 17 SUPERSTRUCTURES AND DECKHOUSES

2.17.1 General requirements

2.17.1.1 All sea-going ships are to be provided with forecastles or increased sheer to such a minimum bow height as to meet the requirements of their respective flag Administrations. The forecastles of bulk carriers, ore cariers and combination carriers engaged on international voyages are to be also in compliance with Section 14, Chapter 8 of this PART.

2.17.1.2 Where superstructures and deckhouses are subject to loading in excess of that as specified in this Section, the scantlings of their structural members are to be appropriately increased in addition to complying with the requirements of this Section.

2.17.1.3 Where long superstructures are provided within 0.5*L* midships, the deck structure of the 1st tier is to comply with the requirements for strength decks and side shell is to comply with the requirements for shell plating.

2.17.1.4 Where long deckhouses are provided within 0.5*L* midships, the thickness of plating and the size of framing of the 1st tier is to be increased according to the contribution of these deckhouses to the longitudinal bending of hull girders.

2.17.1.5 The requirements in this Section for boundary bulkheads of deckhouses are not applicable to offshore supply ships. Such ships are to comply with Section 5, Chapter 11 of this PART in this respect.

2.17.1.6 Definitions of tiers of superstructures/deckhouses: The lowest, or first tier, is normally that tier which is directly situated on the uppermost continuous deck to which the rule moulded depth *D* is to be measured. The second tier is the next tier above the lowest tier and so on.

2.17.1.7 The deck plating of No. N tier of superstructure/deckhouse is the top plating of this tier of superstructure/deckhouse.

2.17.1.8 Where the freeboard corresponding to or exceeding the uncorrected tabular values of the International Convention on Load Lines, 1966 can be obtained for a ship with excessive freeboard, i.e. by considering the ship to have a virtual moulded depth *D'* at least one standard superstructure height less than the Rule depth *D* (see Figure 2.17.1.8), the 1st tier erection may be treated as a 2nd tier, and the 2nd tier as the 3rd tier when applying the requirements of this Section. According to Regulation 33 of the International Convention on Load Lines, 1966, the standard superstructure height is to be obtained as follows:

$$h_S = 1.05 + 0.01L \quad \text{m, and } 1.8 \leqslant h_S \leqslant 2.3$$

where: *L* —— length of ship as defined in Regulation 3 of the International Convention on Load Lines, 1966, in m.

However, this does not apply to type B ships with reduced freeboard.

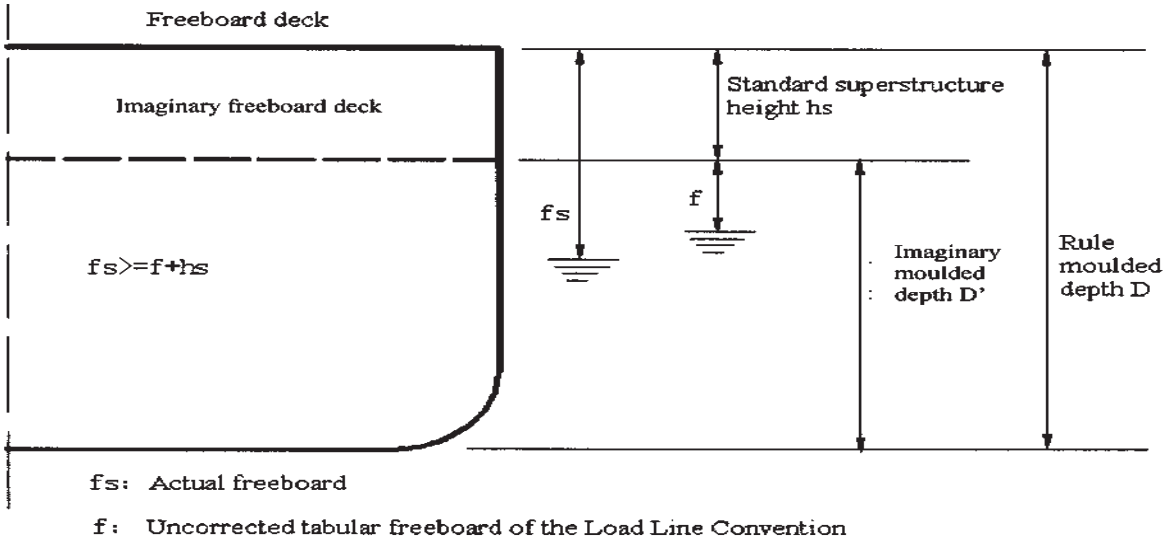


Figure 2.17.1.8

“第 17 节　上层建筑及甲板室

2.17.1　一般要求

2.17.1.1　所有船舶应设置首楼或增大舷弧，使船首最小高度符合船旗国主管机关的要求。对于国际航行的散装货船、矿砂船和兼用船，其首楼的设置尚应满足本篇第 8 章第 14 节的要求。

2.17.1.2　上层建筑和甲板室如承受本节规定以外的载荷时，除应符合本节要求外，尚应适当增大构件尺寸。

2.17.1.3　当在船中 0.5L 区域内设置长上层建筑时，第 1 层长上层建筑的甲板结构应满足强力甲板的要求，舷侧外板应满足船体外板的要求。

2.17.1.4　当在船中 0.5L 区域内设置长甲板室时，根据长甲板室参与船体梁总纵弯曲的程度，第 1 层长甲板室的甲板板厚度和骨架尺寸应增大。

2.17.1.5　本节有关甲板室围壁结构的规定不适用于近海供应船首楼甲板上的甲板室，而应符合本篇第 11 章第 5 节的要求。

2.17.1.6　上层建筑 / 甲板室各层的定义： 最低层或第 1 层通常系指直接位于计量规范型深 D 时所量到最上层连续甲板上的上层建筑 / 甲板室 。第 2 层指位于最低层之上的那一层，依次类推。

2.17.1.7　第 N 层上层建筑 / 甲板室的甲板是指该层上层建筑 / 甲板室的顶甲板。

2.17.1.8　对于具有特大干舷的船舶，即假定船舶有一个比规范型深 D 低一个标准上层建筑高度的虚拟型深 D' ，也能达到或超过《1966 年国际载重线公约》规定的未经修正的表列干舷值时（见图 2.17.1.8），则在应用本节的要求时，可将第 1 层作为第 2 层处理，第 2 层作为第 3 层处理。根据《1966 年国际载重线公约》第 33 条，上层建筑的标准高度 h_S 应按下式计算：

$$h_S = 1.05 + 0.01L \quad \text{m，且 } 1.8 \leqslant h_S \leqslant 2.3$$

式中：L ——《1966 年国际载重线公约》第 3 条定义的船长，m。

但上述规定不适用于减小干舷的“B”型船舶。

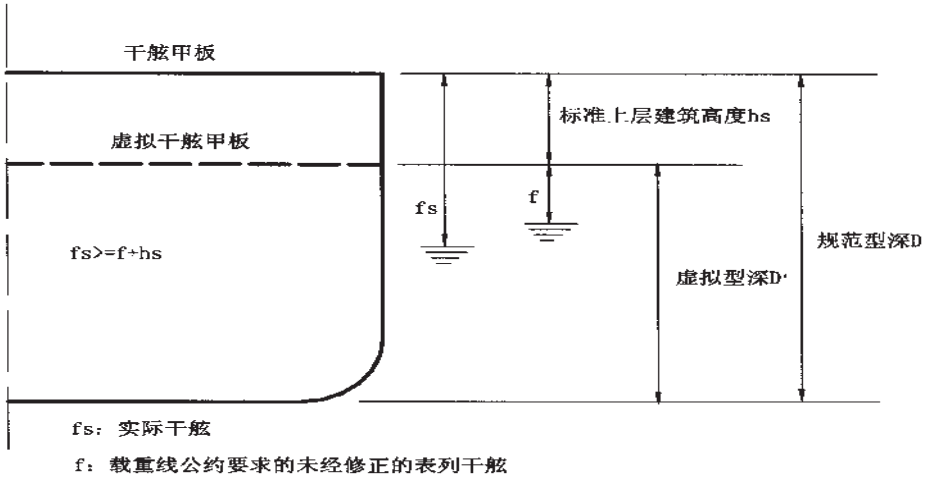


图 2.17.1.8

2.17.2 Design pressure head

2.17.2.1 The design pressure head h for end bulkheads of exposed superstructures and boundary bulkheads (end and side bulkheads) of deckhouse is to be obtained as follows and not less than the minimum value in Table 2.17.2.1:

$$h = \alpha\delta\,(\,\beta\lambda - \gamma\,) \quad \text{m}$$

where: α、 β 、λ and δ —— coefficients, to be determined respectively according to 2.17.2.2, 2.17.2.3, 2.17.2.4 and 2.17.2.5 of this Section;

γ —— vertical distance in metres from summer waterline to midpoint of stiffener span or of panel.

Table 2.17.2.1

Length of ship L (m)	Design pressure head h_{min} (m)	
	Lowest tier of unprotected fronts	Elsewhere
$L \leqslant 50$	3.0	1.5
$50 < L < 250$	$0.01L + 2.5$	$0.005\,L + 1.25$
$L \geqslant 250$	5.0	2.5

2.17.2.2 Coefficient α is to be determined as follows:

$\alpha = 0.0083L_1 + 2.0$, lowest tier of unprotected fronts

$\alpha = 0.0083\,L_1 + 1.0$, second tier of unprotected fronts

$\alpha = 0.0067\,L_1 + 0.5$, third tier of unprotected fronts and above, sides and protected fronts

$\alpha = 0.001\,L_1 - 0.8\,(X/L) + 0.7$, aft ends aft of amidships

$\alpha = 0.001\,L_1 - 0.4\,(X/L) + 0.5$, aft ends forward of amidships

where: L、L_1 —— length of ship, in m ; L_1need not be taken greater than 300m;

X —— distance in metres between bulkhead considered and AP When determining sides of a deckhouse, the deckhouse is to be subdivided into parts of approximately equal length, not exceeding $0.15L$ each and X is to be taken as the distance between AP and the centre of each part considered.

2.17.2.3 Coefficient β is to be determined as follows:

$$\beta = 1.0 + \left(\frac{X/L - 0.45}{C_b + 0.2}\right)^2, \quad \text{for} \quad X/L \leq 0.45$$

$$\beta = 1.0 + 1.5\left(\frac{X/L - 0.45}{C_b + 0.2}\right)^2, \quad \text{for} \quad X/L > 0.45$$

where: L —— length of ship, in m;

X —— see 2.17.2.2;

C_b —— block coefficient, where $C_b < 0.6$, it is to be taken as 0.6; where $C_b > 0.8$, it is to be taken as 0.8; where the aft end bulkhead of the superstructure is forward of amidships, C_b used in determining the value β for the aft end bulkhead is not to be taken as less than 0.8.

2.17.2.4 Coefficient λ is to be determined as follows:

2.17.2 计算压头

2.17.2.1 露天的上层建筑端壁和甲板室围壁（端壁和侧壁）的计算压头 h 应按下式计算，且应不小于表 2.17.2.1 所列的最小值：

$$h = \alpha\ \delta\ (\beta\ \lambda - \gamma) \qquad \text{m}$$

式中：α、β、λ 和 δ —— 系数，分别按本节 2.17.2.2、2.17.2.3、2.17.2.4 和 2.17.2.5 确定。

γ —— 自夏季载重线至扶强材跨距中点或至板格中心的垂直距离，m。

表 2.17.2.1

船长 L（m）	计算压头 h_{min}（m）	
	最下层无保护前端壁	其他位置
$L \leqslant 50$	3.0	1.5
$50 < L < 250$	$0.01L + 2.5$	$0.005\ L + 1.25$
$L \geqslant 250$	5.0	2.5

2.17.2.2 系数 α 按下列各式计算：

$\alpha = 0.0083L_1 + 2.0$，最下层无保护前端壁

$\alpha = 0.0083L_1 + 1.0$，第二层无保护前端壁

$\alpha = 0.0067L_1 + 0.5$，第三层及以上无保护前端壁、各层有保护前端壁和各层侧壁

$\alpha = 0.001L_1 - 0.8(X/L) + 0.7$，各层位于船中以后的后端壁

$\alpha = 0.001L_1 - 0.4(X/L) + 0.5$，各层位于船中以前的后端壁

式中：L、L_1 —— 船长，m，L_1 取值不必大于 300m；

X —— 尾垂线至所考虑舱壁的距离，m；在确定甲板室侧壁的构件尺寸时，应将甲板室分成长度大致相等而不超过 $0.15L$ 的若干部分，而 X 则应量至每一部分长度的中点。

2.17.2.3 系数 β 按下列各式计算：

$$\beta = 1.0 + \left(\frac{X/L - 0.45}{C_b + 0.2}\right)^2, \qquad \text{当}\ \ X/L \leq 0.45$$

$$\beta = 1.0 + 1.5\left(\frac{X/L - 0.45}{C_b + 0.2}\right)^2, \qquad \text{当}\ \ X/L > 0.45$$

式中：L —— 船长，m；

X —— 见 2.17.2.2；

C_b —— 方形系数，当 $C_b < 0.6$ 时，取 $C_b = 0.6$；当 $C_b > 0.8$ 时，取 $C_b = 0.8$；当上层建筑后端壁位于船中以前，用以确定后端壁 β 值的 C_b 应不小于 0.8。

2.17.2.4 系数 λ 按下列各式计算：

$$\lambda = \frac{L}{10} e^{-L/300} - [1 - (\frac{L}{150})^2], \text{ for L} < 150\text{m}$$

$$\lambda = \frac{L}{10} e^{-L/300}, \qquad \text{for } 150\text{m} \le \text{L} < 300\text{ m}$$

$$\lambda = 11.03, \qquad \text{for L} \ge 300\text{ m}$$

where: L —— length of ship, in m.

2.17.2.5 Coefficient δ is to be determined as follows:

$$\delta = 0.7 \frac{b}{B_1} + 0.3, \text{ not less than } 0.475$$

where: b —— breadth of deckhouse at the position considered, in m;

B_1—— actual maximum breadth of ship on the exposed weather deck at the position considered, in m.

For exposed parts of superstructures, machinery casings and deckhouses protecting pump room openings, δ is to be taken as 1.

2.17.3 End bulkheads of superstructures and boundary bulkheads of deckhouse

2.17.3.1 The thickness t of end bulkhead plating of superstructures and boundary bulkhead plating of deckhouse is not to be less than:

$t = 3s\sqrt{h}$	mm
$t_{min} = 0.01L + 5.0$	mm, for lowest tier
$t_{min} = 0.01L + 4.0$	mm, upper tiers, but not less than 5 mm

where: s —— spacing of stiffeners, in m;

h —— design pressure head, in m, to be calculated according to 2.17.2 of this Section;

L —— length of ship, in m.

2.17.3.2 The section modulus W of end bulkhead stiffeners of superstructures and boundary bulkhead stiffeners of deckhouse is not to be less than:

$$W = 3.5shl^2 \quad \text{cm}^3$$

where: s —— spacing of stiffeners, in m;

l —— span of stiffeners, in m; to be taken as height of deckhouse, but not less than 2.0 m in any case;

h —— design pressure head, in m, to be obtained according to 2.17.2 of this Section.

2.17.3.3 The ends of following stiffeners are to be bracketed or connected by equivalent arrangements. The scantlings of brackets are to be determined according to 1.2.6 of this PART:

(1) front stiffeners of the lowest tier;

(2) front stiffeners of upper tiers in ships over 150 m in length;

(3) side stiffeners of single tier deckhouse;

(4) aft stiffeners of the lowest aft deckhouse;

$$\lambda = \frac{L}{10}e^{-L/300} - [1 - (\frac{L}{150})^2] \quad ，当L<150m时$$

$$\lambda = \frac{L}{10}e^{-L/300} \quad ，当150m\leqslant L<300m时$$

$$\lambda = 11.03 \quad ，当L\geqslant 300m时$$

式中：L —— 船长，m。

2.17.2.5　系数 δ 按下式计算：

$$\delta = 0.7\frac{b}{B_1} + 0.3, \text{ 且不小于}0.475$$

式中：b —— 所考虑位置的甲板室宽，m；

B_1 —— 船舶的露天甲板在所考虑位置处的最大实际宽度，m。

对于上层建筑、机舱棚的露天部分和保护泵舱开口的甲板室应取 δ=1。

2.17.3　上层建筑端壁和甲板室围壁

2.17.3.1　上层建筑端壁板和甲板室围壁板的厚度 t 应不小于：

$t = 3s\sqrt{h}$　　mm

$t_{min} = 0.01L + 5.0$　　mm，　对最下层

$t_{min} = 0.01L + 4.0$　　mm，　对其他各层，且不小于 5mm

式中：s —— 扶强材间距，m；

h —— 计算压头，m；按本节 2.17.2 计算；

L —— 船长，m。

2.17.3.2　上层建筑端壁和甲板室围壁的扶强材剖面模数 W 应不小于：

$$W = 3.5shl^2 \quad cm^3$$

式中：s —— 扶强材间距，m；

l —— 扶强材跨距，m；应取为甲板间高度，但在任何情况下取值不得小于 2.0m；

h —— 计算压头，m，按本节 2.17.2 计算。

2.17.3.3　下列情况的扶强材端部应用肘板连接或采用其他等效措施，肘板尺寸应符合本篇 1.2.6 的有关规定：

（1）　最下层前端壁扶强材；

（2）　船长大于 150m 的上层前端壁扶强材；

（3）　单层甲板室侧壁扶强材；

（4）　最下层尾甲板室后端壁扶强材；

(5) side stiffeners of upper deckhouses when the length of ship is greater than 150 m, side stiffeners of the lowest deckhouse if two or more tiers of deckhouses are fitted; where such stiffeners are not connected by brackets but directly welded to decks, their section modulus is to be increased by 20%.

2.17.3.4 For exposed machinery and pump room casings, the front stiffeners on amidships casing and all stiffeners on aft end casings which are situated on the deck to which D is measured are to be bracketed at top and bottom. Where such stiffeners are not connected by brackets but directly welded to decks, their section modulus is to be increased by 20% above that required for the stiffeners of deckhouses in the corresponding positions. All other stiffeners on exposed machinery and pump room casings are to be welded to decks at top and bottom.

2.17.4 Sides of superstructures

2.17.4.1 The scantlings of the side framing of superstructures are to be determined according to the requirements of Section 7 of this Chapter.

2.17.4.2 The side plating of superstructures is to comply with the following requirements:

(1) The thickness t of side plating of forecastles is not to be less than:

$$t = (0.028L + 5.5)\sqrt{\frac{s}{s_b}} \quad \text{mm}$$

where: L —— length of ship, in m;

s —— spacing of frames or longitudinals, in m, to be taken as not less than s_b;

s_b —— standard spacing of frames or longitudinals, in m.

(2) The thickness t of side plating of bridge and poop is not to be less than:

$$t = (0.025L + 5)\sqrt{\frac{s}{s_b}} \quad \text{mm}$$

where: L —— length of ship, in m;

s —— spacing of frames or longitudinals, in m, to be taken as not less than s_b;

s_b —— standard spacing of frames or longitudinals, in m.

2.17.5 Decks

2.17.5.1 The deck framing of superstructures is to comply with the relevant requirements of Section 8 of this Chapter. The deck framing of the forecastle is also to comply with the following requirements:

(1) Within the region forward of $0.075L$ from F.P., the spacing of deck girders supporting the beams is generally not to be more than 3.5 m, and that of the transverses supporting the deck longitudinals is generally not to be more than 2.5 m;

(2) The web depth of deck girders and transverses is not to be less than twice the depth of cutouts for the passage of beams or longitudinals being supported.

2.17.5.2 The section modulus W of the deck longitudinals or beams of deckhouses is not to be less than:

$$W = 5shl^2 \quad \text{cm}^3\text{, and not less than } 25s$$

where: s —— spacing of deck longitudinals or beams, in m;

l —— span of deck longitudinals or beams, in m;

（5） 船长大于 150m 的上层甲板室侧壁扶强材，设置二层或二层以上甲板室时最下层甲板室的侧壁扶强材；如不设肘板而直接与甲板焊接时，扶强材剖面模数应增加 20%。

2.17.3.4 在船中部的露天机舱棚和泵舱棚前端壁扶强材，以及位于量计型深 D 的甲板上的露天机舱棚和泵舱棚后端壁扶强材的两端应用肘板连接，如不用肘板而直接与甲板连接时，则按相应位置甲板室扶强材剖面模数增加 20%。除此以外的露天机舱棚和泵舱棚的扶强材两端都应与甲板焊接。

2.17.4 上层建筑的侧壁

2.17.4.1 上层建筑舷侧骨架应符合本章第 7 节的有关要求。

2.17.4.2 上层建筑的舷侧外板应符合下列要求：

(1) 首楼的舷侧外板厚度 t 应不小于：

$$t = (0.028L + 5.5)\sqrt{\frac{s}{s_b}} \quad \text{mm}$$

式中：L —— 船长，m；
s —— 肋骨或纵骨间距，m，计算时取值应不小于 s_b；
s_b —— 肋骨或纵骨的标准间距，m。

(2) 桥楼和尾楼的舷侧外板厚度 t 应不小于：

$$t = (0.025L + 5)\sqrt{\frac{s}{s_b}} \quad \text{mm}$$

式中：L —— 船长，m；
s —— 肋骨或纵骨间距，m，计算时取值应不小于 s_b；
s_b —— 肋骨或纵骨的标准间距，m。

2.17.5 甲板

2.17.5.1 上层建筑的甲板骨架应符合本章第 8 节的有关要求。首楼甲板骨架尚应符合下述要求：

（1） 在距首垂线 0.075L 以前区域，支持横梁的甲板纵桁的间距一般不大于 3.5m；支持甲板纵骨的强横梁的间距一般不大于 2.5m；

（2） 甲板纵桁和强横梁腹板高度应不小于所支持的横梁或纵骨穿过处开口高度的 2 倍。

2.17.5.2 甲板室甲板纵骨或横梁剖面模数 W 应不小于：

$$W = 5shl^2 \quad \text{cm}^3，\text{且不小于 } 25s$$

式中：s —— 甲板纵骨或横梁间距，m；
l —— 甲板纵骨或横梁跨距，m；

h —— design pressure head, in m, to be determined as follows

0.9 m, for those on first tier deck;

0.6 m, for those on second tier deck;

0.45 m, for those on third tier decks and above.

2.17.5.3 The scantlings of deck girders and transverses of deckhouses are to be calculated in accordance with the relevant requirements of Section 8 of this Chapter, but the design pressure head adopted is to be as specified in 2.17.5.2 of this Section. The web thickness of girders of deckhouses is to be not less than 1% the depth plus 2 mm, but not to be less than 4 mm.

2.17.5.4 The thickness t of deck plating of superstructures (except the forecastle) and the deckhouses is not to be less than:

$$t = (0.02L + C)\sqrt{\frac{s}{s_b}} - t_c \quad \text{mm, and not less than 5mm}$$

where: L ——length of ship, in m; not to be taken as greater than 100 m;

s —— spacing of deck longitudinals or beams, in m, to be taken as not less than s_b;

s_b —— standard spacing of deck longitudinals or beams, in m;

C —— coefficient, to be taken as follows:

5.5, for the first tier deck;

5.0, for the second tier deck;

4.5, for the third tier deck and above.

t_c —— t_c = 1 for decks of dry spaces within superstructures and deckhouses; t_c = 0 in other cases.

2.17.5.5 The thickness t of forecastle deck plating is to be not less than:

$$t = (0.02L + 6)\sqrt{\frac{s}{s_b}} \quad \text{mm}$$

where: L —— length of ship, in m;

s —— spacing of deck longitudinals or beams, in m, to be taken as not less than s_b;

s_b —— standard spacing of deck longitudinals or beams, in m.

2.17.6 Local strengthening of superstructures

2.17.6.1 Web frames or partial bulkheads spaced about 9 m apart are to be fitted within the poop or bridge that have large deckhouses or other erections above, to support side and end bulkheads of the deckhouses.

Appropriate strength members are also to be fitted in other areas under high loading.

2.17.6.2 The web frames or partial bulkheads within superstructures are to be arranged, where practicable, in line with the watertight bulkheads or other strength members below.

2.17.6.3 Pillars, diaphragms, bulkheads or other strength members are to be arranged under the ends of superstructures for support.

2.17.6.4 To reduce stress concentration in main hull structure in way of ends of superstructures which are flush with ship's side, the side plating of the superstructures is to extend beyond their ends and the height of the side plating is to be gradually reduced to that of sheer strake in a smooth transition (free edges of extension plating generally in an oval shape with horizontal axis, see Figure 2.17.6.4). This plating is to be supported by web plates and to be efficiently stiffened at the upper edge by a face plate having the same thickness as the extension plating and a breadth not less than 10 times its thickness. The thickness of the extension plating is to comply with the following requirements:

h —— 计算压头，m，按下列选取：

在第一层：0.9m；

在第二层：0.6m；

在第三层和以上：0.45m。

2.17.5.3　甲板室甲板纵桁和强横梁尺寸按本章第 8 节的有关要求计算，但计算压头按本节 2.17.5.2 的规定。甲板室纵桁的腹板厚度应不小于其高度的 1% 加 2mm。但不小于 4mm。

2.17.5.4　除首楼外的上层建筑和甲板室的甲板板厚度 t 应不小于：

$$t = (0.02L + C)\sqrt{\frac{s}{s_b}} - t_c \quad \text{mm，且不小于 5mm}$$

式中：L —— 船长，m；计算时取值不必大于 100m；

s —— 甲板纵骨或横梁间距，m，计算时取值应不小于 s_b；

s_b —— 甲板纵骨或横梁的标准间距，m；

C —— 系数，按下列选取：

在第一层：5.5；

在第二层：5.0；

在第三层和以上：4.5；

t_c —— 对于上层建筑或甲板室内部干燥处所的甲板，$t_c = 1$；其他情况 $t_c = 0$。

2.17.5.5　首楼甲板板厚度 t 应不小于：

$$t = (0.02L + 6)\sqrt{\frac{s}{s_b}} \quad \text{mm}$$

式中：L —— 船长，m；

s —— 甲板纵骨或横梁间距，m，计算时取值应不小于 s_b；

s_b —— 甲板纵骨或横梁的标准间距，m。

2.17.6　上层建筑的局部加强

2.17.6.1　当尾楼或桥楼上面有大甲板室或其他建筑物时，在尾楼或桥楼内应设置间距约 9m 的强肋骨或局部舱壁以支持甲板室的侧壁和端壁。

其他高负荷区域下也应设置相应的强力构件。

2.17.6.2　上层建筑内强肋骨或局部舱壁应尽可能设置在与其下面的水密舱壁或其他强力构件同一垂直平面内。

2.17.6.3　上层建筑端部的下面应设置支柱、隔壁、舱壁或其他强力构件以支持上层建筑。

2.17.6.4　为降低舷侧无内缩的上层建筑端部主船体结构中的应力集中，上层建筑的舷侧外板应延伸至上层建筑端部以外，且其高度逐步减小至主船体的舷顶列板，过渡应光顺（延伸板的自由边缘一般应做成长轴为水平布置的椭圆状，见图 2.17.6.4）。延伸板应用加强肘板支持，上缘应用相同厚度而宽度不小于 10 倍厚度的面板加强。延伸板应满足下述要求：

(1) For end bulkheads of superstructures situated within 0.5*L* amidships, the length of the extension plating is to be not less than 1.5 times the height of the superstructure and its thickness is to be increased by 25%.

(2) For end bulkheads of superstructures situated within 0.2*L* from F.P. or A.P., the length of the extension plating is to be not less than the height of the superstructure and its thickness need not be increased.

(3) For end bulkheads of superstructures situated betweem 0.2*L* and 0.25 *L* from F.P. or A.P., the length and thickness of the extension plating is to be increased by interpolation.

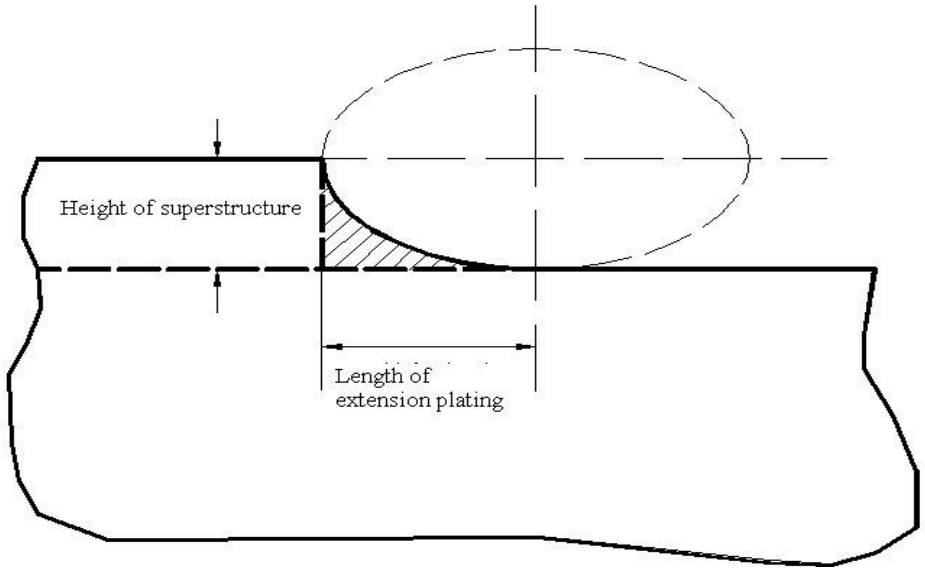


Figure 2.17.6.4

2.17.6.5 The thickness of the upper deck stringer plate and the sheer strake is to be increased at the ends of the superstructure from at least two frame spaces inside the superstructure to two frame spaces beyond the extension of side plating (see Figure 2.17.6.5) in accordance with the following requirements:

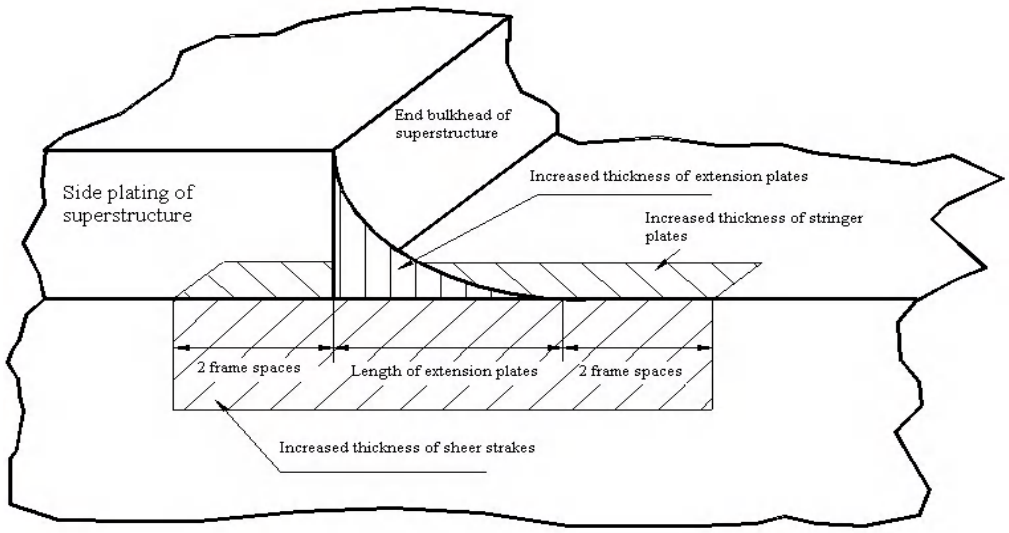


Figure 2.17.6.5

(1) Where the end bulkheads of the superstructure are situated within 0.5*L* amidships, the thickness of stringer plates and sheer strakes is to be increased by 20%;

(2) Where the end bulkheads of the superstructure are situated within 0.2*L* from F.P. or A.P., the thickness of stringer plates and sheer strakes need not be increased;

(3) Where the end bulkheads of the superstructure are situated between 0.2*L* and 0.25*L* from F.P. or A.P., the thickness of stringer plates and sheer strakes is to be increased by interpolation.

（1） 当上层建筑端壁位于船中部 0.5L 区域内，延伸板的长度应不小于 1.5 倍的上层建筑高度，延伸板的厚度应增加 25%；

（2） 当上层建筑端壁位于离船端 0.2L 区域内，延伸板的长度应不小于上层建筑高度，延伸板的厚度可不增加；

（3） 当上层建筑端壁位于离船端 0.2L 至 0.25L 之间区域内，延伸板的长度和厚度的增加值应按内插法求得。

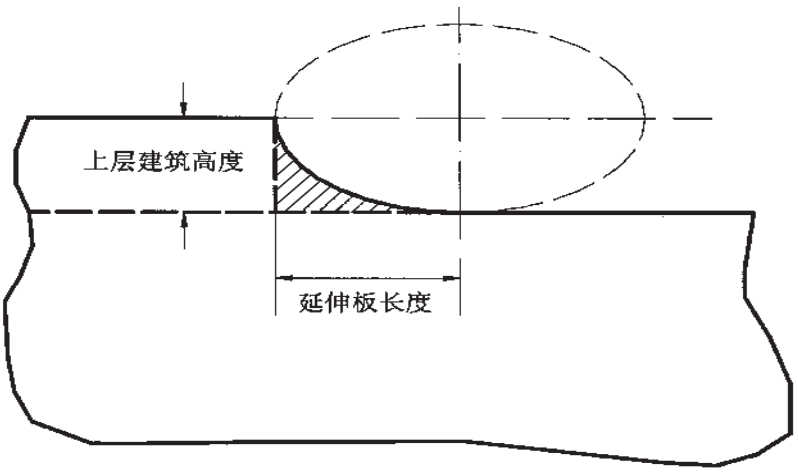


图 2.17.6.4

2.17.6.5 从上层建筑端壁向内至少 2 个肋距至舷侧外板延伸部分端点外 2 个肋距之间区域（见图 2.17.6.5），上甲板的甲板边板和舷顶列板应按下列要求增加厚度：

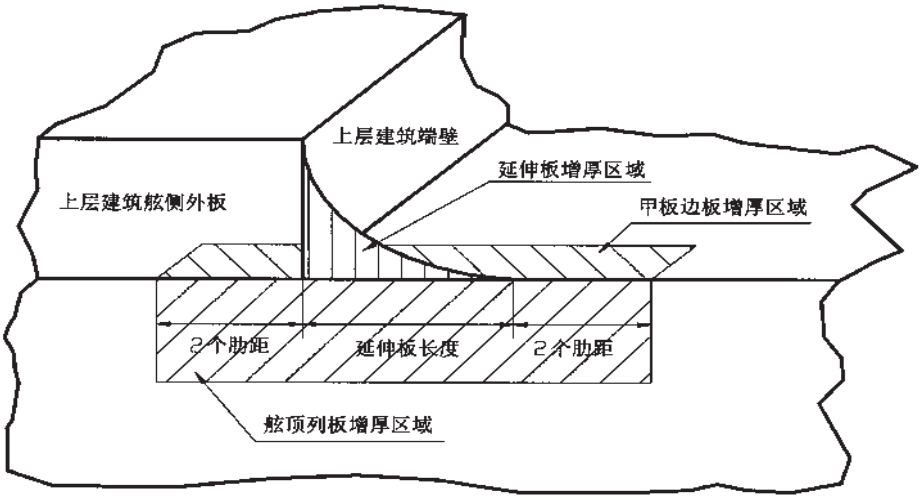


图 2.17.6.5

(1) 当上层建筑端壁位于船中部 0.5L 区域内，甲板边板和舷顶列板的厚度应增加 20%；

(2) 当上层建筑端壁位于离船端 0.2L 区域内，甲板边板和舷顶列板的厚度可不增加；

(3) 当上层建筑端壁位于离船端 0.2L 至 0.25L 之间区域内，甲板边板和舷顶列板的增加值应按内插法求得。

2.17.7 Local strengthening of deckhouses

2.17.7.1 Adequate support under the ends of deckhouses is to be provided in the form of pillars, diaphragms or bulkheads, or other strengthening members. At the corners of houses and in way of supporting structures, attention is to be given to the connection to the deck, and doublers or equivalent arrangements are generally to be fitted.

2.17.7.2 All openings cut in the sides of long deckhouses are to be adequately strengthened and have well rounded corners. Continuous coamings with enough depth are to be fitted below and above doors and similar openings. House tops are to be strengthened in way of boat davits. Special care is to be taken to minimize the size and number of openings in the side bulkheads in the region of the ends of deckhouses within 0.5*L* amidships.

2.17.7.3 The sides and ends of the long deckhouses on the lowest tier deck are generally to be strengthened by partial bulkheads or vertical web stiffeners spaced not more than 9 m apart, and these strength members are, as far as practicable, to be arranged in line with the strengthening members within the tween deck space below the deckhouse.

2.17.8 Raised quarter decks

2.17.8.1 The scantlings of the main frames in way of the raised quarter decks are to be determined according to the requirements of Section 7 of this Chapter, in this case the span of the frame is to be measured to the raised quarter deck.

The scantlings of the beams in way of the raised quarter decks are to be determined in accordance with the relevant requirements for the strength deck beams as specified in Section 8 of this Chapter.

The thickness of the raised quarter deck sheer strake is to be determined according to the requirements of Section 3 of this Chapter, and the thickness of deck plating is to be determined in accordance with the relevant requirements for strength deck plating as specified in Section 4 of this Chapter, in such cases the moulded depth is to be taken as the depth at the raised quarter deck.

The thickness of break bulkheads and the scantlings of stiffeners are to be determined in accordance with the requirements for end bulkheads of corresponding superstructures.

2.17.8.2 Strengthening at the break within 0.5*L* amidships

(1) When $L < 65$ m, the strength deck stringer plate and the raised quarter deck stringer plate are to extend for 3 or 4 frame spaces on either side of the break bulkhead and are to be gradually tapered off.

(2) When $L \geqslant 65$ m, the upper and raised deck plating at the break is to overlap for 2 or 3 frame spaces, in this case the stringer plates of both decks are to extend forward and aft for 2 or 3 frame spaces beyond the ends of overlapped plating. Vertical diaphragm plates spaced not more than 1.5 m apart in parallel with a longitudinal centreline are to be fitted between the overlapped deck plating. The thickness of the diaphragm plates is to be the same as that of the break bulkhead plating, and the diaphragms are to be efficiently stiffened and their free edges are to be flanged or provided with a face plate.

2.17.8.3 Where the break is located outside of 0.5*L* amidships, the strength deck stringer plate is to extend for 3 frame spaces beyond the break, and is to be gradually tapered off.

2.17.8.4 The sheer strake is to be increased in thickness by 30% for a distance of 3 to 5 frame spaces on either side of the break bulkhead. Where a raised quarter deck is connected to a long bridge, the sheer strake of side plating within the raised quarter deck area is to be increased in thickness by 25% for a distance of at least 2 frame spaces on either side of the break, and the side plating of the bridge is to be gradually tapered in a curve line from the end of the bridge deck stringer plate into the sheer strake of side plating within raised quarter deck area over a length more than 1.5 times the height of the bridge above the raised quarter deck.

2.17.9 Machinery casings

2.17.9.1 Machinery space openings in the exposed deck are to be protected by strong steel casings. Machinery casings situated on the freeboard or raised quarter deck are to be enclosed in the superstructures or deckhouses so far as practicable.

2.17.9.2 Doors in machinery casings are to be of steel and rigid construction, and are to be capable of being operated from both sides.

2.17.9.3 The scantlings of boundary bulkheads of exposed casings are to be determined in accordance with the requirements for those of the deckhouses in the corresponding positions.

2.17.7 甲板室的局部加强

2.17.7.1 甲板室端部的下面应设支柱、隔板、舱壁或其他强力构件以支持甲板室。应注意甲板室角隅和支持结构区域与甲板的连接，一般应加复板或采用其他有效结构。

2.17.7.2 长甲板室侧壁上的开口应有足够的加强和圆角。门或类似开口的下面和上面应有足够高度的连续围壁板。甲板室顶的吊艇架区域应加强。在船中部 0.5L 区域内的甲板室端区应尽量减小侧壁开口的尺寸和数量。

2.17.7.3 最下层长甲板室端壁和侧壁一般应以间距约 9m 的局部舱壁或垂直桁材加强，此加强构件应尽可能和甲板室下面甲板间舱的加强结构位于同一平面内。

2.17.8 升高甲板

2.17.8.1 升高甲板区的主肋骨按本章第 7 节的要求确定，此时肋骨跨距应量至升高甲板。

升高甲板的横梁应按本章第 8 节对强力甲板的有关要求确定。

升高甲板区的舷顶列板厚度应按本章第 3 节的要求选取；甲板厚度应按本章第 4 节对强力甲板的有关要求选取。此时型深可取升高甲板处的型深。

甲板台阶处端壁板厚度及扶强材应按相应上层建筑的端壁选取。

2.17.8.2 船中部 0.5L 区域内升高甲板台阶处的加强：

(1) L ＜ 65m 时，强力甲板的甲板边板和升高甲板的甲板边板应分别自台阶处端壁向首尾延伸 3 至 4 个肋距，并逐渐消失。

(2) L ≥ 65m 时，台阶处上下甲板应交错 2 至 3 个肋距，此时各层甲板的甲板边板应自交错部分的甲板端部再向前延伸 2 至 3 个肋距。在交错部分的两甲板间，应设置与纵中剖面平行的垂直隔板，隔板的间距不得大于 1.5m，厚度等于台阶处的端壁厚度，隔板上应以加强筋加强，其自由边应有折边或面板。

2.17.8.3 在船中部 0.5L 区域以外升高甲板台阶处，强力甲板的甲板边板，应自台阶处延伸 3 个肋距，并逐渐消失。

2.17.8.4 在升高甲板端壁向首尾各 3 至 5 个肋距的范围内，舷顶列板的厚度应增加 30%。当升高甲板与长桥楼相连时，在台阶前后至少各 2 个肋距的范围内，升高甲板区域舷侧外板的顶列板厚度应增加 25%；桥楼区域舷侧外板应自桥楼甲板边板端部逐渐向升高甲板区域舷侧外板的顶列板过渡，该过渡区的长度须大于桥楼高出升高甲板的高度的 1.5 倍。

2.17.9 机舱棚

2.17.9.1 机舱在露天甲板上的开口应以坚固可靠的钢质舱棚保护，干舷甲板及尾升高甲板上的机舱棚，应尽可能设于上层建筑或甲板室内。

2.17.9.2 机舱棚的门应为钢质且结构坚固，并在其内外两面均可关闭。

2.17.9.3 露天机舱棚围壁的构件尺寸，应按相应位置的甲板室围壁的要求进行计算。

2.17.9.4 The scantlings of boundary bulkheads of non-exposed casings are to comply with the following requirements:

(1) The minimum thickness of boundary bulkheads of the casings is not to be less than 6.5 mm in way of cargo spaces and not to be less than 5 mm in way of accommodation spaces.

(2) The section modulus W of the stiffeners of boundary bulkheads of the casings is not to be less than that obtained from the following formula:

$$W = 8sl \quad \text{cm}^3$$

where: s —— spacing of stiffeners, in m;

l —— span of stiffener, in m.

For ships of 65 m or over in length, the depth of stiffeners is not to be less than 60 mm.

2.17.9.5 Where casing stiffeners support the deck transverses or girders or where they are in line with pillars below, they are to be suitably strengthened.

2.17.9.6 Where the casing sides act as girders supporting decks above, the openings for doors, windows etc. in the sides are to be effectively strengthened. Particular attention is to be paid to stiffening where the casing supports the funnel or exhaust uptakes.

2.17.10 Breakwater

2.17.10.1 The design load is to be determined with the requirements for fronts of superstructures in 2.17.2 of this Section as reference.

2.17.10.2 The thickness of breakwater plating and the scantlings of breakwater stiffeners are to be determined according to 2.17.3 of this Section.

2.17.10.3 The scantlings of main members (horizontal and vertical girders) supporting breakwater are to be determined by direct calculations, and permissible stress is as follows:

Permissible equivalent stress $[\sigma_e] = \sqrt{\sigma^2 + 3\tau^2} = 235/K$ N/mm^2 ”

The existing Section 18 “DECKHOUSES, MACHINERY CASINGS” is deleted, with the section number being retained for future use.

Section 22 STRENGTHENED FOR HEAVY CARGOES

The existing paragraph 2.22.3.4 is replaced by the following:

“2.22.3.4 The thickness t of inner bottom plating is not to be less than that obtained from the following formulae:

$$t = 0.04L + 5s + 6.1 \quad \text{mm}$$

$$t = 4.65s\sqrt{H/\gamma} \quad \text{mm}$$

where: L —— length of ship, not to be taken as greater than 400 m;

s —— spacing of inner bottom longitudinals, in m;

γ —— stowage rate, in m^3/t, but not to be greater than 0.833;

H —— vertical distance, in m, measured from the inner bottom plating to deck at side amidships.”

2.17.9.4　非露天机舱棚的构件尺寸应符合下列要求：

(1)　机舱棚围壁板最小厚度，在货舱区域应不小于 6.5mm；在居住舱室区域应不小于 5mm；

(2)　机舱棚围壁扶强材剖面模数 W 应不小于按下式计算所得之值：

$$W = 8sl \quad cm^3$$

式中：s —— 扶强材间距，m；
l —— 扶强材跨距，m。
对 $L \geqslant 65m$ 的船舶，扶强材高度应不小于 60mm。

2.17.9.5　当机舱棚扶强材支持甲板强横梁或纵桁，或扶强材与下面的支柱在同一直线上时，扶强材应适当加强。

2.17.9.6　当机舱棚的围壁支持其上面的甲板时，围壁上门、窗等开口应有效地加强。对支持烟囱或排气烟道的机舱棚部分应注意加强。

2.17.10　挡浪板

2.17.10.1　计算载荷参照本节 2.17.2 按上层建筑前端壁的要求确定。

2.17.10.2　挡浪板的板厚和扶强材尺寸按本节 2.17.3 确定。

2.17.10.3　支持挡浪板的主要构件（水平桁材和垂直桁材）尺寸应用直接计算法确定，许用应力如下：

许用相当应力　$[\sigma_e] = \sqrt{\sigma^2 + 3\tau^2} = 235/K$　　N/mm^2

整节删除“第 18 节　甲板室及机舱棚”，但节号保留，内容暂空缺。

第 22 节　　重货加强

2.22.3.4 改为：

2.22.3.4　内底板的厚度 t 应不小于按下列两式计算所得之值：

$$t = 0.04L + 5s + 6.1 \quad mm$$

$$t = 4.65s\sqrt{H/\gamma} \quad mm$$

式中：L —— 船长，计算时取值不必大于 400m；
s —— 内底纵骨间距，m；
γ —— 装载率，m^3/t，其值应不大于 0.833；
H —— 在船中部舷侧处，从内底板量至甲板的垂直距离，m。”

CHAPTER 3 EQUIPMENT AND OUTFITS

Section 1 RUDDERS

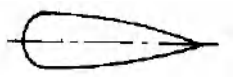
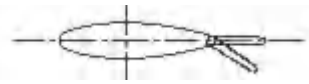
In paragraph 3.1.2.1:

The sixth line is replaced by the following:

"K_2 —— coefficient, in accordance with Table 3.1.2.1; data obtained through tests may be used subject to approval by the Society;"

Table 3.1.2.1 is replaced by the following:

Coefficient K_2 **Table 3.1.2.1**

Profile	K_2	
	Ahead condition	**Astern condition**
 NACA-00 Gottingen profile	1.1	0.80
 Hollow profile	1.35	0.90
 Flat side profile	1.1	0.90
 High lift rudder	1.7	1.7

In paragraph 3.1.3.2:

The line "α —— coefficient, 0.33 for ahead condition, 0.66 for astern condition;" is replaced by "α —— coefficient, 0.33 for ahead condition, 0.66 for astern condition. For high lift rudders, α may be specially considered. If no test data are available, 0.40 is to be taken for ahead condition and 0.66 for astern condition;"

A new item (3) is added in paragraph 3.1.9.2 as follows:

"(3) The thrust oil force P_e is to be calculated by the following formula:

$$P_e = 3.14PD_m l(\frac{K_1}{2} + 0.02) \quad \text{N}$$

where: P —— thrust oil pressure calculated according to (2) of this paragraph, in N/mm^2;

D_m, K_1, l —— same as in (1) above."

第 3 章　舵　装

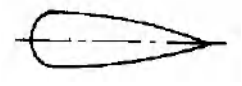
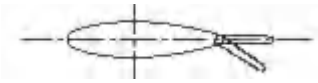
第 1 节　舵

3.1.2.1 中第 6 行改为：

“K_2 —— 系数，见表 3.1.2.1；经本社认可，可以采用试验提供数据。”

表 3.1.2.1 改为：

系数　K_2　　**表 3.1.2.1**

翼型	K_2	
	正车时	倒车时
 NACA-00 哥汀根翼型	1.1	0.80
 凹翼型	1.35	0.90
 平边翼型	1.1	0.90
 襟翼舵	1.7	1.7

3.1.3.2 中“α ——系数，正车时取 0.33，倒车时取 0.66；”改为：

“α ——系数，正车时取 0.33，倒车时取 0.66。对襟翼舵可特殊考虑，如不能提供试验数据，正车时取 0.40，倒车时取 0.66；”

3.1.9.2 中新增：

（3） 推入力 P_e 可按下式计算：

$$P_e = 3.14PD_m l\left(\frac{K_1}{2} + 0.02\right) \quad \text{N}$$

式中：P —— 按本条（2）计算的推入压力，N/mm^2；

D_m、K_1、l 同本条（1）。

Section 5 EMERGENCY TOWING ARRANGEMENTS

The existing paragraph 3.5.6.2 is replaced by the following:

"3.5.6.2 Different solutions on design of chafing gear can be used. If a chafing chain is to be used, the following requirements are to be complied with:

(1) The chafing chain is to be stud link chain and is to extend from the strongpoint to a point at least 3 m beyond the fairlead;

(2) One end of the chafing chain is to be suitable for connection to the strongpoint. The other end is to be fitted with a standard pear-shaped open link allowing connection to the towing pennant via a standard bow shackle. A typical outboard chafing chain end and a pear-shaped open link are shown in Figure 3.5.6.2(2);

(3) In addition to this Section, the chafing chain is to be designed, manufactured, tested and certified in accordance with relevant requirements in Section 2, Chapter 10 of PART ONE of the Society's Rules for Materials and Welding;

(4) Chafing chains are to be made of AM2 or AM3 chain steel by manufacturers approved by the Society;

(5) The nominal diameter of common link for chafing chains is to comply with the value indicated in Table 3.5.6.2(5) and the nominal diameter of other links are to be determined according to Figure 3.5.6.2(2);

(6) The chafing chain is to be stowed in such a way that it can be rapidly connected to the strongpoint.

Minimum Nominal Diameter of Common Link Table 3.5.6.2(5)

Type of ETA	Nominal diameter of common link, *d* min.	
	Grade 2	Grade 3
ETA1000	62mm	52mm
ETA2000	90mm	76mm

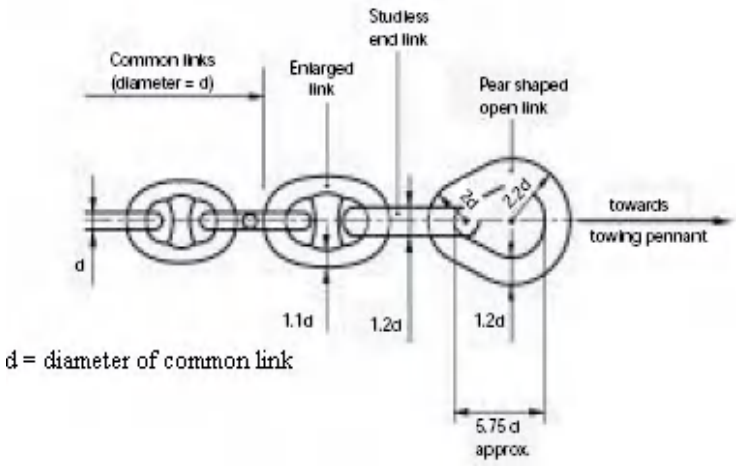


Figure 3.5.6.2(2) Typical Outboard Chafing Chain End"

A new Section 6 is added as follows:

"Section 6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS

3.6.1 General requirements

3.6.1.1 This Section applies to shipboard fittings and supporting hull structures associated with towing and mooring on new conventional vessels contracted for construction after 1 January 2005.

3.6.1.2 Conventional vessels means new displacement-type vessels of 500 GT and above, excluding high speed craft, special purpose vessels, and offshore units of all types.

第 5 节　应急拖带装置

3.5.6.2 改为：

“3.5.6.2　防擦装置的设计可以使用不同的方法。如采用防擦链时应符合下列要求：

(1)　防擦链应为有档链，其长度应从拖力点延伸至导缆装置以外至少 3m；

(2)　防擦链的一端应适合与拖力点连接，另一端应装配一个标准的梨形无档链环，以便通过标准弓形卸扣与短拖索连接。典型端部结构和梨形链环如图 3.5.6.2(2) 所示；

(3)　防擦链的设计、制造、试验和证书，除本条要求外，应符合本社《材料与焊接规范》第 1 篇第 10 章第 2 节的有关规定；

(4)　防擦链应采用认可的 AM2 或 AM3 级锚链钢，由本社认可的工厂制造；

(5)　防擦链普通链环的直径应符合表 3.5.6.2(5) 的要求，其他链环的名义直径按图 3.5.6.2(2) 要求确定；

(6)　防擦链的存放应能确保其快速连接到拖力点上。

普通链环的最小名义直径　　表 3.5.6.2(5)

应急拖带装置型号	普通链环的最小名义直径 d	
	2 级链	3 级链
ETA1000	62mm	52mm
ETA2000	90mm	76mm

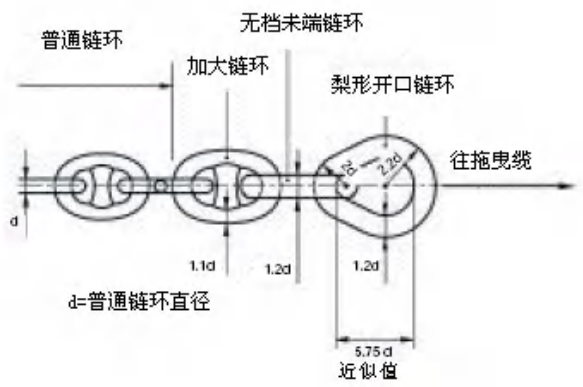


图 3.5.6.2(2)　典型防擦链的端部结构”

“第 6 节　普通船舶上用于拖带和系泊的船用配件与支承结构

3.6.1　一般要求

3.6.1.1　本节适用于 2005 年 1 月 1 日以后签定建造合同的新造普通船舶上船用配件与支撑结构。

3.6.1.2　普通船舶：500 总吨及以上的新造排水型船舶，不包括高速船、特殊用途船舶、所有型式的海洋设施。

3.6.1.3 Shipboard fitting means bollards and bitts, fairleads, stand rollers, chocks used for the normal mooring of the vessel and the similar components used for the towing and emergency towing of the vessel. Other components such as capstans, winches, etc. are not covered by this Section. Any weld or bolt or equivalent device connecting the shipboard fitting to the supporting structure is part of the shipboard fitting and subject to the Industry standard applicable to this shipboard fitting.

3.6.1.4 Supporting hull structures mean that part of the ship structure on/in which the shipboard fitting is placed and which is directly submitted to the forces exerted on the shipboard fitting. The supporting hull structure of capstans, winches, etc. used for the towing, emergency towing and mooring operations mentioned above is also subject to the requirements in this Section.

3.6.1.5 Industry standard means international standard (ISO, etc.) or standards issued by national association such as DIN or JMSA, etc. which are recognized in the country where the ship is built.

3.6.2 Towing

3.6.2.1 The strength of shipboard fittings used for normal and/or emergency operations at bow, sides and stern and their supporting structures are to comply with the requirements in this Section.

3.6.2.2 Shipboard fittings for towing are to be located on longitudinals, beams and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the towing load. Other equivalent arrangments may be accepted (for Panama chocks, etc.).

3.6.2.3 The design load to be used is the greater of (1) and (2) as specified below:

(1) Twice the maximum breaking strength of the tow line anticipated to be used throughout the service life of the ship is to be applied.

(2) Twice the breaking strength of the tow line according to the ship's corresponding EN in Section 2 of this Chapter is to be applied.

3.6.2.4 The selection of shipboard fittings is to be made by the shipyard in accordance with an Industry standard (e.g. ISO3913 Shipbuilding – Welded Steel Bollards) accepted by the society. When the shipboard fitting is not selected from an accepted Industry standard, the design load used to assess its strength and its attachment to the ship is to be in accordance with 3.6.2.3.

3.6.2.5 Supporting hull structure

(1) Arrangement of the reinforced members (carling) beneath shipboard fittings is to consider any variation of direction (laterally and vertically) of the towing forces (which is to be not less than the Design Load as per 3.6.2.3) acting through the arrangement of connection to the shipboard fittings.

(2) The acting point of the towing force on shipboard fittings is to be taken at the attachment point of a towing line or equivalent.

(3) Allowable stresses

Allowable bending stress: 100% of the specified yield point for the material used;

Allowable shearing stress: 60% of the specified yield point for the material used;

No stress concentration factors being taken into account.

3.6.2.6 Safe Working Load (SWL)

(1) The SWL is not to exceed one half of the design load per 3.6.2.3.

(2) The SWL of each shipboard fitting is to be marked (by weld bead or equivalent) on the deck fittings used for towing.

(3) The SWL with its intended use (for normal and/or emergency conditions) for each shipboard fitting referred to in (2) above, is to be noted in the towing and mooring arrangement plan or other information available on board for the guidance of the Master.

3.6.1.3　船用配件：正常系泊用的系缆桩与缆柱、系缆器、立式滚轮、导缆孔以及用于拖带与应急拖带船舶的类似部件。其他部件如绞盘、绞车等不包含在本节要求中。任何船用配件连接支撑结构的焊接、螺栓连接或其他等效连接方式都应作为船舶配件的组成部分，应满足该船用配件所适用的工业标准。

3.6.1.4　支承结构：上部或内部安装船用配件并直接承受作用在船舶用配件上的力的部分船体结构。用于拖带、应急拖带与上述系泊操作的绞盘、绞车等的支承结构也应符合本节的规定。

3.6.1.5　工业标准：船舶建造的国家认可的国际标准（ISO 等）或由国家行业协会颁布的标准（如 DIN、JMSA 等）。

3.6.2　拖带

3.6.2.1　在船首、舷侧、船尾，用于正常和 / 或应急操作的船用配件及其支承结构的强度应符合本节的规定。

3.6.2.2　为使拖带负荷有效分布，拖带用的船用配件应布置在部分甲板结构（纵骨、横梁和 / 或桁材）上。也可以接受其他等效布置（如巴拿马导缆孔等）。

3.6.2.3　设计载荷应取（1）和（2）中的较大值：

（1）　船舶服务期限内预计使用的拖索最大破断负荷的 2 倍；

（2）　按照本章第 2 节中船舶舾装数对应的拖索破断负荷的 2 倍。

3.6.2.4　由船厂根据本社接受的工业标准（如 ISO3913《造船－钢质焊接带缆桩》）选择船用配件。如船用配件没有按接受的工业标准选择时，评估该配件的强度及配件与船舶的连接所采用的设计载荷应符合 3.6.2.3 的要求。

3.6.2.5　支承结构：

（1）　船用配件下加强部件（短梁）的布置应考虑作用在与该布置连接的船舶配件上的拖带载荷（不小于 3.6.2.3 规定的设计载荷）的方向（侧向和垂向）变化；

（2）　船用配件上拖带载荷的作用点应是拖索的附着点或等效位置；

（3）　许用应力。

许用弯曲应力：100％所用材料的屈服强度；
许用剪切应力：60％所用材料的屈服强度；
计算不考虑应力集中影响。

3.6.2.6　安全工作负荷（SWL）：

（1）　SWL 应不超过 3.6.2.3 规定的设计负荷的一半；

（2）　每一船用配件的 SWL 应标记（焊点或等效方法）在用于拖带的甲板配件上；

（3）上述（2）规定的每个船用配件预定用途（正常和 / 或应急拖带）的 SWL，应在拖带布置图或船上船长可获得的其他指导信息上注明；

(4) The above requirements on SWL apply for a single post basis (no more than one turn of one cable).

(5) The arrangement plan mentioned in (3) above is to explicitly prohibit the use of mooring and/or towing lines outside of their intended function and/or of different characteristics.

3.6.2.7 Emergency Towing Arrangement

Ships subject to SOLAS Reg.II-1/3-4 are to comply with that regulation and MSC.35(63) as may be amended.

3.6.3 Mooring

3.6.3.1 Equipment that is used for both towing and mooring is to be in accordance with 3.6.2. However, when equipment is only used for mooring, 3.6.2.1 through 3.6.2.6 is to be applied with the understanding that "towing" is to read to mean "mooring" throughout."

CHAPTER 5 DOUBLE SKIN OIL TANKERS

Section 1 GENERAL REQUIREMENTS

In paragraph 5.1.1.1:

The words "and Chapter 6" is inserted after "… If not covered in this Chapter, the relevant requirements of Chapter 2".

The existing paragraph 5.1.8.1 is replaced by the following:

"5.1.8.1 For oil tankers of 190 m or over in length, their primary members (longitudinal or transverse) in cargo tank region are to be subject to direct strength calculation which is to comply with the requirements in the Society's Guidelines for Direct Strength Analysis of Oil Tanker. The thickness of the structural members determined by direct calculation is also to comply with the requirements in 5.1.6 of this Section, and is to be submitted to the Society for approval."

Section 2 SHELL PLATING

The existing paragraph 5.2.4.2 is replaced by the following:

"5.2.4.2 Where longitudinal bottom and side framing is adopted and no longitudinals are fitted at the bilge, the thickness of bilge plating is not to be less than $\frac{rF_b}{165K}$ (r being the radius of the bilge, in mm, K being conversion factor of material and F_b being reduction factor of bottom). The framing associated with such an arrangement is to comply with the requirements of 5.4.4.1 of Section 4 of this Chapter."

CHAPTER 7 CONTAINER SHIPS

Section 1 GENERAL REQUIREMENTS

The existing paragraph 7.1.4.3 is deleted.

The existing paragraph 7.1.4.4 is replaced by the following:

"7.1.4.3 Under hydrodynamic torque loading of the hull, the average rate of the torsional angle of hatch openings in the strength deck is generally not exceeding 0.006^0/m and the elongation of the hatch opening diagonal is generally not exceeding 35 mm, except for open-top container ships."

（4） 上述要求的 SWL 适用于 1 根缆索用 1 个绳圈缠绕于单个缆桩的基本型式。

（5） 上述（3）规定的布置图应明确禁止超出预定功能和 / 或不同特性的系索和 / 或拖索的使用。

3.6.2.7 应急拖带布置：SOLAS Reg.II-1/3-4 要求的船舶应满足该规定和可能修订的 MSC.35（63）的要求。

3.6.3 系泊

3.6.3.1 同时用于系泊和拖带的设备应满足 3.6.2 的要求。当设备仅用于系泊时，应满足 3.6.2.1 ～ 3.6.2.6 的要求，可将要求中“拖带”完全理解为“系泊”。”

第 5 章 双壳油船

第 1 节 一般规定

5.1.1.1 条 在“…本章中无规定者按本篇第 2 章”后插入以下内容“和第 6 章”。

5.1.8.1 改为：

“5.1.8.1 船长为 190m 及以上的油船，其货油舱区域主要构件（纵向、横向）应用直接计算方法进行强度计算，直接计算应符合本社《油船结构强度直接计算指南》要求，由直接计算确定的构件厚度尚应符合本节 5.1.6 的要求，并送本社批准。”

第 2 节 外 板

5.2.4.2 改为：

“5.2.4.2 当船底和舷侧为纵骨架式而舭部不设纵骨时，舭列板厚度还应不小于 $\frac{rF_b}{165K}$（r 为舭部半径，mm，K 为材料换算系数，F_b 为船底折减系数），且该部位的骨架应符合本章第 4 节 5.4.4.1 的要求。”

第 7 节 平面油密横舱壁

5.7.3.7 中的“式中：s —— 扶强材间距，mm；”改为“式中：s —— 扶强材间距，m；”

第 7 章 集装箱船

第 1 节 一般规定

删除 7.1.4.3

7.1.4.4 改为：

“7.1.4.3 除敞口集装箱船外，船体在水动力扭矩作用下，强力甲板舱口的平均扭转角一般不超过 0.006°/m，强力甲板舱口的对角线伸长一般不超过 35mm。”

A new paragraph 7.1.5 is added as follows:

"**7.1.5 Direct strength calculation and fatigue strength assessment for hull structure**

7.1.5.1 Where the width of strength deck hatch is greater than 0.85 *B* (*B* being the breadth of ship) or *B* is greater than 32.2 m, the strength of primary structural members wihin cargo area are to be calculated in accordance with relevant requirements of the Society's Guidelines for Direct Calculations of Strength of Container Ship, and calculation results are to be submitted to the Society for approval.

7.1.5.2 Where the width of strength deck hatch is greater than 0.89 *B* (*B* being the breadth of ship) or the structural arrangement is on non-conventional type, or the structural scantlings are other than those as specified in the Rules, the global strength of main structures of the ship is to be calculated in accordance with the Society's Guidelines for Direct Calculations of Strength of Container Ship, and calculation results are to be submitted to the Society for approval.

7.1.5.3 For container ships of 150 m in length and above, the fatigue strength of cargo area structure is to be assessed in accordance with the Society's Guidelines for Fatigue Strength of Hull Structure, and assessment results are to be submitted to the Society for approval."

Section 8 BOW SIDE STRUCTURE STRENGTHENING

The existing paragraph 7.8.1.1 is replaced by the following:

"7.8.1.1 Bow (including forecastle) side structure is to be strengthened. The strengthened area is from fore perpendicular to 0.1 *L* aft and above summer load line. The scantlings of side members in the area is to comply with the requirements of this Section. "

CHAPTER 8 BULK CARRIERS AND ORE CARRIERS

Section 1 GENERAL REQUIREMENTS

The existing paragraph 8.1.1.2 is replaced by the following:

"8.1.1.2 Where the side structures of bulk carriers are of double skin, they are to comply with the Guidelines for Hull Structure of Double Side Skin Bulk Carriers of the Society."

A new paragraph 8.1.4 is added as follows:

"**8.1.4 Direct strength calculation and fatigue strength assessment for hull structure**

8.1.4.1 For bulk carriers of 150 m in length and above, the strength of primary structural members (both longitudinal and transverse) within cargo area are to be calculated in accordance with the Society's Guidelines for Direct Strength Analysis of Bulk Carriers, and calculation results are to be submitted to the Society for approval.

8.1.4.2 For bulk carriers of 150 m in length and above, the fatigue strength of cargo area structure is to be assessed in accordance with the Society's Guidelines for Fatigue Strength of Ship Structure, and assessment results are to be submitted to the Society for approval."

Section 2 BOTTOM STRUCTURES

The existing paragraph 8.2.2.1 is replaced by the following:

"8.2.2.1 For bulk carriers less than 150 m in length, intended to be assigned with the class notation of Bulk Carrier, Strengthened for Heavy Cargoes, Hold Nos··· may be Empty, the bottom structures are to comply with the requirements of this Section, and in addition, their strength is to be confirmed by direct calculation."

新增 7.1.5：

“7.1.5　船体结构强度直接计算和疲劳强度评估

7.1.5.1　强力甲板舱口的宽度大于 0.85*B*(*B* 为船宽）或船宽 *B* 大于 32.2m 时，货舱区域主要构件应按本社《集装箱船结构强度直接计算指南》的有关要求进行强度计算，并应送本社批准。

7.1.5.2　强力甲板舱口的宽度大于 0.89*B*(*B* 为船宽）或结构布置非常规形式或结构尺寸超出规范规定时，应按本社《集装箱船结构强度直接计算指南》的要求对其主要结构的总体强度进行计算，并应送本社批准。

7.1.5.3　船长 150m 及以上的集装箱船，其货舱区域结构应按本社《船体结构疲劳强度指南》的要求进行疲劳强度评估，并应送本社批准。”

第 8 节　船首舷侧结构加强

7.8.1.1 改为：

“7.8.1.1　船首部舷侧结构（包括首楼舷侧结构）应予以加强。加强范围自首垂线起向后 0.1*L* 之间与夏季载重线以上区域。在该区域内舷侧构件的尺寸应符合本节的要求。”

第 8 章　散装货船与矿砂船

第 1 节　一般规定

8.1.1.2 改为：

“8.1.1.2　舷侧为双壳结构的散装货船，应满足本社《双舷侧散装货船船体结构指南》的要求。”

新增 8.1.4：

“8.1.4　船体结构强度直接计算和疲劳评估

8.1.4.1　船长为 150m 及以上的散装货船，其货舱区域主要构件（纵向、横向）应用直接计算方法进行强度计算，直接计算应符合本社《散货船结构强度直接计算指南》要求，并送本社批准。

8.1.4.2　船长为 150m 及以上的散货船，其货舱区域结构应进行疲劳强度评估。疲劳强度评估应符合本社《船体结构疲劳强度指南》要求，并送本社批准。”

第 2 节　船底骨架

8.2.2.1 改为：

“8.2.2.1　船长小于 150m 的散装货船，凡拟取得重货加强且有指定空舱或间隔空舱附加标志的散装货船，其船底骨架除应符合本节要求外，还应进行强度直接计算。

Section 5 HOPPER TANKS

The existing paragraph 8.5.3.1 is replaced by the following:

"8.5.3.1 The section modulus W of the sloping plating longitudinals is not to be less than that of the inner bottom longitudinals required in Section 6, Chapter 2 of this PART and if intended to be assigned with the class notatin of Strengthened for Heavy Cargoes, nor to be less than that obtained from the following formula:

$$W = 8.5Hsl^2 / \gamma \quad \text{cm}^3$$

where: γ —— see Section 22, Chapter 2 of this PART;
H —— vertical distance, in m, measured from longitudinal to the lower edge of the sloping plating of topside tanks at side;
s —— spacing of longitudinals, in m;
l —— span of longitudinal, in m.

Where hopper tanks are interconnected with topside tanks or they are used as ballast tanks, the section modulus W of the sloping plating longitudinals is not to be less than:

$$W = 9shl^2 \quad \text{cm}^3$$

where: s, l —— same as defined above;
h —— vertical distance, in m, measured from the longitudinal to the top of the tank, or half the vertical distance from that to the top of the overflow pipe, whichever is greater."

Section 12A EVALUATION OF SCANTLINGS OF HATCH COVERS OF CARGO HOLDS

In paragraph 8.12A.3.3:

"$t_2 = 0.01\ s$ mm" for net plate thickness of hatch cover top plating is replaced by "$t_2 = 10\ s$ mm".

The existing paragraph 8.12A.6.1 is replaced by the following:

"**8.12A.6.1 Hatch covers**

For all the structure (plating and secondary stiffeners) of single skin hatch covers, the corrosion addition t_s is to be 2.0 mm.

For double skin hatch covers, the corrosion addition t_s is to be 2.0 mm for the top and bottom plating and 1.5 mm for the internal structures.

For single skin hatch covers and for the plating of double skin hatch covers, steel renewal is required where the gauged thickness is less than t_{net} + 0.5 mm. Where the gauged thickness is within the range t_{net} + 0.5 mm and t_{net} + 1.0 mm, coating or annual gauging may be adopted as an alternative to steel renewal. Coating is to be maintained in GOOD condition, as defined in 4.3.2.2 of Chapter 4 of PART ONE.

For the internal structure of double skin hatch covers, thickness gauging is required when plating renewal is to be carried out or when this is deemed necessary, at the discretion of the Society's Surveyor, on the basis of the plating corrosion or deformation condition. In these cases, steel renewal for the internal structures is required where the gauged thickness is less than t_{net}."

Section 13 HARMONIZED NOTATIONS AND CORRESPONDING DESIGN LOADING CONDITIONS FOR BULK CARRIERS

The existing paragraph 8.13.2.2 is replaced by the following:

"8.13.2.2 The loading conditions listed in 8.13.4 are to be used for the checking of rule criteria regarding longitudinal strength, local strength, capacity and disposition of ballast tanks and stability. The longitudinal strength is to comply with the requirements of Section 2, Chapter 2 and Section 9, Chapter 8 of this PART. The loading conditions listed in 8.13.5 are to be used for the checking of rule criteria regarding local strength. Direct calculations are to be carried out for the strength of all primary structural members within cargo area in accordance with the Society's Guidelines for Direct Strength Analysis of Bulk Carriers."

第 5 节　底边舱

8.5.3.1 改为：

“8.5.3.1　斜板纵骨剖面模数 W 应不小于本篇第 2 章第 6 节对内底纵骨的要求。如有重货加强，还应不小于按下式计算所得之值：

$$W = 8.5Hsl^2/\gamma \qquad cm^3$$

式中：γ —— 见本篇第 2 章第 22 节；

H —— 自纵骨量至顶边舱斜板下表面的垂直距离，m；

s —— 纵骨间距，m；

l —— 纵骨跨距，m。

当底边舱与顶边舱相通或底边舱为压载舱时，斜板纵骨的剖面模数还应不小于：

$$W = 9shl^2 \qquad cm^3$$

式中：s、l —— 同上；

h —— 自纵骨量至舱顶的垂直距离，或量至溢流管顶垂直距离的一半，m，取较大者。”

第 12A 节　货舱舱口盖尺寸的确定

8.12A.3.3 舱口盖顶板的净板厚中 t_2 改为：

$$t_2 = 10s \qquad mm$$

8.12A.6.1 改为：

“8.12A.6.1　舱口盖：

对于单壳舱口盖，所有结构（板和扶强材）的腐蚀余量 t_s 为 2.0mm；

对于双壳舱口盖，顶板和底板的腐蚀余量 t_s 为 2.0mm，内部结构的腐蚀余量 t_s 为 1.5mm。

对于双壳舱口盖的板和单壳舱口盖，当测量厚度小于 t_{net} + 0.5 mm 时要求换新。当测量厚度大于等于 t_{net} + 0.5 mm 且小于 t_{net} + 1.0 mm 时，可通过采用涂装或年度测厚的措施替代换新。涂装应保持在“良好”状态，“良好”的定义见第 1 篇第 4 章 4.3.2.2。

当本社验船师根据外板腐蚀和变形情况，对外板换新或认为有必要时，应对双壳舱口盖的内部结构进行测厚，如果测量厚度小于 t_{net}，内部结构应要求换新。

第 13 节　散装货船协调附加标志与相应设计装载工况

8.13.2.2 改为：

“8.13.2.2　8.13.4 所列工况应按规范要求校核总纵强度、局部强度，并满足压载舱布置和稳性要求，其中总纵强度应满足本篇第 2 章第 2 节要求和第 8 章第 9 节要求。8.13.5 所列工况应按规范要求校核局部强度，货舱区域主要构件应用直接计算方法进行强度计算，直接计算应符合本社《散货船结构强度直接计算指南》的要求。”

Section 15 ORE CARRIERS

The existing paragraph 8.15.4.6 is replaced by the following:

"8.15.4.6 Direct calculations are to be carried out for the strength of primary members within cargo area."

CHAPTER 9 ROLL ON-ROLL OFF SHIPS

Section 1 GENERAL REQUIREMENTS

The existing paragraph 9.1.2 is replaced by the following:

"**9.1.2 Class notation**

9.1.2.1 Roll on-roll off ships complying with the requirements of this Chapter will be eligible to be assigned one of the following class notations:

(1) Roll on-roll off ships: Ro/Ro ship;

(2) Passenger roll on-roll off ships carrying only road vehicles: Ro-Ro Passenger Ship;

(3) Passenger roll on-roll off ships carrying railway vehicles: Train/Ro-Ro Passenger ship."

The existing paragraph 9.1.3 is replaced by the following:

"**9.1.3 Plans and documents**

9.1.3.1 In addition to the plans and documents required in Section 1, Chapter 2 of this PART, the following plans and documents are also to be submitted to the Society for approval:

(1) Structural arrangements and strength calculations of ramp;

(2) Structural arrangements of bow or stern doors and inner door, and strength calculations of their primary structures, securing and supporting devices;

(3) Structural arrangements and strength calculations of movable platforms, if fitted;

(4) Direct strength calculations for vehicle deck, if available;

(5) Direct calculations of transverse strength for hull."

Section 3 BOW DOORS AND INNER DOORS

The existing paragraph 9.3.1.1(1) is replaced by the following:

"9.3.1.1(1) This Section applies to ro-ro ships and gives requirements for the arrangement, strength and securing of bow doors and inner doors leading to a complete or long forward enclosed superstructure."

The existing paragraph 9.3.1.3 is replaced by the following:

"9.3.1.3 For the purpose of this Chapter:

第 15 节　矿砂船

8.15.4.6 改为：

“8.15.4.6　货舱区域主要构件应用直接计算方法进行强度计算。”

第 9 章　滚装船

第 1 节　一般规定

9.1.2 改为：

“9.1.2　附加标志

9.1.2.1　凡符合本章规定的滚装船，可授予下列附加标志之一：

(1)　滚装船：Ro/Ro ship；

(2)　仅载运公路车辆的客滚船：Ro-Ro Passenger Ship；

(3)　载运铁路车辆的客滚船：Train/Ro-Ro Passenger ship。”

9.1.3　改为：

“9.1.3　图纸资料

9.1.3.1　除本篇第 2 章第 1 节所规定的图纸资料外，还应将下列图纸资料提交本社批准：

(1)　跳板结构图及强度计算书；

(2)　首门或尾门和内门结构图及其主要结构、紧固和支持装置强度计算书；

(3)　如在船上设有升降平台，则还应包括升降平台结构图和强度计算书；

(4)　车辆甲板强度直接计算书（如有时）；

(5)　横向强度直接计算书。”

第 3 节　首门和内门

9.3.1.1（1）改为：

“9.3.1.1（1）　本节要求适用于滚装船。本节对通向完整的或长的船首部封闭上层建筑的首门和内门的布置、强度和紧固提出要求。”

9.3.1.3 改为：

“9.3.1.3　本章的定义如下：

Securing device**:** a device used to keep the door closed by preventing it from rotating about its hinges.

Supporting device, locking devices, ro-ro passenger ship, ro-ro space and special category space are as defined in 1.8.1.6 of Chapter 1 of this PART."

Descriptions for "A_x, A_y and A_Z" in paragraph 9.3.3.1(2) are replaced by the following:

"A_x —— area, in m^2, of the transverse vertical projection of the door between the levels of the bottom of the door and the top of the upper deck bulwark, or between the bottom of the door and the top of the door, including the bulwark, where it is part of the door, whichever is lesser. Where the flare angle of the bulwark is at least 15 degrees less than the flare angle of the adjacent shell plating, the height from the bottom of the door may be measured to the upper deck or to the top of the door, whichever is lesser. In determining the height from the bottom of the door to the upper deck or to the top of the door, the bulwark is to be excluded. See Figure 9.3.3.1(2);

A_y —— area, in m^2, of the longitudinal vertical projection of the door between the levels of the bottom of the door and the top of the upper deck bulwark, or between the bottom of the door and the top of the door, including the bulwark, where it is part of the door, whichever is lesser. Where the flare angle of the bulwark is at least 15 degrees less than the flare angle of the adjacent shell plating, the height from the bottom of the door may be measured to the upper deck or to the top of the door, whichever is lesser. See Figure 9.3.3.1(2);

A_Z —— area, in m^2, of the horizontal projection of the door between the bottom of the door and the top of the upper deck bulwark, or between the bottom of the door and the top of the door, including the bulwark, where it is part of the door, whichever is the lesser. Where the flare angle of the bulwark is at least 15 degrees less than the flare angle of the adjacent shell plating, the height from the bottom of the door may be measured to the upper deck or to the top of the door, whichever is lesser."

The existing paragraph 9.3.4.3(3) is replaced by the following:

"9.3.4.3(3) Scantlings of the primary members are generally to be supported by direct strength calculations in association with the external pressure given in 9.3.3.1(1) of this Section and permissible stresses given in 9.3.2.1 of this Section. Normally, formulae for simple beam theory may be applied to determine the bending stress. Members are to be considered to have simply supported end connections."

The existing paragraph 9.3.6.2(9) is replaced by the following:

"9.3.6.2(9) All load transmitting elements in the design load path, from door through securing and supporting devices into the ship structure, including welded connections, are to be to the same strength standard as required for the securing and supporting devices. These elements include pins, supporting brackets and back-up brackets."

The existing paragraph 9.3.7.2 is replaced by the following:

"9.3.7.2 For indication/monitoring systems of doors, refer to relevant requirements in Section 9, Chapter 2 of PART FOUR."

The existing subparagraphs 9.3.7.2(1) to 9.3.7.2(6) are deleted.

The existing paragraph 9.3.8.1 is replaced by the following:

"9.3.8.1 An Operating and Maintenance Manual for the bow door and inner door is to be provided on board and is to contain necessary information on:

(1) Main particulars and design drawings:

Special safety precautions;

Details of vessel, class, statutory certificates;

Equipment and design loading (for ramps);

Key plan of equipment (doors and ramps);

Manufacturer's recommended testing for equipment;

Description of equipment: bow doors, inner bow doors, bow ramp/doors, side doors, stern doors, central power pack, bridge panel, engine control room panel.

紧固装置：使门保持关闭，防止其绕铰链转动的一种装置。

“支持和锁紧装置、客滚船、滚装处所和特种处所”的定义见本篇第 1 章 1.8.1.6。”

9.3.3.1（2）式中注解改为：

“(2) 式中：A_x —— 门的底平面与上甲板舷墙之间或门底与门顶之间，门的横向垂直投影面积，m^2，取较小者，如果舷墙是门的一部分，则应包括舷墙。如果舷墙的外飘角比相邻舷侧板的外飘角小 15° ，可从门底平面的高度量至上甲板或门顶，取小者。计算门底平面上甲板或门顶高度时，应不包括舷墙，见图 9.3.3.1 (2)；

A_y —— 门的底平面与上甲板舷墙之间或门底与门顶之间，门的纵向垂直投影面积，m^2，取较小者，如果舷墙是门的一部分，则应包括舷墙。如果舷墙的外飘角比相邻舷侧板的外飘角小 15° ，可从门底平面的高度量至上甲板或门顶，取小者，见图 9.3.3.1 (2)；

A_Z —— 门的底平面与上甲板舷墙之间或门底与门顶之间，门的水平投影面积，m^2，取较小者，如果舷墙是门的一部分，则应包括舷墙。如果舷墙的外飘角比相邻舷侧板的外飘角小 15° ，可从门底平面的高度量至上甲板或门顶，取小者，见图 9.3.3.1 (2)；”

9.3.4.3(3) 改为：

“9.3.4.3(3)　主要构件的尺寸通常应按照本节 9.3.3.1 (1) 中给出的外压力和本节 9.3.2.1 中给出的许用应力，由直接计算确定。通常可用两端简支的单跨梁计算弯曲应力。”

9.3.6.2(9) 改为：

“9.3.6.2(9)　在设计载荷的传力路线上，从门经过紧固和支持装置至船体结构，包括焊接连接的所有传力部件的强度水平应与紧固和支持装置相同。传力部件应包括销子和肘板。”

9.3.7.2 改为：

“9.3.7.2　门的指示 / 监控系统见第 4 篇第 2 章第 9 节的有关规定。”

删除 9.3.7.2（1）～ 9.3.7.2（6）。

9.3.8.1 改为：

“9.3.8.1　船上应备有舷门和尾门的操作和维护手册。操作和维护手册应包含下列必要的资料：

(1)　主要数据和设计图纸：

特种安全预警；
船舶、船级和法定证书；
跳板设备和设计载荷；
门和跳板的设备平面图；
制造商建议的设备试验；
设备描述：首门、内门、首跳板 / 门、舷门、尾门、中央电源单元；驾驶室控制屏，机舱控制室控制屏。

(2) Service conditions:

Limiting heel and trim of ship for loading/unloading;

Limiting heel and trim for door operations;

Doors/ramps operating instructions;

Doors/ramps emergency operating instructions.

(3) Maintenance:

Schedule and extent of maintenance;

Trouble shooting and acceptable clearances;

Manufacturer's maintenance procedures.

(4) Register of inspections, including inspection of locking, securing and supporting devices, repairs and renewals.

This Manual is to be submitted to the Society for approval that the above mentioned items are contained in the OMM and that the maintenance part includes the necessary information with regard to inspections, troubleshooting and acceptance/rejection criteria ① ."

A new section 4 is added as follows:

"Section 4 ADDITIONAL REQUIREMENTS FOR PASSENGER RO-RO SHIPS

9.4.1 General requirements

9.4.1.1 This Section applies to passenger ro-ro ships with multi-deck hull.

9.4.1.2 Web frames and deck transverses within the vehicle hold area may be connected with continuous rounded corners or cross joints of bracketless connections, see Figure 9.4.1.2. The radius R of the rounded corners is to be not less than the web depth of web frame or deck transverse, whichever is greater. The web thickness t_3 of the joint of cross connection without brackets (between web frame and deck transverse) is to be not less than the greater of the values obtained by following formulas, nor less than the web thickness of web frame or deck transverse, whichever is greater.

$$t_3 = \frac{1}{k}\left(\frac{\sigma_1 A_1}{dw_2} - \frac{t_2 \tau_2}{100}\right) \quad \text{mm}$$

$$t_3 = \frac{1}{k}\left(\frac{\sigma_2 A_2}{dw_1} - \frac{t_1 \tau_1}{100}\right) \quad \text{mm}$$

where: A_1, A_2 —— section area of faceplate respectively of web frame and deck transverse, in cm^2;

dw_1, dw_2 —— web depth respectively of web frame and deck transverse, in mm;

t_1、t_2 —— web thickness respectively of web frame and deck transverse adjacent to cross connection joint, in mm;

σ_1, σ_2 —— bending stress respectively of web frame and deck transverse adjacent to cross connection joint, in N/mm^2;

τ_1, τ_2 —— shear stress respectively of web frame and deck transverse adjacent to cross connection joint, in N/mm^2;

k —— conversion factor of material of web, see Section 5, Chapter 1 of PART TWO.

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① It is recommended that recorded inspections of the door supporting and securing devices be carried out by the ship's staff at monthly intervals or following incidents that could result in damage, including heavy weather or contact in the region of the shell doors. Any damages recorded during such inspections are to be reported to the Society.

(2) 使用条件：

船舶装 / 卸载时的横倾与纵倾限制；

操作门时的横倾与纵倾限制；

门 / 跳板操作指示；

门 / 跳板应急操作指示；

(3) 维护和功能试验：

维护范围与维护计划；

故障解答；

制造商维护程序；

(4) 检验和修理记录，包括锁门装置、锁紧装置和支承装置的检验、维修和换新。

该手册应提交本社审批，确保上述资料包含在操作和维护手册中，并且维护部分包括维修所需要的信息和故障解答①。”

新增第 4 节：

“第 4 节 客滚船补充规定

9.4.1 一般要求

9.4.1.1 本节规定适用于具有多层甲板结构型式的客滚船。

9.4.1.2 车辆舱的强横梁与强肋骨可采用连续性圆角连接或无肘板交叉连接，见图 9.4.1.2。圆角连接的圆角半径 R 应不小于强横梁和强肋骨腹板高度的较大者。无肘板交叉连接接头（强横梁与强肋骨之间）的腹板厚度 t_3 应不小于按下列两式计算所得之值的较大者，且应不小于强横梁和强肋骨腹板厚度的较大者。

$$t_3 = \frac{1}{k}\left(\frac{\sigma_1 A_1}{dw_2} - \frac{t_2 \tau_2}{100}\right) \quad \text{mm}$$

$$t_3 = \frac{1}{k}\left(\frac{\sigma_2 A_2}{dw_1} - \frac{t_1 \tau_1}{100}\right) \quad \text{mm}$$

式中：A_1、A_2 —— 分别为强肋骨和强横梁的面板的剖面积，cm^2；

dw_1、dw_2 —— 分别为强肋骨和强横梁的腹板高度，mm；

t_1、t_2 —— 分别为邻近交叉连接接头处强肋骨和强横梁的腹板厚度，mm；

σ_1、σ_2 —— 分别为邻近交叉连接接头处强肋骨和强横梁的弯曲应力，N/mm^2；

τ_1、τ_2 —— 分别为邻近交叉连接接头处强肋骨和强横梁的剪应力，N/mm^2；

k —— 腹板的材料换算系数，见本规范第 2 篇第 1 章第 5 节。

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① 建议门支承装置和锁紧装置的维护手册由船长每月记录一次，包括可能导致损坏的事件（恶劣海况、舷侧或尾门的触碰）。上述损坏记录应报告本社。

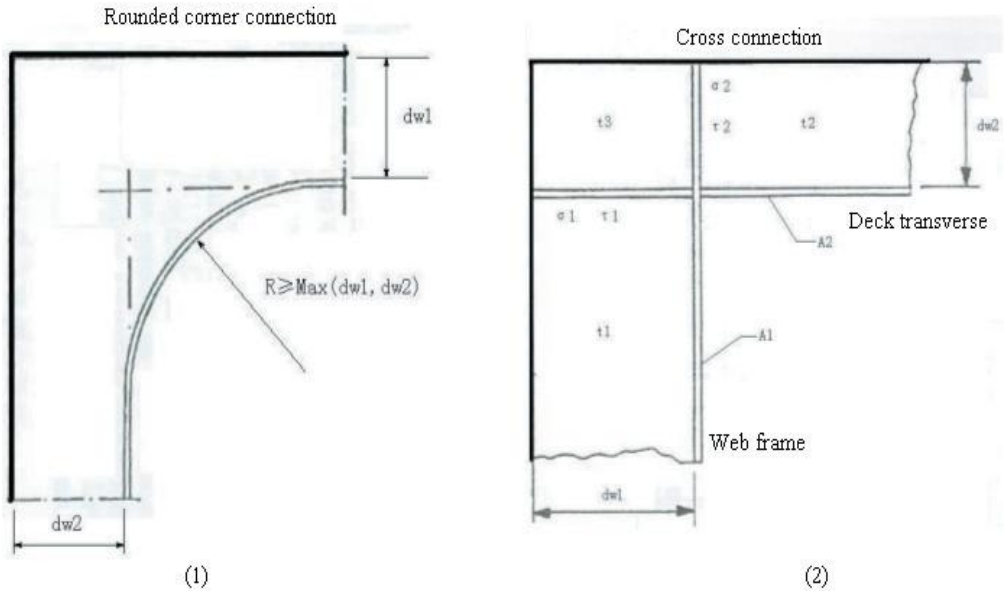


Figure 9.4.1.2

The faceplate of web frame and deck transverse, which are cross-connected without brackets, is to be continuous to and connected with deck plating and side shell.

9.4.1.3 Transverse strength of hull is to be checked in accordance with 9.4.3 of this Section.

9.4.1.4 Where vehicle deck framing is fitted with deck transverses and girders, their scantlings may be determined by direct calculations in accordance with 9.4.3 of this Section.

9.4.1.5 Where large openings are cut in side shell below strength deck and this significantly reduces shear force transmission from side shell to strength deck, the contribution of longitudinal continuous members within the area of strength deck and openings below to the longitudinal strength may be determined by finite element direct calculations.

9.4.1.6 The structure supporting the securing equipment is to be locally strengthened.

9.4.1.7 The scantlings of stabilizing tanks and balancing tanks are to comply with the requirements for deep tanks. The scantlings of those members, which may be subject to sloshing load, are to be increased by 10%.

9.4.2 Scantling requirements

9.4.2.1 When determining the scantlings of primary members of side framing below freeboard deck in accordance with Section 7, Chapter 2 of PART TWO, the design pressure head may be measured to freeboard deck at side.

9.4.2.2 Where superstructure deck is strength deck, the deck structure is to comply with the following:

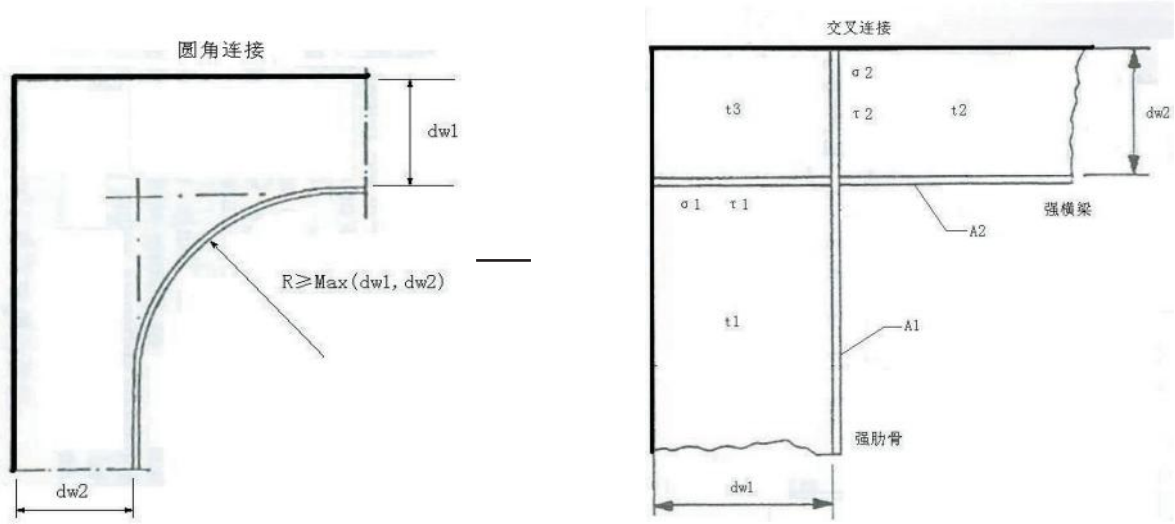
(1) Thickness t of superstructure deck is to be not less than the value obtained as follows:

$$t = 5.5 + 0.02\,L \quad \text{mm}$$

where: L —— length of ship, in m, not to be taken greater than 100m.

The thickness of strength deck not exposed to weather may be 1 mm less than the value obtained above, but the thickness is not to be less than 6 mm in any case.

The framing of superstructure deck is to comply with relevant requirements in Section 8, Chapter 2 of PART TWO.



(1) (2)

图 9.4.1.2

对于无肘板交叉连接的强肋骨和强横梁的面板应保持连续至甲板板和舷侧外板，并与甲板板和舷侧外板连接。

9.4.1.3　应按本节 9.4.3 的规定校核船体的横向强度。

9.4.1.4　当车辆甲板骨架同时设置强横梁和纵桁时，可按 9.4.3 的规定采用直接计算法确定强横梁和纵桁的尺寸。

9.4.1.5　当强力甲板下舷侧外板具有较大的开口时，导致舷侧外板明显降低了向强力甲板传递的剪力，则强力甲板及其以下开口范围内的纵向连续构件对总纵强度的有效性可采用有限元直接计算确定。

9.4.1.6　车辆系固设备与船体结构系固点区域的结构应作相应的局部加强。

9.4.1.7　减摇水舱和平衡水舱的构件尺寸应符合深舱的要求，对可能承受晃动载荷的构件尺寸应增大 10%。

9.4.2　规范计算

9.4.2.1　按本规范第 2 篇第 2 章第 7 节要求确定干舷甲板以下舷侧骨架的主要构件尺寸时，计算压头可量计至干舷甲板边线。

9.4.2.2　上层建筑甲板为强力甲板时，甲板结构应符合下列规定：

（1）　上层建筑甲板厚度 t 应不小于按下式计算所得之值：

$$t = 5.5 + 0.02L \quad \text{mm}$$

式中：L —— 船长，m；计算时取值不必大于 100m。

非露天强力甲板板厚可按上式计算所得之值减薄 1mm，但均不得小于 6mm。

上层建筑甲板骨架应满足本规范第 2 篇第 2 章第 8 节的有关要求。

The structure of superstructure deck is also to comply with the requirements in Section 2, Chapter 2 of PART TWO for section modulus and for buckling strength of deck plating and deck longitudinals in respect to longitudinal strength.

(2) Thickness t of upper continuous deck below superstructure deck is to be not less than the value obtained as follows, but not to be greater than 8 mm:

$$t = 12\,s \quad \text{mm}$$

where: s —— spacing of stiffeners, in m, to be taken not less than standard spacing of members.

The framing of upper continuous deck is to comply with relevant requirements in Section 8, Chapter 2 of PART TWO.

9.4.2.3 Section modulus W and inertial moment I of deck longitudinals or beams within area of deckhouses in accommodation spaces are to be not less than the values obtained as follows:

$$W = 5shl^2 \quad \text{cm}^3\text{, and not less than } 25\,s$$

$$I = 2.3Wl \quad \text{cm}^4$$

Where: s —— spacing of deck longitudinals or beams, in m;

l —— span of deck longitudinals or beams, in m;

h —— design head, in m, taken as 0.45 m and for portions exposed to weather, increased by (h_o-1.2) m where h_o is to be calculated according to 2.8.1.1 of Chapter 2 of PART TWO.

The scantlings of deck girders and transverses within area of deckhouses in accommodation spaces are to be calculated in accordance with relevant requirements in Section 8, Chapter 2 of PART TWO, while the design head is to be taken as 0.45 m and web thickness of deckhouse girders is to be not less than 1% of web depth plus 2 mm, nor less than 4 mm.

For deck framing within area of deckhouses in baggage and storage spaces, calculations are to be in accordance with the requirements in Section 8, Chapter 2 of PART TWO for cargo decks not exposed to weather.

9.4.3 Direct calculations

9.4.3.1 This Section specifies the methods for direct calculations of deck transverse and girder strength of vehicle deck framing and transverse strength of hull structure.

9.4.3.2 Where there are two or more tyre prints on one panel of vehicle deck plating and vehicle-loaded inner bottom, the thickness of plating may be determined by finite element direct calculations.

9.4.3.3 Design load

① Acceleration of ship motion

(A) Rolling period and rolling angle of ship motion are to be calculated as follows:

(a) Rolling period T_R is to be calculated as follows:

$$T_R = 2k_r / \sqrt{GM} \quad \text{s}$$

where: k_r —— radius of gyration for rolling, in m, to be evaluated as follows if no specific values available:

$$k_r = 0.39B$$

where: B — breadth of ship, in m;

上层建筑甲板结构还应满足本规范第 2 篇第 2 章第 2 节总纵强度的剖面模数要求以及甲板板和甲板纵骨的屈曲强度要求。

（2） 上层建筑甲板以下的上层连续甲板厚度 t 应不小于按下式计算所得之值，但不必大于 8mm：

$$t = 12s \quad \text{mm}$$

式中：s —— 骨材间距，m；计算时取值应不小于骨材的标准间距。

上层连续甲板骨架应满足本规范第 2 篇第 2 章第 8 节的有关要求。

9.4.2.3 居住处所的甲板室甲板纵骨或横梁剖面模数 W 和惯性矩 I 应不小于按下列各式计算所得之值：

$$W = 5shl^2 \quad \text{cm}^3\text{，且不小于 } 25s$$
$$I = 2.3Wl \quad \text{cm}^4$$

式中：s —— 甲板纵骨或横梁间距，m；
l —— 甲板纵骨或横梁跨距，m；
h —— 计算压头，m，取 0.45m，对露天部分尚应增加 $(h_o - 1.2)$m，其中 h_o 按本规范第 2 篇第 2 章 2.8.1.1 计算。

居住处所的甲板室甲板纵桁和强横梁尺寸按本规范第 2 篇第 2 章第 8 节的有关要求计算，但计算压头取 0.45m，甲板室纵桁的腹板厚度应不小于其腹板高度的 1% 加 2mm，且应不小于 4mm。

对于行李和储藏处所的甲板室甲板骨架按本规范第 2 篇第 2 章第 8 节的非露天货物甲板的要求计算。

9.4.3 直接计算

9.4.3.1 本条规定了车辆甲板骨架的强横梁和纵桁以及船体结构横向强度的直接强度计算方法。

9.4.3.2 当车辆甲板板和装载车辆内底板的板格上有两个及以上轮印时，可采用有限元直接强度计算法确定板厚。

9.4.3.3 设计载荷：

① 船舶运动加速度：

(A) 船舶运动时的摇摆周期和摇摆角应按下列各式计算：

(a) 横摇周期 T_R 应按下式计算：

$$T_R = 2k_T / \sqrt{GM} \quad \text{s}$$

式中：k_T —— 横摇转动半径，m，没有确切数值时，可按下式估算：

$$k_T = 0.39B$$

其中：B —— 船宽，m；

GM — initial metacentric height under full load departure condition, in m, to be evaluated as follows if no specific values available:

$$GM = 0.07B$$

where: *B* — breadth of ship, in m.

(b) Maximum rolling angle is to be calculated as follows, but not to be greater than 0.523:

$$\varphi_m = k\frac{62.5 - 1.25T_R}{B + 75} \quad \text{rad}$$

where: T_R — see (A)(a);

B — breadth of ship, in m;

k — coefficient, to be taken as follows:

k = 1.2 for ships without bilge keel;

k = 1.0 for ships with bilge keel;

k = 0.8 for ships with stabilizers.

(c) Pitching period T_P is to be calculated as follows:

$$T_P = 1.80\sqrt{L/10} \quad \text{sec}$$

where: *L* — length of ship, in m.

(d) Maximum pitching angle Ψ_m is to be calculated as follows, not to be greater than 0.14:

$$\Psi_m = 0.25a_0/C_b \quad \text{rad}$$

where: C_b — block coefficient;

a_0 — acceleration factor, to be calculated as follows:

$$a_0 = 3SC/L + C_V V/\sqrt{L}$$

where: $C_V = \sqrt{L}/50$, not to be greater than 0.2;

L — length of ship, in m;

V — speed, in knot;

C — coefficient, to be taken as follows:

$C = 0.0412L + 4$ for $L < 90$ m;

$C = 10.75 - \left[\frac{(300 - L)}{100}\right]^{1.5}$ for 90 m ≤ *L* ≤ 300 m;

S — service coefficient, to be taken as follows:

S = 0.95 for great coastal service;

S = 0.90 for coastal service;

S = 0.85 for sheltered water service.

(B) Acceleration of ship motion is to be calculated as follows:

GM —— 满载出港工况下的初稳性高度，没有确切数值时，可按下式估算：

$$GM = 0.07B$$

其中：B —— 船宽，m。

(b) 最大横摇角φ_m应按下式计算，但不得大于 0.523：

$$\varphi_m = k\frac{62.5 - 1.25T_R}{B+75} \quad \text{rad}$$

式中：T_R —— 见 (A)(a)；
B —— 船宽，m；
k —— 系数，应按下列各式取值：
k = 1.2　无舭龙骨的船舶；
k = 1.0　有舭龙骨的船舶；
k = 0.8　具有减摇装置的船舶。

(c) 纵摇周期T_P应按下式计算：

$$T_P = 1.80\sqrt{L/10} \quad \text{sec}$$

式中：L —— 船长，m。

(d) 最大纵摇角ψ_m应按下式计算，但不得大于 0.14：

$$\psi_m = 0.25a_0/C_b \quad \text{rad}$$

式中：C_b —— 方形系数；
a_0 —— 加速度系数，应按下式计算：

$$a_0 = 3SC/L + C_V V/\sqrt{L}$$

其中：$C_V = \sqrt{L}/50$，取不大于 0.2；
L —— 船长，m；
V —— 航速，knot；
C —— 系数，应按下列各式计算：

$$C = 0.0412L + 4 \qquad \text{当 } L < 90\text{m 时；}$$

$$C = 10.75 - \left[\frac{(300-L)}{100}\right]^{1.5} \qquad \text{当 } 90\text{m} \leqslant L \leqslant 300\text{m 时；}$$

S —— 航区系数，应按下列各式取值：
S = 0.95，近海航区；
S = 0.90，沿海航区；
S = 0.85，遮蔽航区。

(B) 船舶运动时的加速度应按下列各式计算：

(a) Sway acceleration a_y is to be calculated as follows:

$$a_y = 3a_0 \quad \mathrm{m/s^2}$$

where: a_0 — see (A)(d).

(b) Heave acceleration a_z is to be calculated as follows:

$$a_z = 7a_0/\sqrt{C_b} \quad \mathrm{m/s^2}$$

where: a_o ,C_b — see (A)(d).

(c) Rolling angular acceleration a_r is to be calculated as follows:

$$a_r = \varphi_m (6.28/T_R)^2 \quad \mathrm{rad/s^2}$$

where: T_R — rolling period, in sec, to be calculated according to (A)(a);

φ_m — maximum rolling angle, in rad, to be calculated according to (A)(b).

(d) Pitching angular acceleration a_p is to be calculated as follows:

$$a_p = \psi_m (6.28/T_p)^2 \quad \mathrm{rad/s^2}$$

where: T_p — pitching period, in sec, to be calculated according to (A)(c);

ψ_m — maximum pitching angle, in rad, to be calculated according to (A)(d).

(e) Transverse composite acceleration a_t is to be calculated as follows:

$$a_t = \sqrt{a_y^2 + \left[a_r (z - z_{rp}) + 10 \sin \varphi_m\right]^2} \quad \mathrm{m/s^2}$$

where: a_y — sway acceleration, see (B)(a);
a_r — rolling angular acceleration, see (B)(c);
φ_m — maximum rolling angle, see (A)(b);
z — vertical distance from the point considered to baseline;
z_{rp} — vertical distance from axis of gyration for rolling and that for pitching to baseline, to be obtained by following two formulas, whichever is less:

$$z_{rp1} = \frac{D}{4} + \frac{d}{2} \quad \mathrm{m}$$

$$z_{rp2} = \frac{D}{2} \quad \mathrm{m}$$

where: D — moulded depth, in m;
d — draught, in m.

(f) Vertical composite acceleration a_v is to be obtained by following two formulas, whichever is greater:

(a) 横荡加速度 a_y 应按下式计算：

$$a_y = 3a_0 \quad \text{m/s}^2$$

式中：a_0 见 (A)（d)。

（b） 升沉加速度 a_z 应按下式计算：

$$a_z = 7a_0/\sqrt{C_b} \quad \text{m/s}^2$$

式中：a_0 、C_b 见 (A)、(d)。

（c） 横摇角加速度 a_r 应按下式计算：

$$a_r = \varphi_m (6.28/T_R)^2 \quad \text{rad/s}^2$$

式中：T_R —— 横摇周期，s，按 (A)（a）计算；
φ_m —— 最大横摇角，rad，按 (A)（b）计算。

（d） 纵摇角加速度 a_p 应按下式计算：

$$a_p = \psi_m (6.28/T_p)^2 \quad \text{rad/s}^2$$

式中：T_p —— 纵摇周期，s，按 (A)（c）计算；
ψ_m —— 最大纵摇角，rad，按 (A)（d）计算。

（e） 横向合成加速度 a_t 应按下式计算：

$$a_t = \sqrt{a_y^2 + \left[a_r (z - z_{rp}) + 10 \sin \varphi_m\right]^2} \quad \text{m/s}^2$$

式中：a_y —— 横荡加速度，见 (B)（a)；
a_r —— 横摇角加速度，见 (B)（c)；
φ_m —— 最大横摇角，见 (A)（b)；
z —— 计算点到基线的垂向距离；
z_{rp} —— 横摇转动轴和纵摇转动轴到基线的垂直距离，应按下列两式计算，取小者：

$$z_{rp1} = \frac{D}{4} + \frac{d}{2} \quad \text{m}$$

$$z_{rp2} = \frac{D}{2} \quad \text{m}$$

其中：D —— 型深，m;
d —— 吃水，m。

（f） 垂向合成加速度 a_v 应按下列两式计算，取大者：

$$a_{v1} = \sqrt{a_z^2 + a_r^2 y^2} \qquad \text{m/s}^2;$$

$$a_{v2} = \sqrt{a_z^2 + a_p^2 (x - 0.45L)^2} \qquad \text{m/s}^2;$$

where: a_z — heave acceleration, see (B)(b);

a_r — rolling angular acceleration, see (B)(c);

a_p — pitching angular acceleration, see (B)(d);

x — longitudinal distance from the point considered to AP, in m;

y — transverse distance from the point considered to longitudinal centreline, in m;

L — length of ship, in m.

② For direct strength calculation of vehicle deck structure, the design load P_v of deck is to be calculated as follows:

$$P_v = (g + 0.5a_v)M \quad \text{kN}$$

where: g — acceleration due to gravity, 9.81 m/s^2;

a_v — vertical composite acceleration, in m/s^2, see ① (B)(f);

M — mass of vehicle considered, in t.

③ For direct calculation of transverse strength, the ship is assumed to heel to maximum heeling angle and the designe load of each tier of decks is to be calculated as follows:

(A) Vertical load P_v and transverse load P_t of vehicle deck are to be respectively calculated as follows:

$$P_v = (gCos\varphi_m + 0.5a_v)M \quad \text{kN}$$

$$P_t = (g\,Sin\varphi_m + 0.5a_t)M \quad \text{kN}$$

where: g — acceleration due to gravity, 9.81 m/s^2;

φ_m — maximum heeling angle, see (A)(b);

a_v — vertical composite acceleration, in m/s^2, see ① (B)(f);

a_t — transverse composite acceleration, in m/s^2, see ① (B)(e);

M — mass of vehicle considered, in t.

(B) Vertical load p_v and transverse load p_t of superstructure deck and deckhouse deck are to be respectively calculated as follows:

$$p_v = 0.35(g\,Cos\varphi_m + 0.5a_v) \quad \text{kN/m}^2$$

$$p_t = 0.35(g\,Sin\varphi_m + 0.5a_t) \quad \text{kN/m}^2$$

where: g — acceleration due to gravity, 9.81 m/s^2;

φ_m — maximum heeling angle, see (A)(b);

a_v — vertical composite acceleration, in m/s^2, see ① (B)(f);

a_t — transverse composite acceleration, in m/s^2, see ① (B)(e).

9.4.3.4 Model for calculation

2- or 3-dimensional beam model or plate/beam model may be used for direct calculations, and the extent of model is usually based on the following principles:

$$a_{v1} = \sqrt{a_z^2 + a_r^2 y^2} \qquad m/s^2;$$

$$a_{v2} = \sqrt{a_z^2 + a_p^2 (x - 0.45L)^2} \qquad m/s^2;$$

式中：a_z —— 升沉加速度，见 (B) (b)；
a_r —— 横摇角加速度，见 (B) (c)；
a_p —— 纵摇角加速度，见 (B) (d)；
x —— 计算点到尾垂线的纵向距离，m；
y —— 计算点到纵中剖面的横向距离，m；
L —— 船长，m。

② 车辆甲板结构强度直接计算时，甲板设计载荷 P_v 应按下式计算：

$$P_v = (g + 0.5a_v)M \qquad kN$$

式中：g —— 重力加速度，9.81 m/s^2；
a_v —— 垂向合成加速度，m/s^2，见① (B)(f)；
M —— 计入的车辆质量，t。

③ 横向强度直接计算时，假定船舶横倾至最大横摇角，各层甲板设计载荷按下列各式计算：

(A) 车辆甲板载荷为垂向载荷 P_v 和横向载荷 P_t，应分别按下式计算：

$$P_v = (gCos\varphi_m + 0.5a_v)M \qquad kN$$

$$P_t = (gSin\varphi_m + 0.5a_t)M \qquad kN$$

式中：g —— 重力加速度，9.81 m/s^2；
φ_m —— 最大横摇角，见 (A)(b)；
a_v —— 垂向合成加速度，m/s^2，见① (B)(f)；
a_t —— 横向合成加速度，m/s^2，见① (B)(e)；
M —— 计入的车辆质量，t。

（B） 上层建筑和甲板室的甲板载荷为垂向载荷 p_v 和横向载荷 p_t，应分别按下式计算：

$$p_v = 0.35(gCos\varphi_m + 0.5a_v) \qquad kN/m^2$$

$$p_t = 0.35(gSin\varphi_m + 0.5a_t) \qquad kN/m^2$$

式中：g —— 重力加速度，9.81 m/s^2；
φ_m —— 最大横摇角，见 (A)(b)；
a_v —— 垂向合成加速度，m/s^2，见① (B)(f)；
a_t —— 横向合成加速度，m/s^2，见① (B)(e)；

9.4.3.4 计算模型

直接计算模型可采用二维或三维梁系或板梁组合模型，模型范围通常按以下原则选取：

① Vehicle deck structure: Girders and transverses of the vehicle deck are to be taken as main objects of analysis, covering at least half the longitudinal length of the deck. Alternatively, a typical portion of the deck structure may be taken for modelling according to specific conditions of load distribution, deck structure and its supporting structure (e.g. pillars, bulkheads). Regardless of the length of the model, the whole tier of deck is to be considered for selection of load.

② Transverse strength: Primary members of the deck and their supporting structures (e.g. pillars, bulkheads, side structures and transverse webs) are to be taken as main objects of analysis, covering at least in longitudinal direction all tiers of decks and their supporting structures starting from midpoint between baseline and bulkhead deck to the uppermost deck, in transverse direction the entire breadth of ship, and in vertical direction at least the length of 5 strength frame rings or one design length of a vehicle amidships, whichever is greater.

9.4.3.5 Boundary conditions

For constraining of boundary conditions, the main objects of analysis are to be determined at first. Appropriate boundary constraints are then to be given according to the forces acting on the structure and the structural deformation, as follows:

① To minimize the effects of boundary constraint on the results of vehicle deck structure strength calculation, the boundary conditions are preferably to be applied at a suitable distance above and/or below vehicle deck plane. For the fore and aft end planes of the model, the displacement in longitudinal direction and the rotation about the coordinate axis perpendiculr to longitudinal direction are to be taken as zero.

② To minimize the effects of boundary constraint on the results of transverse strength calculation, the boundary conditions are preferably to be applied at a sufficient distance below bulkhead deck (generally at midpoint between baseline and bulkhead deck). For the fore and aft end planes of the model, the displacement in longitudinal direction and the rotation about the coordinate axis perpendiculr to longitudinal direction are to be taken as zero.

9.4.3.6 Permissible stress

① 2- or 3-dimensional beam model:

Permissible bending stress $[\sigma]$ is to be:

$[\sigma] = 165/k$, in N/mm^2, for primary transverse members, $[\sigma]$ may be taken as $180/k$, in N/mm^2;

Permissible shear stress $[\tau]$ is to be:

$[\tau] = 94/k$, in N/mm^2;

where: k — conversion factor of material, to be taken according to Table 1.5.1.4 of PART TWO;

σ — bending stress, in N/mm^2;

τ — shear stress, in N/mm^2.

② Plate/beam model:

Permissible shear stress $[\tau]$ is to be:

$[\tau] = 94/k$, N/mm^2;

Permissible equivalent stress $[\sigma_e]$ is to be:

$$[\sigma_e] = \sqrt{\sigma_x^2 + \sigma_y^2 + \sigma_x\sigma_y + 3\tau_{xy}^2} = 180/k \quad \text{N/mm}^2$$

where: k — conversion factor of material, to be taken according to Table 1.5.1.4 of PART TWO;

σ_x — normal stress of the element in X direction under plane stress, in N/mm^2;

σ_y — normal stress of the element in Y direction under plane stress, in N/mm^2;

τ_{xy} — shear stress of the element in X direction under plane stress, in N/mm^2.

① 车辆甲板结构：以车辆甲板的纵桁和强横梁作为主要分析对象，纵向应至少取二分之一的甲板长度，也可根据载荷分布、甲板结构及其支撑结构（如支柱、舱壁等）的具体情况，选择某一段典型的甲板结构计算模型。无论模型长度如何，载荷选取应考虑整层甲板范围。

② 横向强度：以甲板的主要构件及其支持结构（如支柱、舱壁、舷侧结构以及横向强框架等）的主要构件作为主要的分析对象，模型范围至少应包括：垂向为基线与舱壁甲板之间的中点处至舱壁甲板以上的各层甲板及其支持结构；横向取整个船宽；纵向在船中处至少取 5 档强框架长度或一个设计车长，取大者。

9.4.3.5 边界条件：

对于边界条件的约束处理首先应明确主要的分析对象，并根据结构的受力及变形特点给出适当的边界约束：

① 车辆甲板结构强度计算时，为尽量减少边界约束对车辆甲板结构强度计算结果的影响，边界条件宜施加在距车辆甲板平面之上和 / 或之下的适当距离处。对于模型的前后端面，垂直于端面方向的线位移为零，绕端面内两坐标轴的角位移为零；

② 横向强度计算时，为尽量减少边界约束对横向强度计算结果的影响，边界条件宜施加在舱壁甲板以下足够远的距离处（一般取基线与舱壁甲板之间的中点处），对于模型的前后端面，垂直于端面方向的线位移为零，绕端面内两坐标轴的角位移为零。

9.4.3.6 许用应力：

① 二维或三维梁系模型：

许用弯曲应力 $[\sigma]$ 为：

$[\sigma] = 165/k$，N/mm^2, 但对横向主要构件取 180/k,N/mm^2；

许用剪切应力 $[\tau]$ 为：

$[\tau] = 94/k$，N/mm^2；

式中：k —— 材料换算系数，按 CCS《钢规》第 2 篇表 1.5.1.4 选取；
σ —— 弯曲应力，N/mm^2；
τ —— 剪切应力，N/mm^2。

② 板梁组合模型：

许用剪切应力 $[\tau]$ 为：

$[\tau] = 94/k$，N/mm^2；

许用相当应力 $[\sigma_e]$ 为：

$$[\sigma_e] = \sqrt{\sigma_x^2 + \sigma_y^2 + \sigma_x\sigma_y + 3\tau_{xy}^2} = 180/k \quad \text{N/mm}^2$$

式中：k —— 材料换算系数，按 CCS《钢规》第 2 篇表 1.5.1.4 选取；
σ_x —— 平面应力状态下结构任一点 X 坐标方向的正应力，N/mm^2；
σ_y —— 平面应力状态下结构任一点 Y 坐标方向的正应力，N/mm^2；
τ_{xy} —— 平面应力状态下结构任一点 X 坐标方向的剪切应力，N/mm^2。

9.4.4 Train deck

9.4.4.1 Rails on the deck are to be fitted in way of deck girders. Rails are not considered in strength calculation.

9.4.4.2 Where jacks are used to secure trains, the supporting points of the jacks are to be arranged as far as practicable in way of primary supporting members of the deck structure, otherwise the structure in this area is to be locally strengthened.

9.4.4.3 The thickness of deck plating is to be in accordance with relevant requirements in Section 4, Chapter 2 of PART TWO.

9.4.4.4 The longitudinals or beams of deck framing are to be in accordance with relevant requirements in Section 8, Chapter 2 of PART TWO.

9.4.4.5 The girders and transverses of deck framing are to be in accordance with relevant requirements in Section 21, Chapter 2 of PART TWO, taking into account the load of train wheels and the concentrated static load at supporting points of lifting jacks respectively.

Where the deck framing is fitted with transverses and girders, their scantlings may be determined by direct calculations in accordance with 9.4.3 of this Section.

9.4.4.6 Where the train deck is intended to carry road vehicles, relevant requirements in Section 21, Chapter 2 of PART TWO and in this Section for vehicle decks are to be complied with."

A new Section 5 is added as follows:

"Section 5 VEHICLE RAMP

9.5.1 The structural strength of vehicle ramp is to comply with the relevant requirements of Chapter 2, PART TWO of the Rules.

9.5.2 The strength of ramp framing is to be checked in accordance with the following requirements:

(1) The ramp is in a lowered position;

(2) The design vehicle load multiplied by coefficient 1.1 is the load acting on the ramp at its worst position and the mass of the ramp is also to be considered at the same time;

(3) Allowable bending stress $[\sigma] = 141/k$, N/mm^2, where k being the conversion factor of materials, see 1.5.1.4 of Chapter 1 of this PART; allowable deflection $[f] = l/400$ mm, l being the distance between the supporting points of frames, in mm.

9.5.3 The connecting hinges of vehicle ramps are to comply with the following requirements:

(1) The diameter d of axial pin for hinges is to comply with the following:

$$d \geqslant \sqrt{\frac{1.27F}{[\tau]}} \text{ mm}$$

(2) The size of central eye plate for hinges are to comply with the following:

$$\frac{F}{b_o t_o} \leqslant [\tau], \ b_o \geqslant d$$

(3) The size of eye plates on both sides for hinges are to comply with the following:

$$\frac{F}{2t_1 t_2} \leqslant [\tau], \ t_1 \geqslant d/2$$

9.4.4　铁路车辆甲板

9.4.4.1　甲板上的路轨应设置在甲板纵桁处，强度计算时不应计入路轨。

9.4.4.2　采用起重器对火车车辆进行系固时，起重器的支撑点应尽量布置在甲板结构的主要支撑构件上，否则该区域的结构应作相应的局部加强。

9.4.4.3　甲板板厚应符合本规范第 2 篇第 2 章第 4 节的有关要求。

9.4.4.4　甲板骨架的纵骨或横梁应符合本规范第 2 篇第 2 章第 8 节的有关规定。

9.4.4.5　甲板骨架的纵桁和强横梁应符合本规范第 2 篇第 2 章第 21 节有关规定，其中应分别考虑火车车轮载荷和起重器支撑点的集中静载荷。

当甲板骨架同时设置强横梁和纵桁时，可按本节 9.4.3 的规定采用直接计算法确定强横梁和纵桁的尺寸。

9.4.4.6　若火车车辆甲板拟载运公路车辆时，尚应符合本规范第 2 篇第 2 章第 21 节以及本节对车辆甲板的有关规定。”

新增第 5 节：

“第 5 节　车辆跳板

9.5.1　车辆跳板的结构强度应符合本规范第 2 篇第 2 章对车辆甲板的相关规定。

9.5.2　车辆跳板的骨架尚应按如下要求进行强度校核：

（1）　跳板处于放下状态；

（2）　设计的车辆负荷乘上 1.1 的系数以最不利的位置作用于跳板上，同时考虑跳板的自身重量负荷；

（3）　许用弯曲应力为：$[\sigma]=141/k$, N/mm², 其中 k 为材料换算系数，见本篇第 1 章 1.5.1.4；许用挠度为：$[f]=l/400$mm，其中 l 为骨材支撑点之间的距离，mm。

9.5.3　车辆跳板连接铰链应满足如下要求：

（1）　铰链轴销的直径 d 应满足下式：

$$d \geqslant \sqrt{\frac{1.27F}{[\tau]}} \text{ mm}$$

（2）　铰链中心眼板的尺寸应满足下列两式：

$$\frac{F}{b_o t_o} \leqslant [\tau],\ b_o \geqslant d$$

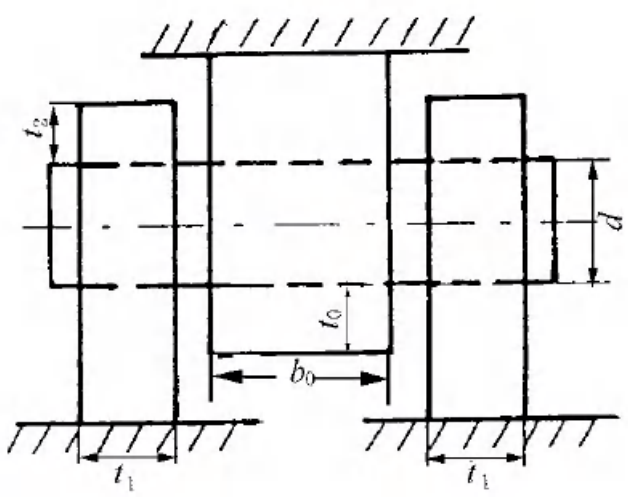
（3）　铰链的两侧眼板的尺寸应满足下列两式：

$$\frac{F}{2t_1 t_2} \leqslant [\tau],\ t_1 \geqslant d/2$$

where: F —— maximum shear force sustained by hinges, in N;

t_1, t_2, b_o, t_o, d —— see Figure 9.5. 3;

$[\tau]$ —— allowable shear stress, to be taken as $[\tau] = 81.6/k$, N/mm^2, where k being the conversion factor of materials, see 1.5.1.4 of Chapter 1 of this PART.



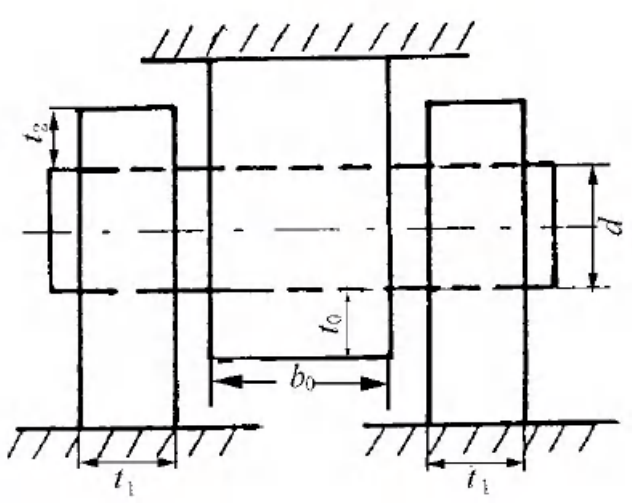
in mm

Figure 9.5.3”

式中：F —— 铰链承受的最大剪切力，N；

t_1、t_2、b_o、t_o、d —— 见图 9.5.3；

［τ］—— 许用剪切应力，取［τ］= 81.6/k, N/mm², 其中 k 为材料换算系数，见本篇第 1 章 1.5.1.4。



单位 mm

图 9.5.3

PART THREE MACHINERY INSTALLATIONS

CHAPTER 1 GENERAL PROVISIONS

Section 1 GENERAL REQUIREMENTS

The existing paragraph 1.1.6.1 is replaced by the following:

"1.1.6.1 In order to maintain sufficient manoeuvrability and secure control of the ship in all normal circumstances, the main propulsion machinery is to be capable of reversing the direction of thrust so as to bring the ship to rest from the maximum service speed."

The existing paragraph 1.1.6.2 is replaced by the following:

"1.1.6.2 The main propulsion machinery is to be capable of maintaining in free route astern at least 70% of the ahead revolutions for a period of at least 30 min. Where steam turbines are used for main propulsion machinery, they are to be capable of maintaining in free route astern at least 70% of the ahead revolutions for a speed of at least 15 min. However, the astern trial is to be limited to 30 min or in accordance with manufacturer's recommendation to avoid the overheating of the turbine due to the effects of "windage" and friction."

The existing paragraph 1.1.8.1 is replaced by the following:

"1.1.8.1 Ship's machinery is to be so arranged that it can be brought into operation from the dead ship condition using only the facilities available on board without the assistance from the outside.

Dead ship condition is to be understood to mean a condition under which the main propulsion plant, boilers and auxiliaries are not in operation and in restoring the propulsion, no stored energy for starting and operating the propulsion plant, the main source of electrical power and other essential auxiliaries is assumed to be available.

Where the emergency source of power is an emergency generator which complies with the Rules, this generator may be used for restoring operation of the main propulsion plant, boilers and auxiliaries where any power supplies necessary for engine operation are also protected to a similar level as the starting arrangements.

Where there is no emergency generator installed or an emergency generator does not comply with the Rules, the arrangements for bringing main and auxiliary machinery into operation are to comply with the requirements of 9.5.1 of Section 5, Chapter 9 of this PART.

The arrangements for bringing main and auxiliary machinery into operation are to have capacity such that the starting energy and any power supplies for engine operation are available within 30 min of a dead ship condition."

CHAPTER 2 PUMPING AND PIPING SYSTEMS

Section 2 CARBON AND LOW-ALLOY STEELS

A new paragraph "2.2.5 Mechanical joints" is added as follows:

"2.2.5 Mechanical joints

2.2.5.1 The mechanical joints of the approved type are to be shown in Table 2.2.5.1(1). Their application is to comply with the provisions of Table 2.2.5.1(2) and Table 2.2.5.1(3).

2.2.5.2 Construction of mechanical joints is to prevent the possibility of tightness failure affected by pressure pulsation, piping vibration, temperature variation and other similar adverse effects occurring during operation on board.

2.2.5.3 Material of mechanical joints is to be compatible with the piping material and internal and external media.

第3篇 轮机

第1章 通 则

第1节 一般规定

1.1.6.1修改为：

“1.1.6.1 为了保证船舶在任何正常情况下具有足够的机动性和安全可靠的控制性，主推进系统应能倒车运转，并能使船舶从最大的服务航速开始倒车制动到静止。”

1.1.6.2修改为：

“1.1.6.2 主推进机械应能以70%正车额定转速倒车自由航行至少30min。汽轮机主推进机械应能以70%正车额定转速倒车自由航行至少15min，但航行试验时，此时间可限制在30min之内或按制造厂推荐的时间进行，以避免由于“鼓风磨擦”引起的过热。”

1.1.8.1修改为：

“1.1.8.1 船舶机械设备的布置应能使其在没有外来帮助的情况下只通过船上可用的设备使其从“瘫船”状态达到运转的目的。

“瘫船”状态是指主推进装置、锅炉和辅机已停止运行，且在恢复推进的过程中，假定已没储存的能源能起动和运行推进装置、主发电机和其他重要的辅机的状态。

如应急动力源是一台满足本规范要求的应急发电机，则这台发电机可用于恢复主推进装置、锅炉和辅机的运行，但为发动机运行所必需的任何动力供应源应加以保护到起动装置的类似水平。

如未安装应急发电机或应急发电机未满足本规范的要求，则使主辅机械进入运转的布置应满足本篇第9章第5节9.5.1的要求。

使主辅机械进入运转的配置应有足够的容量，以便起动能量或为发动机运行的任何动力源在瘫船状态30 min内可用。”

第2章 泵与管系

第2节 碳钢与低合金钢

新增2.2.5机械接头

“2.2.5 机械接头

2.2.5.1 认可型的机械接头图示于表2.2.5.1(1)中。它们的应用应符合表2.2.5.1(2)和表2.2.5.1(3)的规定。

2.2.5.2 机械接头的结构应能防止其装船后因压力脉动、管路振动、温度变化和其他类似不利影响的产生而引起的密封失效。

2.2.5.3 机械接头的材料应与管系材料和内外介质相容。

2.2.5.4 The mechanical joints are to be designed to withstand internal and external pressure as applicable and where used in suction lines are to be capable of operating under vacuum.

2.2.5.5 Where the application of mechanical joints results in reduction in pipe wall thickness due to the use of bite type rings or other structural elements, this is to be taken into account in determining the minimum wall thickness of the pipe to withstand the design pressure.

2.2.5.6 Mechanical joints, which in the event of damage could cause fire or flooding, are not to be used in piping sections directly connected to the sea openings or tanks containing flammable fluids. The number of mechanical joints in oil systems is to be kept to a minimum.

2.2.5.7 Mechanical joints in bilge systems of machinery space and higher fire risk space (e.g. cargo pump room and vehicle space) are to be of fire resistant type.

2.2.5.8 Piping in which a mechanical joint is fitted is to be adequately adjusted, aligned and supported. Supports or hangers are not to be used to force alignment of piping at the point of connection.

2.2.5.9 Slip-on joints are not to be used in pipelines in cargo holds, tanks, and other spaces which are not easily accessible. Application of these joints inside tanks may be permitted only for the same media that is in the tanks.

2.2.5.10 Unrestrained Slip-on joints are to be used only in cases where compensation of lateral pipe deformation is necessary. Usage of these joints as the main means of pipe connection is not permitted.

2.2.5.11 Mechanical joints are not to be used in the following cases:

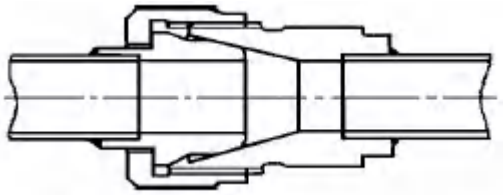
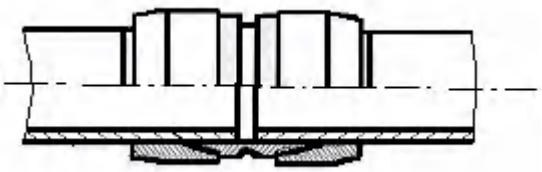
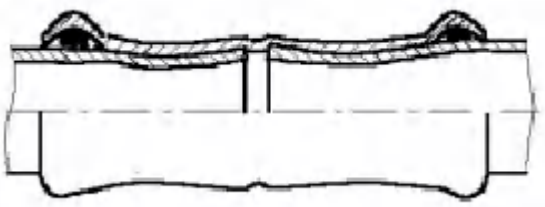
(1) Bilge piping through ballast tanks and fuel tanks;

(2) Sea water and ballast piping (including air and overflow pipes) through cargo holds and fuel tanks;

(3) Fuel and oil piping (including air and overflow pipes) through machinery spaces, cargo holds and ballast tanks;

(4) Non-water filled pressure water spraying systems (dry pipe systems).

Examples of mechanical joints Table 2.2.5.1 (1)

Pipe Unions	
Welded and Brazed Types	
Compression	
Swage Type	
Press Type	

2.2.5.4　机械接头应能承受其内外压力。用于吸入管路的机械接头应能在一定的真空度下正常工作。

2.2.5.5　由于使用咬合环或其他结构元件而导致管壁厚度减小，应在确定设计压力下的最小管壁厚度时予以考虑。

2.2.5.6　在发生破损时会引起火灾或浸水的机械接头，不应直接连接至通海或易燃液体舱的管段上。油路系统中的机械接头的数量应尽可能少。

2.2.5.7　机器处所和高火险处所（如货泵舱和车辆处所）的舱底水系统的机械接头应是耐火型的。

2.2.5.8　具有机械接头的管路应予以适当的调节、校直和支撑。支架或吊架不应用在连接处对管路进行强迫校直。

2.2.5.9　滑套接头应不用于货舱内、液舱内和不易接近的其他处所内的管系。与液舱同种介质的方可在液舱内使用滑套接头（其他机械接头也可使用）。

2.2.5.10　只有当管路的侧向变形需要补偿时，方可使用未受限制的滑套接头。但不应把这种接头作为管路连接的主要方式。

2.2.5.11　机械接头不应用于下列场合：

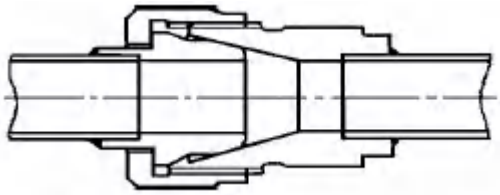
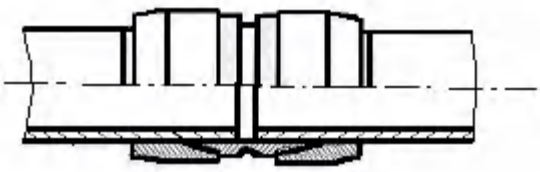
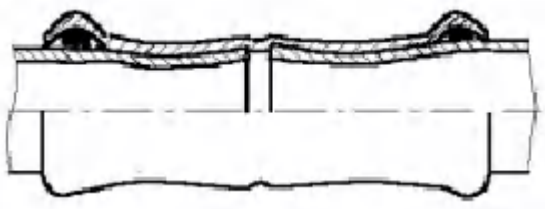
(1)　穿过压载舱和燃料舱的舱底水管系；

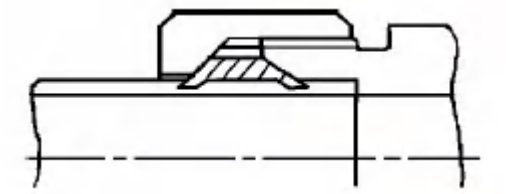
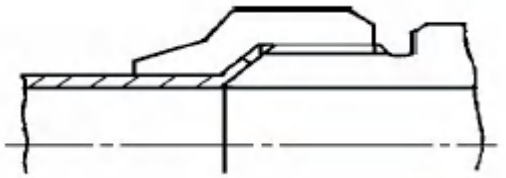
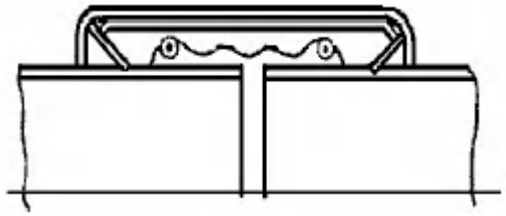
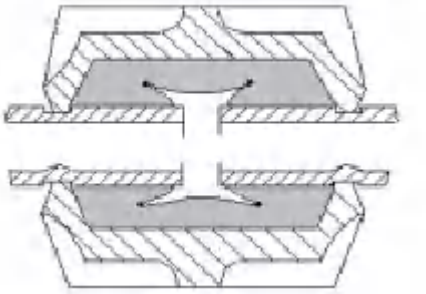
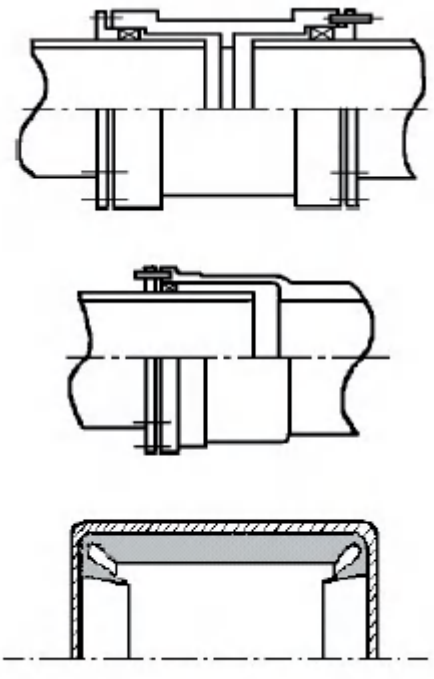
(2)　穿过货舱和燃料舱的海水和压载管系，包括空气和溢流管系；

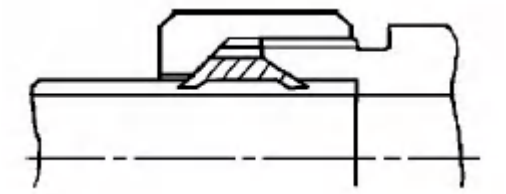
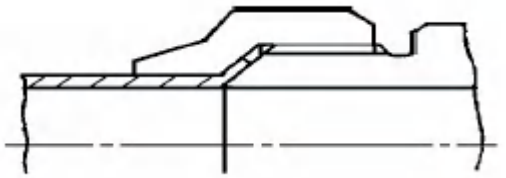
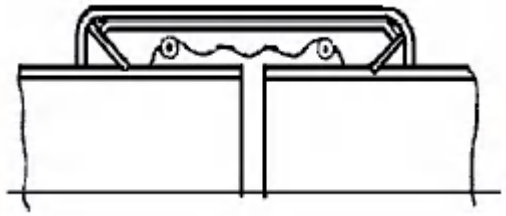
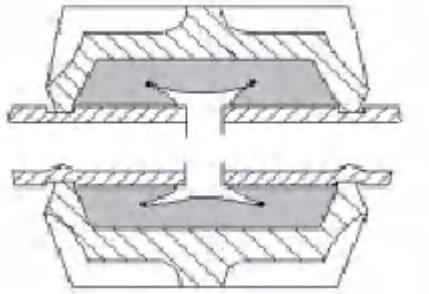
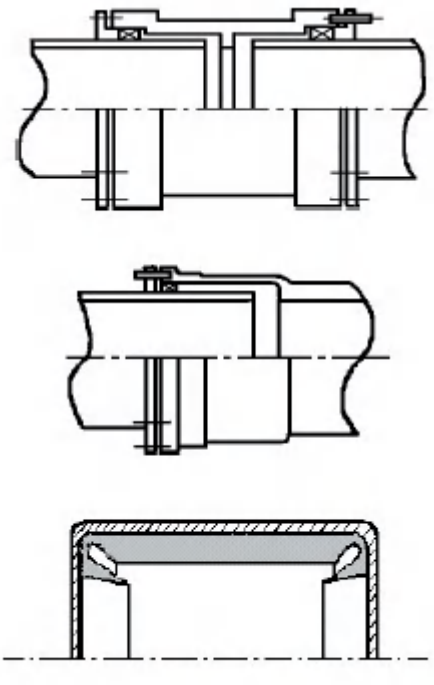
(3)　穿过机器处所、货舱和压载舱的燃料和油类管系，包括空气和溢流管系；

(4)　压力水雾系统中的非注水管（干管系统）。

机械接头举例　　**表 2.2.5.1（1）**

管接头	
电焊和铜焊型	
压力接头	
镦粗型	
压紧型	

Bite Type	
Flared Type	
Slip-on Joints	
Grip Type	
Machine Grooved Type	
Slip Type	

咬合型	
扩管型	
滑套接头	
夹扣型	
机械槽型	
滑动型	

Application of mechanical joints **Table 2.2.5.1 (2)**

Systems		Kind of connections		
		Pipe unions	Compression Couplings ⑥	Slip-on joints
Flammable fluids (Flash point ≤ 60℃)				
1	Cargo oil lines	×	×	× ⑤
2	Crude oil washing lines	×	×	× ⑤
3	Vent lines	×	×	× ③
Inert gas				
4	Water seal effluent lines	×	×	×
5	Scrubber effluent lines	×	×	×
6	Main lines	×	×	× ②⑤
7	Distribution lines	×	×	× ⑤
Flammable fluids (flash point > 60℃)				
8	Cargo oil lines	×	×	× ⑤
9	Fuel oil lines	×	×	× ②③
10	Lubricating oil lines	×	×	× ②③
11	Hydraulic oil	×	×	× ②③
12	Thermal oil	×	×	× ②③
Sea water				
13	Bilge lines	×	×	× ①
14	Fire main and water spray	×	×	× ③
15	Foam system	×	×	× ③
16	Sprinkler system	×	×	× ③
17	Ballast system	×	×	× ①
18	Cooling water system	×	×	× ①
19	Tank cleaning services	×	×	×
20	Non-essential systems	×	×	×
Fresh water				
21	Cooling water system	×	×	× ①
22	Condensate return	×	×	× ①
23	Non-essential system	×	×	×
Sanitary/Drains/Scuppers				
24	Deck drains (internal)	×	×	× ④
25	Sanitary drains	×	×	×
26	Scuppers and discharge (overboard)	×	×	-
Sounding/Vent				
27	Water tanks / Dry spaces	×	×	×
28	Oil tanks (f.p. > 60℃)	×	×	× ②③
Miscellaneous				
29	Starting/Control air	×	×	–
30	Service air (non-essential)	×	×	×
31	Brine	×	×	×
32	CO_2 system ①	×	×	–
33	Steam	×	×	–

Notes:
× Application is allowed;

机械接头的应用 **表 2.2.5.1（2）**

管系		接头类型		
		管接头	压力接头[6]	滑套接头
可燃液体（闪点不大于 60℃）				
1	货油管系	×	×	×[5]
2	原油洗舱管系	×	×	×[5]
3	透气管系	×	×	×[3]
惰性气体				
4	水封排水管系	×	×	×
5	扫舱排放管系	×	×	×
6	惰性气体总管	×	×	×[2][5]
7	惰性气体支管	×	×	×[5]
可燃液体（闪点大于 60℃）				
8	货油管系	×	×	×[5]
9	燃油管系	×	×	×[2][3]
10	滑油管系	×	×	×[2][3]
11	液压油管系	×	×	×[2][3]
12	热油管系	×	×	×[2][3]
海水				
13	舱底水管系	×	×	×[1]
14	消防总管和水雾管	×	×	×[3]
15	泡沫管系	×	×	×[3]
16	喷淋管系	×	×	×[3]
17	压载管系	×	×	×[1]
18	冷却水管系	×	×	×[1]
19	洗舱服务管	×	×	×
20	非重要管系	×	×	×
淡水				
21	冷却水管系	×	×	×[1]
22	冷凝回水管	×	×	×[1]
23	非重要管系	×	×	×
卫生 / 排放 / 疏水				
24	甲板排水管（船内）	×	×	×[4]
25	卫生排放管	×	×	×
26	疏水管和排放管（舷外）	×	×	-
测深 / 透气				
27	湿舱 / 干舱	×	×	×
28	油舱（闪点大于 60℃）	×	×	×[2][3]
其他				
29	启动 / 控制空气管	×	×	-
30	杂用空气管（非重要的）	×	×	×
31	盐水管	×	×	×
32	CO_2 管系[1]	×	×	-
33	蒸汽管	×	×	-

备注：

× 允许使用；

- Application is not allowed;

① Inside machinery spaces of category A - only approved fire resistant types;

② Not inside machinery spaces of category A or accommodation spaces. May be accepted in other machinery spaces provided the joints are located in easily visible and accessible positions;

③ Approved fire resistant types;

④ Above free board deck only;

⑤ In pump rooms and open decks - only approved fire resistant types;

⑥ If Compression Couplings include any components which readily deteriorate in case of fire, they are to be of approved fire resistant type as required for Slip-on joints.

Application of mechanical joints depending upon the class of piping Table 2.2.5.1(3)

Types of joints	Classes of piping systems		
	Class I	Class II	Class III
Pipe unions			
Welded and brazed type	× ($D_0 \leqslant$ 60.3mm)	× ($D_0 \leqslant$ 60.3mm)	×
Compression couplings			
Swage type	×	×	×
Bite type Flared type	× ($D_0 \leqslant$ 60.3mm) × ($D_0 \leqslant$ 60.3mm)	× ($D_0 \leqslant$ 60.3mm) × ($D_0 \leqslant$ 60.3mm)	× ×
Press type	-	-	×
Slip-on joints			
Machine grooved type	×	×	×
Grip type	-	×	×
Slip type	-	×	×

Note:

× Application is allowed;

- Application is not allowed;

D_0 Outer diameter of the pipe.”

CHAPTER 3 SHIP’S PIPING AND VENTILATING SYSTEMS

Section 12 HOLD, BALLAST AND DRY SPACE WATER LEVEL DETECTORS AND AVAILABILITY OF PUMPING SYSTEMS

In the heading, the footnote ① is deleted.

A new paragraph 3.12.1.5 is added as follows:

“3.12.1.5 Draining and pumping capacities required in 3.12.5 are applicable to the bulk carriers[①] whose contract for construction is to be signed on or after 1 January 2005.”

The words “including the arrangement of intrinsically-safe circuit (where fitted);” are added at the end of paragraph 3.12.2.1(1).

The existing paragraph 3.12.2.1(2) is replaced by the following:

“3.12.2.1(2) Dewatering arrangement for all tanks (including ballast tanks) forward of No.1 cargo hold.”

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① This requirement applies to bulk carriers constructed generally with single deck, top-side tanks and hopper side tanks in cargo spaces intended primarily to carry dry cargo in bulk, and includes such types as ore carriers and combination carriers.

- 不允许使用；

① 在 A 类机器处所内，只能使用认可的耐火型式；

② 不在 A 类机器处所或生活处所内，假若连接接头位于易看见和到达的位置，可接受在其他的机器处所内；

③ 认可的耐火型式；

④ 仅适用于干舷甲板以上；

⑤ 泵舱和敞开甲板，仅适用耐火型式；

⑥ 假如压力接头含有任何易受火灾损害的部件，压力接头也应与滑套接头的要求一样，是认可的耐火型式。

管系等级下的机械接头的应用 表 2.2.5.1（3）

接头型式	系统管系等级		
	I 级	II 级	III 级
管接头			
电焊和铜焊型	× ($D_0 \leqslant$ 60.3mm)	× ($D_0 \leqslant$ 60.3mm)	×
压力接头			
镦粗型	×	×	×
咬合型 扩管型	× ($D_0 \leqslant$ 60.3mm) × ($D_0 \leqslant$ 60.3mm)	× ($D_0 \leqslant$ 60.3mm) × ($D_0 \leqslant$ 60.3mm)	× ×
压紧型	-	-	×
滑套接头			
机械槽型	×	×	×
夹扣型	-	×	×
滑动型	-	×	×

备注：

× 允许使用；

- 不允许使用；

D_0 管子外径。

第 3 章 船舶管系与舱室通风系统

第 12 节 货舱、压载舱和干舱的水位探测以及泵系的有效性

标题中的“水位报警”改为“水位探测”，并删除其中的脚注①。

新增 3.12.1.5

“3.12.1.5 对于 3.12.5 所要求的排水与泵吸能力适用于 2005 年 1 月 1 日及以后签订建造合同的散货船①。”

3.12.2.1(1) 最后加上“包括本质安全电路（如设有时）布置图；”

3.12.2.1（2）修改为：

“3.12.2.1（2）第一货舱前方所有舱室（包括压载舱）的排水布置图。”

3.12.3 的标题改为“水位探测”

① 散货船系指货物处所中通常建有单层甲板、顶边舱和底边舱，且主要用于运输散装干货的船舶，包括诸如矿砂船和兼装船等船型。

A new paragraph 3.12.3.1 is added as follows:

"3.12.3.1 Water level detectors installed in cargo holds, ballast tanks and dry spaces are to comply with the relevant standards ① accepted by the Society in addition to the provisions of this Section, and are to be subject to the type approval by the Society."

The existing paragraphs 3.12.3.1 to 3.12.3.4 are renumbered as 3.12.3.2 to 3.12.3.5 respectively.

In the renumbered paragraph 3.12.3.2, the text "The water level detectors are to be fitted in the aft end of the cargo holds." is replaced by "The water level detectors are to be fitted in compliance with the provisions of 3.12.3.11 of this Section."

New paragraphs from 3.12.3.6 to 3.12.3.11 are added as follows:

"3.12.3.6 Detection equipment is to be suitably corrosion resistant for all intended cargoes. Detection equipment includes the sensor and any filter and protection arrangements for the detector installed in cargo holds and other spaces.

3.12.3.7 The part of water level detector system which has circuitry in the cargo area, is to be of an intrinsically safe type complying with i_a class as specified in the standards ② accepted by the Society. Where a ship is designed only for the carriage of cargoes that cannot create a combustible or explosive atmosphere, then the requirement for intrinsically safe circuitry will not to be insisted upon provided that it is specified in Operation Manual of the water level detector system, Ship's Cargo Book and any Certification relating to the carriage of specially identified cargoes.

3.12.3.8 Where intrinsically safe equipment is installed in cargo spaces, it is to be of a certified safe type complying with 1.3.3.1 of PART FOUR. The group and the maximum surface temperature of the equipment are to be appropriate for the combustible dust and / or explosive gases likely to be encountered. Where the characteristics of the dust and gases are unknown, the group class is not to be lower than II C, the temperature class is to be T6 or the maximum surface temperature of equipment is not to exceed 85℃ .

3.12.3.9 The electrical power supply for water level detector system is to comply with the following:

(1) It is to be supplied from two separate sources:

① one is to be the main source of electrical power and the other is to be the emergency source; or

② the arrangement, location and endurance for power supply from the main source and a continuously charged dedicated accumulator battery are equivalent to that of the emergency source (18 h). The battery supply may be an internal battery in the water level detector system.

(2) The changeover arrangement of supply from one electrical source to another need not be integrated into the water level detector system.

(3) Failure of the primary electrical power supply is to be indicated by an alarm. Where batteries are used for the secondary power supply, failure alarms for both power supplies are to be provided.

3.12.3.10 The degree of protective enclosures for electrical components installed in cargo holds, ballast tanks and dry spaces are to satisfy the requirements of IP 68 (see 1.3.2.1 of PART FOUR).

3.12.3.11 Installation requirements for the water level detectors

(1) The sensors are to be located in a protected position that is in communication with the aft part of the cargo hold such that the position of the sensor detects the level that is representative of the levels in the actual cargo holds. These sensors are to be located either as close to the centerline as practicable, or at both the port and starboard sides of the cargo hold.

For ships having keel laid on or after 1 July 2004, if sensors are not placed within a distance less than or equal to 1 corrugation space or 1 bulkhead vertical stiffener space from the centerline, sensors are to be located at both the port and starboard sides of the cargo hold.

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① See IMO adopted resolution MSC.145(77) Performance Standards for Water Level Detectors on Bulk Carriers.

② See IEC publication 60079.

新增 3.12.3.1 如下：

“3.12.3.1　安装在货舱、压载舱和干舱中的水位探测器除应符合本节规定外，还应符合本社接受标准[①]的有关规定，并经本社型式认可。”

原 3.12.3.1 至 3.12.3.4 的编号分别改为 3.12.3.2 至 3.12.3.5，并将其中的“声光报警”改为“听觉和视觉报警”。

现 3.12.3.2 中的“水位探测器应安装在货舱的后端”改为“水位探测器的安装应符合本节 3.12.3.11 的规定”。

新增 3.12.3.6 至 2.12.3.11 如下：

“3.12.3.6　探测设备应有适合所有拟装货物的腐蚀保护。对探测设备包括传感器和滤器，以及安装在货舱和其他处所的探测器应给予适当的保护。

3.12.3.7　水位探测系统在货物区域中如有电路部分，则应为符合本社接受标准[②]规定的 i_a 等级的本质安全电路。如果船舶设计成仅载运不会产生易燃或爆炸性环境的货物，并在本探测系统操作手册、船舶装货手册和有关载运特殊货物的证书中有所规定，则上述的本质安全电路可不作强制性要求。

3.12.3.8　如在货物处所中安装本质安全型设备，则应为符合第 4 篇 1.3.3.1 要求的合格防爆电气设备。其防爆类别和最高表面温度应适合于其可能遭遇到的易燃粉尘和 / 或爆炸性气体。如不知道该易燃粉尘和 / 或爆炸性气体的特性，则防爆类别应不低于 II C，温度组别为 T6 或最高表面温度不超过 85℃。

3.12.3.9　水位探测系统的供电应符合如下要求：

(1)　由两个独立的电源供电：

①　主电源和应急电源；或者

②　主电源和一连续充电的专用蓄电池，其布置、位置和供电时间均等效于应急电源 (18h)。该蓄电池可以是在水位探测系统中的内部蓄电池；

(2)　从一电源换至另一电源供电的转换设备不需要组合在水位探测系统中；

(3)　在主电源供电发生故障时应发出报警指示。当另一电源是蓄电池时，则两个电源都应有故障报警。

3.12.3.10　安装在货舱、压载舱和干舱中的电气部件的外壳防护等级应达到 IP68(参见第 4 篇 1.3.2.1) 要求。

3.12.3.11　对水位探测器的安装要求：

(1)　传感器应安装在货舱后部有保护的位置上，该位置应使传感器测出的水位能代表货舱的实际水位。这些传感器应尽可能安装在靠近中心线，或在货舱的左右舷均安装。

对于 2004 年 7 月 1 日及以后安放龙骨的船舶，传感器的安装位置与船中心线的距离不应超过 1 个槽距或 1 个舱壁垂向加强材间距，否则应在货舱的左右两侧都安装传感器。

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① 参见 IMO 通过的 MSC.145(77) 决议《散货船上水位探测器的性能标准》。

② 参见 IEC60079 号出版物。

For ships having keel laid before 1 July 2004, if sensors are not placed within a distance less than or equal to *B*/6 (*B* for breadth of the ship) from the centerline, sensors are to be located at both the port and starboard sides of the cargo hold;

(2) The detector installation is not to inhibit the use of any sounding pipe or other water level gauging device for cargo holds or other spaces;

(3) Detectors and equipment are to be installed where they are accessible for survey, maintenance and repair;

(4) Any filter element fitted to detectors is to be capable of being cleaned before loading;

(5) Electrical cables and any associated equipment installed in cargo holds are to be protected from damage by cargoes or mechanical handling equipment associated with bulk carrier operations, such as in tubes of robust construction or in similar protected locations;

(6) Any changes/modifications to the ship's structure, electrical systems or piping systems that involves cutting and/or welding are to be approved by the Society before work is carried out."

The existing paragraph 3.12.4 is replaced by the following:

"3.12.4 Availability of pumping systems

3.12.4.1 On bulk carriers, the means for draining and pumping ballast tanks forward of the collision bulkhead, and bilges of dry spaces any part of which extends forward of the foremost cargo hold, are to be capable of being brought into operation from a readily accessible enclosed space, the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. Where pipes serving such tanks or bilges pierce the collision bulkhead, as an alternative to the valve control specified in 3.2.4.3 of Chapter 3 of this PART, valve operation by means of remotely operated actuators may be accepted, provided that the location of such valve controls complies with this regulation.

(1) The requirements of this regulation are applicable to the spaces indicated in 3.12.3.3, which, however does not apply to the spaces the volume of which does not exceed 0.1% of the ship's maximum displacement volume and to the chain locker.

(2) Where the piping arrangements for dewatering closed dry spaces are connected to the piping arrangements for the drainage of water ballast tanks, two non-return valves are to be provided to prevent the ingress of water into dry spaces from those intended for the carriage of water ballast. One of these non-return valves is to be fitted with shut-off isolation arrangement. The non-return valves are to be located in readily accessible positions. The shut-off isolation arrangement is to be capable of being controlled from the navigation bridge, the propulsion machinery control position or enclosed space which is readily accessible from the navigation bridge or the propulsion machinery control position without travelling exposed freeboard or superstructure decks. In this context, a position which is accessible via an under deck passage, a pipe trunk or other similar means of access is not to taken as being in the "readily accessible enclosed space".

(3) The control of valves specified in 3.2.4.3 of Chapter 3 of this PART is to comply with the requirements of the "shut-off isolation arrangement" as mentioned in (2) above. The valve is not to be moved from the demanded position in the case of failure of the control system power or actuator power. Positive indication is to be provided at the remote control station to show that the valve is fully open or closed. Local hand powered valve operation from above the freeboard deck, as permitted under 3.2.4.3 of Chapter 3 of this PART, is requested, but is not an acceptable alternative to this regulation, unless all of the provisions of this regulation are met.

(4) The dewatering arrangements are to be such that any accumulated water can be drained directly by a pump or eductor.

(5) The dewatering arrangements are to be such that when they are in operation, other systems essential for the safety of the ship including fire-fighting and bilge systems remain available and ready for immediate use. The systems for normal operation of electric power supplies, propulsion and steering are not to be affected by the operation of the dewatering systems. It must also be possible to start fire pumps immediately and have a ready available supply of fire-fighting water and to be able to configure and use bilge system for any compartment when the dewatering system is in operation.

(6) Bilge wells are to be provided with gratings or strainers that will prevent blockage of the dewatering system with debris.

(7) The enclosures of electrical equipment for the dewatering system installed in any of the forward dry spaces are to be provided with protection to IPX8 ① standard for a water head equal to the height of the space in which the electrical equipment is installed for a time duration of at least 24 h."

① See IEC publication 60529 .

对于 2004 年 7 月 1 日以前安放龙骨的船舶，传感器的安装位置与船中心线的距离不应超过或等于 $B/6$（B 为船宽），否则应在货舱的左右两侧都安装传感器；

(2) 探测器的安装不应阻碍任何测深管或其他用于测量货舱或其他舱室水位测量器具的使用；

(3) 传感器和设备应安装在可以对其进行检验、维护和修理的地方；

(4) 探测器设有的任何滤器部件应能在装货之前予以清洗；

(5) 安装在货舱内的电缆和任何相关联的设备应防护，例如装在结构牢固的管道内或有类似防护的位置上，以免其被货物或与散货船操作相关的装卸机械损坏；

(6) 船舶结构、电气系统或管系的任何改变改装如涉及切割和 / 或焊接，应在施工之前经本社批准。”

3.12.4 修改为：

“3.12.4 泵系的有效性

3.12.4.1 散货船上，用于排放和泵吸位于防撞舱壁前方的压载舱的压载水，和任何部位延伸至首货舱前面的干舱中的舱底水的设备，应能从一个可进入的密封处所内使其运行。如果用于这些舱的或舱底水的管路穿过防撞舱壁，作为本篇第 3 章 3.2.4.3 条规定的阀的控制的替代措施，只要此类阀门控制器的位置符合本条的规定，也可接受通过遥控启动阀门操作的装置。

（1） 3.12.3.3 所指的处所适用本条的要求。但本条不适用于容积不超过船舶最大排水容积 0.1％的处所和锚链舱。

（2） 若密闭干处所的排水的管系布置与压载舱的排水管系布置相连，为防止从那些拟装载压载水舱的水进入干处所，应安装 2 个止回阀。这些止回阀中的 1 个应具有关闭隔离装置，这些止回阀的安装之处应易于接近。关闭隔离装置应能从驾驶室、推进机械控制位置，或能从驾驶室或机械控制位置进入而无需穿过露天甲板或上层建筑甲板的围蔽处所进行控制；就此而言，通过下甲板通道、管弄或其他类似接近措施的可接近之处，不应看作是“易于接近的围蔽处所”。

（3） 本篇第 3 章 3.2.4.3 条中所规定的阀，其控制应满足上述（2）中的“关闭隔离装置”的要求。万一控制系统的动力或执行器的动力丧失，这个阀的阀位应不会从所要求的位置上移动。在遥控站应设有能显示该阀是全开或全闭的实际指示。本篇第 3 章 3.2.4.3 条允许的，也应要求从干舷甲板上能对该阀就地人力手动操纵，但这个要求不可作为对本条的替代，除非本条的全部要求能满足。

（4） 排水系统的布置应使任何积水能直接地通过泵或喷射器排出。

（5） 排水系统的布置应使它们在运行时，对船舶安全重要的其他系统包括消防泵和舱底水系统还应能随时可以使用；电力供应系统、推进系统和操舵系统的正常运行不应受到排水系统运行的影响。当排水系统在运行时，消防泵应能直接启动并能提供可使用的消防水，舱底水系统对任何舱都能进行配置和使用。

（6） 污水井应设有格栅和滤器，以防排水系统中的碎片堵塞。

（7） 安装在任何前干舱处所并用于排水系统的电气设备，其外壳防护等级应为 IPX8①，该保护应能在安装电气设备处所高度的水头压力下至少持续 24h。”

① 参见 IEC60529 号出版物。

A new paragraph 3.12.5 is added as follows:

"3.12.5 Draining and pumping forward spaces in bulk carriers

3.12.5.1 The dewatering system for ballast tanks located forward of the collision bulkhead and for bilges of dry spaces any part of which extends forward of the foremost cargo hold is to be designed to remove water from the forward spaces at a rate of not less than $320A$ m³/h, where A is the cross-sectional area in m² of the largest air pipe or ventilated pipe connected from the exposed deck to a closed forward space that is required to be dewatered by these arrangements."

CHAPTER 4 MACHINERY PIPING SYSTEMS

Section 2 OIL FUEL SYSTEMS

The existing paragraph 4.2.9.3 is replaced by the following:

"4.2.9.3 Relief valves are to be fitted on the oil side of heaters. The discharge from the relief valves is to be led to the suction of a related pump or to a safe position."

Section 4 FEED, BLOW-OFF AND CONDENSATE SYSTEMS

The existing paragraph 4.4.2.1 is replaced by the following:

"4.4.2.1 Two feed water systems are to be provided for main and auxiliary boilers for essential services, including feed pumps. The feed systems are to be of sufficient capacity to supply feed water to the boilers with any one system out of action. Only one feed water system may be provided for steam generators heated by steam where the steam for essential services is capable of being supplied simultaneously from another source.

Feed water systems are to be so arranged that the feed water cannot be contaminated by oil or oily water."

Section 8 THERMAL OIL SYSTEM

The existing paragraph 4.8.3.6 is deleted, and the existing paragraphs followed are renumbered successively.

CHAPTER 5 PIPING SYSTEMS FOR OIL TANKERS

Section 1 GENERAL REQUIREMENTS

The existing paragraph 5.1.11 is replaced by the following:

"5.1.11 Prevention and free of spark

5.1.11.1 The outlets of the exhaust gas pipes for main and auxiliary engines, boilers and other burner equipment are to be located at the sufficient height above the main deck. The horizontal distance of the outlets from cargo area is not to be less than 10 m. Where internal combustion engine is provided with approved spark arresters, as well as boilers and other burner equipment to be provided with spark arresters, their distance may be reduced to 5 m."

CHAPTER 6 BOILERS AND PRESSURE VESSELS

Section 5 BOILER MOUNTINGS AND FITTINGS

The existing paragraph 6.5.4.1 is replaced by the following:

"6.5.4.1 Each boiler whose operation is designed at a specified water level is to be fitted with at least two water level indicators, one is to be water gauge for direct reading, and the other may either be water gauge or an equivalent device approved by the Society (e.g. remote water level indicator)."

新增 3.12.5

“3.12.5　散货船前处所的排水与泵吸能力

3.12.5.1　用于排放位于防撞舱壁前的压载舱的压载水，和任何部位延伸至首货舱前面的干舱中的舱底水的系统，应设计成以不小于 320A m^3/h 速率从前处所排水，其中：A——本规定要求排水的水密处所，从其到露天甲板上最大的空气管或通风管的截面积，m^2。”

第 4 章　动力管系

第 2 节 燃油管系

4.2.9.3 修改为：

“4.2.9.3　加热器的燃油侧应装有安全阀，安全阀排出的油应引至相关泵的吸口或其他安全的地点。”

第 4 节　锅炉给水、排污与凝水管系

4.4.2.1 修改为：

“4.4.2.1　主锅炉、重要用途的辅锅炉应有 2 套独立的给水管系（包括给水泵在内），当其中一套停止工作时，另一套管系应能保证锅炉的正常工作。对用蒸汽加热的蒸汽发生器，若重要用途的蒸汽能同时从另一来源得到，则可只装一套给水管系。

给水管系的布置应使油或含油污水不致混入到锅炉内的水中。”

第 8 节　热油系统

4.8.3.6 删除，本条后的条文号依次上升。

第 5 章　油船管系

第 1 节　一般规定

5.1.11 修改为：

“5.1.11　火星的预防与消除

5.1.11.1　主机、辅机、锅炉以及其他燃烧设备的排气管出口应位于主甲板上足够高度处，该出口与货物区域的水平距离应不小于 10m。若内燃机设有经认可的火星熄灭器，锅炉和其他燃烧设备的排气管也设有火星熄灭器，则该距离可减至 5m。”

第 6 章　锅炉与受压容器

第 5 节　锅炉附件

6.5.4.1 修改为：

“6.5.4.1　运行设计在规定水位的每台锅炉应至少设置 2 只独立的水位指示器，其中一只应为直接读数的玻璃水位表。另一只也可是玻璃水位表，或是经本社认可的等效仪表（如：遥测水位指示器）。”

The last paragraph in 6.5.4.2 is replaced by the following:

"In water tube boilers, where the steam and water drum exceeds 4 m in length and is fitted athwartships, one water gauge is to be fitted in a suitable place at or near each end of the drum."

CHAPTER 9 DIESEL ENGINES

Section 1 GENERAL REQUIREMENTS

A new paragraph 9.1.4.1(9) is added as follows:

"9.1.4.1(9) High pressure fuel oil injection system, including pressure, pipe size and material, etc."

The existing paragraph 9.1.4.2(9) is replaced by the following:

"9.1.4.2(9) Diesel engine operation and service manuals (including special tools and gauges to be used)."

Section 3 DESIGN AND CONSTRUCTION

A new paragraph 9.3.1.3 is added as follows:

"9.3.1.3 For the requirements of electronically controlled diesel engines, reference may be made to Guidelines on Electronically Controlled Diesel Engines by the Society."

In the existing paragraph 9.3.4.1, the last sentence "Consideration will be given to the replacement of the relief valve by an efficient warning device of overpressure in the cylinder" is replaced by the following:

"For auxiliary engines, consideration will be given to the replacement of the relief valve by an efficient warning device of overpressure in the cylinder".

Section 4 PIPING SYSTEMS

In the existing paragraph 9.4.4.3, "Each diesel engine is to have a separate exhaust pipe" is replaced by "Each diesel engine is to have a separate exhaust pipe to prevent the backflow of the exhausts."

Section 5 STARTING ARRANGEMENTS

In the existing paragraph 9.5.1.1, "and any power source for running engines" is added after "…… initial charge of starting air or initial electric power".

In the existing paragraph 9.5.5.1, "approved by the Society" is deleted.

In the existing paragraph 9.5.5.2, "approved by the Society" is deleted.

CHAPTER 12 SHAFT VIBRATION AND ALIGNMENT

Section 1 GENERAL REQUIREMENTS

The existing paragraph 12.1.3.5 is replaced by the following:

"12.1.3.5 The measurement reports of torsional vibration are to include order, angular amplitude or stress, natural frequency, torsional vibration of each shaft, vibratory torque of the gear and elastic couplings (where applicable) at each measuring point under test speed, and to make stress / torque and speed curves with the allowable value."

A new paragraph 12.1.3.6 is added as follows:

"12.1.3.6 During measurement, the main engine is to start from the minimum steady speed to the rated speed, and the measurement is to be carried out under the condition of different speed and steady speed. Near the resonance speed, the speed separation is to be reduced appropriately."

6.5.4.2　中的最后一段修改为：“水管锅炉的汽、水筒，如长度超过 4m 且按横向布置时，则应在或靠近鼓筒两端适合的位置各安装 1 只玻璃水位表。”

第 9 章　柴油机

第 1 节　一般规定

新增 9.1.4.1(9)：

“（9） 高压燃油喷射系统，包括压力、管子尺寸和材料等。”

9.1.4.2（9）改为：

“9.1.4.2(9)　柴油机操作和使用说明书（包括使用的专用工具和仪表的说明）。”

第 3 节　设计与构造

9.3.1.3 新增：

“9.3.1.3　对电控制柴油机的要求，可参照本社《柴油机电控系统指南》。”

9.3.4.1 中的“气缸安全阀也可由可靠的气缸超压报警装置代替”改为“对于辅机，气缸安全阀也可由可靠的气缸超压报警装置代替”。

第 4 节　管系

9.4.4.3 中“每台柴油机的排气系统应为独立的”改为“每台柴油机应有独立的排气管，以防止排气倒流”。

第 5 节　起动装置

9.5.1.1 中的“……压缩空气或电力”后增加“和为发动机运转的任何动力源”。
9.5.5.1 中的“一个经本社认可的”删除。
9.5.5.2 中的“经本社认可的”删除。

第 12 章 轴系振动与校中

第 1 节 一般规定

12.1.3.5 改为：

“12.1.3.5　扭振测量报告应包括试验转速下各测点的简谐次数、角振幅或应力、固有频率、各轴的扭振应力、各弹性联轴器和齿轮的振动扭矩（若适用时），并作出应力 / 扭矩与转速曲线图，且加绘其允许值。”

增加 12.1.3.6：

“12.1.3.6　测量时，主机从最低稳定转速开始到额定转速为止，转速分档并转速稳定情况下进行测量。在共振转速附近，转速间隔应适当减少。”

The following text is added at the end of the existing paragraph 12.1.4.3:

"unless effective measures are to be taken to identify the normal work of the vibration dampers."

Section 2 TORSIONAL VIBRATION

The existing paragraph 12.2.2.6 is replaced by the following:

"12.2.2.6 Torsional vibration calculation is to be carried out with one cylinder misfiring in addition to that under normal working condition."

In the existing paragraph 12.2.4.1, "2.5º" is replaced by "3.5º".

In the existing paragraph 12.4.2.1, "the rated speed" is followed by "speed ratio (where applicable)".

The following is to be added at the end of the existing paragraph 12.2.4.2:

"Where a main engine drives two or more generators, the rated torque of each generator is to be taken into consideration separately".

Section 4 WHIRLING VIBRATION

The existing paragraph 12.4.3.1 is replaced by the following:

"12.4.3.1 For high power propulsion shafting systems, generally, 1 order forward whirling resonant speeds are to be 20% more than the rated speed, and blade order forward whirling resonant speeds are not to appear in the range of $r = 0.85 \sim 1.0$."

12.1..4.3 改为：

12.1.4.3　最后增加“除非有有效的手段识别减振器是否正常工作”。

第 2 节　扭转振动

12.2.2.6 改为：

“12.2.2.6　除了进行正常工况下的扭振计算外，还应对 1 缸熄火进行扭振计算。”

12.2.4.1 中的“2.5°”改为“3.5°”。

12.4.2.1 中“额定转速”后增加“速比（若适用时）”。

12.2.4.2 最后增加“如果一台主机驱动 2 台或多台发电机时，应分别考虑每台发电机本身的额定扭矩”。

第 4 节　回旋振动

12.4.3.1 改为：

“12.4.3.1　对大功率推进轴系，一般 1 次正回旋共振转速应超过额定转速 20%以上。叶片次正回旋共振转速不在 $r = 0.85 \sim 1.0$ 范围内出现。”

PART FOUR ELECTRICAL INSTALLATIONS

CHAPTER 1 GENERAL PROVISIONS

Section 1 GENERAL REQUIREMENTS

The existing sub-paragraph (d) in 1.1.2.1(1) ① is replaced by the following:

"(d) forced draught fans, feed water pumps, water circulating pumps, vacuum pumps, condensate pumps and oil burning installation for steam plants on steam turbine vessels and for auxiliary boilers where steam is used for equipment supplying primary essential equipment;".

"(k)" and "(m)" in the existing paragraph 1.1.2.1(1) ② is replaced respectively by the following:

"(k) internal safety communication equipment;"
"(m) lighting system;".

A new sub-paragraph (o) is added in 1.1.2.1(1) ② as follows:

"(o) the equipment used for cooling and maintaining the lesser ambient temperature (see 1.2.1.2 of this Chapter);".

The existing sub-paragraphs "(o)" to "(r)" in 1.1.2.1(1) ② are renumbered as "(p)" to "(s)" respectively, and the words "(a) to (n)" in "(o)" and "(p)" are replaced by "(a) to (o)".

The existing sub-paragraph 1.1.2.1(6) is replaced by the following:

"(6) Dead ship condition means a condition under which the main propulsion plant, boilers and auxiliaries are not in operation and in restoring the propulsion, no stored energy for starting and operating the propulsion plant, the main source of electrical power and other essential auxiliaries is assumed to be available."

A new sub-paragraph (24) in 1.1.2.1 is added as follows:

"(24) Shelf life of battery means the duration of storage under specified conditions at the end of which a battery retains the ability to give a specified performance."

Section 2 OPERATING CONDITIONS

The text in first line of the existing paragraph 1.2.1.1 is replaced by the following:

"Unless otherwise specified (e.g. in 1.2.1.2 of this Section), all electrical equipment are to operate satisfactorily under the following environmental conditions:".

A new paragraph 1.2.1.2 is added as follows:

"1.2.1.2 Where electrical equipment is installed within environmentally controlled spaces the ambient temperature for which the equipment is to be suitable may be reduced from 45°C and maintained at a value not less than 35°C provided:

(1) the equipment is not for use for emergency services and is located outside of the machinery space(s);

(2) temperature control is achieved by at least two cooling units so arranged that in the event of loss of one cooling unit, for any reason, the remaining unit(s) is capable of satisfactorily maintaining the design temperature;

(3) the equipment is able to be initially set to work safety within a 45°C ambient temperature until such a time that the lesser ambient temperature may be achieved; the cooling equipment is to be rated for a 45°C ambient temperature;

第 4 篇 电气装置

第 1 章　通　则

第 1 节　一般规定

1.1.2.1(1) ① (d) 改为：

“(d)　在蒸汽轮机船上为蒸汽装置服务和为向主重要设备供汽的辅锅炉服务的强力鼓风机、给水泵、循环水泵、真空泵、冷凝水泵以及油燃烧装置；”

1.1.2.1(1) ② (k) 和 (m) 分别改为：

“(k)　船内安全通信设备；
(m)　照明系统；”

1.1.2.1(1) ②新增 (o) 如下：

“(o) 为降低环境空气温度的制冷设备（参见本章 1.2.1.2)；”

1.1.2.1(1) ②中的编号“(o) 至 (r)”分别改为“(p) 至 (s)”；以及 (o) 和 (p) 中的“(a) 至 (n)”分别改为：“(a) 至 (o)”。

1.1.2.1(6) 修改如下：

“(6)　瘫船状态：系指主推进装置、锅炉和辅机已停止运行，且在恢复推进的过程中，假定无储存的能源起动和运行推进装置、主发电机和其他重要辅机的状态。”

1.1.2.1 新增 (24) 如下：

“(24) 蓄电池的贮存寿命：系指蓄电池在规定条件下的贮存期间，在此期间的最后仍能保持其规定的性能。”

第 2 节　工作条件

1.2.1.1 第 1 行改为：

“1.2.1.1　除非另有规定（例如本节 1.2.1.2)，所有电气设备均应在下列环境条件下正常工作：”

新增 1.2.1.2 如下：

“1.2.1.2　当电气设备安装在环境空气温度受到控制的处所时，适用于电气设备的最高环境空气温度可以由 45℃降低至不低于 35℃，其条件是：

(1)　该设备是非应急设备，并位于机器处所之外；

(2)　至少有 2 套制冷单元进行温度控制，在其中 1 套制冷单元失效时，其余单元能满意地保持其设计温度；

(3)　该设备开始时应能在环境空气温度 45℃条件下处于安全工作状态，直至达到较低环境空气温度时为止。冷却设备的环境空气温度应为 45℃；

(4) audible and visual alarms are provided, at a continually manned control station, to indicate any malfunction of the cooling units;

(5) it is to be ensured that electrical cables for their entire length are adequately rated for the maximum ambient temperature to which they are exposed along their length."

Section 3 DESIGN, CONSTRUCTION AND INSTALLATION

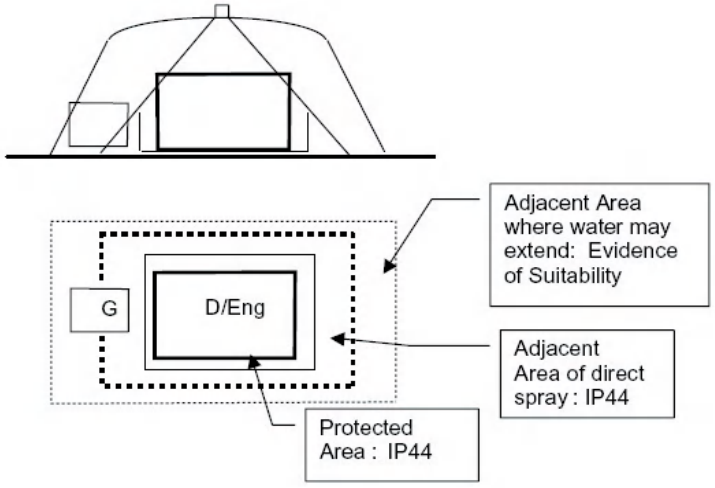
The existing paragraph 1.3.2.2 is replaced by the following:

"1.3.2.2 The type of protective enclosures selected for electrical equipment is to be appropriate to the conditions of the location at which such equipment is installed. The lowest degree of protection is to comply with the requirements given in Table 1.3.2.2 unless otherwise specified (e.g. in 1.3.2.3 and 1.3.2.4 of this Section)."

New paragraphs 1.3.2.3 and 1.3.2.4 are added as follows:

"1.3.2.3 The electrical and electronic equipment located within areas (see Figure 1.3.2.3) protected by FWBLAFFS and those within adjacent areas exposed to direct spray are to have a degree of protection not less than IP44.

1.3.2.4 Electrical and electronic equipment within adjacent areas (see Figure 1.3.2.3) not exposed to direct spray may have a lower degree of protection provided evidence of suitability for use in these areas is submitted taking into account the design and equipment layout, e.g. position of inlet ventilation openings, filters, baffles, etc. to prevent or restrict the ingress of water mist/spray into the equipment.



G – generator; D/Eng – diesel engine

Figure 1.3.2.3 Areas protected by fixed water-based local application fire-fighting systems"

CHAPTER 2 ELECTRICAL INSTALLATIONS IN SHIPS

Section 2 EMERGENCY SOURCE OF ELECTRICAL POWER

The following text is added at the end of 2.2.1.6:

"For steam ships, the 30 min time limit can be interpreted as time from blackout/dead ship condition defined above to light-off of the first boiler."

A new sub-paragraph ⑦ in 2.2.3.1 (2) is added as follows:

" ⑦ in all cargo pump rooms of tankers constructed on or after 1 July 2002;"

(4) 在连续有人的控制站内设有听觉和视觉报警，以指示制冷单元的任何故障；

(5) 有关电缆的载流量，应以其整个长度上所遭遇到的最高环境空气温度为准确定。”

第 3 节 设计、制造和安装

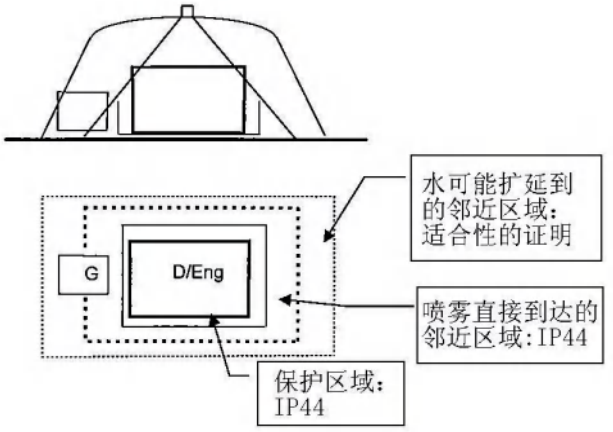
1.3.2.2 修改为：

“1.3.2.2 电气设备的外壳防护型式的选择，应与安装的场所相适应。除非另有规定（例如本节 1.3.2.3 和 1.3.2.4)，其最低防护等级应符合表 1.3.2.2 的要求。”

新增 1.3.2.3 和 1.3.2.4 如下：

“1.3.2.3 在机舱中，位于固定式局部水基灭火系统所保护的区域及其喷雾直接到达的邻近区域（见图 1.3.2.3) 中的电气和电子设备，应有不低于 IP44 的防护等级。

1.3.2.4 在机舱中，位于本节 1.3.2.3 规定区域之外水可能扩延到的邻近区域（见图 1.3.2.3) 中的电气和电子设备，如果提供了适合在这些区域中使用的证据，考虑到其设计和配置：例如进风口的位置、滤器和挡板等能防止或限制水雾 / 喷雾进入设备，则可以使用较低的防护等级。”



G—发电机；D/Eng—柴油机

图 1.3.2.3 固定式局部水基灭火系统保护区域示意图

第 2 章 船上电气装置

第 2 节 应急电源

2.2.1.6 最后加上：对于蒸汽轮机船，此 30 min 限制在从上述的失电 / 瘫船状态开始至第一台锅炉完成点火这段时间。

新增 2.2.3.1(2) ⑦如下：

“⑦ 在 2002 年 7 月 1 日或之后建造的液货船的所有货泵舱内；”

A new paragraph 2.2.4 is added as follows:

"2.2.4 Use of emergency generator in port

2.2.4.1 The emergency generator may be used during lay time in port for the supply of the ship mains, provided the requirements below are complied with:

(1) to prevent the generator or its prime mover from becoming overloaded when used in port, arrangements are to be provided to shed sufficient non-emergency loads to ensure its continued safe operation;

(2) the prime mover is to be arranged with fuel oil filters and lubrication oil filters, monitoring equipment and protection devices as required for the prime mover for main power generation and for unattended operation;

(3) the fuel oil supply tank to the prime mover is to be provided with a low level alarm, arranged at a level ensuring sufficient fuel oil capacity for the emergency services for the period of time as required in 2.2.2 or 2.2.3 of this Section;

(4) the prime mover is to be designed and built for continuous operation and to be subjected to a planned maintenance scheme verified by the Society ensuring that it is always available and capable of fulfilling its role in the event of an emergency at sea;

(5) fire detectors are to be installed in the location where the emergency generator set and emergency switchboard are installed;

(6) means are to be provided to readily change over to emergency operation;

(7) control, monitoring and supply circuits, for the purpose of the use of the emergency generator in port are to be so arranged and protected that any electrical fault will not influence the operation of the main and emergency services. When necessary for safe operation, the emergency switchboard is to be fitted with switches to isolate the circuits;

(8) instructions, which are also to contain information on required fuel oil tank level, position of harbour/sea mode switch if fitted, ventilation openings etc., are to be provided on board to ensure that when the vessel is under way all control devices (e.g. valves, switches) are in a correct position for the independent emergency operation of the emergency generator set and emergency switchboard. These instructions are to be posted in the emergency generator room."

Section 3 EXTERNAL POWER SOURCE

The last sentence in 2.3.1.1 is replaced by the following:

"Suitable cables having adequate ratings, permanently fixed, are to be provided for connection between the shore connection box and the main switchboard or emergency switchboard."

The existing paragraph 2.3.1.3 is replaced by the following:

"2.3.1.3 The shore connection is to be provided with an indicator at the main switchboard or emergency switchboard in order to show when the cable is energized."

Section 4 POWER SUPPLY AND DISTRIBUTION

The number in first line below the column "Maximum voltage (V)" in the existing Table 2.4.4.1 is replaced by "17500".

The existing paragraph 2.4.8.2 is replaced by the following:

"2.4.8.2 The distribution board of supplies to navigation equipment is to be independent of those for radio equipment."

The existing paragraph 2.4.8.4 is deleted.

The existing paragraphs 2.4.8.5 and 2.4.8.6 are renumbered as 2.4.8.4 and 2.4.8.5 respectively.

新增 2.2.4 如下：

“2.2.4　港内停泊时使用应急发电机

2.2.4.1　如果符合下列要求，则应急发电机可在船舶停泊港内期间向主电网供电：

(1)　为防止发电机及其原动机过载，应设有能卸除足够非应急负载的装置，以确保发电机组的安全运行；

(2)　原动机应配置用于主发电机原动机和无人看管要求的燃油滤器、润滑油滤器、监视设备和保护设备；

(3)　原动机的燃油供应柜应有适当的容量并设有低位报警，该低位报警应设定在对应于足够在本节 2.2.2 或 2.2.3 规定的供电时间内进行应急操作所需燃油量的液位上报警；

(4)　原动机应按连续工作定额设计和制造，并应按经本社审核的计划保养系统的规定确保其随时可用，以及能在海上发生紧急情况时起到其自身的作用；

(5)　在应急发电机组和应急配电板的所在位置应装设火灾探测器；

(6)　应设有能迅速地转换至应急运行的转换装置；

(7)　为在港内使用应急发电机而附加的控制、监视和供电电路的布置和保护，应使其任何电气故障都不会对主设备和应急设备的运行产生影响。为了安全操作，必要时应在应急配电板上设有隔离这些电路的开关；

(8)　船上应备有包括所要求的燃油柜液位、港口 / 海上模式转换装置的位置和通风口在内的操作说明书，以确保船舶在航行途中用于应急发电机组和应急配电板独立应急操作的所有阀门、开关等处在正确的位置上。该操作说明书应张贴在应急发电机室内。”

第 3 节　外来电源

2.3.1.1 最后一句改为：

“在岸电箱与主配电板或应急配电板间应以固定敷设并具有足够定额的电缆相连。”

2.3.1.3 改为：

“2.3.1.3　在主配电板或应急配电板上应设有岸电指示器，以指示岸电电缆已经通电。”

第 4 节　供电与配电

2.4.4.1　表 2.4.4.1 最高电压 (V) 栏下第 1 行改为：“17500”。

2.4.8.2 改为：

“2.4.8.2　无线电分配电板应与航行设备分配电板相互独立。”

2.4.8.4 删除。

2.4.8.5 和 2.4.8.6 的编号分别改为 2.4.8.4 和 2.4.8.5

Section 6 AUXILIARY MECHANISMS

The existing paragraph 2.6.6 is replaced by the following:

"2.6.6 Emergency stops for ventilating fans and oil pumps

2.6.6.1 Power ventilation of accommodation spaces, service spaces, cargo spaces and control stations is to be capable of being stopped from an easily accessible position outside the space being served. This position is not to be readily cut off in the event of a fire in the spaces served.
The exhaust fans in the exhaust ducts from galley ranges are to be capable of being shut off within the galley.

2.6.6.2 Cutting-off of the ventilation fans and oil pumps in machinery spaces:

(1) Means of control are to be provided for stopping ventilation fans in machinery spaces. Controls provided for the power ventilation serving the machinery spaces are to be grouped so as to be operable from two positions, one of which is to be located at the easily accessible place outside such spaces, and is not to be readily cut off in the event of a fire in the spaces served.

The means provided for stopping the power ventilation of the machinery spaces are to be entirely separate from the means provided for stopping ventilation of other spaces.

(2) Means of control are to be provided for stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps, lubricating oil service pumps, thermal oil circulating pumps and oil separators (purifiers). Except oil separators, such means of control are to be situated outside each related space, so that it will not be cut off in the event of a fire in the spaces served.

2.6.6.3 Additional requirements for passenger ships

(1) In passenger ships, the controls required in 2.6.6.2 of this Section are to be situated at one control position or grouped in as few positions as possible, which have a safe access from the open deck.

(2) In passenger ships carrying more than 36 passengers, power ventilation, except machinery spaces and cargo spaces and unless otherwise specified in PART SIX, is to be fitted with controls so grouped that all fans may be stopped from either of two separate positions which are to be situated as far apart as practicable.

Fans serving power ventilation systems to cargo spaces are to be capable of being stopped from a safe position outside such spaces."

Section 7 LIGHTING AND NAVIGATION LIGHTS

The existing paragraph 2.7.1.1 is deleted.

The existing paragraphs 2.7.1.2 to 2.7.1.4 are renumbered as 2.7.1.1 to 2.7.1.3 respectively.

In the renumbered paragraph 2.7.1.2, the text "coal bunkers and holds in coal carriers," is deleted.

In the existing paragraph 2.7.2.3, the words "fire zone" are replaced by "main vertical fire zone".

The existing paragraph 2.7.3.5 is replaced by the following:

"2.7.3.5 No local switch is to be installed in the emergency lighting circuits in the spaces so specified in 2.2.2.1 (1) and 2.2.3.1 (2) of this Chapter except for the emergency lights in the navigation bridge, at the stowage space of lifeboats and liferafts."

Section 9 SAFETY SYSTEMS FOR SHIPS AND PERSONS ONBOARD

The existing paragraph 2.9.10 is replaced by the following:

第 6 节　辅助机械

2.6.6 修改为：

“2.6.6　风机和油泵的切断

2.6.6.1　起居处所、服务处所、货物处所和控制站的动力通风，应能从其所服务的处所外面易于到达的位置将其停止。此位置应在其所服务的处所失火时不易被隔断。

厨房排气管道的抽风机应能在厨房内将其停止。

2.6.6.2　机器处所风机和油泵的切断：

(1)　应设有停止机器处所通风机的控制设备。服务于机器处所动力通风的控制应集中在两个位置上进行，其中之一应位于这种处所的外面易于到达之处，且应在其所服务的处所失火时不易被隔断。

机器处所动力通风的停止设备应与其他处所的通风停止设备完全分开；

(2)　应设有停止强力送风和抽风机、燃油驳运泵、燃油装置用泵、润滑油供应泵、热油循环泵和油分离器（净油器）的控制设备。除油分离器外，该控制设备应位于各有关处所的外部，从而不会在其所服务的处所失火时被隔断。

2.6.6.3　对客船的附加要求：

(1)　对于客船，本节 2.6.6.2 所要求的控制设备应位于一个控制位置或者集中在尽可能少的位置上。这些位置均应具有通往开敞甲板上的安全通道；

(2)　对于载客超过 36 人的客船，除机器处所和货物处所的通风以及第 6 篇另有规定之外，其动力通风应设有集中控制设备，以便在两个尽可能远离位置均可停止所有通风机。

服务于货物处所动力通风系统的风机，应能从该处所外的安全位置将其停止。”

第 7 节　照明与航行灯

2.7.1.1　删除。

2.7.1.2 至 2.7.1.4 的编号分别改为：2.7.1.1 至 2.7.1.3。

2.7.1.2 删除其中的“运煤船货舱和燃煤船的煤舱”。

2.7.2.3 中的“防火区”改为“主竖防火区”。

2.7.3.5 改为：

“2.7.3.5　除驾驶室和救生艇、筏存放处舷外的应急照明灯外，在本章 2.2.2.1(1) 和 2.2.3.1(2) 规定处所的应急照明电路内不应装设就地开关。”

第 9 节　船舶和乘员安全系统

2.9.10 全部修改如下：

"**2.9.10 Boundary doors between special category spaces and ro-ro spaces**

2.9.10.1 The requirements in 2.9.10.2 to 2.9.10.5 of this Section are applicable to boundary doors of special category spaces or ro-ro spaces as defined in PART TWO. These spaces may be flooded through the doors.

In cargo ships, where no part of a door is under highest water line, and the open area of the door is not greater than 6 m^2, the requirements from 2.9.10.2 to 2.9.10.5 of this Section is not applicable.

2.9.10.2 Separate indicator lights and audible alarms are to be provided in the navigation bridge and on the operating panel to show that the bow door and inner door are closed and that their securing and locking devices are properly positioned.

The indication panel is to be provided with a lamp test function. It is not to be possible to turn off the indicator light.

2.9.10.3 The indicator system is to be designed ① on the fail safe principle and is to show by visual alarms if the door is not fully closed and not fully locked and by audible alarms if securing devices become open or locking devices become unsecured. The power supply for the indicator system for operating and closing doors is to be independent of the power supply for operating and closing the doors and is to be provided with a back-up power supply from the emergency source of power or other secure power supply (e.g. UPS).

The sensors of the indicator system are to be protected from water, ice formation and mechanical damage.

2.9.10.4 The indication panel on the navigation bridge is to be equipped with a mode selection function "harbour/ sea voyage", so arranged that audible alarm is given on the navigation bridge if the vessel leaves harbour with the bow door or inner door not closed or with any of the securing devices not in the correct position.

2.9.10.5 A water leakage detection system ① with audible alarm and television surveillance is to be arranged on a passenger ship and a ro-ro ship to provide an indication to the navigation bridge and to the engine control room of leakage through the inner door.

A water leakage detection system ① with audible alarm is to be arranged on a cargo ship to provide an indication to the navigation bridge of leakage through the inner door.

2.9.10.6 Additional requirements for the bow door and the inner door on a ro-ro ship

(1) Between the bow door and the inner door a television surveillance system ② is to be fitted with a monitor on the navigation bridge and in the engine control room. The system is to monitor the position of the doors and a sufficient number of their securing devices. Special consideration is to be given for the lighting and contrasting colour of objects under surveillance.

(2) A drainage system ② is to be arranged in the area between bow door and ramp, or where no ramp is fitted, between the bow door and inner door. The system ② is to be equipped with an audible alarm function to the navigation bridge being set off when the water levels in these areas exceed 0.5m or the high water level alarm, whichever is lesser.

(3) For ro-ro passenger ships on international voyages, the special category spaces and ro-ro spaces are to be continuously patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions or unauthorized access by passengers thereto, may be detected whilst the ship is underway."

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① The indicator system is considered designed on the fail - safe principle when:
(1) The indication panel is provided with:
- a power failure alarm
- an earth failure alarm
- a lamp test
- separate indication for door closed, door locked, door not closed and door not locked.

(2) Limit switches electrically closed when the door is closed (when more limit switches are provided they may be connected in series).

(3) Limit switches electrically closed when securing arrangements are in place (when more limit switches are provided they may be connected in series).

(4) Two electrical circuits (also in one multicore cable), one for the indication of door closed / not closed and the other for door locked / not locked.

(5) In case of dislocation of limit switches, indication to show : not closed / not locked / securing arrangement not in place - as appropriate.

② For fail safe principle, see footnote of 2.9.10.3 of this Section.

“2.9.10　特种处所和滚装处所边界中的门

2.9.10.1　本节 2.9.10.2 至 2.9.10.5 的要求适用于第 2 篇所定义的特种处所或滚装处所边界中的门，通过该门这些处所可以浸水。

对货船，如门无任何部分处在最高水线以下，且门的开口面积不大于 6㎡，则本节 2.9.10.2 至 2.9.10.5 的要求不适用。

2.9.10.2　在驾驶桥楼和每个操作控制屏上应设有独立的指示灯和听觉报警器，以显示门已关闭及其紧固和锁紧装置已处于适当的位置。

指示屏应具有试灯功能，且不应关闭指示灯。

2.9.10.3　指示系统应按故障安全原则设计①，并设计成：如门未完全关闭和未完全锁紧，以视觉报警显示；如锁紧装置变成开启或锁紧装置变成非锁紧，以听觉报警显示。指示系统的电源应独立于操作和关闭门的电源，且应设有备用电源，该备用电源可以是应急电源或其他的可靠电源（如 UPS）。

应对指示系统的传感器加以保护，以防来自水、结冰和机械的损伤。

2.9.10.4　在驾驶桥楼的指示屏上应设有“在港 / 在航”工况的选择功能，如船离港时首门、尾门或舷门等未关闭或任一紧固装置不在正确位置上时，则应在驾驶桥楼发出听觉报警。

2.9.10.5　客船和滚装船应配备带听觉报警和电视监控的水渗漏探测系统①，以向驾驶桥楼和机舱控制室显示门的任何渗漏情况。

一般货船应配备带听觉报警的水渗漏探测系统①，以向驾驶桥楼显示门的任何渗漏情况。

2.9.10.6　对滚装船首门和内门的附加要求：

(1) 在首门和内门之间应装设电视监控系统①，并在驾驶桥楼和机舱控制室内配置监视器。该系统用以监视门的位置及其足够数量的紧固装置。应对所监视物体的亮度和色彩对比度给以特殊考虑；

(2) 在首门和跳板之间的区域应设排水系统②，当不设置跳板时，则首门与内门之间区域应设排水系统②。该系统在驾驶桥楼应设有听觉报警功能，当区域内积水水位超过车辆甲板 0.5m 或高水位报警值（取小者）时发出警报；

(3) 客滚船在航行途中，应对特种处所和滚装处所进行不间断巡逻或通过有效途径（如电视监控）进行监控，以确保发现在恶劣天气下机动车辆的任何移动或乘客未经许可而进入上述处所的情况。”

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① 当指示系统满足下列要求时，则可认为是按故障安全原则设计的：

(1) 指示屏具有下列功能：

- 电源故障报警；
- 接地故障报警；
- 指示灯试验；
- 对门关闭、门锁紧、门未关闭和门未锁紧能分别进行指示。

(2) 当门关闭时，电气限位开关应闭合（当设有多个限位开关时，可串联连接）。

(3) 当紧固装置起作用时，电气限位开关应闭合（当设有多个限位开关时，可串联连接）。

(4) 设两个电路（也可在一多芯电缆中），一个电路作为门关闭和未关闭指示，另一电路作为锁紧和未锁紧指示。

(5) 当限位开关错位时，应指示：未关闭 / 未锁紧 / 紧固装置不在位（如适用时）。

② 故障安全原则见本节 2.9.10.3 脚注。

Section 11 STORAGE BATTERIES

In the existing paragraph 2.11.4.1, the last sentence ", and the bulkhead lighting is to be used in accordance with the requirements of 2.7.1.1 of this PART" is deleted.

A new paragraph 2.11.5 is added as follows:

"**2.11.5 Recording of the type, location and maintenance cycle of batteries**

2.11.5.1 Where batteries are fitted for use for essential and emergency services, a schedule of such batteries is to be compiled and maintained. The schedule, which is to be reviewed and verified by the Surveyor to the Society, is to include at least the following information regarding the battery(ies):

- Type and manufacturer's type designation;
- Voltage and ampere-hour rating;
- Location;
- Equipment and/or system(s) served;
- Maintenance/replacement cycle dates;
- Date(s) of last maintenance and/or replacement;
- For replacement batteries in storage, the date of manufacture and shelf life**.**

2.11.5.2 Procedures are to be put in place to ensure that where batteries are replaced that they are of an equivalent performance type.

2.11.5.3 Where vented type batteries replace valve-regulated sealed type, it is to be ensured that there is adequate ventilation as so required in 2.11.2.3 and 2.11.2.7 of this Section, and that the requirements in 2.11.1 of this Section relevant to the location and installation of vented type batteries are complied with.

2.11.5.4 Details of the schedule and of the procedures verified by the Surveyor mentioned above are to be included in the ship's safety management system."

Section 12 CABLES

The existing paragraph 2.12.3.4 is replaced by the following:

"2.12.3.4 Cables ① for services, required to be operable under fire conditions including those ② for their power supplies, are to be of a fire resistant type, complying with 4.4.1.1 of this PART, where they pass through high fire risk areas ③, and in addition for passenger ships, main vertical fire zones. The following services may be exempted:

(1) fail safe system;

(2) self monitoring system;

(3) duplicated system with cable runs as widely separated as is practicable."

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① In case of cables for services required to be operable under fire conditions, the fire resistant cables are to extend from the control/monitoring panel to the nearest local distribution panel serving the relevant area or zone.

② In case of power supply cables used for services required to be operable under fire conditions, the fire resistant cables are to extend from their distribution point within the space containing the emergency source of electrical power to the nearest local distribution panel serving the relevant area or zone.

③ The definition of "high fire risk areas" is for the following spaces:

(1) Machinery spaces as defined by Chapter II-2 of SOLAS;

(2) Spaces containing fuel treatment equipment and other highly flammable substances;

(3) Galley and Pantries containing cooking appliances;

(4) Laundry with drying equipment;

(5) Accommodation spaces, machinery spaces and main galley, other spaces for storing flammable liquid with high fire risk as defined by reg. 9, Chap. II-2 of SOLAS for ships carrying more than 36 passengers;

(6) Enclosed or semi-enclosed hazardous spaces, in which certified safe type electric equipment is required.

第 11 节　蓄电池组

删除 2.11.4.1 中最后的“但其照明也可采用符合本篇 2.7.1.1 规定的隔壁照明灯。”

新增 2.11.5 如下：

“2.11.5　蓄电池组型式、位置和维护周期记录

2.11.5.1　对用于重要设备和应急设备的蓄电池组，应制定一记录表并保持更新。该记录表应经本社现场验船师审核，并至少应包括蓄电池组的下列信息：

-- 型式和制造厂的型号；
-- 电压和安时定额；
-- 安放位置；
-- 所服务的设备和 / 或系统；
-- 维护 / 更换周期；
-- 上一次维护和 / 或更换日期；
-- 贮存中的更换蓄电池的制造日期和贮存寿命。

2.11.5.2　应提出一更换蓄电池的程序，以保证在更换蓄电池时，所更换者均为具有等效性能的蓄电池。

2.11.5.3　若将阀控密封型蓄电池更换成透气型蓄电池，则应保证有本节 2.11.2.3 和 2.11.2.7 要求的适当通风，其位置和安装应符合本节 2.11.1 的有关要求。

2.11.5.4　上述经验船师审核的详细记录表和程序，应纳入到船舶安全管理体系中。”

第 12 节　电缆

2.12.3.4 改为：

“2.12.3.4　需在失火状况下工作的设备的电缆①，包括其供电电缆②，如穿过较大失火危险处所③和客船上的主竖防火区，则应采用符合本篇 4.4.1.1 规定的耐火电缆。但下列设备可以除外：

(1)　故障安全系统；

(2)　有自我检测功能的系统；

(3)　双套系统，且其电缆是远离分开敷设的。”

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① 在电缆用于需在失火状态下工作设备的情况下，该耐火电缆应从控制 / 监视屏延伸至用于相关处所或区域的最接近的分配电板。

② 在供电电缆用于需在失火状态下工作设备的情况下，该耐火电缆应从装有应急电源的处所内这些设备的供电点延伸至用于相关处所或区域的最接近的分配电板。

③ “较大失火危险处所”，是指下列处所：
(1) SOLAS 公约第Ⅱ -2 章所定义的机器处所；
(2) 装有燃油处理设备或其他易燃物质的处所；
(3) 厨房和装有烹调设备的配膳间；
(4) 带有烘干设备的洗衣房；
(5) 载客超过 36 人客船上，SOLAS 公约第Ⅱ -2 章第 9 条所规定的较大失火危险的起居处所、机器处所和主厨房、储藏易燃液体的其他处所；
(6) 要求安装合格防爆电气设备的围蔽或半围蔽危险处所。

A new sub-paragraph (9) in 2.12.3.5 is added as follows:

"(9) remote emergency stop/shutdown arrangements for systems which may support the propagation of fire and/or explosion."

A new paragraph 2.12.3.6 is added as follows:

"2.12.3.6 So far as is reasonably practicable the electrical cables to the emergency fire pump are not to pass through the machinery spaces containing the main fire pumps and their source(s) of power and/or prime mover(s). Where the ship arrangements are such that the cables have to pass through these spaces the cables are to be of a fire resistant type and specially protected against mechanical damage (e.g. run in heavy gauge pipe)."

The existing paragraphs 2.12.3.6 to 2.12.3.8 are renumbered as 2.12.3.7 to 2.12.3.9 respectively.

A new paragraph 2.12.9.14 is added as follows:

"2.12.9.14 The arrangement and run of fire resistant cables are to be in compliance with the following:

(1) Cables are to be so arranged that the loss of these services is minimized due to a localized fire at any one area or zone in 2.12.3.4 of this Section.

(2) Cables are to be run as straight as is practicable."

Section 14 SPECIAL REQUIREMENTS FOR HIGH VOLTAGE ELECTRICAL INSTALLATIONS

The existing sub-paragraph (2) in 2.14.6.4 is replaced by the following:

"(2) When external source of supply is necessary for auxiliary circuits, at least two external sources of supply are to be provided and so arranged that a failure or loss of one source will not cause the loss of more than one generator set and/or set of essential services.

Where necessary one source of supply is to be from the emergency source of electrical power for the start up from dead ship condition."

In sub-paragraph 2.14.7.2(3), the word "castings" is replaced by "casings".

The existing Section 16 is replaced by the following:

"Section 16 ADDITIONAL REQUIREMENTS FOR OIL TANKERS

2.16.1 General requirements

2.16.1.1 Electrical installations on tankers carrying crude oil and oil product are to comply with the provisions of this Section and other provisions of this PART as appropriate.

2.16.1.2 Electrical equipment and cables are, in principle, not to be installed in any hazardous zones or spaces. If it is impracticable to avoid doing so, relevant provisions of this Section are to be complied with.

2.12.3.5 新增 (9) 如下：

“(9)　可能形成火灾和 / 或爆炸蔓延系统的遥控停止 / 关闭设备。”

新增 2.12.3.6 如下：

“2.12.3.6　至应急消防泵的电缆，应尽可能不穿过装有主消防泵及其动力源和 / 或原动机的机器处所。如果由于船舶布置使至应急消防泵的电缆必须穿过这些机器处所，则应采用耐火电缆，并应有防止机械损伤的保护（例如敷设在厚壁管中）。”

2.12.3.6 至 2.12.3.8 的编号分别改为：2.12.3.7 至 2.12.3.9。

新增 2.12.9.14 如下：

“2.12.9.14　耐火电缆的布置和走线应符合下列要求：

(1)　电缆应布置成由于在本节 2.12.3.4 规定的处所或区域之一的局部火灾所引起的有关设备的功能减损为最小；

(2)　电缆应尽可能平直走线。”

2.12.25.1 ～ 2.12.25.4 中的“外套”改为“封闭罩壳”。

第 14 节　交流高压电气装置特殊要求

2.14.3.1 改为：

“2.14.3.1　应引出发电机定子绕组所有相的端头，以便安装差动保护。”

2.14.6.4(2) 改为：

“(2)　当辅助电路必需外电源供电时，应至少设有 2 套外电源，并布置成使其中 1 套发生故障或丧失功能的情况下，而不会导致 1 台以上发电机和 / 或成组的重要设备不能工作。

如果必要，上述电源之一应是能从瘫船状态起动的应急电源。”

2.14.7.2(3) 中的“铸件”改为“封闭罩壳”。

第 16 节全部替换如下：

“第 16 节　油船附加要求

2.16.1　一般要求

2.16.1.1　载运原油和成品油船舶上的电气装置，应符合本节规定以及本篇其他适用的规定。

2.16.1.2　在任何危险区域或处所中，原则上不应敷设电缆和安装电气设备。若确属无法避免，则应符合本节的有关规定。

2.16.1.3 Where electrical equipment need to be installed in any hazardous zones or spaces, it is to be the certified safe type electrical equipment complying with 1.3.3 of this PART, and the group and temperature class are not to be less than the requirements of IIA, T3.

2.16.2 Distribution systems

2.16.2.1 The following distribution systems may be used in tankers:

(1) D.C., two-wire insulated;

(2) A.C., single-phase, two-wire insulated;

(3) A.C., three-phase, three-wire insulated.

2.16.2.2 No direct electrical connection is allowed between circuits having different voltages.

2.16.2.3 All circuits of generation, supply and distribution systems are not to be earthed, and hull return system is not permitted with the following exceptions:

(1) intrinsically safe circuits;

(2) power supplied, control circuits and instrumentation circuits where technical or safety reasons preclude the use of a system with no connection to earth, provided the current in the hull is limited to not more than 5 A in both normal and fault conditions;

(3) limited and locally earthed systems, provided that any possible resulting current does not flow directly through any of the hazardous spaces;

(4) alternating current power networks of 1000 V root mean square (line to line) and over, provided that any possible resulting current does not flow directly through any of the hazardous spaces.

2.16.3 Cables and their installation

2.16.3.1 All cables, other than those of intrinsically safe circuits, installed in any hazardous zones or spaces as specified in 2.16.6.2 of this Section, are to be sheathed with at least one of the following:

(1) a non-metallic impervious sheath in combination with braiding or other metallic covering;

(2) copper or stainless steel sheath for mineral insulated cables only. Aluminium sheathed cables may be considered for special applications.

2.16.3.2 Cables of intrinsically safe circuits are to have a metallic shielding with at least a non-metallic external impervious sheath.

2.16.3.3 Where cables are subject to lengthy immersion in the cargo, the construction of the cables is to be such as to withstand the substances to which they can be exposed, or the cables are to be enclosed in casings (such as metallic pipes) capable of withstanding such substances.

2.16.3.4 Where corrosion may be expected, non-metallic impervious sheath is to be applied over the metal meshwork, metallic sheath or steel armour of the cable.

2.16.3.5 Each intrinsically safe circuit is to have its own separate cable. Intrinsically safe circuits are to be laid separately with non-intrinsically safe circuits, e.g. neither lay these together in a cable bundle or pipe nor mount them under common clamps.

2.16.3.6 Where cables pass through gastight bulkheads or decks, separating hazardous zones or spaces from non-hazardous zones or spaces, arrangements are to be such that gastight integrity of the bulkhead or deck is not impaired.

2.16.1.3　如需在危险区域或处所中安装防爆电气设备，则应为符合本篇 1.3.3 规定的合格防爆电气设备，其类别和温度组别应不低于Ⅱ A,T3。

2.16.2　配电系统

2.16.2.1　可采用以下的配电系统：

(1)　直流双线绝缘系统；

(2)　交流单相双线绝缘系统；

(3)　交流三相三线绝缘系统。

2.16.2.2　不同电压的网络不应有电气上的直接连接。

2.16.2.3　发电机电路、供电和配电电路均不应接地，也不应使用以船体作回路的系统，但下列可以例外：

(1)　本质安全型电路；

(2)　供电、控制和仪表电路，如因技术上或安全上原因不能使用不接地系统，且在正常和故障情况下可能产生的船体电流均不超过 5A；

(3)　有限和局部的接地系统，如果由此可能产生的任何电流不直接流过危险处所；

(4)　线电压为 1000V（均方根值）及以上的交流配电系统，如果由此可能产生的任何电流不直接流过任何危险处所。

2.16.3　电缆及其敷设

2.16.3.1　除了本质安全型电路中的电缆以外，敷设在本节 2.16.6.2 所列危险区域或处所内的所有电缆应至少具有下列之一的保护层：

(1)　非金属不透性护套，加上金属编织层或其他金属保护层；

(2)　矿物绝缘电缆应具有铜或不锈钢护套。对于特殊用途，可以考虑采用具有铝护套的电缆。

2.16.3.2　本质安全型电路的电缆应具有金属屏蔽，并至少加上一非金属不透性外护套。

2.16.3.3　如果电缆被货油长期浸没，则电缆的结构应能经受这些物质的浸泡，或者将电缆密封在能经受这些物质的封闭罩壳（例如金属管）中。

2.16.3.4　可能经受腐蚀的所有电缆，应在其金属编织层、铠装或金属护套外加上非金属不透性外护套。

2.16.3.5　每个本质安全电路应具有各自的专用电缆，并应与非本质安全电路的电缆分开敷设（例如：不应束聚在一起，不应放在同一罩壳或管道内，也不应用同一夹线板固定）。

2.16.3.6　电缆或电缆管穿越分隔危险与非危险区域或处所的气密舱壁和甲板时，其布置不应破坏舱壁或甲板的气密完整性。

2.16.3.7 Cables installed on deck or on fore and aft gangways are to be protected against mechanical damage. Cables are to be so installed as to avoid strain or chafing and due allowance is to be made for expansion or working of the structure. Where expansion bends are fitted, they are to be accessible for maintenance.

2.16.3.8 Cables installed in pump rooms are to be suitably protected against mechanical damage.

2.16.3.9 Cable runs are to be kept at an adequate distance from the decks, bulkheads, cargo tanks or pipes. When cables pass through bulkheads, the distance of the cables from steam pipe flanges is to be not less than 450 mm for steam pipes having a diameter greater than 75 mm, and not less than 300 mm for steam pipes having a diameter equal to or less than 75 mm.

2.16.3.10 Flexible cables or wires for portable electrical appliances are not to pass through the hazardous zones or spaces, with the exception of flexible cables or wires of intrinsically safe type.

2.16.4 Equipment in hazardous zones

2.16.4.1 Measuring, monitoring, control and communication equipment onboard (including pocket radio equipment) and circuits located in hazardous zones or spaces are to be intrinsically safe. However, where it is impracticable to be satisfied technically, safe type equipment may be used instead as considered appropriate by the Society, with the exception of those hazardous zones or spaces in which only intrinsically safe equipment of category "ia" are permitted to be used.

2.16.4.2 Simple electrical apparatus and components (such as thermocouples, photocells and limit switches etc.) included in intrinsically safe circuits may be installed in hazardous zones or spaces, provided that they cannot store or generate electrical power or energy in excess of the limits given in the standard ① accepted by the Society, and that their surface temperature rise may be neglected under the normal work condition.

2.16.4.3 Transmitting aerials and any associated riggings are to be sited well clear of gas and vapour outlets.

2.16.4.4 When electrical equipment is permitted in hazardous zones, all switches and protective devices are to be capable of interrupting all poles or phases and are to be located in a non- hazardous zone or space. Such equipment, switches and protective devices are to be suitably labelled for identification purpose.

2.16.4.5 Portable lamps used in hazardous zones or spaces are to be:

(1) of intrinsically safe, increased safety and flameproof type with self-contained battery;

(2) of air driven type with pressurized enclosure.

2.16.4.6 The driving generator of the ventilator in enclosed and semi-enclosed hazardous spaces is not to be provided in the vent duct. The construction of the ventilator is to be in compliance with the requirements in 2.11.2.5 of this Chapter.

2.16.4.7 The socket outlets and plugs installed in the extended hazardous zones or spaces on the weather deck are to be interlocked with a switch so that the plug can not be inserted or withdrawn when the switch is in the on position, and the switch is to be capable of isolating all the poles or phases in the circuit.

2.16.5 Earth connection and static electricity protection

2.16.5.1 The metal casings of all electrical equipment in any hazardous zones or spaces, no matter how the working voltage is, are to be reliably earthed.

2.16.5.2 Cargo tanks, process plant and piping systems are to be earthed in accordance with 1.3.4.12 of this PART for the control of static electricity.

2.16.5.3 All rigging is to be effectively bonded to ship's hull.

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① See IEC publication 60079-14 – Electrical Apparatus for Explosive Gas Atmospheres -- Part 14: Electrical Installations in Hazardous Areas (other than mines).

2.16.3.7　敷设在甲板上或首尾步桥上的电缆应作保护，防止其遭受机械性损伤。所敷设的电缆应避免发生应变或擦伤，且应考虑到船体结构的膨胀或走动，而留有适当的余量。当设有膨胀弯头时，应能接近，以利维护。

2.16.3.8　敷设在货泵舱中的电缆应作适当防护，以防机械损伤。

2.16.3.9　电缆敷设时应与甲板、舱壁、油舱以及各种管子离开足够的距离。电缆穿过舱壁时与蒸汽管道法兰的距离：当蒸汽管直径大于 75mm 时，应不小于 450mm；当蒸汽管直径等于或小于 75mm，应不小于 300mm。

2.16.3.10　连接可携式电气器具的移动式软电缆或电线，不应通过危险区域或处所，但本质安全电路的软电缆或电线可以除外。

2.16.4　危险区域中的设备

2.16.4.1　处于危险区域或处所中的测量、监视、控制和船内通信（包括可携式无线电设备）等设备及电路均应为本质安全型。但除了只允许安装 ia 等级本质安全型设备的危险区域或处所外，如满足此要求在技术上并不切实可行，则可采用本社认为合适的防爆电气设备替代。

2.16.4.2　包含在本质安全电路中的简单电器和元件（例如热电偶、光电元件和限位开关等），如不能储存或产生超过本社接受的标准[①]限制的电能或能量，且在正常工作状态下具有可忽略的表面温升，则可安装在危险区域或处所内。

2.16.4.3　发射天线及其所属索具的位置均应远离易燃或易爆蒸气或气体的出口。

2.16.4.4　允许在危险区域或处所内安装的电气设备，其开关和保护电器应能分断所有的极或相，而且应设在安全的区域或处所内。设备、开关和保护电器应有清晰而耐久的标志，以便于识别。

2.16.4.5　在危险区域或处所内的可携式照明灯具，应采用：

(1)　带有独立蓄电池的本质安全型、增安型和隔爆型灯具；

(2)　具有正压外壳的空气驱动型灯具。

2.16.4.6　围蔽和半围蔽危险处所通风机的驱动电动机不应设在通风管道内。通风机的构造应符合本章 2.11.2.5 的要求。

2.16.4.7　安装在露天甲板危险区域或处所以外的插座，应与开关联锁，使开关在接通位置时，插头不能插入和拔出，且该开关应能分断所有的极或相。

2.16.5　接地与防静电

2.16.5.1　在危险区域或处所中所有电气设备，不管其工作电压如何，其金属外壳均应可靠接地。

2.16.5.2　为防止静电放电危害，货油舱（柜）、处理装置和管系应按本篇 1.3.4.12 的规定进行接地。

2.16.5.3　桅索应与船体有可靠的电气连接。

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① 参见 IEC60079-14 出版物《爆炸性气体环境用电气设备 第 14 篇 危险区域中的电气装置 (煤矿除外)》。

2.16.6 Oil tankers carrying cargo oils having a flash point not exceeding 60℃

2.16.6.1 The electrical installations on oil tankers carrying cargo oil having a flash point not exceeding 60℃ are to comply with the provisions of 2.16.6.2 to 2.16.6.4 below, in addition to those of 2.16.1 to 2.16.5 of this Section.

2.16.6.2 Electrical equipment and cables permitted to be installed in hazardous zones or spaces (I):

(1) Cargo oil tanks, inside the pipes and equipment containing cargo oil:

intrinsically safe electrical equipment of category "ia".

(2) Cofferdams adjoining cargo tanks:

① intrinsically safe electrical equipment of category "ia";

② transducers of electrical depth-sounding devices. The transducers of electrical depth-sounding devices are to be hermetically enclosed and are to be installed in a gastight, robust vertical trunk located clear of the cargo tank bulkhead. Cables to the transducers are to be housed in pipes with gastight joints to the main deck. The cable pipe is to be sealed with packings where the cable passes a cofferdam;

③ where impressed current cathodic protection systems are fitted (for external hull protection only) and if it is essential for the cables to pass through cofferdams, these cables are to be installed in heavy gauge steel pipes with gastight joints up to the main deck. Corrosion-resistant pipes are to be used in compartments which may be filled with sea water (e.g. permanent ballast tanks).

(3) Cargo pump rooms:

① electrical equipment as defined in 2.16.6.2 (2) of this Section;

② intrinsically safe equipment of category "ib";

③ the lighting to be supplied at least by two final circuits. Lighting points are to be arranged on two independent circuits with the lighting points distributed alternately, and to comply with the following:

(a) flameproof type lighting or pressurized lighting is to be fitted in the cargo pump rooms;

(b) lighting is to be connected to ventilation, so that ventilation starts when the lighting is switched on, with the exception of emergency lighting. The failure of the ventilation system is not to cause the lighting to go out;

④ gas detector heads having sinter-type flametrap protection included in intrinsically safe circuits;

⑤ general emergency alarm sounder of flameproof type, without internal sparking contacts;

⑥ where it is necessary for cables to pass through cargo pump room entrances, they are to be installed in heavy gauge steel pipes with gastight joints;

⑦ electrical motors for driving equipment located in cargo pump rooms are to be separated from the pump room by a gastight bulkhead or deck. Flexible couplings or other means of maintaining alignment are to be fitted in the shafts between the motors and the driven unit. In addition, gastight and efficiently lubricated stuffing boxes are to be fitted where shafts pass through gastight bulkheads or decks.

(4) Enclosed or semi-enclosed spaces immediately above cargo tanks (e.g. tweendeck spaces) or having bulkheads above and in line with cargo tank bulkheads: enclosed or semi-enclosed rooms directly above cargo pump rooms or above vertical cofferdams adjoining cargo tanks, unless separated from each other by a gastight deck and without mechanical ventilation, and store rooms for cargo hoses:

2.16.6 载运闪点（闭杯）不超过60℃货油的油船

2.16.6.1 载运闪点（闭杯）不超过60℃货油油船上的电气装置，除应符合本节2.16.1至2.16.5的规定以外，还应符合以下2.16.6.2至2.16.6.4的规定。

2.16.6.2 危险区域或处所及可在其中安装的电气设备和电缆（一）：

(1) 货油舱、含有货油的管路和设备的内部：

ia等级的本质安全型电气设备；

(2) 毗邻货油舱的隔离空舱：

① ia等级的本质安全型电气设备；

② 电测深装置的传感器。其传感器应为全封闭型且应放在1个离开货油舱舱壁的坚固气密围阱内。接至传感器的电缆应离开油舱壁敷设在镀锌厚壁钢管内。从传感器至上甲板上面之间的管子，其接头应气密。在电缆进入隔离空舱处，管道内应以填料封隔；

③ 外加电流阴极保护系统（仅用于船体外壳保护）。而电缆必需穿经隔离空舱时，则此项电缆自上甲板以下部分应装在具有气密接头的厚壁钢管中，在可能充注海水的舱室（如固定压载舱），应采用耐蚀管道；

(3) 货泵舱：

① 本节2.16.6.2(2)中所允许安装的设备；

② ib等级的本质安全型设备；

③ 照明应至少由两个最后分路供电，两分路的灯点应交错布置，并符合如下要求：

(a) 货油泵舱内部可安装隔爆型或正压型灯具；

(b) 除应急照明外，其照明应与通风联锁，使得在开启照明时即开始通风。通风系统的故障不应使照明熄灭。

④ 包含在本质安全电路内，具有烧结型限焰器保护的可燃气体探测器；

⑤ 隔爆型通用紧急报警发声器，但其内部应无产生火花的触点；

⑥ 仅限在其入口处路经敷设电缆，但应敷设在接头为气密的厚壁钢管内；

⑦ 安装在货泵舱内的设备，其驱动电动机应以气密舱壁或甲板使之与货泵舱分隔。在电动机和被其驱动的设备之间的轴上，应装有挠性联轴器或保持对中的其他设施。此外，在轴穿过舱壁和甲板之处，应装有良好润滑的气密填料函；

(4) 直接在货油舱上方的围蔽或半围蔽处所（例如甲板间处所）或其舱壁在货油舱舱壁之上并与之成一直线的围蔽或半围蔽处所；直接在货泵舱上方或在毗邻于货油舱的垂直隔离空舱上方彼此未以气密甲板分隔，且无适当的机械通风的围蔽或半围蔽处所；贮放输油软管的舱室：

① intrinsically safe equipment;

② flameproof type, increased safety type and pressurized type lighting;

③ through runs of cable.

(5) Enclosed or semi-enclosed spaces fitted with cargo oil pipes

① electrical equipment as defined in 2.16.2.2 (2) of this Section;

② the following electrical equipment may be installed only if appropriate machinery ventilation exists in these spaces:

(a) intrinsically safe equipment of category "ib";

(b) flameproof type or pressurized type lighting;

(c) through runs of cable.

(6) Spaces other than cofferdams adjoining to and below the top of a cargo oil tank, e.g. trunks, passageways and cargo holds, and double bottom and pipe tunnels below cargo tanks:

① electrical equipment as defined in 2.16.6.2 (2) of this Section;

② intrinsically safe equipment of category "ib";

③ flameproof type or pressurized type lighting. The lighting is to be supplied at least by two final circuits;

④ gas detector heads having sinter-type flametrap protection included in intrinsically safe circuits;

⑤ general emergency alarm sounder of flameproof type, without internal sparking contacts;

⑥ through runs of cables, subject to the agreement of the Society.

(7) Zones on weather deck, or semi-enclosed spaces on weather deck, within 3 m of any cargo oil tank outlet or vapour outlet (e.g. cargo tank hatches, sight ports, tank cleaning openings, sounding pipes, cargo pump rooms or vent outlets of cofferdams and cargo pump room entrances);

In vertical cylindrical zone with unrestricted height with a radius of 6 m above the ventilation openings of breathing valve outlets of cargo tanks, and from there downward to the zones on weather deck, or semi-enclosed spaces on weather deck:

① certified safe type electrical equipment (see 1.3.3.2 of this PART);

② through runs of cables, where cable expansion bends are not to be used.

(8) Zones[①] on weather deck over all cargo tanks (including all ballast tanks within the cargo tank area) to the full width of the vessel, plus 3 m fore and aft on weather deck, up to a height of 2.4 m above the deck:

① certified safe type electrical equipment (see 1.3.3.2 of this PART);

② through runs of cables.

① Where spillage barriers are fitted, the horizontal distance of the hazardous zone on weather deck referred to above is deemed to extend 3 m aft of the spillage barrier or 3 m aft of the cargo tank area, whichever is further aft.

① 本质安全型设备；

② 隔爆型、增安型或正压型灯具；

③ 路经电缆

(5) 装有货油管路的围蔽或半围蔽处所：

① 与本节 2.16.6.2(2) 相同的设备；

② 只要该处所有适当的机械通风，则可安装下列电气设备：

(a) ib 等级的本质安全型设备；

(b) 隔爆型或正压型灯具；

(c) 路经电缆。

(6) 除隔离空舱以外其他与货油舱毗邻而且在货油舱顶板下面的处所（例如围壁通道、走道和杂货舱）以及货油舱下面的双层底和管隧：

① 与本节 2.16.6.2(2) 相同的设备；

② ib 等级的本质安全型设备；

③ 隔爆型或正压型灯具。照明应至少由两个最后分路供电；

④ 包含在本质安全电路内，具有烧结型限焰器保护的可燃气体探测器；

⑤ 隔爆型通用紧急报警发声器，但其内部应无产生火花的触点；

⑥ 路经电缆，但应经本社同意；

(7) 离任何有少量气体或蒸气混合物排出的（例如由于温度变化形成）货油舱出口或者其他出口（例如货油舱舱口、观察孔、洗舱开口、测深口、货油泵舱或隔离空舱的通风出口和货油泵舱入口）3m 范围以内的露天甲板区域，或露天甲板上的半围蔽处所；

在装卸货油或压载过程中通过大量气体或蒸气混合物的货油舱出口向上，以 6m 为半径、无限高度的垂直圆柱内；以及自该出口向下，以 6m 为半径的半球面内的露天甲板区域，或露天甲板上的半围蔽处所：

① 合格防爆电气设备（见本篇 1.3.3.2）；

② 路经电缆，但不应设置电缆膨胀弯头；

(8) 货油舱前后向首尾各延伸 3m，宽度为船的全宽（包括在货油舱范围内的所有压载舱）上面的露天甲板区域[①]，离甲板高度为 2.4m 以内的区域：

① 合格防爆电气设备（见本篇 1.3.3.2）；

② 路经电缆；

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① 对设有溢油挡板的船舶，上述露天甲板危险区域的划分，以溢油挡板为界向后延伸 3m，或以货油舱区为界向后延伸 3m，应以较后者为准。

(9) Enclosed or semi-enclosed spaces having direct openings to any of the above hazardous spaces are to be fitted with the electrical equipment complying with the requirements for the zones where the openings are to reach.

2.16.6.3 Electrical equipment and cables permitted to be installed in hazardous zones (II):

(1) Zones on weather deck, or semi-enclosed spaces on weather deck, 2 m from within a radius of 3 m of any cargo oil tank outlet or vapour outlet of little gas or vapour mixture as specified in 2.16.6.2(7):

① certified safe type electrical equipment (see 1.3.3.2 of this PART);

② electrical equipment with no sparks (Ex "n");

③ ensuring the absence of sparks or arcs and whose surface does not rise to an unacceptable level, during normal operation or of certified safe type;

④ through runs of cables.

(2) Zones on weather deck, or semi-enclosed spaces on weather deck, 4 m from within a radius of 6 m around breathing valve outlets of cargo tanks as specified in 2.16 6.2 (7) of this Section:

The same electrical equipment as is specified in 2.16.6.3 (1).

2.16.6.4 The danger in some hazardous zones or spaces, e.g., they have openings directly toward hazardous zones or spaces, may be reduced or these zones or spaces may be regarded as non- hazardous zones or spaces, provided that the arrangements of ventilation, pressurization, doors at openings and other safe protection measures are to be in compliance with relevant standards ① accepted by the Society.

2.16.7 Oil tankers carrying cargo oils having a flashpoint exceeding 60 ℃ and not heated or heated to the temperature more than 15℃ below its flashpoint

2.16.7.1 For tankers carrying cargo oils having a flashpoint exceeding 60℃ (closed cup test), where the cargo oil temperature is more than 15℃ below its flashpoint, no hazardous zones exit. The provisions in 2.16.1 to 2.16.5 of this Section are not applicable to such kind of oil tankers. However, the provisions in 2.16.7.2 to 2.16.7.6 below are to be complied with in order to avoid the possible ignition source.

2.16.7.2 No cables are allowed to be laid in the cargo tanks except for those connecting essential equipment in cargo tanks and to run in thick-walled bulkheads and gas-tight conduits up to the main deck.

2.16.7.3 Every cable of intrinsically safe electric circuit is to be in compliance with the provisions in 2.16.3.2 and 2.16.3.5 of this Section.

2.16.7.4 Only intrinsically safe remote monitoring circuit is allowed to be used in cargo tanks and cargo pipes.

2.16.7.5 Electrical equipment in cargo pump rooms is the one which will ensure the absence of spark of arcs and whose surface does not rise to an unacceptable level, during normal operation or of certified safe type.

2.16.7.6 Portable electrical installations used in cargo tanks are to be of certified safe type.

2.16.8 Oil tankers carrying cargo oils having a flashpoint exceeding 60℃ and heated above its flashpoint or heated to the temperature less than 15℃ of its flashpoint

2.16.8.1 The oil tankers are to be in compliance with the requirements of the oil tankers carrying cargo oils having a flashpoint not exceeding 60℃ ."

① See IEC publication 60092-502 "Tankers-Special Features".

(9) 有开口直接通向上述危险区域之一的围蔽或半围蔽处所内，应只安装符合该开口所通达区域所要求的电气设备。

2.16.6.3 危险区域及可在其中安装的电气设备和电缆（二）：

(1) 在 2.16.6.2(7) 规定的任何有少量气体或蒸气混合物排出的货油舱出口，或者其他出口周围 3m 半径的球面之外 2m 的露天甲板上的区域或露天甲板上的半围蔽处所：

① 合格防爆电气设备（见本篇 1.3.3.2）；

② 无火花型设备 (Ex“n”)；

③ 在正常工作时不产生火花或电弧，且其表面不可能达到不可接受温度的设备；

④ 路经电缆；

(2) 在 2.16.6.2(7) 规定的通过大量气体或蒸气混合物的货油舱出口周围的 6m 半径的球面之外 4m 的露天甲板上的区域或露天甲板上的半围蔽处所：

与本节 2.16.6.3(1) 相同的设备。

2.16.6.4 某些危险区域或处所，例如有开口直接通向危险区域或处所的区域或处所，如果其通风、增压（正压保护）、开口处门的设置以及其他安全保护措施符合本社接受标准[①]的有关规定，则该区域或处所的危险性可以降低，或者作为非危险区域或处所。

2.16.7 载运闪点（闭杯）超过 60℃货油，且不加热或加热温度低于其闪点 15℃以上的油船

2.16.7.1 载运闪点（闭杯）超过 60℃货油的油船，如果货油温度低于其闪点 15℃以上，则不存在危险区域，本节 2.16.1 ～ 2.16.5 的规定不适用于此类油船。但是为了避免可能的引燃源，应符合以下 2.16.7.2 ～ 2.16.7.6 的规定。

2.16.7.2 除与货油舱内必要的设备相连，且至主甲板以上为止系敷设在厚壁、气密的管道中的电缆外，在货油舱中不允许敷设电缆。

2.16.7.3 每一本质安全电路的电缆应符合本节 2.16.3.2 和 2.16.3.5 的规定。

2.16.7.4 在货油舱和货油管道中仅允许设置本质安全型的遥控监视设备和电路。

2.16.7.5 货油泵舱的电气设备，应保证是在正常工作时不产生火花或电弧，且表面温度不会达到不允许程度的设备，或者是合格防爆电气设备。

2.16.7.6 用于货油舱中的可携式电气设备应为合格防爆电气设备。

2.16.8 载运闪点（闭杯）超过 60℃货油，且将其加热至其闪点以上或加热至与其闪点之差小于 15℃的油船

2.16.8.1 该类油船应符合本节以上对载运闪点（闭杯）不超过 60℃货油油船的规定。”

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① 参见 IEC60092-502 出版物《专辑 - 液货船》。

The existing Section 18 is replaced by the following:

"Section 18 ADDITIONAL REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS

2.18.1 General requirements

2.18.1.1 The electrical installations onboard ships for carrying dangerous goods specified in 2.18.1.2 in their hazardous cargo spaces are to comply with the requirements of this Section and other applicable requirements of this PART.

2.18.1.2 Dangerous goods, for which safety measures may be required with respect to the electrical equipment, are based on IMO Code of International Maritime Dangerous Goods and Code of Safe Practice for Solid Bulk Cargos are grouped into the following classes:

(1) Dangerous goods in packaged form

Class 1	Explosive, except goods of division 1.4, compatibility group S;
Class 2.1	All flammable gases, compressed, liquefied or dissolved under pressure;
Class 3.1, 3.2	All flammable liquids having a flashpoint below 23℃ (closed cup test);
Class 6.1	All poisonous substances having a flashpoint below 23℃ (closed cup test);
Class 8	All corrosive liquids having a flashpoint below 23℃ (closed cup test).

(2) Solid dangerous goods in bulk

Class 4.1	Flammable solids;
Class 4.2	Substances liable to spontaneous combustion;
Class 4.3	Substances, which in contact with water, emit flammable gases;
Class 5.1	Oxidizing substances;
Class 9	Miscellaneous dangerous substances, that is any other substance in respect of which experience has shown, or may show, to be of such a dangerous character that the provisions of this PART apply to it.
MHB:	The materials, when carried in bulk present sufficient hazards to require specific precautions.

2.18.1.3 Hazardous areas onboard ships for carrying the dangerous goods required in this Section comprise the following:

(1) Zones and spaces in which an explosive atmosphere① is likely to occur in normal operation, are defined to be hazardous areas;

(2) Zones and spaces in which an explosive atmosphere is not likely to occur in normal operation and , if it does occur, is likely to do so only infrequently and will exist for a short period only, are defined to be extended hazardous areas.

2.18.1.4 Electrical equipment are to be installed in hazardous areas only when it is essential for safe and operational purposes. The explosion protection of the installed and operated electrical equipment is to be compatible with the characteristics of the dangerous cargo.

2.18.2 Carriage of explosive substances in packaged form, conforming to class 1, required in 2.18.1.2 (1) (except goods of division 1.4, compatibility group S)

2.18.2.1 The following zones or spaces are the hazardous areas:

(1) enclosed cargo spaces, and enclosed or open ro-ro cargo spaces;

(2) permanently fixed containers (e.g. magazines).

① An explosive atmosphere may exist due to gas and/or dust.

第 18 节全部替换如下：

“第 18 节　载运危险货物船舶附加要求

2.18.1　一般要求

2.18.1.1　具有载运本节 2.18.1.2 规定危险货物装货处所的船舶上的电气装置，应符合本节规定以及本篇其他适用的规定。

2.18.1.2　按 IMO《国际海运危险品规则》（《IMDG 规则》）和《固体散装货物安全操作规则》（《BC 规则》）的有关规定，需对电气设备采取安全措施的危险货物分为以下几类：

(1)　有包装的危险货物：

1 类	爆炸品，但在配装组 S 中的 1.4 类爆炸品除外；
2.1 类	压缩、液化或加压溶解的所有易燃气体；
3.1，3.2 类	闪点（闭杯试验）低于 23℃的所有易燃液体；
6.1 类	闪点（闭杯试验）低于 23℃的所有有毒物质；
8 类	闪点（闭杯试验）低于 23℃的所有腐蚀性液体。

(2)　散装固体危险货物：

4.1 类	易燃固体物质；
4.2 类	易于自燃的物质；
4.3 类	遇水会散发易燃气体的物质；
5.1 类	氧化物；
9 类	杂类危险物质，经验已经表明或可能表明按其危险性质应采用本节规定的任何其他物质；
MHB	如散装运输会有危险，要求采取特殊措施的物质。

2.18.1.3　由于载运本节规定的危险货物可能产生的危险区域可分为以下两类：

(1)　在正常工作状态下可能出现爆炸性环境[①]的区域或处所，称为危险区；

(2)　在正常工作状态下不太可能出现爆炸性环境，即使出现也仅仅是偶然的和短时间的区域或处所，称为扩大危险区。

2.18.1.4　在危险区域中仅允许安装船舶安全与营运所必不可少的电气设备，所安装和使用的电气设备的防爆性能应适合于所载运货物的特性。

2.18.2　载运本节 2.18.1.2(1) 规定的有包装的 1 类爆炸品（在配装组 S 中的 1.4 类爆炸品除外）

2.18.2.1　下列区域或处所属危险区：

(1)　闭式装货处所和闭式或开式滚装装货处所；

(2)　固定安装的容器（例如：弹药箱）。

① 爆炸性环境可能由于爆炸性气体和 / 或粉尘的存在而存在。

2.18.2.2 Cables required in 2.18.8.2 and the electrical equipment not less than the requirements of Table 2.18.2.2 are to be permitted to fit in the hazardous areas required in 2.18.2.1 of this Section.

Permitted electrical equipment **Table 2.18.2.2**

Environment	Electrical equipment			
	Type	Explosion group	Temp. class or maximum surface temp.	Degree of protection
Explosive dust	General electrical equipment		100℃	IP65
Explosive gas	Intrinsically safe Ex "i"	IIA	T5	
	Flameproof enclosure Ex "d"	IIA		
	Increased safety type Ex "e" (only for lighting)	II		
Explosive gas and dust	Intrinsically safe Ex "i"	IIA	T5	IP65
	Flameproof enclosure Ex "d"	IIA		
	Increased safety type Ex "e" (only for lighting)	II		

2.18.3 Carriage of solid dangerous goods in bulk which may develop explosive dust only

2.18.3.1 The following zones or spaces are hazardous areas:

(1) enclosed cargo spaces;

(2) ventilation ducts (if any) for hazardous areas;

(3) enclosed or semi-enclosed spaces with direct openings to (1) or (2) mentioned above, without appropriate measures to prevent inflammable dust from entering in.

2.18.3.2 Cables required in 2.18.8.2 and the electrical equipment not less than the following requirements are permitted to fit in the hazardous areas required in 2.18.3.1 of this Section.

(1) general electrical equipment

- degree of protection IP55;
- maximum surface temperature 200℃ ; or

(2) certified explosion-protected equipment

- degree of protection IP55;
- temperature class T3.

2.18.3.3 Where the characteristics of the cargo demand a lower surface temperature than in 2.18.3.2 of this Section, the relevant requirements are to be complied with (see also 2.18.7).

2.18.4 Carriage of inflammable liquids with a flashpoint below 23℃ in packaged form

2.18.4.1 The following zones or spaces are hazardous areas:

2.18.2.2　在本节 2.18.2.1 规定的危险区内，允许安装符合本节 2.18.8.2 规定的电缆，以及不低于表 2.18.2.2 要求的电气设备。

允许安装的电气设备　　表 2.18.2.2

环境	电气设备			
	类型	防爆类别	温度组别或最高表面温度	外壳防护等级
爆炸性粉尘环境	一般电气设备		100℃	IP65
爆炸性气体环境	本质安全型 Ex“i”	ⅡA	T5	
	隔爆型 Ex“d”	ⅡA		
	增安型 Ex“e”（仅适用于照明灯具）	Ⅱ		
爆炸性粉尘和爆炸性气体兼有的环境	本质安全型 Ex“i”	ⅡA	T5	IP65
	隔爆型 Ex“d”	ⅡA		
	增安型 Ex“e”（仅适用于照明灯具）	Ⅱ		

2.18.3　载运只产生爆炸性粉尘环境的散装固体危险货物

2.18.3.1　下列区域或处所属危险区：

(1)　闭式装货处所；

(2)　危险区域的通风管道（如设有）；

(3)　有开口直接通向以上 (1) 或 (2) 所列处所的围蔽或半围蔽处所，并无防止易燃粉尘进入该处所的适当措施。

2.18.3.2　在本节 2.18.3.1 规定的危险区内，允许安装符合 2.18.8.2 的规定的电缆，以及不低于下列要求的电气设备：

(1)　一般电气设备

-- 外壳防护等级　IP55；
-- 最高表面温度　200℃；或者

(2)　合格防爆电气设备

-- 外壳防护等级　IP55；
-- 温度组别　T3 。

2.18.3.3　如果载运的危险货物要求较本节 2.18.3.2 规定更低的表面温度，则应按该货物的要求（另见本节 2.18.7)。

2.18.4　载运闪点低于 23℃有包装的易燃液体

2.18.4.1　下列区域或处所属危险区：

(1) enclosed cargo spaces or enclosed ro-ro cargo spaces;

(2) ventilation ducts (if any) for hazardous areas;

(3) weather deck areas, or semi-enclosed spaces on weather deck round 1.5 m from any draft outlet of hazardous areas;

(4) enclosed or semi-enclosed spaces with direct openings to (1) and (2) mentioned above, and without appropriate measures to prevent inflammable gases from entering in.

2.18.4.2 The following zones or spaces are extended hazardous areas:

(1) spaces which may be separated by self-closed gastight doors (watertight doors can be regarded as the gastight) from the hazardous areas as mentioned in 2.18.4.1 (1) and (2) of this Section, and have natural ventilation;

(2) inside the air-lock (if any) adjoining to the hazardous areas as mentioned in 2.18.4.1;

(3) weather deck areas, or semi-enclosed spaces on weather deck 1.5 m outside the hazardous areas as specified in 2.18.4.1 (3).

2.18.4.3 Cables required in 2.18.8.2 are permitted to fit in the hazardous areas required in 2.18.4.1 and 2.18.4.2 of this Section, and to be not less than the requirements for the electrical equipment in Table 2.18.4.3.

Permitted electrical equipment **Table 2.18.4.3**

Type of hazardous areas	Electrical equipment		
	Type	Explosion group	Temp. class or maximum surface temp.
Hazardous areas	Intrinsically safe Ex "i"	IIC	T4
	Flameproof enclosure Ex "d"	IIC	
	Pressurized type Ex "p"	II	
	Encapsulation Ex "m"	II	
Extended hazardous areas	Permitted electrical equipment in the hazardous areas mentioned above	IIC or II	T4
	No spark type Ex "n"	II	
	Appliances which do not generate spark or arc under normal work		135℃

2.18.4.4 If cargoes to be carried have no hydrogen or hydrogen mixtures, or in bulk which may produce hydrogen under certain conditions, the explosion group required above may be set to II B.

2.18.5 Carriage of only dangerous solid goods in bulk and MHB

2.18.5.1 Where dangerous goods in bulk and MHB (containing dangerous solid goods which may produce explosive gas environment) are only to be carried:

(1) Zones and spaces mentioned in 2.18.4.1 are hazardous areas;

(2) Zones and spaces mentioned in 2.18.4.2 are extended hazardous areas.

2.18.5.2 In hazardous areas defined in 2.18.5.1 of this Section, the type of cables and electrical equipment permitted are to be in compliance with the requirements of 2.18.3.2 and 2.18.4.3, and with the minimum requirements as shown in Table 2.18.5.2.

2.18.5.3 For some dangerous goods such as class 5.1 and class 9, all end circuits in cargo spaces are to be cut off (see Table 2.18.5.2 of this Section) in accordance with the requirements of 2.18.8.1.

(1) 闭式装货处所和闭式滚装装货处所；

(2) 危险区的通风管道（如设有）；

(3) 离危险区任何排风口周围 1.5m 范围内的露天甲板区域，或者露天甲板上的半围蔽处所；

(4) 有开口直接通向以上 (1) 和 (2) 所列处所的围蔽或半围蔽处所，并无防止易燃气体进入该处所的适当措施；

2.18.4.2 下列区域或处所属扩大危险区：

(1) 以自闭式气密门（水密门可认为是气密的）与本节 2.18.4.1(1) 和 (2) 所列危险处所分隔，并有自然通风的处所；

(2) 与本节 2.18.4.1 所列危险区相毗邻的气闸（如设有）的里面；

(3) 在 2.18.4.1(3) 规定的危险区之外 1.5m 范围的露天甲板区域，或者露天甲板上的半围蔽处所。

2.18.4.3 在本节 2.18.4.1 和 2.18.4.2 规定的危险区域内，允许安装本节 2.18.8.2 规定的电缆，以及不低于表 2.18.4.3 要求的电气设备。

允许安装的电气设备 **表 2.18.4.3**

危险区类别	电气设备		
	类型	防爆类别	温度组别或最高表面温度
危险区	本质安全型 Ex“i”	ⅡC	T4
	隔爆型 Ex“d”	ⅡC	
	正压型 Ex“P”	Ⅱ	
	浇封型 Ex“m”	Ⅱ	
扩大危险区	以上危险区允许安装的设备	ⅡC 或Ⅱ	T4
	无火花型 Ex“n”	Ⅱ	
	正常工作时不产生火花或电弧的设备		135℃

2.18.4.4 如果所载运的货物不包括氢气、氢气混合物以及在一定条件下可能产生氢气的散装货物，则以上规定的防爆类别可为ⅡB。

2.18.5 只载运散装固体危险货物和 MHB

2.18.5.1 如果只载运散装固体危险货物（含能产生爆炸性气体环境的固体危险货物）和 MHB，则：

(1) 本节 2.18.4.1 所列区域或处所属危险区；

(2) 本节 2.18.4.2 所列区域或处所属扩大危险区。

2.18.5.2 在本节 2.18.5.1 规定的危险区域内，允许安装的电缆和电气设备的类型应符合本节 2.18.3.2 和 2.18.4.3 的规定，以及表 2.18.5.2 所示的最低要求。

2.18.5.3 对某些 5.1 类和 9 类危险货物，应按照 2.18.8.1 的规定切断在装货处所终止的所有电路（见本节表 2.18.5.2）。

Characteristics of electrical equipment for use in hazardous areas (example) Table 2.18.5.2

Dangerous goods	IMO class	Main hazard①	Explosive dusts	Explosive atmosphere	
			Degree of casing protection	Explosion group	Temp. class
Aluminium dross	MHB	H_2	-	IIC	T2
aluminium ferrosilicon powder	4.3	H_2	-	IIC	T2
Aluminium silicon powder uncoated	4.3	H_2	-	IIC	T2
Ammonium nitrate fertilizer -- type A -- type B	 5.1 9	 ② ②	 - -	 - -	 - -
Coal	MHB	Dust, methane	IP55	IIA	T4
Directly reduced iron	MHB	H_2	-	IIC	T2
Ferrophosphorus (excl. briquettes)	MHB	H_2	-	IIC	T1
Ferrosilicon	4.3	H_2	-	IIC	T1
Iron ocide, spent Sponge iron, spent	4.2	Dust	IP55	IIA	T2
Dust (e.g. from grain)	4.2	Dust	IP55	-	-
Sqeesed aromatic plant seeds	4.2	Hexane	-	IIA	T3
Silicon manganese	MHB	H_2	-	IIC	T1
Sulphur	4.1	Combustible	IP55	-	T4
Zinc ashes Zinc dross Zinc residues Zinc skimmings	4.3	H_2	-	IIC	T2

Note: ① The term "Hazard" relates exclusively to the danger of explosion attributable to the dangerous goods and electrical appliances.

② In accordance with the requirements of 2.18.5.3, all circuits of cargo spaces are to be cut off.

2.18.6 Pressurized protection

2.18.6.1 Spaces with the openings directly to the adjoining hazardous areas (such as the hazardous areas specified in 2.18.4.1 (4) of this Section) can be non-hazardous spaces provided that they have pressurized protection specified as the standards① accepted by the Society.

2.18.7 Special requirements

2.18.7.1 If no details of the characteristics of the prospected cargo are available, or if a ship is intended to be used for the carriage of all the materials defined in 2.18.1.2, the electrical equipment permitted are to be in compliance with the following requirements:

- degree of casing protection IP65;
- maximum surface temperature 85℃ ;
- explosion group IIC;
- temperature class T6.

2.18.7.2 On ships intended exclusively for the carriage of containers, where containers with dangerous goods defined in 2.18.1.2 of this Section are stowed in the cargo holds with the exception of class 1 goods, hydrogen and hydrogen mixtures, the electrical equipment are to be in compliance with the following requirements:

- degree of casing protection IP55;
- maximum surface temperature 135℃ ;
- explosion group IIB;
- temperature class T4.

① See IEC publication 60092-506 "Special features – Ships carrying specific dangerous goods and materials hazardous only in bulk".

2.18.6 正压保护

2.18.6.1 有开口直接通向毗邻危险区（例如本节 2.18.4.1(4) 规定的危险区） 的处所，如果具有本社接受标准[①]规定的正压保护，则可使其成为非危险处所。

在危险区内使用的电气设备特性（举例） **表 2.18.5.2**

危险货物	IMO 分类	主要危险①	粉尘防爆	气体防爆	
			外壳防护等级	防爆类别	温度组别
碎铝	MHB	H_2	-	Ⅱ C	T2
硅铝铁粉	4.3	H_2	-	Ⅱ C	T2
未包覆的硅铝粉	4.3	H_2	-	Ⅱ C	T2
硝酸铵肥料 --A 型 --B 型	 5.1 9	 ② ②	 - -	 - -	 - -
煤	MHB	粉尘，甲烷	IP55	Ⅱ A	T4
直接还原铁	MHB	H_2	-	Ⅱ C	T2
磷铁（无团块）	MHB	H_2	-	Ⅱ C	T1
硅铁	4.3	H_2	-	Ⅱ C	T1
废氧化铁 废海绵铁	4.2	粉尘	IP55	Ⅱ A	T2
粉尘（例如：来自谷物）	4.2	粉尘	IP55	-	-
压榨过的含芳香植物种子的饼	4.2	已烷	-	Ⅱ A	T3
硅锰合金	MHB	H_2	-	Ⅱ C	T1
硫	4.1	易燃	IP55	-	T4
锌渣 碎锌 废锌 锌浮渣	4.3	H_2	-	Ⅱ C	T2

注：① 这里的“危险”一词专指因危险货物和电气设备而产生的爆炸危险。
② 应按照 2.18.5.3 的规定，切断在装货处所终止的所有电路。

2.18.7 特殊规定

2.18.7.1 如果未获得拟载运的货物特性的详细资料，或者船舶拟载运本节 2.18.1.2 规定的所有货物，则允许安装在危险区域中的电气设备应符合下列规定：

-- 外壳防护等级 IP65
-- 最高表面温度 85℃
-- 防爆类别 Ⅱ C
-- 温度组别 T6

2.18.7.2 在仅限载运集装箱的船舶上，且置于货舱内的集装箱内装有本节 2.18.1.2 规定除 1 类危险品、氢和氢混合物以外的各类危险货物，则安装在危险区域中的电气设备应符合下列规定：

-- 外壳防护等级 IP55
-- 最高表面温度 135℃
-- 防爆类别 Ⅱ B
-- 温度组别 T4

① 参见 IEC60092-506 出版物《专辑 载运特殊危险货物和仅散装有危险货物船舶》。

2.18.7.3 The requirements in 2.18.7.1 or 2.18.7.2 of this Section may be deviated. However, such deviation is to be noted on the certificates issued for the carriage of dangerous goods and the scope of the dangerous goods permitted to carry is to be limited in accordance with the conditions of the equipment fitted.

2.18.8 Installation of electrical system in hazardous areas

2.18.8.1 If electrical equipment are installed which are not suitable for use in areas with an explosion hazard, they are to be capable of being switched-off and safe-guarded against unauthorized re-switching. The switching devices are to be located outside the hazardous area, and are to, where possible, include isolating links or lockable switches.

2.18.8.2 Cables are to be armoured or to have braided shield, or to be laid in metallic conduits, with the exception of the extended hazardous areas.

2.18.8.3 Cables joints in cargo spaces are to be avoided where possible. When joints are unavoidable, they are to be enclosed in explosion protection metallic or high strength plastic junction boxes, or encapsulated crimp sleeve cable joint.

2.18.8.4 Except in extended hazardous areas, bulkhead and deck penetrations are to be sealed to prevent the passage of inflammable gases or vapours.

2.18.9 Portable electrical equipment in hazardous areas

2.18.9.1 Portable electrical equipment which are necessary for ship operation are to be certified safe type for the zones where they are expected to be used, and except for intrinsically safe circuits, to be generally with power source of their own in general."

CHAPTER 4 CONSTRUCTION AND TESTING OF ELECTRICAL EQUIPMENT

Section 1 ROTATING MACHINES

In note ② of Table 4.1.8.3, "kW/kVA" is replaced by: "kW".

Section 2 SWITCHGEAR ASSEMBLIES

The existing paragraph 4.2.1.11 is replaced by the following:

"4.2.1.11 The main and emergency generators are to be interlocked with the shore connection so as to prevent the simultaneous supply."

Section 4 CABLES

The existing paragraph 4.4.1.1 is replaced by the following:

"4.4.1.1 Cables are to comply with the requirements of this Section. Those not covered in this Section are to comply with the relevant requirements of the standards ① accepted by the Society. Fire-resisting cables are to additionally comply with the relevant requirements for fire-resisting cables of the standards ② accepted by the Society."

The existing footnote ② in 4.4.1.3 is renumbered as ③ .

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① See "cable series standards" in IEC publication 60092.

② See: outer diameter of the cable > 20 mm: IEC publication 60331-31 ;
outer diameter of the cable ≤ 20 mm: IEC publication 60331-21; and may be adopted;
electrical data cables: IEC 60331-23;
fibre-optic cables; IEC 60331-25.

2.18.7.3　可以偏离本节 2.18.7.1 或 2.18.7.2 的规定。但应在签发的载运危险货物的证书上注明这些偏离，并根据所配备设备的情况对许载危险货物范围加以限制。

2.18.8　危险区域内电气设备的安装

2.18.8.1　如果安装的电气设备为不适合在有爆炸危险的区域中使用者，则应能将其关断，并应有防止未经批准的再次接通的保护。该项关断应在危险区域之外进行，且一般应采用隔离开关或可锁定的开关实施。

2.18.8.2　电缆均应是铠装的或者应具有编织的屏蔽层，否则应敷设在金属管道中，但扩大危险区可以除外。

2.18.8.3　装货处所中应尽可能避免电缆接头，如不可避免，则接头应围蔽在防爆的金属或高强度塑料制成的接线盒中，或者将其密封在波纹套筒电缆接头中。

2.18.8.4　除扩大危险区以外，甲板和舱壁上的电缆贯穿应是密封的，以防止易燃气体或蒸气透过。

2.18.9　危险区域内的可携电气设备

2.18.9.1　如果为船舶营运必需在危险区域内使用可携电气设备，则应采用适合于该危险区域中使用的合格防爆电气设备，且除本质安全电路外，一般应自带电源。”

第 4 章　电气设备的制造和试验

第 1 节　旋转电机

表 4.1.8.3 下注②中的“kW/kVA”改为“kW”。

第 2 节　配电板与配电电器

4.2.1.11 改为：

“4.2.1.11　应设有所有主发电机和应急发电机与岸电之间的联锁装置，以避免同时供电。”

第 4 节　电　缆

4.4.1.1 改为：

“4.4.1.1　电缆应符合本节的规定，本节未作规定者，则应符合本社接受标准[①]的有关规定。对于耐火电缆，还应符合本社接受的有关耐火电缆标准[②]的有关规定。”

4.4.1.3 中的脚注编号改为③。

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① 参见 IEC60092 出版物中的电缆系列标准。

② 参见：电力电缆外径 >20 mm：IEC60331-31 出版物；
电力电缆外径≤ 20 mm：IEC60331-21 出版物；以及可能采用：
电气数据电缆：IEC60331-23；
光导纤维缆：IEC60331-25。

CHAPTER 5 SUPPLEMENTARY REQUIREMENTS FOR SMALL SHIPS AND SHIPS IN RESTRICTED SERVICE

Section 2 SHIPS ENGAGED ON NON-INTERNATIONAL VOYAGES AND IN COASTAL AND GREATER COASTAL SERVICES

A new subparagraph (3) in 5.2.3.3 is added as follows:

"(3) in an accommodation of more than 16 persons;"

The existing subparagraphs 5.2.3.3(3) and (4) are renumbered as (4) and (5) respectively.

Section 3 SHIPS NAVIGATING IN SHELTERED WATER SERVICE

The existing paragraph 5.3.3.1 is replaced by the following:

"5.3.3.1 Emergency sources of electrical power as required in Section 2 of Chapter 2 of this PART may not be fitted, but an independent spare power source is to be fitted complying with:

(1) the requirements of 5.2.4.2 of this Section;

(2) supplying lighting for an accommodation of more than 16 persons from its power supply system, in addition to complying with the requirements of 5.2.4.3 of this Section;

(3) the supply period being 1 h."

A new paragraph 5.3.4 is added as follows:

"**5.3.4 Additional emergency lighting for ro-ro passenger ships**

5.3.4.1 Ro-ro passenger ships are to be provided with additional emergency lighting as required in 2.2.2.3 of this PART."

The existing paragraphs 5.3.4 and 5.3.4.1 are renumbered as 5.3.5 and 5.3.5.1 respectively.

第 5 章　小船与有限航区船舶的补充规定

第 2 节　近海、沿海非国际航行船舶

5.2.3.3 新增 (3) 如下：

“(3)　超过 16 人的居住舱室；”

5.2.3.3 中的编号 (3)、(4) 分别改为 (4)、(5)。

第 3 节　遮蔽航区航行船舶

5.3.3.1 改为：

“5.3.3.1　可以不设本篇第 2 章第 2 节要求的应急电源，但应设一独立的并符合下列要求的备用电源：

(1)　符合本节 5.2.4.2 的规定；

(2)　其供电设备除满足本节 5.2.4.3 的要求外，还应增加对超过 16 人的居住舱室照明的供电；

(3)　其供电时间可为 1h。”

新增 5.3.4 如下：

“5.3.4　客滚船附加应急照明

5.3.4.1　客滚船应设有符合本篇 2.2.2.3 要求的附加应急照明。”

原 5.3.4 和 5.3.4.1 的编号分别改为：5.3.5 和 5.3.5.1。

PART FIVE REFRIGERATED CARGO INSTALLATIONS

CHAPTER 1 CLASSIFICATION AND SURVEYS OF REFRIGERATED CARGO INSTALLATIONS

Section 2 CHARACTERS OF CLASSIFICATION AND CLASS NOTATIONS

The existing paragraph 1.2.2.1 is replaced by the following:

"1.2.2.1 The refrigerated cargo installation classed with the Society will be assigned the class notations affixed to the character of classification, depending on the performance or service of the installation:

LG − This notation will be assigned to re-liquefaction or refrigerated cargo installations of liquefied gas carriers used for controlling cargo temperature and pressure.

CF − This notation will be assigned to refrigerated cargo installations for carriage of fruit, showing that the refrigeration cycle in cargo holds, arrangement of fresh air exchange have the cooling capacity for carrying fruit within an appropriate periods of time.

Quick-freezing – This notation will be assigned to refrigerated cargo installations having a quick-freezing capability for fishing vessels."

第 5 篇　货物冷藏装置

第 1 章　货物冷藏装置的入级与检验

第 2 节　入级符号与附加标志

1.2.2.1 修改为：

“1.2.2.1　凡经本社批准入级的船舶货物冷藏装置，根据其性能和用途在入级符号后加注相应的附加标志：

LG 加注于液化气体运输船上用来控制货温和压力的再液化或制冷设备。

CF 加注于适于载运水果货物的冷藏装置，表示货舱内的制冷空气循环流通量、更换新鲜空气的布置具有在合理的时间内能冷却所载运水果的能力。

Quick freezing 加注于渔船上具有速冻能力的制冷装置。”

PART SIX FIRE PROTECTION, DETECTION AND EXTINCTION

CHAPTER 2 FIRE EXTICTION, FIRE DETECTION AND INERT GAS SYSTEMS

Section 4 INERT GAS SYSTEMS

In the existing paragraph 2.4.2.2, the first sentence is replaced by the following:

"In addition to the requirements of Chapter 15 of International Code for Fire Safety Systems (hereinafter referred to as the FSS Code), ……".

The existing paragraph 2.4.3.2 is replaced by the following:

"2.4.3.2 Where such systems are provided in place of the boiler flue gas or oil fired inert gas generators referred to in 2.4.2 of this Section, the following requirements of 2.3.1.3.1, 2.3.1.3.2, 2.3.1.5, 2.3.2, 2.4.2, 2.4.3.1.6, 2.4.3.1.8, 2.4.3.1.9, 2.4.3.3, 2.4.3.4, 2.4.4 of Chapter 15 of the FSS Code and Reg. II-2/4.5.3.4.2, 4.5.6.3, 11.6.3.4 of the SOLAS Convention or equivalent requirements of Resolution A.567(14) remain applicable for the piping arrangements, alarms and instrumentation downstream of the gas generator."

The existing paragraph 2.4.4 is replaced by the following:

"2.4.4 Nitrogen/inert gas systems fitted for purposes other than inerting required in SOLAS Reg. II-2/4.5.5.1.1".

CHAPTER 3 FIRE SAFETY MEASURES

Section 1 SAFETY MEASURES OF PIPE TUNNEL IN DOUBLE BOTTOMS UNDER CARGO OIL TANKS

The existing paragraph 3.1.1 is replaced by the following:

"3.1.1 Pipe tunnel (corresponding to SOLAS Reg. II-2/4.5.2.4) in the double bottom".

第 6 篇　消　防

第 2 章　灭火、探火与惰性气体系统

第 4 节　惰性气体系统

2.4.2.2 第一句改为：

“惰性气体系统除应满足国际消防安全系统规则（以下简称“FSS 规则”）第 15 章的要求外，……”。

2.4.3.2 改为：

“2.4.3.2　如果设有上述系统来代替本节 2.4.2 所提及的锅炉烟气发生器或燃油型惰性气体发生器，FSS 规则第 15 章的 2.3.1.3.1，2.3.1.3.2，2.3.1.5，2.3.2，2.4.2，2.4.3.1.6，2.4.3.1.8，2.4.3.1.9，2.4.3.3，2.4.3.4，2.4.4 以及 SOLAS 公约第 II-2 章第 4.5.3.4.2、4.5.6.3、11.6.3.4 条的要求或与之等效的海大决议案 A.567(14) 的要求仍然对管系布置、报警器以及气体发生器排气口的测试仪器适用。”

2.4.4 改为：

“2.4.4　SOLAS 公约第 II-2 章第 4.5.5.1.1 条要求惰化以外的氮气和惰性气体系统。”

第 3 章　防火安全措施

第 1 节　货油舱下方双层底管隧的安全措施

3.1.1 改为：

“3.1.1　双层底内的管隧（对应于 SOLAS 公约第 II-2 章第 4.5.2.4 条）。”

PART SEVEN AUTOMATION AND REMOTE CONTROL OF MACHINERY

CHAPTER 3 REQUIREMENTS FOR THE AUTOMATION OF PERIODICALLY UNATTENDED MACHINERY SPACES WITH ADDITIONAL NOTATION AUT-0

Section 10 AUTOMATIC CONTROL AND MONITORING ITEMS

The item "Air-conditioner in control station" in "Miscellaneous" of Table 3.10.1.1 is replaced by the following:

"Automatic Control and Monitoring Items for Ships with Additional Notation AUT-0 Table 3.10.1.1

Item	CCS		Mode of protective control action	Mode of alarm at BCS	Remarks
	Display	Limit alarm			
1	2	3	4	5	6
23 Miscellaneous					
Controlled environmental conditions	-	Abnormal	-	Y	Where controlled environment is required for equipment, this requirement is to be complied with

"

第 7 篇　轮机自动控制与遥控

第 3 章　周期无人值班机器处所附加 AUT-0 标志的要求

第 10 节　自动化监视项目

表 3.10.1.1 中“其他”的“控制站空调”项目改为：

附加 AUT-0 标志船舶的自动化监视项目表　　**表 3.10.1.1**

项目	机舱集控站（ 室）		安全系统动作类别	驾驶室控制站报警方式	备注
	显示	极限报警			
1	2	3	4	5	6
23 其他					
受控环境条件	—	失常	—	Y	若设备要求有一受控制的环境时，则应符合本项要求

PART EIGHT MISCELLANEOUS

CHAPTER 1 STABILITY

Section 2 DAMAGE STABILITY

The existing paragraph (2) in 1.2.2.1 is replaced by the following:

"(2) damage control plan and damage control booklets (for passenger ships and type B freeboard cargo ships of 80 m or over in length);"

CHAPTER 5 ADDITIONAL REQUIREMENTS FOR FERRIES

Section 5 VEHICLE RAMP

The existing Section 5 is deleted.

CHAPTER 9 HELICOPTER DECK FACILITIES

Section 1 GENERAL REQUIREMENTS

A new paragraph 9.1.2 "Class notation" is added as follows:

"**9.1.2 Class notation**

9.1.2.1 Ships complying with the requirements of this Chapter may be assigned class notation: Helicopter Deck."

The existing paragraphs "9.1.2", "9.1.2.1" and "9.1.2.2" are renumbered as "9.1.3", "9.1.3.1" and "9.1.3.2" respectively.

The existing paragraphs "9.1.3", "9.1.3.1", "9.1.3.2", "9.1.3.3" are renumbered as "9.1.4", "9.1.4.1", "9.1.4.2", "9.1.4.3" respectively.

CHAPTER 11 VAPOUR CONTROL SYSTEMS

The existing "Chapter 11 Vapour Control Systems" is renumbered as "Chapter 12 Vapour Control Systems".

A new Chapter 13 is added as follows:

"CHAPTER 13 ADDITIONAL REQUIREMENTS FOR SEMI-SUBMERSIBLE VESSELS

Section 1 GENERAL REQUIREMENTS

13.1.1 Application

13.1.1.1 This Chapter is applicable to the vessels for carriage of ships, offshore installations or other massive goods.

13.1.1.2 Those not specified in this Chapter are to be in compliance with the provisions of other PARTs and chapters of the Rules as appropriate.

13.1.2 Definitions

13.1.2.1 Semi-submersible vessel means a ship, designed to load and unload cargoes under semi-submerged condition, with larger open weather cargo deck and with the higher superstructure or deck house or pontoon.

第 8 篇　其　他

第 1 章　稳　性

第 2 节　破损稳性

1.2.2.1(2) 改为：

(2)　破损控制图与破损控制小册子（客船、船长 80m 及以上的 B 型干舷干货船）；

第 5 章　渡船补充规定

第 5 节　车辆跳板

整节删除。

第 9 章　直升机甲板设施

第 1 节　一般规定

新增 9.1.2 附加标志

9.1.2.1　对符合本章要求的船舶，可授予附加标志：Helicopter Deck。

原条文号“9.1.2”、“9.1.2.1”和“9.1.2.2”改为“9.1.3”、“9.1.3.1”和“9.1.3.2”。

原条文号“9.1.3”、“9.1.3.1”、“9.1.3.2”、“9.1.3.3”改为“9.1.4”“9.1.4.1”、“9.1.4.2”、“9.1.4.3”。

第 11 章　蒸气控制系统

原“第 11 章　蒸气控制系统”修改为“第 12 章　蒸气控制系统”。

新增第 13 章如下：

“第 13 章　半潜船补充规定

第 1 节　一般规定

13.1.1　适用范围

13.1.1.1　本章适用于装运船舶、海上设施或其它大件货物的半潜船。

13.1.1.2　对于本章未作规定者，还应符合本规范其它篇章的适用规定。

13.1.2　定义

13.1.2.1　半潜船：系指有较大开敞露天载货甲板，首部或尾部有较高上层建筑或甲板室或浮箱，在装卸货物作业过程中呈半潜状态的船舶。

13.1.2.2 Semi-submerged condition means any condition when lifting cargo deck is submerged, only depending on reserve buoyancy provided by the superstructure or deck house or pontoon.

13.1.2.3 Lifting cargo deck means the open weather deck for the carriage of goods which is submerged during loading and unloading cargoes.

13.1.2.4 Maximum submerged depth means the maximum draft at which the vessel is allowed to be submerged under semi-submerged operation condition.

13.1.3 Class notation

13.1.3.1 Semi-submersible vessels complying with this Chapter will be assigned class notation: Semi-Submersible Vessel.

Section 2 STRUCTURE AND STRENGTH

13.2.1 General requirements

13.2.1.1 All ballast tanks are to be provided with air pipes whose diameters are to be in compliance with the relevant provisions of the Rules. A certain number of manholes are to be made at the appropriate locations in longitudinal and transverse strength members of all ballast tanks, so that the each part inside the tanks can be easily reached. At the same time, they are effective for ventilation when the tanks are empty.

13.2.1.2 Where a semi-submersible vessel is used for trail run, the calculation of towing strength is to be made, and consideration is to be given to the arrangement of towing equipment and relevant structure strength.

13.2.1.3 General tensile steel or high tensile steel adopted for hull structure of semi-submersible vessels is to be in compliance with the relevant provisions of the Rules. Where other material is adopted, special consideration is to be given and the material is to be subject to approval by the Society.

13.2.1.4 Where a semi-submersible vessel classed with CCS is intended to adopt direct calculation or other commonly used formulae to determine the dimensions of each members, the relevant calculation and calculation assumption and descriptions are to be submitted to the Society for approval.

13.2.2 Longitudinal strength

13.2.2.1 The calculation of longitudinal strength is to be in compliance with the requirements of Chapter 2, PART TWO of the Rules.

13.2.2.2 The conditions of longitudinal strength calculation are also to include the typical operation condition of the semi-submersible vessel and the assumed most dangerous operation condition.

13.2.2.3 The structural members to be included in the calculation of the section modulus is to be longitudinally continuous within 0.4 L amidships. In no case is the crane trail to be included in section modulus calculation.

13.2.2.4 For non-self propelled semi-submersible barge designed for sheltered water area or port operation, the longitudinal strength may be calculated in accordance with the relevant requirements in Rules and Regulations for the Construction and Classification of Floating Docks by the Society, subject to agreement by the Society.

13.2.2.5 The longitudinal structural members are to be adequately stiffened to prevent buckling.

13.2.3 Transverse strength

13.2.3.1 The transverse strength is to be checked for the typical transverse strength throughout the whole vessel.

13.2.3.2 The conditions of the transverse strength calculation are to include the typical operation condition of the semi-submersible vessel and the assumed most dangerous operation condition.

13.2.3.3 The transverse strength members are to be suitable for the sum of the following loading components:

(1) self-weight of the semi-submersible vessel including supporting blocks;

13.1.2.2　半潜状态：系指举升甲板被水淹没，仅依赖上层建筑或甲板室或浮箱提供储备浮力的状态。

13.1.2.3　举升甲板：系指承载货物并在装卸货物作业过程中被水淹没的开敞露天甲板。

13.1.2.4　最大沉深：系指半潜作业状态下允许下潜到的最大吃水。

13.1.3　船级附加标志

13.1.3.1　凡符合本章规定的半潜船，可授予附加标志：Semi — Submersible Vessel。

第 2 节　结构与强度

13.2.1　一般要求

13.2.1.1　所有压载水舱都应设置空气管，其直径应符合本规范的有关规定。对于所有压载水舱，应在其纵、横强力构件上的适当位置开设一定数量的人孔，以便能顺利到达舱内各部位，同时在空舱情况下能起到通风作用。

13.2.1.2　如果半潜船需拖航使用，则应进行拖航强度计算，并考虑拖带设备的布置和相应的结构加强。

13.2.1.3　半潜船船体结构所采用的一般强度钢或高强度钢应符合本规范的有关规定。如需采用其他材料，应予特殊考虑并经本社审查同意。

13.2.1.4　如在本社入级的半潜船拟采用直接计算法或其他通用的经验公式来决定各构件的尺寸，则应将有关的计算与计算假定及计算说明一并提交本社审查同意。

13.2.2　纵向强度

13.2.2.1　总纵强度计算应满足本规范第 2 篇第 2 章的要求。

13.2.2.2　总纵强度计算的工况还应包括半潜船典型的作业工况，其中应含有假定期望的最危险作业工况。

13.2.2.3　计入纵强度剖面模数的构件，应在半潜船中部 0.4L 区域内保持纵向连续。但起重机轨道不应计入剖面模数中。

13.2.2.4　对设计用于在遮蔽航区或港内作业的非自航的半潜驳，经本社同意，其总纵强度可以按照本社《浮船坞入级与建造规范》中的相关要求计算。

13.2.2.5　应保证纵向强力构件具有足够的抵抗屈曲破坏的能力。

13.2.3　横向强度

13.2.3.1　应对整个船长范围内典型横向结构进行横向强度校核。

13.2.3.2　横向强度计算的工况应包括半潜船典型的作业工况，其中应含有假定期望的最危险作业工况。

13.2.3.3　横向强度校核时，应考虑下述载荷的作用：

(1)　半潜船的自重（包括龙骨墩）；

(2) maximum member weight to be carried;

(3) external hydrostatic pressure due to given draught;

(4) internal hydrostatic pressure due to the level of evenly distributed ballast associated with the draught as in (3) when lifting at maximum capacity;

13.2.3.4 The bending stresses are not to exceed $170/K$ N/mm². The shear stresses are not to exceed $95/K$ N/mm² and the combined stress at any point is not to exceed $180/K$ N/mm² (where K is conversion factor of the material, to be taken as per 1.5.1.4 of Chapter 1, PART TWO of the Rules).

13.2.3.5 The transverse structural members are to be adequately stiffened to prevent buckling.

13.2.4 Local strength

13.2.4.1 General requirements

(1) Scantlings of plating and supporting stiffeners are to be adequate to meet the requirements for longitudinal and transverse strength, and not to be less than the relevant specification in this Section.

(2) The minimum section modulus for the stiffeners specified in this Section is that with attached plating. The breadth of the attached plating is to be determined complying with the relevant requirements of the Rules.

(3) Primary structural members, such as longitudinals, beams and side frames, are to keep continuous. If discontinuing in a position, they are to be bracketed. The scantlings of the bracket are to comply with the relevant requirements of the Rules.

13.2.4.2 For all tank plating subject to lateral pressure, the thickness t is not to be less than that obtained from the following equation or 7.5 mm:

$$t = 3.9s\sqrt{h} + 2.5 \quad \text{mm}$$

where: s — stiffener spacing, in m;
h — obtained from the following, but not less than 2.5 m:

(1) for tanks, vertical distance measured from the lower edge of the plate in a strake to the top of tank or half the distance to the top of overflow, in m, whichever is the greater;

(2) for ballast tanks, in addition to the above (1), is not to be less than the maximum differential head defined in 13.2.4.7, in m;

(3) for cofferdams and void spaces, vertical distance measured from the lower edge of the plate in a strake to the maximum immersion water line, in m;

(4) for ballast tanks where compressed air is used to discharge ballast water, water pressure head equivalent to the maximum pressure of compressed air, in m.

13.2.4.3 For all tank stiffeners, longituninals, beams and side frames subjected to lateral pressure, the minimum section modulus W is not to be less than that obtained from the following equation:

$$W = 6.28shl^2 \quad \text{cm}^3$$

where: s — stiffener spacing, in m;
l — the span in m between effective supporting members;
h — obtained from the following, but not less than 2.5 m:

(1) for tanks, vertical distance measured from the mid-point of l to the top of tank or half the distance to the top of overflow, in m, whichever is the greater;

(2) 被运输物件的最大重量；

(3) 特定吃水下的外部静水压力；

(4) 相应于 (3) 规定的吃水，且半潜船举起被运输物件最大重量时，均布压载水的内部静水压力；

13.2.3.4 弯曲许用应力为 $170/K$ N/mm^2，剪切许用应力为 $95/K$ N/mm^2，任何点合成应力的许用应力取为 $180N/K$ /mm^2。(K 材料换算系数按本规范第 2 篇第 1 章 1.5.1.4 选取)

13.2.3.5 应保证横向强力构件具有足够的抵抗屈曲破坏的能力。

13.2.4 局部强度

13.2.4.1 一般要求

(1) 板与骨材的尺寸应能满足纵向和横向强度要求，且不得小于本节的有关规定。

(2) 本节对骨材所规定的最小剖面模数，均指包括附连带板后的剖面模数。带板宽度按本规范的有关规定确定。

(3) 纵骨、横梁及肋骨等重要骨材应保持连续，如有间断，应用肘板过渡。肘板尺寸应符合本规范的有关规定。

13.2.4.2 所有承受横向载荷的液体舱舱壁板的板厚 t 应不小于按下式计算所得之值，且应不小于 7.5mm：

$$t = 3.9s\sqrt{h} + 2.5 \quad \text{mm}$$

式中：s —— 扶强材间距，m；
h —— 取下述值，但不小于 2.5m。

(1) 对液体舱取为板下缘至液舱顶的垂直距离，或至溢流管顶垂直距离的一半，m，取大者；

(2) 对压载水舱除满足 (1) 的要求外，还应不小于 13.2.4.7 所述的最大压差水头高，m；

(3) 对空舱和隔离空舱取为板下缘至最大吃水线的垂直距离，m；

(4) 对采用压缩空气排压载水的压载舱，取与压缩空气的最大压力相当的水压头，m。

13.2.4.3 承受横向载荷的舱壁扶强材、纵骨、横梁、肋骨的最小剖面模数 W 应不小于按下式计算所得之值：

$$W = 6.28shl^2 \quad \text{cm}^3$$

式中：s —— 扶强材间距，m；
l —— 扶强材跨距，m；
h —— 取下述值，但不小于 2.5m。

(1) 对液舱取为由扶强材跨距中点量至液舱顶的垂直距离，或量至溢流管顶垂直距离的一半，m，取大者；

(2) for ballast tanks, in addition to the above (1), it is not to be less than the maximum differential head defined in 13.2.4.7 at the mid-point of *l*, in m;

(3) for cofferdams and void spaces, vertical distance measured from the mid-point of *l* to the maximum immersion water line, in m;

(4) for ballast tanks where compressed air is used to discharge ballast water, water pressure head equivalent to the maximum pressure of compressed air, in m.

13.2.4.4 For all webs, transverse, stringers and girders subjected to lateral pressure, the minimum section modulus *W* is not to be less than that obtained from the following equation:

$$W = 6.28bhl^2 \qquad \text{cm}^3$$

where: *b* — spacing of webs, transverse, stringers, or girders, in m;
l — the span in m between effective supporting members;
h — obtained from the following, but not less than 2.5 m:

(1) for tanks, vertical distance measured from the mid-point of *l* to the top of tank or half the distance to the top of overflow, in m, whichever is the greater;

(2) for ballast tanks, in addition to the above (1), it is not to be less than the maximum differential head defined in 13.2.4.7 at the mid-point of *l*, in m;

(3) for cofferdams and void spaces, vertical distance measured from the mid-point of *l* to the maximum immersion water line, in m;

(4) for ballast tanks where compressed air is used to discharge ballast water, water pressure head equivalent to the maximum pressure of compressed air, in m.

13.2.4.5 The scantlings of non-watertight pillar bulkhead plating and stiffeners may be determined in accordance with the relevant requirements of the Rules. The sectional area, scantlings and end reinforcement of pillars may be determined in accordance with relevant requirements of the Rules with loading *P* taken as actual loads supported by the pillars.

13.2.4.6 The sectional area, scantlings and reinforcement of cross tie may be determined referring to the pillar defined in the Rules with the loading *P* taken as follows:

$$P = 9.8shl \qquad \text{kN}$$

where: *h* — maximum differential head, in m, as defined in 13.2.4.7;
s — spacing of cross tie, in m;
l — vertical distance between the mid-point of the spans of two girders immediately over and under the cross ties, in m.

13.2.4.7 Maximum differential head is the maximum vertical difference in meters between the ballast water level and the semi-submersible draught acting on a structural member during the working sinkage. If the head is used in the local strength calculations, the differences between ballast water levels and water levels outside the vessel varying with the vessel draught are to be calculated for determining the head. The calculating data together with other plans and documents are to be submitted to the Society for approval.

Section 3 MACHINERY INSTALLATIONS

13.3.1 General requirements

13.3.1.1 In cabin ventilation system below the deepest immersion water line, the ventilating ducts through the watertight partition bulkheads are to be fitted with appropriate valves on watertight bulkheads, so as to satisfy the watertight requirements of the bulkheads. Where the valves are not fitted on the bulkheads, the wall thickness of connecting pipes between valves and bulkheads is not to be less than 8.8 mm. In addition that the valves can be controlled at site, they are to be controlled in other spaces above the deepest immersion water line, where the instruction measures are to be provided to turn on and off the valves.

(2) 对压载水舱除应满足 (1) 的要求外，还应不小于 13.2.4.7 所述的扶强材跨距中点最大压差水头高，m；

(3) 对空舱和隔离空舱取为扶强材跨距中点至最大吃水线的垂直距离，m；

(4) 对采用压缩空气排压载水的压载舱，取与压缩空气的最大压力相当的水压头，m。

13.2.4.4 承受横向载荷的强肋骨、强横梁及支持扶强材的桁材的最小剖面模数 W，应不小于按下式计算所得之值：

$$W = 6.28bhl^2 \quad cm^3$$

式中：b —— 强肋骨、强横梁或桁材支持宽度，m；
l —— 强肋骨、强横梁或桁材间的跨距，m；
h —— 取下述值，但不小于 2.5m。

(1) 对液舱取为由强肋骨、强横梁或桁材跨距中点量至液舱顶的垂直距离，或量至溢流管顶垂直距离的一半，m，取大者；

(2) 对压载水舱除应满足 (1) 的要求外，还应不小于 13.2.4.7 所述的强肋骨、强横梁或桁材跨距中点最大压差水头高，m；

(3) 对空舱和隔离空舱取为强肋骨、强横梁或桁材跨距中点至最大吃水线的垂直距离，m；

(4) 对采用压缩空气排压载水的压载舱，取与压缩空气的最大压力相当的水压头，m。

13.2.4.5 非水密支承舱壁板厚及扶强材尺寸，可参照本规范的有关规定确定。支柱的剖面积、壁厚和端部加强，可按本规范的有关规定确定，但负荷 P 应取为支柱实际支持的负荷。

13.2.4.6 撑杆的剖面积、壁厚和端部加强，可参照本规范对支柱的有关规定确定，但负荷 P 应取为：

$$P = 9.8shl \quad kN$$

式中：h —— 13.2.4.7 所述的撑杆处最大压差水头高，m；
s —— 撑杆间距，m；
l —— 撑杆支撑处上下方桁材距中点之间的垂直距离，m。

13.2.4.7 最大压差水头高系指半潜船在工作沉浮过程中，船体结构某处所承受的内外最大水面差所形成的水头高。如在局部强度计算中使用了最大压差水头高，则应先计算出船体内调节压载水位与船体外吃水水面差值随半潜船吃水的变化，从而确定最大压差水头高，并将该资料随同其他图纸资料一起提交本社审查同意。

第 3 节 轮 机

13.3.1 一般要求

13.3.1.1 最深水线以下的舱室通风系统中，凡穿过有水密分隔要求的舱壁的通风管段，应在水密舱壁上安装适当的阀门，以保持舱室的水密要求。若阀门没安装在舱壁上，阀门与舱壁之间的连接钢管的壁厚应不小于 8.8 mm。该阀门除能就地操纵外，还应能在最深水线以上的其他处所操纵，并应在操纵处设有阀门开闭状态的指示装置。

13.3.1.2 The inner diameter of the bilge main in the machinery spaces of a maneuverable semi-submersible vessel is to be calculated in accordance with the requirements for oil tankers.

13.3.1.3 The inner diameter of the bilge main in the machinery spaces of a non-self propelled semi-submersible vessel with auxiliary power is to be calculated in accordance with the following equation, but the actual inner diameter of the bilge main may be obtained by the integer of the size nearest to the acceptable standards:

$$d_2 = 25 + 2.15\sqrt{l(B+D)} \qquad \text{mm}$$

where: l — length of the cabin, in m;
B — breadth of the vessel, in m;
D — molded depth to bulkhead deck, in m.

13.3.1.4 Other equivalent measures (e.g. remote measuring devices) may be adopted for cabins (such as the ballast tank under the lifting cargo deck) where piping is hard to measure in a normal way.

13.3.1.5 Where air compressors (to use the pressure difference of air) are used as a power source to flood or discharge water, special consideration is to be given by the Society to the design, installation and test of the whole apparatus (including ballast tanks, control systems).”

13.3.1.2　机动半潜船机器处所的舱底水总管内径的计算可按油船的规定进行。

13.3.1.3　非机动半潜船有辅助动力的机器处所的舱底水总管内径应按下式计算，但是舱底水总管的实际内径可按所接受标准的最接近的尺度取整：

$$d_2 = 25 + 2.15\sqrt{l(B+D)} \qquad \text{mm}$$

式中：l —— 舱室长度，m；

B —— 船宽，m；

D —— 至舱壁甲板的型深，m。

13.3.1.4　难以采用常规测量管系的舱室（如举升甲板下面的压载舱），可采用其他等效测量措施（如遥测装置）。

13.3.1.5　使用空压机（指利用空气的压差）作为压载舱排注压载水的动力源者，其整套装置（包括压载舱、控制系统）的设计、安装、试验等本社将给予特别考虑。”

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