Corrigenda for 2023 Classification Technical Rules

* Please note that this corrigenda is for the printed version of the 2023 Classification Technical Rules, and the PDF files posted on the website have been corrected.

PART 1

Present	Amendments	Reason
〈Rule Pt 1〉 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 2 Annual Survey 201. Due range 〈omitted〉 202. Hull, equipment and fire-extinguishing appliances 1. The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, and equipment are maintained in a satisfactory condition. 〈hereinafter, omitted〉 Ref. 3.2 Scope 3.2.1 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, equipment and related piping are maintained in a satisfactory condition. (UR Z7, 3.2.1, Rev.29 May 2022)	**〈Rule Pt 1〉** CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 2 Annual Survey 201. Due range 〈same as the current Rules〉 202. Hull, equipment and fire-extinguishing appliances 1. The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, ~~and~~ equipment and related piping are maintained in a satisfactory condition. 〈hereinafter, same as the current Rules〉	- Typo, reflected UR Z7 3.2.1 (English only)

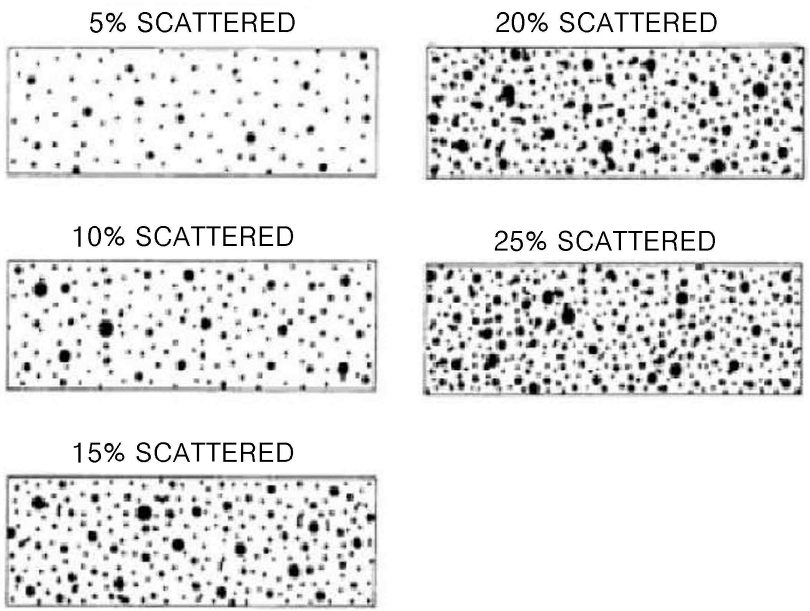
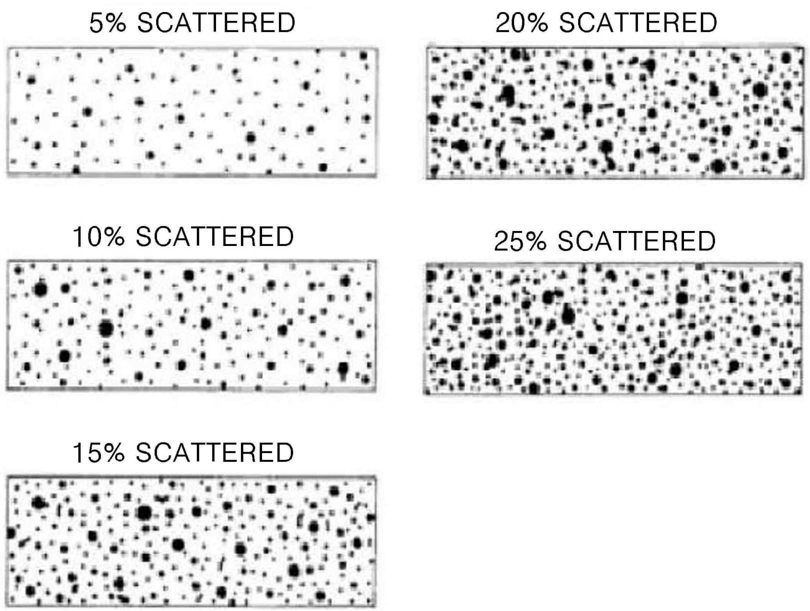
Present	Amendments	Reason
Annex 1-12 Hull Survey for Classification Survey during Construction **Appendix 1-12-2** **Requirements for Tankers and Bulk Carriers subject to SOLAS Ch II-1 Pt A-1 Reg.3-10(Goal-based ship construction standards for bulk carriers and oil tankers)** **2. Design Transparency** 2.1 For ships subject to compliance with IMO Res. MSC.287(87)(Adoption of the international goal-based ship construction standards for bulk carriers and oil tankers), IMO Res. MSC. 290(87) (Adoption of amendments to the international convention for the safety of life at sea, 1974, as amended), IMO Res. MSC.296(87) (Adoption of the guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers) and IMO MSC.1/Circ. 1343(Guidelines for the information to be included in a ship construction file), readily available documentation is to include the main goal-based parameters and all relevant design parameters that may limit the operation of the ship.	**Annex 1-12 Hull Survey for Classification Survey during Construction** **Appendix 1-12-2** **Requirements for Tankers and Bulk Carriers subject to SOLAS Ch II-1 Pt A-1 Reg.3-10(Goal-based ship construction standards for bulk carriers and oil tankers)** **2. Design Transparency** 2.1 For ships subject to compliance with IMO Res. MSC.287(87)(Adoption of the international goal-based ship construction standards for bulk carriers and oil tankers), IMO Res. MSC. 290(87) (Adoption of amendments to the international convention for the safety of life at sea, 1974, as amended), IMO Res. ~~MSC.296(87)~~ MSC.454(100) (~~Adoption of the~~ Revised guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers) and IMO MSC.1/Circ. 1343(Guidelines for the information to be included in a ship construction file), readily available documentation is to include the main goal-based parameters and all relevant design parameters that may limit the operation of the ship.	- Reflection to IACS UR Z23 (Rev.7 Corr. 2 May 2023)

Present	Amendments	Reason
〈Rule Pt 1〉 **CHAPTER 2 GENERAL** **Section 15 Hull Surveys for General Dry Cargo Ships** **1501. General** **2. Definitions** (1) Refer to the Definitions of **Ch 2, Sec 1,** 101. *(2020)* **3. Procedures for thickness measurements** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1.** 110. *(2018)* **Section 16 Hull Surveys for Liquefied Gas Carriers** **1601. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, 101. *(2020)* **3. Procedures for thickness measurements** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1.** 110. *(2018)* **CH 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME** **Section 1 General** **101. Application** **2. Procedural requirements for certain ESP surveys** (4) The following surveys may be witnessed by a single Surveyor; - Thickness measurements in accordance with **Ch 2,** 109. of the Rules	〈Rule Pt 1〉 **CHAPTER 2 GENERAL** **Section 15 Hull Surveys for General Dry Cargo Ships** **1501. General** **2. Definitions** (1) Refer to the Definitions of **Ch 2, Sec 1,** 102. *(2020)* **3. Procedures for thickness measurements** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1.** 111. *(2018)* **Section 16 Hull Surveys for Liquefied Gas Carriers** **1601. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, 102. *(2020)* **3. Procedures for thickness measurements** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1.** 111. *(2018)* **CH 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME** **Section 1 General** **101. Application** **2. Procedural requirements for certain ESP surveys** (4) The following surveys may be witnessed by a single Surveyor; - Thickness measurements in accordance with **Ch 2,** 111. of the Rules	- Typo

Present	Amendments	Reason
102. Preparations for survey **7. Survey planning meeting** (1) Follow the procedure of Survey planning meeting of **Ch 2, Sec 1.** **109.** *(2018)* **104. Procedures for thickness measurements *(2021)*** **1. General *(2018)*** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1** **110.** *(2018)* **3. Reporting *(2018)*** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1** **110.** **Section 2 Bulk Carriers** **201. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, 101. *(2020)* **Section 3 Oil Tankers** **301. General** **2. Definitions** (1) Refer to the Definitions of **Ch 2, Sec 1,** **101.** *(2020)*	**102. Preparations for survey** **7. Survey planning meeting** (1) Follow the procedure of Survey planning meeting of **Ch 2, Sec 1.** 110. *(2018)* **104. Procedures for thickness measurements *(2021)*** **1. General *(2018)*** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1** 111. *(2018)* **3. Reporting *(2018)*** (1) Follow the procedure for thickness measurement of **Ch 2, Sec 1** 111. **Section 2 Bulk Carriers** **201. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, 102. *(2020)* **Section 3 Oil Tankers** **301. General** **2. Definitions** (1) Refer to the Definitions of **Ch 2, Sec 1,** 102. *(2020)*	- Typo

Present	Amendments	Reason
Section 4 Chemical Tankers **401. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, <u>101.</u> *(2020)* **Section 5 Double Hull Oil Tankers** **501. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, <u>101.</u> *(2020)* **Section 6 Double Skin Bulk Carriers** **601. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, <u>101.</u> *(2020)*	**Section 4 Chemical Tankers** **401. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, <u>102.</u> *(2020)* **Section 5 Double Hull Oil Tankers** **501. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, <u>102.</u> *(2020)* **Section 6 Double Skin Bulk Carriers** **601. General** **2. Definitions** (1) Refer to the Definitions of Ch 2, Sec 1, <u>102.</u> *(2020)*	- Typo

Present	Amendments	Reason
<Rule Pt 1> **CHAPTER 1 CLASSIFICATION** **Section 9 Suspension/Withdrawal of Class and Reclassification** **901. Suspension/Reinstatement of class 〈omitted〉** **902. Withdrawal of class【See Guidance】** **1.** The classification may be withdrawn under the approval of the Classification Committee. (1) ~ (4) 〈omitted〉 (5) when the Surveyor reports that the vessel has not complied with the Rules of the Society as regards surveys to maintain the classification specified in **Ch 2, 102.** **〈hereinafter, omitted〉**	<Rule Pt 1> **CHAPTER 1 CLASSIFICATION** **Section 9 Suspension/Withdrawal of Class and Reclassification** **901. Suspension/Reinstatement of class 〈same as the current Rules〉** **902. Withdrawal of class【See Guidance】** **1.** The classification may be withdrawn under the approval of the Classification Committee. (1) ~ (4) 〈same as the current Rules〉 (5) when the Surveyor reports that the vessel has not complied with the Rules of the Society as regards surveys to maintain the classification specified in **Ch 2, 103. 102.** **〈hereinafter, same as the current Rules〉**	- Typo

Present	Amendments	Reason
〈Rule Pt 1〉 **CHAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 1 General** **102. Definitions** **28. Pitting corrosion** is defined as scattered corrosion spots/areas with local material reductions which are greater than the general corrosion in the surrounding area. Pitting intensity is defined in **Fig 1.2.3.** *(2020)*  Fig <u>1.2.1</u> Pitting intensity diagrams	〈Rule Pt 1〉 **CHAPTER 2 PERIODICAL AND OTHER** **HAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 1 General** **102. Definitions** **28. Pitting corrosion** is defined as scattered corrosion spots/areas with local material reductions which are greater than the general corrosion in the surrounding area. Pitting intensity is defined in **Fig 1.2.3.** *(2020)*  Fig ~~1.2.1~~ <u>1.2.3</u> Pitting intensity diagrams	- Typo

Present	Amendments	Reason
〈Guidance Pt 1〉 **Annex 1-16 Procedures for Testing Tanks and Tight** **CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME** **Section 3 Oil Tankers** **304. Special Survey** *(2021)* **1.** In application to **304. 5** of the Rules, the following guidance on pressure testing of boundaries of cargo tanks under direction of the master is to be applied. **【See Rule】** (4) Pressure testing using cargo (A) In order to test the relevant boundaries, the ship may be loaded in a checker board pattern(Fig 1), so that each cargo tank internal bulkhead is subjected to a fully loaded head of pressure provided that the intended loading and stability condition are checked and confirmed by the master.  **Fig 1 "Stagger test" - checker board pattern**	**〈Guidance Pt 1〉** **Annex 1-16 Procedures for Testing Tanks and Tight** **CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME** **Section 3 Oil Tankers** **304. Special Survey** *(2021)* **1.** In application to **304. 5** of the Rules, the following guidance on pressure testing of boundaries of cargo tanks under direction of the master is to be applied. **【See Rule】** (4) Pressure testing using cargo (A) In order to test the relevant boundaries, the ship may be loaded in a checker board pattern(Fig ~~1~~ 1.3.1), so that each cargo tank internal bulkhead is subjected to a fully loaded head of pressure provided that the intended loading and stability condition are checked and confirmed by the master.  **Fig ~~1~~ 1.3.1 "Stagger test" - checker board pattern**	- Number system changes

Present	Amendments	Reason
Annex 1-16 Procedures for Testing Tanks and Tight Boundaries *(2018)* **PART A - SOLAS Ships** **2. Application** (3) The testing of structures not listed in **Table** 3.1.1 or 3.1.2 is to be specially considered. **3. Tests Types and Definitions** (1) Two types of tests (B) Leak Test : A test to verify the tightness of a boundary. Unless a specific test is indicated, this may be a hydrostatic/hydropneumatic test or an air test. A hose test may be considered an acceptable form of leak test for certain boundaries, as indicated by Footnote (3) of **Table** 3.1.1. **4. Test Procedures** (1) General (A) Tests are to be carried out in the presence of a Surveyor at a stage sufficiently close to the completion of work with all hatches, doors, windows, etc. installed and all penetrations including pipe connections fitted, and before any ceiling and cement work is applied over the joints. Specific test requirements are given in (4) and **Table** 3.1.1. For the timing of the application of coating and the provision of safe access to joints, see (5), (6) and **Table** 3.1.2-1.	**Annex 1-16 Procedures for Testing Tanks and Tight Boundaries *(2018)*** **PART A - SOLAS Ships** **2. Application** (3) The testing of structures not listed in **Table** ~~3.1.1~~ 1 or ~~3.1.2~~ 2 is to be specially considered. **3. Tests Types and Definitions** (1) Two types of tests (B) Leak Test : A test to verify the tightness of a boundary. Unless a specific test is indicated, this may be a hydrostatic/hydropneumatic test or an air test. A hose test may be considered an acceptable form of leak test for certain boundaries, as indicated by Footnote (3) of **Table** ~~3.1.1~~ 1. **4. Test Procedures** (1) General (A) Tests are to be carried out in the presence of a Surveyor at a stage sufficiently close to the completion of work with all hatches, doors, windows, etc. installed and all penetrations including pipe connections fitted, and before any ceiling and cement work is applied over the joints. Specific test requirements are given in (4) and **Table** ~~3.1.1~~ 1. For the timing of the application of coating and the provision of safe access to joints, see (5), (6) and **Table** ~~3.1.2-1~~ 3.	- Number system changes

Present	Amendments	Reason
(2) Structural test procedures (A) Type and time of test (a) Where a structural test is specified in **Table 3.1.1** or **Table 3.1.2**, a hydrostatic test in accordance with (4) (A) will be acceptable. Where practical limitations (strength of building berth, light density of liquid, etc.) prevent the performance of a hydrostatic test, a hydropneumatic test in accordance with (4) (B) may be accepted instead. (B) Testing Schedule for New Construction or Major Structural Conversion (a) Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, shall be tested for tightness and structural strength as indicated in **Table 3.1.1** or **Table 3.1.2.** (3) Leak test procedures (A) For the leak tests specified in **Table 3.1.1**, tank air tests, compressed air fillet weld tests, vacuum box test in accord-ance with (4) (D) through (4) (F), or their combination, will be acceptable. Hydrostatic or hydropneumatic tests may also be accepted as leak tests provided that (5), (6) and (7) are com-plied with. Hose tests will also be acceptable for such loca-tions as specified in **Table 3.1.1**, note *3, in accordance with (4) (C). The application of the leak test for each type of welded joint is specified in **Table 3.1.2-1**. (B) Air tests of joints may be carried out in the block stage pro-vided that all work on the block that may affect the tightness of a joint is completed before the test. See also (5) (A) for the application of final coatings and (6) for the safe access to joints and the summary in **Table 3.1.2-2**.	(2) Structural test procedures (A) Type and time of test (a) Where a structural test is specified in **Table** ~~3.1.1~~ 1 or **Table** ~~3.1.2~~ 2, a hydrostatic test in accordance with (4) (A) will be acceptable. Where practical limitations (strength of building berth, light density of liquid, etc.) prevent the performance of a hydrostatic test, a hydropneumatic test in accordance with (4) (B) may be accepted instead. (B) Testing Schedule for New Construction or Major Structural Conversion (a) Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, shall be tested for tightness and structural strength as indicated in **Table** ~~3.1.1~~ 1 or **Table** ~~3.1.2~~ 2. (3) Leak test procedures (A) For the leak tests specified in **Table** ~~3.1.1~~ 1 tank air tests, compressed air fillet weld tests, vacuum box test in accord-ance with (4) (D) through (4) (F), or their combination, will be acceptable. Hydrostatic or hydropneumatic tests may also be accepted as leak tests provided that (5), (6) and (7) are com-plied with. Hose tests will also be acceptable for such loca-tions as specified in **Table** ~~3.1.1~~ 1 note *3, in accordance with (4) (C). The application of the leak test for each type of welded joint is specified in **Table** ~~3.1.2-1~~ 3. (B) Air tests of joints may be carried out in the block stage provided that all work on the block that may affect the tightness of a joint is completed before the test. See also (5) (A) for the application of final coatings and (6) for the safe access to joints and the summary in **Table** ~~3.1.2-2~~ 3.	- Number system changes

Present	Amendments	Reason
(4) Test Methods (A) Hydrostatic test (a) Unless another liquid is approved, hydrostatic tests are to consist of filling the space with fresh water or sea water, whichever is appropriate for testing to the level specified in **Table 3.1.1** or **Table 3.1.2**. Also refer to 4. (7) "Hydrostatic or hydropneumatic tightness test. (5) Application of Coating (A) Final coating (c) For all other joints, the final coating is to be applied after the completion of the leak test of the joint. See also **Table 3.1.2-1**. (6) Safe access to joints For leak tests, a safe access to all joints under examination is to be provided. See also Table **3.1.2-1**. **Table 3.1.1 Test Requirements for Tanks and Boundaries** **Table 3.1.2 Additional Test Requirements for Special Service Ships/Tanks** **Table 3.1.2-1 Application of Leak Test, Coating and Provision of Safe Access for Type of Welded Joints**	(4) Test Methods (A) Hydrostatic test (a) Unless another liquid is approved, hydrostatic tests are to consist of filling the space with fresh water or sea water, whichever is appropriate for testing to the level specified in **Table** ~~3.1.1~~ 1 or **Table** ~~3.1.2~~ 2. Also refer to 4. (7) "Hydrostatic or hydropneumatic tightness test. (5) Application of Coating (A) Final coating (c) For all other joints, the final coating is to be applied after the completion of the leak test of the joint. See also **Table** ~~3.1.2-1~~ 3. (6) Safe access to joints For leak tests, a safe access to all joints under examination is to be provided. See also Table ~~3.1.2-1~~ 3. **Table ~~3.1.1~~ 1 Test Requirements for Tanks and Boundaries** **Table ~~3.1.2~~ 2 Additional Test Requirements for Special Service Ships/Tanks** **Table ~~3.1.2-1~~ 3 Application of Leak Test, Coating and Provision of Safe Access for Type of Welded Joints**	- Number system changes

Present	Amendments	Reason
PART B – Non-SOLAS Ships and SOLAS Exemption/Equivalent Ships **2. APPLICATION** (1) Testing procedures are to be carried out in accordance with the requirements of PART A in association with the following alternative procedures for 4. (2) (B) of PART A "Testing Schedule for New Construction or Major Structural Conversion" and alternative test requirements for PART A **Table** **3.1.1.** (5) Where the structural adequacy of the tanks of a vessel were verified by the structural testing required in PART A, **Table** **3.1.1**, subsequent vessels in the series (i.e. sister ships built from the same plans at the same shipyard) may be exempted from structural testing of tanks, provided that: (B) structural testing is carried out for at least one tank of "each type" among all tanks of each sister vessel. *(2022)* Note : The expression of "each type" refers to the purpose of the tanks given in each row of **Table** **3.1.1** where the structural testing is required.	**PART B – Non-SOLAS Ships and SOLAS Exemption/Equivalent Ships** **2. APPLICATION** (1) Testing procedures are to be carried out in accordance with the requirements of PART A in association with the following alternative procedures for 4. (2) (B) of PART A "Testing Schedule for New Construction or Major Structural Conversion" and alternative test requirements for PART A **Table** ~~3.1.1~~ 1**.** (5) Where the structural adequacy of the tanks of a vessel were verified by the structural testing required in PART A, **Table** ~~3.1.1~~ 1, subsequent vessels in the series (i.e. sister ships built from the same plans at the same shipyard) may be exempted from structural testing of tanks, provided that: (B) structural testing is carried out for at least one tank of "each type" among all tanks of each sister vessel. *(2022)* Note : The expression of "each type" refers to the purpose of the tanks given in each row of **Table** ~~3.1.1~~ 1 where the structural testing is required.	- Number system changes

PART 2

Present	Amendment	Note

Present

〈Rules〉 Pt 2

CHAPTER 2 WELDING

Section 4 Welding Procedure Qualification Tests

407. Validity of qualified welding procedure specification

2. Validity of variables for qualified WPS is as follows. However, it may be considered as equivalent for the requirements of the standard internationally recognized(*AWS, ASME* etc.) are applied.

(2) **Thickness and outer diameter of base metal**

(a) The qualification of a WPS carried out on a plate or pipe test assembly of thickness t is valid for the thickness range given in **Table 2.2.13** and **Table 2.2.14**. *(2019)*

Table 2.2.14 Range of qualification for parent material thickness *(2019)*

Thickness of the test piece t (mm)	Range of approval
t ≤ 3	0.5t ~ 2t
3 〈 t ≤ 20	3 ~ 2t
t 〉 20	≥ 0.8t

Amendment

〈Rules〉 Pt 2

CHAPTER 2 WELDING

Section 4 Welding Procedure Qualification Tests

407. Validity of qualified welding procedure specification

2. Validity of variables for qualified WPS is as follows. However, it may be considered as equivalent for the requirements of the standard internationally recognized(*AWS, ASME* etc.) are applied.

(2) **Thickness and outer diameter of base metal**

(a) The qualification of a WPS carried out on a plate or pipe test assembly of thickness t is valid for the thickness range given in **Table 2.2.13** and **Table 2.2.14**. *(2019)*

Table 2.2.14 Range of Aluminium alloys qualification for parent material thickness *(2019)*

Thickness of the test piece t (mm)	Range of approval
t ≤ 3	0.5t ~ 2t
3 〈 t ≤ 20	3 ~ 2t
t 〉 20	≥ 0.8t

Note

일자: 2023.10.05.
조치담당: 최대곤 수석

PART 3

<table>
<tr><th>Present</th><th>Amendments</th><th>Reason</th></tr>
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〈Rule Pt 3〉

CHAPTER 8 FRAMES

Section 4 Side Longitudinals

401. Section modulus

The section modulus of side longitudinals in the midship part below the freeboard deck is not to be less than that obtained from the following formula, whichever is the greater:

$Z_1 = 100CShl^2$ (cm^3), $Z_2 = 2.9K\sqrt{L}Sl^2$ (cm^3)

where:

S, l, h, L' = 〈omitted〉

C = 〈omitted〉

$C = \frac{K}{24 - \alpha K}$

α = 〈omitted〉

β = 〈omitted〉

$\beta = 6/a$ when L is 230 m and under

$\beta = 10.5/a$ when L is 400 m and above

For intermediate values of L, β is to be obtained by linear interpolation.

Y' = the greater of the value specified in **Pt 3, Ch 3, 203.**, (5) (a) or (b)

a = $\sqrt{K}$, when high tensile steels are used for not less than 80 % of side shell platings at the transverse section amidship and 1.0 for other parts.

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〈Rule Pt 3〉

CHAPTER 8 FRAMES

Section 4 Side Longitudinals

401. Section modulus

The section modulus of side longitudinals in the midship part below the freeboard deck is not to be less than that obtained from the following formula, whichever is the greater:

$Z_1 = 100CShl^2$ (cm^3), $Z_2 = 2.9K\sqrt{L}Sl^2$ (cm^3)

where:

S, l, h, L' = 〈omitted〉

C = 〈omitted〉

$C = \frac{K}{24 - \alpha K}$

α = 〈omitted〉

β = 〈omitted〉

$\beta = 6/a$ when L is 230 m and under

$\beta = 10.5/a$ when L is 400 m and above

For intermediate values of L, β is to be obtained by linear interpolation.

a = $\sqrt{K}$, when high tensile steels are used for not less than 80 % of side shell platings at the transverse section amidship and 1.0 for other parts.

y = vertical distance (m) from the top of keel to the longitudinal under consideration

y_B = distance from the top of keel to the horizontal neutral axis of transverse section amidship (m).

Y' = the greater of the value specified in **Pt 3, Ch 3, 203.**, (5) (a) or (b)

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- 국문판과 일치하도록 변경함.

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Present	Amendments	Reason

Present

〈Guidance〉
CHAPTER 3 LONGITUDINAL STRENGTH

Section 1 General

Table 3.3.3 For the case of ships, loading manual and longitudinal loading instruments are to be installed *(2018)*

Kind of ship / Application		Category 1-1		Category 1-2		Category 1-3		Category 2	
		〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
①	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
②	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
③	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
④	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉

1. 〈omitted〉
2. 〈omitted〉
3. For the application ① to ⑤, they means application date for the ships under the survey of during construction and construction date for the ships under the survey after construction.
4. (A) : For the ships having not exceeding 120 m in length and reflected in design for non-homogeneous cargo loading, it is specified in category 2 and longitudinal loading instrument may be not installed.
5. (B) : For the ships in category 2 with not exceeding 90 m in length and dead weight is not exceed 30 % of fully loaded displacement, longitudinal loading instrument may be not installed.
6. (C) : For all bulk carriers, ore carriers and combination carriers, longitudinal loading instrument is to be installed until 1 Jan 1999.
7. (D) : The ships less than 100 m in length may not be provided with a loading manual where deemed unnecessary by the Society.
8. For the ships exempted the installation of longitudinal loading instrument may be not installed, when the instruments is installed, they are to be complied with related regulations.

Amendments

〈Guidance〉
CHAPTER 3 LONGITUDINAL STRENGTH

Section 1 General

Table 3.3.3 For the case of ships, loading manual and longitudinal loading instruments are to be installed *(2018)*

Kind of ship / Application		Category 1-1		Category 1-2		Category 1-3		Category 2	
		〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
①	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
②	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
③	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉
④	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉	〈omitted〉

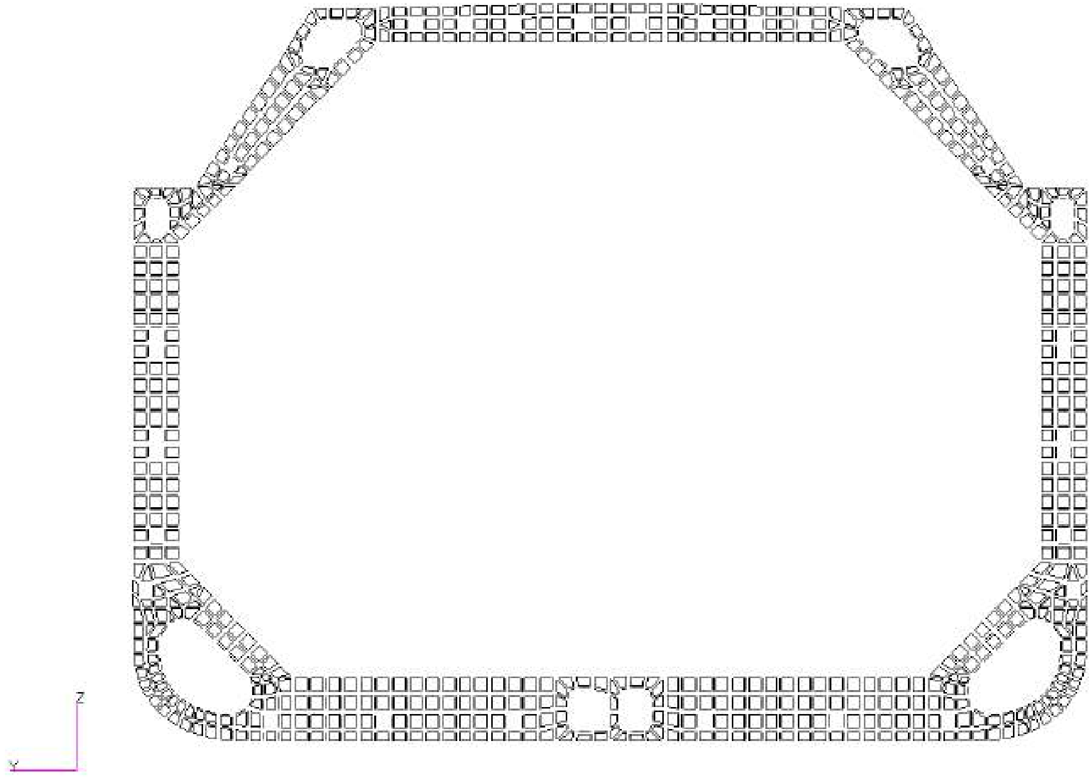
1. 〈omitted〉
2. 〈omitted〉
3. For the application ① to ~~⑤~~<u>④,</u> they means application date for the ships under the survey of during construction and construction date for the ships under the survey after construction.
4. (A) : For the ships having not exceeding 120 m in length and reflected in design for non-homogeneous cargo loading, it is specified in category 2 and longitudinal loading instrument may be not installed.
5. (B) : For the ships in category 2 with not exceeding 90 m in length and dead weight is not exceed 30 % of fully loaded displacement, longitudinal loading instrument may be not installed.
6. (C) : For all bulk carriers, ore carriers and combination carriers, longitudinal loading instrument is to be installed until 1 Jan 1999.
7. (D) : The ships less than 100 m in length may not be provided with a loading manual where deemed unnecessary by the Society.
8. For the ships exempted the installation of longitudinal loading instrument may be not installed, when the instruments is installed, they are to be complied with related regulations.

Reason

- 2018년 개정작업시 “⑤” 삭제되었으나 비고란에는 삭제 누락.

Present	Amendment	Note
〈Rule Pt 3〉 **CHAPTER 16 SUPERSTRUCTURES** **Section 2 Superstructure End Bulkheads** **202. Thickness** **1.** The thickness of superstructure end bulkhead plating is not to be less than that obtained from the following formula: $t = 3S\sqrt{hK}$ (mm) 〈omit〉 **2.** The thickness of bulkhead plating is not to be less than that obtained from the following formula or 5 mm, whichever is the greater, irrespective of the provisions in **Par 1.** *(2023)* Bulkhead plating of the first tier superstructure : $t = \frac{L'}{100} + 4.0$ (mm) Plating of other bulkheads : $t = \frac{L'}{100} + 3.0$ (mm) where: L' = as specified in **Table 3.16.1.** 〈omit〉	〈Rule Pt 3〉 **CHAPTER 16 SUPERSTRUCTURES** **Section 2 Superstructure End Bulkheads** **202. Thickness** **1.** The thickness of superstructure end bulkhead plating is not to be less than that obtained from the following formula: $t = 3S\sqrt{hK}$ (mm) 〈same as current〉 **2.** The thickness of bulkhead plating is not to be less than that obtained from the following formula or 5 mm, whichever is the greater, irrespective of the provisions in **Par 1.** *(2023)* Bulkhead plating of the first tier superstructure : $t = \frac{L'}{100} + 5.0$ (mm) Plating of other bulkheads : $t = \frac{L'}{100} + 4.0$ (mm) where: L' = as specified in **Table 3.16.1.** 〈same as current〉	- UR S3 요건 오기 반영

Present	Amendment	Note
〈Guidance Pt 3〉 **Section 4 Watertight Door** **402. Type of watertight doors 【See Rule】** **1.** Watertight doors provided in watertight bulkheads are to be sliding type as far as practicable. If hinged doors are used, they are to be accessible at any time and, further, to be protected against damages due to cargoes, etc. by suitable means. **2.** For passenger ships the watertight doors and their controls are to be located in compliance with SOLAS II-1/13.5.3 and II-1/13.7.1.2.2.	**〈Guidance Pt 3〉** **Section 4 Watertight Door** **402. Type of watertight doors 【See Rule】** **1.** Watertight doors provided in watertight bulkheads are to be sliding type as far as practicable. If hinged doors are used, they are to be accessible at any time and, further, to be protected against damages due to cargoes, etc. by suitable means. **2.** For passenger ships the watertight doors and their controls are to be located in compliance with Table 3.14.3 and SOLAS II-1/13.5.3, II-1/13.7.1.2.2.	

Present	Amendment	Reason
Annex 3-2 〈omitted〉 III. 〈omitted〉 7. 〈omitted〉 〈Newly added〉	〈Guidance Pt.3〉 Annex 3-2 Guidance for the Direct Strength Assessment III. Guidance for the Hold Analysis 7. Structural Analysis Procedure for Membrane Tank LNG Carriers  Fig 37 Typical F.E. Model of a web frame	- Fig 37 is missing (English only).

<table>
<tr><th>Present</th><th>Amendment</th><th>Reason</th></tr>
<tr><td>〈Guidance Pt. 3〉

Annex 3-2 Guidance for the Direct Strength Assessment

I. General 〈omitted〉

II. Direct Global Structural Analysis 〈omitted〉

III. Guidance for the Hold Analysis

1. ~ 7. 〈omitted〉

8. LPG Carriers with Independent Tank Type A
(1) General 〈omitted〉
(2) Structural modelling
(A) ~ (B) 〈omitted〉
(C) Properties and Corrosion Allowance
(a) The properties of FE models for cargo hold region including local structural strength are to be based on the gross scantling approach for yielding and net thickness approach for buckling, applying a thickness deduction as defined in Ch 3, Sec 4 Table 3.3.3 of the Rule if not defined specifically. In net thickness application, only plate members are considered.
(b) For the independent tank structure made of stainless steel, there is no need to apply the thickness deduction in general.
(D) Supporting Structure Idealization 〈omitted〉
(3) ~ (5) 〈omitted〉
(6) Loads
(A) ~ (E) 〈omitted〉
(F) Design Load Case
(a) In seagoing phase, full load condition with scantling draft, alternate load condition and ballast condition with minimum draft are to be check for structural strength.</td><td>〈Guidance Pt. 3〉

Annex 3-2 Guidance for the Direct Strength Assessment

I. General 〈same as the current Rules〉

II. Direct Global Structural Analysis 〈same as the current Rules〉

III. Guidance for the Hold Analysis

1. ~ 7. 〈same as the current Rules〉

8. LPG Carriers with Independent Tank Type A
(1) General 〈same as the current Rules〉
(2) Structural modelling
(A) ~ (B) 〈same as the current Rules〉
(C) Properties and Corrosion Allowance
(a) The properties of FE models for cargo hold region including local structural strength are to be based on the gross scantling approach for yielding and net thickness approach for buckling~~, applying a thickness deduction as defined in Ch 3, Sec 4 Table 3.3.3 of the Rule if not defined specifically~~. In net thickness application, only plate members are considered.
(b) For the independent tank structure made of stainless steel, there is no need to apply the thickness deduction in general.
(D) Supporting Structure Idealization 〈same as the current Rules〉
(3) ~ (5) 〈same as the current Rules〉
(6) Loads
(A) ~ (E) 〈same as the current Rules〉
(F) Design Load Case
(a) In seagoing phase, full load condition with scantling draft, alternate load condition and ballast condition with minimum draft are to be check for structural strength.</td><td>The corrosion addition value is defined in the IV. Buckling strength calculation.</td></tr>
</table>

(b) For the harbour phase, any alternate loading condition is to be assessed. In that case, the static sea pressure and internal pressure are used considering overflow height. If the harbour phase is not specified in Loading Manual, the assessment for habour condition may be omitted.	(b) For the harbour phase, any alternate loading condition is to be assessed. In that case, the static sea pressure and internal pressure are used considering overflow height. However, if any alternate loading condition is not specified in Loading Manual, the assessment for alternate loading condition may be omitted.	'habour condition' corrected to 'alternate loading condition'
(7) Allowable Stress <omitted>	(7) Allowable Stress <same as the current Rules>	
(8) Buckling Strength Buckling strength is to be calculated according to **Ⅳ. Buckling strength calculation**. Buckling strength is to satisfy the criteria defined in **1** (5) of **Ⅳ. Buckling strength calculation** based on static+dynamic load combination except below load cases.	(8) Buckling Strength Buckling strength is to be calculated according to **Ⅳ. Buckling strength calculation**. Buckling strength is to satisfy the criteria defined in **1** (5) of **Ⅳ. Buckling strength calculation** based on static+dynamic load combination except below load cases.	
Load cases based on static load combination in 1 (5) of **Ⅳ. Buckling strength calculation**: - Table 46 and 47: LC9, LC10 and LC11, - Table 48: LC9 and LC10, - Table 49: LC8, LC9 and LC10.	Load cases based on static load combination in 1 (5) of **Ⅳ. Buckling strength calculation**: - Table 46 and 47: LC9 and LC10 ~~LC11~~, - Table 48: LC8 and LC9 ~~LC10~~, - Table 49: LC8 and LC9 ~~LC10~~.	Load case errors
However, for the cargo hold structural members under intact load cases, following enforced buckling criterion is to be applied. $\eta_{act} \leq 0.9\,\eta_{all}$ where: η_{act}, η_{all} : refer to **1** (5) of **Ⅳ. Buckling strength calculation.**	However, for the cargo hold structural members under intact load cases, following enforced buckling criterion is to be applied. $\eta_{act} \leq 0.9\,\eta_{all}$ where: η_{act}, η_{all} : refer to **1** (5) of **Ⅳ. Buckling strength calculation.**	
IV. Buckling strength calculation <omitted> ⚓	**IV. Buckling strength calculation <same as the current Rules>** ⚓	

Annex 3-3 Guidance for the Fatigue Strength Assessment of Ship Structures 1. ~ 3. 〈omitted〉 **4. Simplified fatigue analysis** The simplified fatigue analysis based on stress concentration factor is to be used to evaluate the fatigue strength of the longitudinal stiffener end connection. The hull girder bending load and the local load are taken into account in this analysis. The former accounts for the vertical wave bending moment and the horizontal wave bending moment, and the latter for the wave load. In this guidance, the loads are determined at the probability level of exceedance 10^{-4}. (1) ~ (4) 〈omitted〉 (5) Calculation of fatigue damage ratio (A) According to the Miner-Palmgren linear cumulative damage rule, the fatigue damage ratio D is calculated using numerical integration as follows: $D = \Sigma \frac{n_i}{N_i}$ where, n_i = number of stress cycles in stress block i for long-term distribution of the combined stress range N_i = number of cycles to failure at the i-th constant stress range. If the long-term distribution of the stress range follows a Weibull one, the damage ratio D_{air} is given by the following formula:	**Annex 3-3 Guidance for the Fatigue Strength Assessment of Ship Structures** 1. ~ 3. 〈same as the current Rules〉 **4. Simplified fatigue analysis** The simplified fatigue analysis based on stress concentration factor is to be used to evaluate the fatigue strength of the longitudinal stiffener end connection. The hull girder bending load and the local load are taken into account in this analysis. The former accounts for the vertical wave bending moment and the horizontal wave bending moment, and the latter for the wave load. In this guidance, the loads are determined at the probability level of exceedance 10^{-4}. (1) ~ (4) 〈same as the current Rules〉 (5) Calculation of fatigue damage ratio (A) According to the Miner-Palmgren linear cumulative damage rule, the fatigue damage ratio D is calculated using numerical integration as follows: $D = \Sigma \frac{n_i}{N_i}$ where, n_i = number of stress cycles in stress block i for long-term distribution of the combined stress range N_i = number of cycles to failure at the i-th constant stress range. If the long-term distribution of the stress range follows a Weibull one, the damage ratio D_{air} is given by the following formula:	

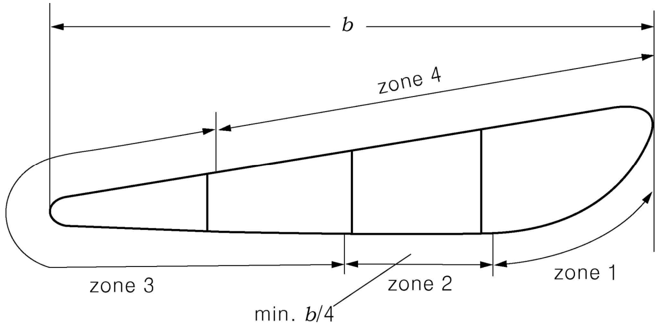
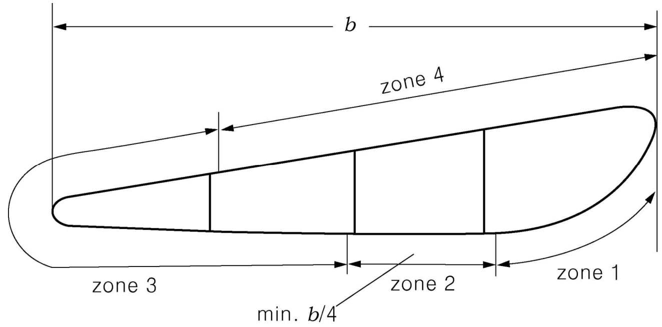
$D_{air} = \frac{N_t}{K_2}\frac{\Delta\sigma_0^m}{(\ln N_0)^{m/\xi}} \cdot \mu_7 \cdot \Gamma\left(1+\frac{m}{\xi}\right)$ where, K_2 = Constant of the design S-N curve, as given in **Table 1** (a) for in-air environment ξ = Weibull shape parameter Γ = complete Gamma function given by the following formula $\Gamma(z) = \int_0^{\infty} t^{z-1}e^{-t}dt$ γ = incomplete Gamma function given by the following formula. $\gamma(z,x) = \int_0^{x} t^{z-1}e^{-t}dt$ μ_7 = Coefficient taking into account the change of inverse slope of the S-N curve, m. $\mu_7 = 1 - \frac{\left\{\gamma\left(1+\frac{m}{\xi},t_7\right) - t_7^{-\frac{2}{\xi}} \cdot \gamma\left(1+\frac{m+2}{\xi},t_7\right)\right\}}{\Gamma\left(1+\frac{m}{\xi}\right)}$ t_7 = as specified in the following formula $t_7 = \left(\frac{\Delta\sigma_7}{\Delta\sigma_0}\right)^{\xi} \ln N_0$ $\Delta\sigma_7$ = stress range of the design S-N curve at	$D_{air} = \frac{N_t}{K_2}\frac{\Delta\sigma_0^m}{(\ln N_0)^{m/\xi}} \cdot \mu_7 \cdot \Gamma\left(1+\frac{m}{\xi}\right)$ where, K_2 = Constant of the design S-N curve, as given in **Table 1** (a) for in-air environment N_0 = Number of cycles corresponding to the reference probability of exceedance of 10^{-4}. $N_0 = 10000$ ξ = Weibull shape parameter Γ = complete Gamma function given by the following formula $\Gamma(z) = \int_0^{\infty} t^{z-1}e^{-t}dt$ γ = incomplete Gamma function given by the following formula. $\gamma(z,x) = \int_0^{x} t^{z-1}e^{-t}dt$ μ_7 = Coefficient taking into account the change of inverse slope of the S-N curve, m. $\mu_7 = 1 - \frac{\left\{\gamma\left(1+\frac{m}{\xi},t_7\right) - t_7^{-\frac{2}{\xi}} \cdot \gamma\left(1+\frac{m+2}{\xi},t_7\right)\right\}}{\Gamma\left(1+\frac{m}{\xi}\right)}$ t_7 = as specified in the following formula $t_7 = \left(\frac{\Delta\sigma_7}{\Delta\sigma_0}\right)^{\xi} \ln N_0$ $\Delta\sigma_7$ = stress range of the design S-N curve at	Missing definition of the N_0

$N = 10^7$ cycles N_t = the total number of stress cycles for a design life of ships and considering voyage days of 85% for the design life of Y(years), the total number of stress cycles is given by the following formula. $N_t = \frac{2.68 \times 10^7}{4 \log L} \times Y$ (B) ~ (C) 〈omitted〉 (6) 〈omitted〉 **5. ~ 7. 〈omitted〉** ⚓	$N = 10^7$ cycles N_t = the total number of stress cycles for a design life of ships and considering voyage days of 85% for the design life of Y(years), the total number of stress cycles is given by the following formula. $N_t = \frac{2.68 \times 10^7}{4 \log L} \times Y$ (B) ~ (C) 〈same as the current Rules〉 (6) 〈same as the current Rules〉 **5. ~ 7. 〈same as the current Rules〉** ⚓	

PART 4

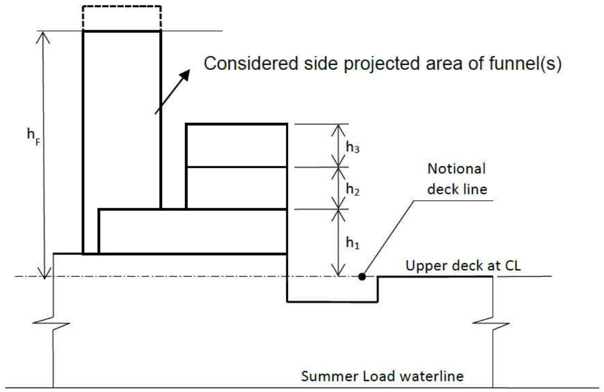
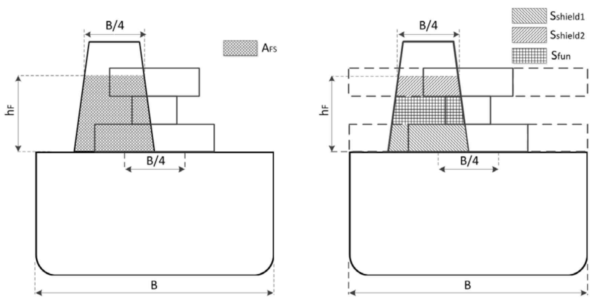
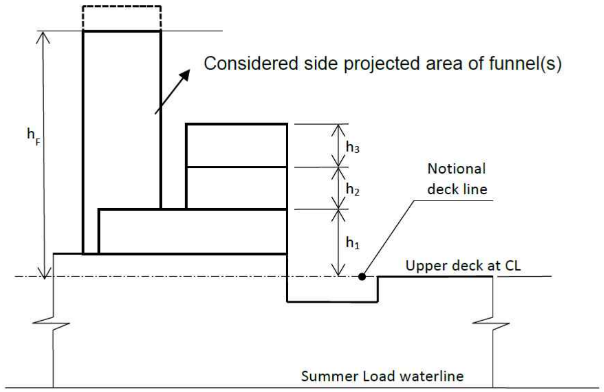
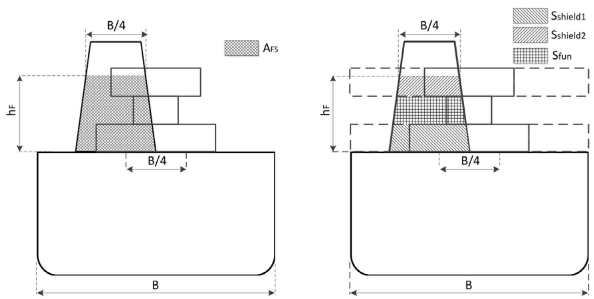
Present	Amendment	Note
<Rule Pt 4> CHAPTER 4 BULWARKS, FREEING PORTS, SIDE SCUTTLES, RECTANGULAR WINDOWS, VENTILATORS AND PERMANENT GANGWAYS Section 1 Bulwarks and Guardrails 〈omitted〉 Section 2 Freeing Ports 〈omitted〉 Section 3 Side Scuttles, Rectangular Windows and Skylights 301. General 【See Guidance】〈omitted〉 302. Position of side scuttles 〈omitted〉 303. Application of side scuttles 【See Guidance】 1.~ 4. 〈omitted〉 5. Side scuttles fitted in spaces which give direct access to an open stairway and provided in deckhouse and companion which protect the openings specified in below, are to be type A, type B side scuttle with dead light or equivalent thereto. Where cabin bulkhead or doors separate side scuttles from a direct access leading below the freeboard deck, the dead light could be omitted. 6.~7. 〈omitted〉	<Rule Pt 4> CHAPTER 4 BULWARKS, FREEING PORTS, SIDE SCUTTLES, RECTANGULAR WINDOWS, VENTILATORS AND PERMANENT GANGWAYS Section 1 Bulwarks and Guardrails 〈same as present〉 Section 2 Freeing Ports 〈same as present〉 Section 3 Side Scuttles, Rectangular Windows and Skylights 301. General 【See Guidance】〈same as present〉 302. Position of side scuttles 〈same as present〉 303. Application of side scuttles 【See Guidance】 1.~ 4. 〈omitted〉 5. Side scuttles fitted in spaces which give direct access to an open stairway and provided in deckhouse and companion which protect the openings specified in below, are to be type A, type B side scuttle with dead light or equivalent thereto. Where cabin bulkhead or doors separate side scuttles from a direct access leading below the freeboard deck, the dead light could be omitted. (1) The opening in the superstructure deck which gives access to the spaces below the freeboard deck or within an enclosed superstructure. (2) The opening in the top of deckhouse on the freeboard deck which gives access to spaces below the freeboard deck. 6.~7. 〈omitted〉 8. Side scuttles shall be of the non-opening type in ships subject to damage stability regulations, if calculations indicate that they would become immersed by any intermediate stage of flooding or the final equilibrium waterplane in any required damage case.	Correction of omissions.

Present	Amendment	Note
	9. Deckhouses situated on a raised quarter deck or on the deck of a superstructure of less than standard height or on the deck of a deckhouse of less than standard height, may be regarded as being in the second tier as far as the provision of deadlights is concerned, provided the height of the raised quarter deck, superstructure or deckhouse is equal to, or greater than, the standard quarter deck height.	Correction of omissions.

Present	Amendment	Note
<Rule Pt 4> CHAPTER 1 RUDDERS Section 1 ~ Section 10 〈omitted〉 Section 11 Propeller Nozzles **1101. Application ~ 1103. Plate thickness 〈omitted〉** **1104. Section modulus** (1) The section modulus of the cross section shown in Fig 4.1.6 around its neutral axis is not to be less than: $W = n \cdot d^2 \cdot b \cdot V^2$ (cm^3) d = inner diameter of nozzle in (m) b = length of nozzle in (m) n = 1.0 for rudder nozzles = 0.7 for fixed nozzles. V = speed of ship(Kt) as specified in **201.**  Fig 4.1.6 Propeller zone	<Rule Pt 4> CHAPTER 1 RUDDERS Section 1 ~ Section 10 〈same as the present〉 Section 11 Propeller Nozzles **1101. Application ~ 1103. Plate thickness 〈same as the present〉** **1104. Section modulus** (1) The section modulus of the cross section shown in Fig 4.1.8 around its neutral axis is not to be less than: $W = n \cdot d^2 \cdot b \cdot V^2$ (cm^3) d = inner diameter of nozzle in (m) b = length of nozzle in (m) n = 1.0 for rudder nozzles = 0.7 for fixed nozzles. V = speed of ship(Kt) as specified in **201.**  Fig 4.1.8 Propeller zone	Correction error

Present	Amendment	Note
CHAPTER 2 HATCHWAYS AND OTHER DECK OPENINGS **Section 1 ~ Section 4 〈omitted〉** **Section 5 Hatch cover details – Closing Arrangement, Securing Devices and Stoppers** **501. Weathertightness ~ 502. General〈omitted〉** **503. Gaskets** **1. ~ 9. 〈omitted〉** **10. Exemption of gaskets** In case of container ship accordance with the following requirements, gaskets may be omitted and clamping devices for steel hatchway covers may be suitably dispensed. (1) The hatchway coamings should be not less than 600 mm in height. (2) The exposed deck on which the hatch covers are located is situated above a depth H(x). H(x) is to be shown to comply with the following criteria: $H(x) \geq T_{fb} + f_b + h'_N$ (m) T_{fb} = draught, in m, corresponding to the assigned summer load line f_b = minimum required freeboard, in m, determined in accordance with **ICLL Reg. 28** as modified by further regulations as applicable h'_N = 4.6 m for $\frac{x}{L_{LL}} \leq 0{,}75$ = 6.9 m for $\frac{x}{L_{LL}} > 0{,}75$	**CHAPTER 2 HATCHWAYS AND OTHER DECK OPENINGS** **Section 1 ~ Section 4 〈same as the present〉** **Section 5 Hatch cover details – Closing Arrangement, Securing Devices and Stoppers** **501. Weathertightness ~ 502. General〈same as the present〉** **503. Gaskets** **1. ~ 9. 〈same as the present〉** **10. Exemption of gaskets** In case of container ship accordance with the following requirements, gaskets may be omitted and clamping devices for steel hatchway covers may be suitably dispensed. (1) The hatchway coamings should be not less than 600 mm in height. (2) The exposed deck on which the hatch covers are located is situated above a depth H(x). H(x) is to be shown to comply with the following criteria: $H(x) \geq T_{fb} + f_b + h'_N$ (m) T_{fb} = draught, in m, corresponding to the assigned summer load line f_b = minimum required freeboard, in m, determined in accordance with **ICLL Reg. 28** as modified by further regulations as applicable h'_N = 4.6 m for $\frac{x}{L_f} \leq 0.75$ = 6.9 m for $\frac{x}{L_f} > 0.75$	Correction error

Present	Amendment	Note
CHAPTER 8 EQUIPMENT NUMBER AND EQUIPMENT **Section 1 General** **101. General and application 【See Guidance】** **1. ~ 3. 〈omitted〉** **4.** All ships are to be provided with suitable appliances for handling of anchors as follows. (1) General (A) All ships are to be provided with suitable appliances for handling of anchors. (B) The bower anchors given in **Table 4.8.1** are to be connected to their cables and stored on board ready for use. Anchor and chain cable are should be accordance with **Sec 3, 4**. (2) Chain locker (A) Chain locker is to have adequate capacity and be of a suitable from to provide for the proper stowage of the chain cable, allowing an easy direct lead for the cable into the chain pipes when the cable is fully stowed. Port and starboard cables are to have separate spaces. (B) Chain locker boundaries and access opening are to be watertight. 〈below omitted〉 **Section 2 Equipment Number** **201. Equipment number *(2022)* 【See Guidance】**	**CHAPTER 8 EQUIPMENT NUMBER AND EQUIPMENT** **Section 1 General** **101. General and application 【See Guidance】** **1. ~ 3. 〈omitted〉** **4.** All ships are to be provided with suitable appliances for handling of anchors as follows. (1) General (A) All ships are to be provided with suitable appliances for handling of anchors. (B) The bower anchors given in **Table 4.8.1** are to be connected to their cables and stored on board ready for use. Anchor and chain cable are should be accordance with **Sec 3, 4**. (2) Chain locker (A) Chain locker is to have adequate capacity and be of a suitable from to provide for the proper stowage of the chain cable, allowing an easy direct lead for the cable into the chain pipes when the cable is fully stowed. Port and starboard cables are to have separate spaces. (B) Chain locker boundaries and access opening are to be watertight and adequate drainage facilities for the chain locker are to be provided. 〈below omitted〉 **Section 2 Equipment Number** **201. Equipment number *(2022)* 【See Guidance】**	Correction of omission.

Present	Amendment	Note
 Figure 4.8.1  Figure 4.8.2	 Fig 4.8.1  Fig 4.8.2	Correction error

Present	Amendment	Note
CHAPTER 11 ACCESS TO AND WITHIN SPACES IN, AND FORWARD OF, THE CARGO AREA OF OIL TANKERS AND BULK CARRIERS Section 1 General 〈omitted〉 Section 2 Technical Provisions for Means of Access for Inspections 〈omitted〉 Table 4.11.1 – Means of access for ballast and cargo tanks of oil tankers (Access to the underdeck and vertical structure)	CHAPTER 11 ACCESS TO AND WITHIN SPACES IN, AND FORWARD OF, THE CARGO AREA OF OIL TANKERS AND BULK CARRIERS Section 1 General 〈omitted〉 Section 2 Technical Provisions for Means of Access for Inspections 〈omitted〉 Table 4.11.1 Means of access for ballast and cargo tanks of oil tankers (Access to the underdeck and vertical structure)	Correction of omission.

PART 7

Amendment	Note

PART 7 Ships of Special Service (Ch1-4, 7-10)

Annex 7-6-1 Water Level Detectors on Multiple Hold Cargo Ships other than Bulk Carriers and Tankers *(2023)*

Section 1 General

1. Application

(1) Multiple hold cargo ships other than bulk carriers and tankers constructed on or after 1 January 2024[1] shall be fitted with water level detectors[2] in each cargo hold intended for dry cargoes. Water level detectors are not required for cargo holds located entirely above the freeboard deck.

(2) The water level detectors required by paragraph (1) shall:

(A) give audible and visual alarms at the navigation bridge, one when the water level above the bottom of the cargo hold reaches a height of not less than 0.3 m, and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m; and

(B) be fitted at the aft end of the cargo holds. For cargo holds which are occasionally used for water ballast, an alarm overriding device may be installed. The visual alarms shall clearly discriminate between the two different water levels detected in each hold.

(3) As an alternative to the water level detector at a height of not less than 0.3 m as per sub-paragraph (2). (A), a bilge level sensor[2] serving the bilge pumping arrangements required by SOLAS II-1 regulation 35-1 and installed in the cargo hold bilge wells or other suitable location is considered acceptable, subject to:

(A) the fitting of the bilge level sensor at a height of not less than 0.3 m at the aft end of the cargo hold; and

(B) the bilge level sensor giving audible and visual alarm at the navigation bridge which is clearly distinctive from the alarm given by the other water level detector fitted in the cargo hold.

*** Footnotes:**

1. **"constructed on or after 1 January 2024"** means ships (**SOLAS Reg. II-1/1.3.2**):
   .1 for which the building contract is placed on or after 1 January 2024; or
   .2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after 1 July 2024; or
   .3 the delivery of which is on or after 1 January 2028.
2. For the performance standards, Refer to Resolution **MSC.188(79)/**Rev.~~1~~2 as may be amended. ⚓

- MSC.188(79) was revised according to MSC 107.

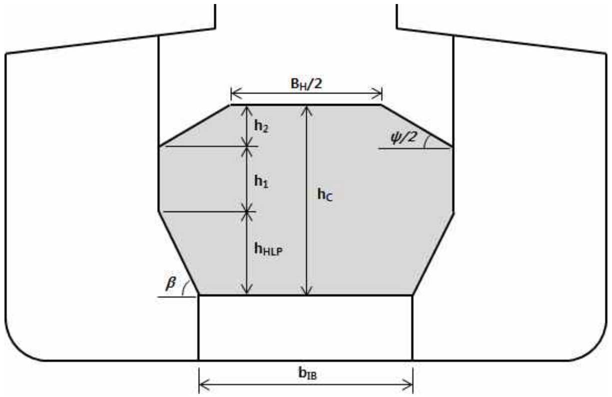
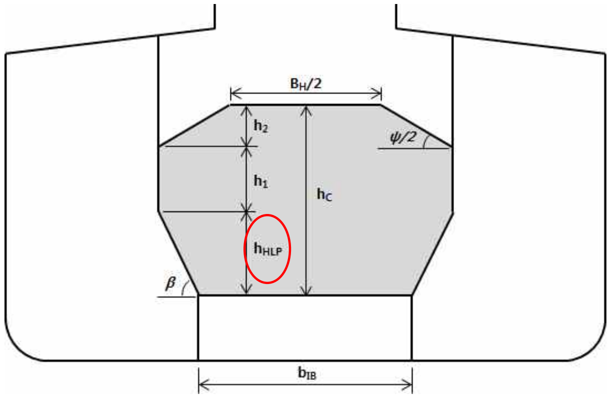
Present	Amendment	Note
〈Rules〉 Pt 7 **CONTENTS** CHAPTER 9 TUGS ·································· 177 **CHAPTER 9 TUGS** **Section 1 General** **101. Application** **1.** The construction and equipment of ships intended to be registered as "Tug" are to be in accordance with the requirements in this Chapter. The construction and equipment of ships intended to be registered as "Offshore Tug/Supply Ships" are to be in accordance with the requirements of **Ch 8.** **Section 4 Panting and Strengthening of Bottom Forward** **401. Panting region reinforcement** The arrangements to resist panting required by **Pt 3, Ch 9** do not apply to tugs less than 46 m in length. In tugs 46 m or more in length, addition stiffening is also to be fitted in the tween decks throughout the panting region. **402. Strengthening of bottom forward** The requirements for strengthening of bottom forward detailed in **Pt 3, Ch 7, Sec 8** do not apply to tugs.	〈Rules〉 Pt 7 **CONTENTS** CHAPTER 9 TUG BOATS ······························ 177 **CHAPTER 9 TUG BOATS** **Section 1 General** **101. Application** **1.** The construction and equipment of ships intended to be registered as "Tug boat" are to be in accordance with the requirements in this Chapter. The construction and equipment of ships intended to be registered as "Offshore Tug/Supply Ships" are to be in accordance with the requirements of **Ch 8.** **Section 4 Panting and Strengthening of Bottom Forward** **401. Panting region reinforcement** The arrangements to resist panting required by **Pt 3, Ch 9** do not apply to tug boats less than 46 m in length. In tug boats 46 m or more in length, addition stiffening is also to be fitted in the tween decks throughout the panting region. **402. Strengthening of bottom forward** The requirements for strengthening of bottom forward detailed in **Pt 3, Ch 7, Sec 8** do not apply to tug boats.	

Present	Amendments	Reason
Section 6 Towing Arrangements **601. Towing hooks** **1.** Towing hooks or equivalent should normally be 5 to 10 percent of the ship's length abaft amidships, but in no circumstances should they be sited forward of the longitudinal center of gravity of the tug in any anticipated condition of loading. In addition, the towing hook should be located as low as practicable in order to minimize heeling moments arising in normal working conditions. **Section 8 Towing Winch Emergency Release Systems *(2021)*** **801. General** **2. Purpose** The purpose of this section is to provide requirements to prevent the capsize of a tug when in the act of towage as a result of the towline force acting transversely to the tug (in beam direction) as a consequence of an unexpected event (could be loss of propulsion/steering or otherwise), whereby the resulting couple generated by offset and opposing transverse forces (towline force is opposed by thrust or hull resistance force) causes the tug to heel and, ultimately, to capsize. This capsize may be referred to as "girting", "girthing", "girding" or "tripping". See **Fig 1** which shows the forces acting during towage operations. **804. Test requirements** **2. Installation trials** (1) The full functionality of the emergency release system is to be tested as part of the shipboard commissioning trials to the satisfaction of the surveyor. Testing may be conducted either during a bollard pull test or by applying the towline load against a strong point on the deck of the tug that is certified to the appropriate load.	**Section 6 Towing Arrangements** **601. Towing hooks** **1.** Towing hooks or equivalent should normally be 5 to 10 percent of the ship's length abaft amidships, but in no circumstances should they be sited forward of the longitudinal center of gravity of the tug boat in any anticipated condition of loading. In addition, the towing hook should be located as low as practicable in order to minimize heeling moments arising in normal working conditions. **Section 8 Towing Winch Emergency Release Systems *(2021)*** **801. General** **2. Purpose** The purpose of this section is to provide requirements to prevent the capsize of a tug boat when in the act of towage as a result of the towline force acting transversely to the tug boat (in beam direction) as a consequence of an unexpected event (could be loss of propulsion/steering or otherwise), whereby the resulting couple generated by offset and opposing transverse forces (towline force is opposed by thrust or hull resistance force) causes the tug boat to heel and, ultimately, to capsize. This capsize may be referred to as "girting", "girthing", "girding" or "tripping". See **Fig 1** which shows the forces acting during towage operations. **804. Test requirements** **2. Installation trials** (1) The full functionality of the emergency release system is to be tested as part of the shipboard commissioning trials to the satisfaction of the surveyor. Testing may be conducted either during a bollard pull test or by applying the towline load against a strong point on the deck of the tug boat that is certified to the appropriate load.	

Present	Amendment	Note
〈Rules〉 Pt 7	〈Rules〉 Pt 7	
CHAPTER 3 BULK CARRIERS	**CHAPTER 3 BULK CARRIERS**	
Section 9 Hatch Covers and Hatch Coamings of Cargo Holds	**Section 9 〈Void〉**	
Section 13 Requirements for the Fitting of a Forecastle for Bulk Carriers, Ore Carriers and Combination Carriers	**Section 13 Requirements for the Fitting of a Forecastle for Bulk Carriers, Ore Carriers and Combination Carriers**	
1302. Dimensions	1302. Dimensions	
3. All points of the aft edge of the forecastle deck are to be located at a distance l_F: $l_F \leq 5\sqrt{H_F - H_C}$ from the hatch coaming plate in order to apply the reduced loading to the No.1 forward transverse hatch coaming and No.1 hatch cover in applying **Sec. 9. 904. 1.** and **905. 2.**	**3.** All points of the aft edge of the forecastle deck are to be located at a distance l_F: $l_F \leq 5\sqrt{H_F - H_C}$ from the hatch coaming plate in order to apply the reduced loading to the No.1 forward transverse hatch coaming and No.1 hatch cover in applying **Pt. 4 Sec. 2. 203. 2.** and **Sec. 5. 505. 4.**	
Section 18 Cargo Hatch Cover Securing Arrangements	**Section 18 〈Void〉**	- related to Sec.9 (URS2) refer to Pt.4 Ch2

Present	Amendment	Note
〈Rules〉 Pt 7 CHAPTER 4 CONTAINER SHIPS Section 2 Longitudinal Strength 201. General 2. Symbols and definitions (1) symbols L : Rule length (m), as defined in **Pt 3, Ch 1, 102.** B : Moulded breadth (m) Section 3 Double Bottoms 304. Thickness of inner bottom plating **1.** The thickness of inner bottom plating is not to be less than that obtained from the following formulae, whichever is the greater : where : d_0 : height of centre girder (m).	〈Rules〉 Pt 7 CHAPTER 4 CONTAINER SHIPS Section 2 Longitudinal Strength 201. General 2. Symbols and definitions (1) symbols L : Rule length (m), as defined in **Pt 3, Ch 1, 102.** B : Moulded breadth (m), as defined in **Pt 3, Ch 1, 104.** Section 3 Double Bottoms 304. Thickness of inner bottom plating **1.** The thickness of inner bottom plating is not to be less than that obtained from the following formulae, whichever is the greater : where : d_0 : height of centre girder (mm).	

Present	Amendment	Note
〈Guidance〉 Pt 7 Annex 7-2 Guidance for the Container Securing Arrangements 8. Determination and application of forces Table 6 Ship motions - if $B \geqq 60\mathrm{m}$, not to be taken less than $f_r \times 18^\circ$ $(fr \times 0.314 rad)$ (If the B is a median value, θ is determined by linear interpolation) (3) Resultant applied forces for unlashed stack Q_i = wind force in one transverse end $Q_i = \dfrac{\alpha 7.33 c\, b\, V_w^2 \cos(C_{YG}\Theta) \times 10^{-4}}{2}$ (kN)	〈Guidance〉 Pt 7 Annex 7-2 Guidance for the Container Securing Arrangements 8. Determination and application of forces Table 6 Ship motions - if $B \geqq 60\mathrm{m}$, not to be taken less than $f_r \times 18^\circ$ $(fr \times 0.314 rad)$ (If the B is a intermediate value, θ is determined by linear interpolation) (3) Resultant applied forces for unlashed stack Q_i = wind force in one transverse end $Q_i = \dfrac{\alpha 7.33 c\, b\, V_w^2 \cos(C_{YG}\theta) \times 10^{-4}}{2}$ (kN)	$\Theta \rightarrow \theta$

Present	Amendment	Note
〈Guidance〉 Pt 7 Annex 7-10 Guidance for Direct Strength Assessment for Ore Carriers  Fig 9 Assumed cargo surface (high density, $h_1 \geq 0$)	〈Guidance〉 Pt 7 Annex 7-10 Guidance for Direct Strength Assessment for Ore Carriers  Fig 9 Assumed cargo surface (high density, $h_1 \geq 0$) h_{HLP} → h_{HPL}	

Present	Amendment	Note
〈Rules〉 Pt 7 CHAPTER 9 TUGS Section 8 Towing Winch Emergency Release Systems Figure 1 Force during towing Figure 2 Towline 'fleet angle' 〈Guidance〉 Pt 7 CHAPTER 3 BULK CARRIES 702. Figs. 7.3.5 and ~ Annex 7-10 Guidance for Direct Strength Assessment for Ore Carriers Figure 15 Transverse distribution of dynamic pressure for BSP-1P(left)와 BSP-1S(right) load cases Figure 16 Transverse distribution of dynamic pressure for BSP-2P(left)와 BSP-2S(right) load cases	〈Rules〉 Pt 7 CHAPTER 9 TUGS Section 8 Towing Winch Emergency Release Systems Fig 1 Force during towing Fig 2 Towline 'fleet angle' 〈Guidance〉 Pt 7 CHAPTER 3 BULK CARRIES 702. Fig 7.3.5 and ~ Annex 7-10 Guidance for Direct Strength Assessment for Ore Carriers Fig 15 Transverse distribution of dynamic pressure for BSP-1P(left)와 BSP-1S(right) load cases Fig 16 Transverse distribution of dynamic pressure for BSP-2P(left)와 BSP-2S(right) load cases	

Amendment	Note

PART 7 Ships of Special Service (Ch1-4, 7-10)

Annex 7-6-1 Water Level Detectors on Multiple Hold Cargo Ships other than Bulk Carriers and Tankers *(2023)*

1. Application

(1) Multiple hold cargo ships other than bulk carriers and tankers constructed on or after 1 January 2024[1] shall be fitted with water level detectors[2] in each cargo hold intended for dry cargoes. Water level detectors are not required for cargo holds located entirely above the freeboard deck.

(2) The water level detectors required by paragraph (1) shall:

(A) give audible and visual alarms at the navigation bridge, one when the water level above the bottom of the cargo hold reaches a height of not less than 0.3 m, and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m; and

(B) be fitted at the aft end of the cargo holds. For cargo holds which are occasionally used for water ballast, an alarm overriding device may be installed. The visual alarms shall clearly discriminate between the two different water levels detected in each hold.

(3) As an alternative to the water level detector at a height of not less than 0.3 m as per sub-paragraph (2). (A), a bilge level sensor[2] serving the bilge pumping arrangements required by SOLAS II-1 regulation 35-1 and installed in the cargo hold bilge wells or other suitable location is considered acceptable, subject to:

(A) the fitting of the bilge level sensor at a height of not less than 0.3 m at the aft end of the cargo hold; and

(B) the bilge level sensor giving audible and visual alarm at the navigation bridge which is clearly distinctive from the alarm given by the other water level detector fitted in the cargo hold.

*** Footnotes:**

1. **"constructed on or after 1 January 2024"** means ships (**SOLAS Reg. II-1/~~1.3.2~~1.1.3.2**):
   .1 for which the building contract is placed on or after 1 January 2024; or
   .2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after 1 July 2024; or
   .3 the delivery of which is on or after 1 January 2028.
2. For the performance standards, installation and testing requirements, Refer to Resolution **MSC.188(79)/Rev.2** as may be amended.

Note:

- Correction for reference regulation
- Clarification for requirement application

PART 7 (CH5, 6)

Present	Amendment	Note
〈Rules〉 Pt 7-2 **Ch 5 Ships Carrying Liquefied Gases in Bulk** **Section 2 Ship Survival Capability and Location of Cargo Tanks** **201. General (IGC Code 2.1)** **1.** Ships subject to this Chapter shall survive the hydrostatic effects of flooding following assumed hull damage caused by some external force. In addition, to safeguard the ship and the environment, the cargo tanks shall be protected from penetration in the case of minor damage to the ship resulting, for example, from contact with a jetty or tug, and also given a measure of protection from damage in the case of collision or grounding, by locating them at specified minimum distances inboard from the ship's shell plating. 〈omit〉	〈Rules〉 Pt 7 Ch 5 **Ch 5 Ships Carrying Liquefied Gases in Bulk** **Section 2 Ship Survival Capability and Location of Cargo Tanks** **201. General (IGC Code 2.1)** **1.** Ships subject to this Chapter shall survive the hydrostatic effects of flooding following assumed hull damage caused by some external force. In addition, to safeguard the ship and the environment, the cargo tanks shall be protected from penetration in the case of minor damage to the ship resulting, for example, from contact with a jetty or tug boat, and also given a measure of protection from damage in the case of collision or grounding, by locating them at specified minimum distances inboard from the ship's shell plating. 〈osame as current〉	

Present	Amendment	Note
〈Rules〉 Pt 7-2 CHAPTER 5 603. 2. (2) Figure 7.5.17, (3) Figure 7.5.18, 605. 3. (4) (D) Fig. 7.5.18: 804. (84 Page) Fig. 7.5.19 〈Guidance〉 Pt 7-2 CHAPTER 5 305. 3. Fig. 7.5.14 407. Fig. 7.5.16 423. Fig. 7.5.22 804. 2 Fig. 7.5.19 CHAPTER 6 701. 3 Fig.7.6.32	〈Rules〉 Pt 7 Ch 5 CHAPTER 5 603. 2. (2) Fig 7.5.17, (3) Fig 7.5.18, 605. 3. (4) (D) Fig 7.5.18: 804. (84 Page) Fig 7.5.19 〈Guidance〉 Pt 7 Ch 5, 6 CHAPTER 5 305. 3. Fig 7.5.14 407. Fig 7.5.16 423. Fig 7.5.22 804. 2 Fig 7.5.19 CHAPTER 6 701. 3 Fig 7.6.32	

PART 9

Present	Amendment	Note
<RULE> Part 9 **CHAPTER 6 Hull Monitoring Systems** **Section 2 System Requirements** **202. System Requirements** **1. Sensors** (1) Long based strain gauge (C) The position of the long based strain gauge is to be planned to measure longitudinal hull girder bending stress. The minimum required number and approximate position of the strain gauges are as follows: (b) Container ship : - 4 at midship in a ring around the section(two port, two starboard; on deck and upper turn of bilge) - 1 at L/4 from the bow(on deck)	<RULE> Part 9 **CHAPTER 6 Hull Monitoring Systems** **Section 2 System Requirements** **202. System Requirements** **1. Sensors** (1) Long based strain gauge (C) The position of the long based strain gauge is to be planned to measure longitudinal hull girder bending stress. The minimum required number and approximate position of the strain gauges are as follows: (b) Container ship : - 4 at midship in a ring around the section(two port, two starboard; on deck and upper turn of bilge) - 1 at L/4 from the bow(on deck) - 1 at L/4 from the stern(on deck)	- Edited for ommission in English version

PART 10

Present	Amendment	Note

Present

〈Rules Pt 10〉

CHAPTER 19 HATCHWAYS AND OTHER DECK OPENINGSS

Section 1 General

104. Corrosion additions

The corrosion addition for both sides to be considered for the plating and internal members of hatch covers, hatch coamings and coaming stays is equal to the value specified as follows

Corrosion addition t_c (mm)		
Member	Bulk carriers Ore carriers Combination carriers	Others except left column
Plating and stiffeners of single skin hatch cover	2.0	2.0 *
〈omit〉	2.0	1.5 *
〈omit〉	1.5	1.0
〈omit〉	1.5	1.5
〈omit〉		

Amendment

〈Rules Pt 10〉

CHAPTER 19 HATCHWAYS AND OTHER DECK OPENINGSS

Section 1 General

104. Corrosion additions

The corrosion addition for both sides to be considered for the plating and internal members of hatch covers, hatch coamings and coaming stays is equal to the value specified as follows

Table 10.19.2 corrosion addition t_c

Corrosion addition t_c (mm)		
Member	Bulk carriers Ore carriers Combination carriers	Others except left column
Plating and stiffeners of single skin hatch cover	2.0	2.0 *
〈omit〉	2.0	1.5 *
〈omit〉	1.5	1.0
〈omit〉	1.5	1.5
〈omit〉		

Note

- 표 제목 누락 반영

Present	Amendment	Note

Present

105. Allowable stresses

The allowable stresses σ_a and τ_a, in N/mm^2, are to be obtained as follows.

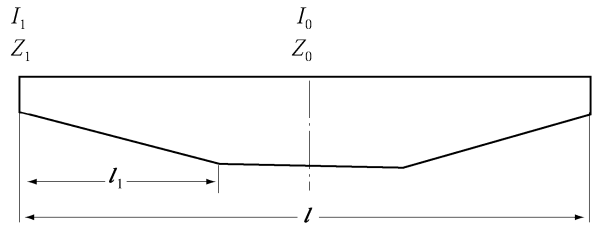
Members of:	σ_a (N/mm^2)	τ_a (N/mm^2)
Weathertight hatch cover	0.80 σ_y	0.46 σ_y
Pontoon hatch cover	0.68 σ_y	0.39 σ_y
Hatch coaming	0.95 σ_y	0.50 σ_y

σ_a : normal Stresses
τ_a : shear Stresses
σ_y : yielding Stresses

Section 3 General

304. Primary supporting members

5. **Primary supporting members of variable cross-section**



Amendment

105. Allowable stresses

The allowable stresses σ_a and τ_a, in N/mm^2, are to be obtained as follows.

Table 10.19.3 Allowable stresses σ_a and τ_a

Members of:	σ_a (N/mm^2)	τ_a (N/mm^2)
Weathertight hatch cover	0.80 σ_y	0.46 σ_y
Pontoon hatch cover	0.68 σ_y	0.39 σ_y
Hatch coaming	0.95 σ_y	0.50 σ_y

σ_a : normal Stresses
τ_a : shear Stresses
σ_y : yielding Stresses

Section 3 General

304. Primary supporting members

5. **Primary supporting members of variable cross-section**

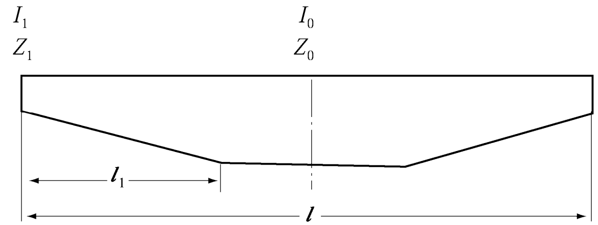


Fig 10.19.1 Primary support member

Note

- 표 제목 누락 반영

PART 14

Present	Amendment	Note
〈Rule Pt 14〉 # Chapter 12 Construction ## Section 1 ~ 2 〈omitted〉 ## Section 3 Design of Weld Joints **1. 〈omitted〉** **2. Tee or Cross Joint** **2.1 ~ 2.4 〈omitted〉** **2.5 Weld size criteria** **2.5.1 〈omitted〉** **2.5.2** The leg length, ℓ_{leg} in mm, of continuous, lapped or intermittent fillet welds is not to be taken less than the greater of the following values: 〈omitted〉 f_{weld} : Weld factor dependent on the type of the structural member, see **Table 2**, **Table 3** and **Table 4.** 〈omitted〉	〈Rule Pt 14〉 # Chapter 12 Construction ## Section 1 ~ 2 〈same as the presnt〉 ## Section 3 Design of Weld Joints **1. 〈same as the presnt〉** **2. Tee or Cross Joint** **2.1 ~ 2.4 〈same as the presnt〉** **2.5 Weld size criteria** **2.5.1 〈same as the presnt〉** **2.5.2** The leg length, ℓ_{leg} in mm, of continuous, lapped or intermittent fillet welds is not to be taken less than the greater of the following values: 〈same as the presnt〉 f_{weld} : Weld factor dependent on the type of the structural member, see **Table 2**, **Table 3** and **Table 4.** 〈same as the presnt〉	

Present	Amendment	Note

Table 2 : Weld factors for different structural members

Connection			f_{weld}
Stiffeners in general	At ends (15% of span) on deep tank bulkheads, brackets at ends		0.30
	Other span		0.20
PSM[(1)] in general	At ends (15% of span), brackets at ends		0.38
	Other span		0.24
	Connection between stiffeners and PSMs, **Figure 4 (a)**		0.30
Watertight boundary	~~Water ballast tanks~~(Deep tank ~~bulkheads),~~ **Figure 4 (b)**		0.48
	Watertight compartments, ~~Other tanks,~~ **Figure 4 (b)**		0.38
Deck	Strength deck,	Within 0.6L midship, **Figure 4 (a)**	PPW[(3)]
		Elsewhere, **Figure 4 (a)**	0.48
	Other deck		0.30
	Hatch coaming[(2)]	End of hatch corner curvature radius(R.E.) + 100 mm, **Figure 5**	PPW[(3)]
		Transverse hatch coaming 15% of hatch coaming height[(5)], **Figure 5**	PPW[(3)] or 0.38
		Elsewhere	PPW[(4)] or 0.38
Side and bottom structure in double hull	Girder[(1)]	At ends[(6)] (15% of span), **Figure 4 (a)**	0.38
		Center girder	0.30
		Other girders	0.24
	Floor, Stringer, Web frame[(1)]	At ends[(6)] (15% of span), **Figure 4 (a)**	0.38
		Other span, **Figure 4 (a)**	0.24
Machinery space	Center girder	To keel and inner bottom	0.38
	Floor	To center girder	0.38
Fore and Aft part	Above waterline		0.20
	Below waterline		0.30
Superstructure, Deckhouse excluding watertight boundary			0.20
Not specified in the table			0.38

(1) Weld factor may be determined based on the shear stress according to **[2.5.7]**

(2) f_{weld} = 0.43 for hatch coaming other than in cargo holds.

(3) PPW : Partial penetration welding in accordance with **[2.4.2]**.

(4) PPW : Partial penetration welding in accordance with **[2.4.2]**, with $f = t_{as-built}/2$

(5) Need not to be taken greater than 250 mm

(6) Need not to be taken greater than length of the shorter side of PSMs

Present	Amendment	Note
	Table 2 : Weld factors for different structural members (see table below)	- Clarified the application of the welding factor for deep tanks.

Table 2 : Weld factors for different structural members

<table>
<tr><th colspan="3">Connection</th><th>f_{weld}</th></tr>
<tr><td rowspan="2">Stiffeners in general</td><td colspan="2">At ends (15% of span) on deep tank bulkheads, brackets at ends</td><td>0.30</td></tr>
<tr><td colspan="2">Other span</td><td>0.20</td></tr>
<tr><td rowspan="3">PSM[(1)] in general</td><td colspan="2">At ends (15% of span), brackets at ends</td><td>0.38</td></tr>
<tr><td colspan="2">Other span</td><td>0.24</td></tr>
<tr><td colspan="2">Connection between stiffeners and PSMs, Figure 4 (a)</td><td>0.30</td></tr>
<tr><td rowspan="2">Watertight boundary</td><td colspan="2">Deep tanks, Figure 4 (b)</td><td>0.48</td></tr>
<tr><td colspan="2">Watertight compartments, Figure 4 (b)</td><td>0.38</td></tr>
<tr><td rowspan="6">Deck</td><td rowspan="2">Strength deck,</td><td>Within 0.6L midship, Figure 4 (a)</td><td>PPW[(3)]</td></tr>
<tr><td>Elsewhere, Figure 4 (a)</td><td>0.48</td></tr>
<tr><td colspan="2">Other deck</td><td>0.30</td></tr>
<tr><td rowspan="3">Hatch coaming[(2)]</td><td>End of hatch corner curvature radius(R.E.) + 100 mm, Figure 5</td><td>PPW[(3)]</td></tr>
<tr><td>Transverse hatch coaming 15% of hatch coaming height[(5)], Figure 5</td><td>PPW[(3)] or 0.38</td></tr>
<tr><td>Elsewhere</td><td>PPW[(4)] or 0.38</td></tr>
<tr><td rowspan="5">Side and bottom structure in double hull</td><td rowspan="3">Girder[(1)]</td><td>At ends[(6)] (15% of span), Figure 4 (a)</td><td>0.38</td></tr>
<tr><td>Center girder</td><td>0.30</td></tr>
<tr><td>Other girders</td><td>0.24</td></tr>
<tr><td rowspan="2">Floor, Stringer, Web frame[(1)]</td><td>At ends[(6)] (15% of span), Figure 4 (a)</td><td>0.38</td></tr>
<tr><td>Other span, Figure 4 (a)</td><td>0.24</td></tr>
<tr><td rowspan="2">Machinery space</td><td>Center girder</td><td>To keel and inner bottom</td><td>0.38</td></tr>
<tr><td>Floor</td><td>To center girder</td><td>0.38</td></tr>
<tr><td rowspan="2">Fore and Aft part</td><td colspan="2">Above waterline</td><td>0.20</td></tr>
<tr><td colspan="2">Below waterline</td><td>0.30</td></tr>
<tr><td colspan="3">Superstructure, Deckhouse excluding watertight boundary</td><td>0.20</td></tr>
<tr><td colspan="3">Not specified in the table</td><td>0.38</td></tr>
</table>

(1) Weld factor may be determined based on the shear stress according to **[2.5.7]**
(2) f_{weld} = 0.43 for hatch coaming other than in cargo holds.
(3) PPW : Partial penetration welding in accordance with **[2.4.2]**.
(4) PPW : Partial penetration welding in accordance with **[2.4.2]**, with $f = t_{as-built}/2$
(5) Need not to be taken greater than 250 mm
(6) Need not to be taken greater than length of the shorter side of PSMs

PART 15

Present	Correction	Reason
〈Part 15〉 Chapter 2 General Arrangement Design Section 4 Compartment Arrangement 1. Cofferdam 〈omission〉 2. Double bottom 2.1 ~ 2.2 〈omission〉 2.3 Height of double bottom 2.3.1 Unless otherwise specified, the height of the double bottom is not to be less than the lesser of: B/~~20~~ or 2 m, however not less than 0.76 m measured vertically from the plane parallel with keel line to inner bottom. ⚓	〈Part 15〉 Chapter 2 General Arrangement Design Section 4 Compartment Arrangement 1. Cofferdam 〈same as present〉 2. Double bottom 2.1 ~ 2.2 〈same as present〉 2.3 Height of double bottom 2.3.1 Unless otherwise specified, the height of the double bottom is not to be less than the lesser of: B/15 or 2 m, however not less than 0.76 m measured vertically from the plane parallel with keel line to inner bottom. ⚓	－Typo

OTHER RULES AND GUIDANCE

Present	Amendments	Remarks
〈Guidance for Approval of Service Suppliers〉 **Appendix Part A – Approval of Service Suppliers listed in IACS UR Z17** **5. Firms engaged in servicing life saving appliances** 5.1 Firms engaged in servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, marine evacuation systems(Z17 Annex 1-5) *(2023)* 5.1.1 〈omitted〉 5.1.2 Equipment and facilities **IMO Res.A.761(18)** as amended by **MSC.55(66)** gives recommendations on conditions for the approval of servicing stations for inflatable liferafts which shall be observed as relevant. Where inflatable liferafts are subject to extended service intervals, **MSC.1/Circ.1328** should also be followed. 5.1.3 Procedures and instructions The Service Supplier shall have documented procedures and instructions for how to carry out service of equipment. Where inflatable liferafts are subject to extended service intervals in accordance with the requirements of **SOLAS Reg.III/20.8.3**, **MSC.1/Circ.1328** should be followed in addition to **Res.A.761(18)** as amended by **MSC.55(66)**. 5.1.4 〈omitted〉 5.1.5 Reference Documents The Service Supplier is to have access to the following documents: (1) **IMO Res.A.761(18)** – Recommendation on Conditions for the Approval of Servicing Stations for Inflatable Liferafts – (adopted on 4 November 1993), amended by **Res. MSC.55(66)** (2) **IMO Res. MSC.55(66)** 〈newly added〉	〈Guidance for Approval of Service Suppliers〉 **Appendix Part A – Approval of Service Suppliers listed in IACS UR Z17** **5. Firms engaged in servicing life saving appliances** 5.1 Firms engaged in servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, marine evacuation systems(Z17 Annex 1-5) *(2023)* 5.1.1 〈same as the current Guidance〉 5.1.2 Equipment and facilities **IMO Res.A.761(18)** as amended by **MSC.55(66)** and by **MSC.388(94)** gives recommendations on conditions for the approval of servicing stations for inflatable liferafts which shall be observed as relevant. Where inflatable liferafts are subject to extended service intervals, **MSC.1/Circ.1328** should also be followed. 5.1.3 Procedures and instructions The Service Supplier shall have documented procedures and instructions for how to carry out service of equipment. Where inflatable liferafts are subject to extended service intervals in accordance with the requirements of **SOLAS Reg.III/20.8.3**, **MSC.1/Circ.1328** should be followed in addition to **Res.A.761(18)** as amended by **MSC.55(66)** and by **MSC.388(94)**. 5.1.4 〈same as the current Guidance〉 5.1.5 Reference Documents The Service Supplier is to have access to the following documents: (1) **IMO Res.A.761(18)** – Recommendation on Conditions for the Approval of Servicing Stations for Inflatable Liferafts – (adopted on 4 November 1993), amended by **Res. MSC.55(66)** and by **MSC.388(94)** (2) **IMO Res. MSC.55(66)** (3) **IMO Res. MSC.388(94)**	- Reflection to IACS UR Z17 (Rev.18 Corr. 1 May 2023) - Reflection to 5.2 of ANNEX I - Reflection to 5.3 of ANNEX I - Reflection to 5.5 of ANNEX I

Present	Amendments	Reason
〈Rules for the Towing Survey of Barges and Tug boats〉 **CHAPTER 1 GENERAL** **Section 1 General** **101. Application** These Rules apply to the tugboats and the barge which are engaged in cargo transportation by towing and to the survey for safe carrying at sea if Owner requests. **102. Definitions** The definitions specified in these Rules are to be as follows: (1) The tugboats is the ship which is used for towing or pushing (hereinafter called as "towing") the towed ship exclusively. (2) The barge is the ship without propulsion engine and is on-water structures for carrying cargoes at sea to be towed by tugboats generally. **103. Restriction in service area** **1.** Restriction in service area for tugboats is to be complied with Korean Ship Safety Act. **3.** In case of any one of the following conditions, it should not be engaged in cargo transportation in coastal service area and over. (1) tugboats whose length is less than 20 m or whose main engine is smaller than 300 HP	**〈Rules for the Towing Survey of Barges and Tug boats〉** **CHAPTER 1 GENERAL** **Section 1 General** **101. Application** These Rules apply to the tug boats and the barge which are engaged in cargo transportation by towing and to the survey for safe carrying at sea if Owner requests. **102. Definitions** The definitions specified in these Rules are to be as follows: (1) The tug boats is the ship which is used for towing or pushing (hereinafter called as "towing") the towed ship exclusively. (2) The barge is the ship without propulsion engine and is on-water structures for carrying cargoes at sea to be towed by tug boats generally. **103. Restriction in service area** **1.** Restriction in service area for tug boats is to be complied with Korean Ship Safety Act. **3.** In case of any one of the following conditions, it should not be engaged in cargo transportation in coastal service area and over. (1) tug boats whose length is less than 20 m or whose main engine is smaller than 300 HP	규칙 1편 부록 1-1의 선종부호 15-1.에 따라 tugboat를 tug boat로 수정함 : English only

Present	Amendments	Reason
CHAPTER 2 STRUCTURES AND EQUIPMENT **Section 1 Tugboats** **101. Structure of tugboats** Except where specified in this Chapter, structures, scantling, equipment, machinery, electrical equipment, steering gears, etc. of tugboats are to be complied with the Rules and **Korean Ship Safety Act** or equivalent thereto. **102. Stability of tugboats** For the tugboats which are larger than 24 m and engaged in greater coastal area, the results of stability calculation are to be approved by the Society except the barge which is smaller than 500 gross tonnage and not engaged in international voyage. **103. Communication equipment of tugboats** **1.** The radio installations required in the **Radio Wave Act of Korea** in accordance with the requirements of **Korean Ship Safety Act. 4. 1.** are to be provided in tugboats. **104. Life-saving appliances of tugboats** Life-saving appliances are to be provided in accordance with the **Standard for Ship Life-Saving Appliances** on tugboats. And maximum number of persons to be carried on lifeboat or liferaft is to include the expected number of crews on barges. **105. Measures for prevention of collision** A light, shape, sound and light signal appliances are to be provided in accordance with **1972 COLREG** on tugboats. **106. Certificate of bollard pull** The certificate of bollard pull is to be provided on all tugboats.	**CHAPTER 2 STRUCTURES AND EQUIPMENT** **Section 1 Tug boats** **101. Structure of tug boats** Except where specified in this Chapter, structures, scantling, equipment, machinery, electrical equipment, steering gears, etc. of tugboats are to be complied with the Rules and **Korean Ship Safety Act** or equivalent thereto. **102. Stability of tug boats** For the tugboats which are larger than 24 m and engaged in greater coastal area, the results of stability calculation are to be approved by the Society except the barge which is smaller than 500 gross tonnage and not engaged in international voyage. **103. Communication equipment of tug boats** **1.** The radio installations required in the **Radio Wave Act of Korea** in accordance with the requirements of **Korean Ship Safety Act. 4. 1.** are to be provided in tug boats. **104. Life-saving appliances of tug boats** Life-saving appliances are to be provided in accordance with the **Standard for Ship Life-Saving Appliances** on tug boats. And maximum number of persons to be carried on lifeboat or liferaft is to include the expected number of crews on barges. **105. Measures for prevention of collision** A light, shape, sound and light signal appliances are to be provided in accordance with **1972 COLREG** on tug boats. **106. Certificate of bollard pull** The certificate of bollard pull is to be provided on all tug boats.	규칙 1편 부록 1-1의 선종부호 15-1.에 따라 tugboat를 tug boat로 수정함 : English only

Present	Amendments	Reason
CHAPTER 3 TOWING ARRANGEMENTS **Section 1 Towing arrangements and resistances** **101. Towing arrangements** ***(2020)*** Towing arrangements in tugboats are divided into towing equipment and towing arrangements and specified generally as follows: **102. Tow-lines** **1.** The length of tow-lines is determined by the following formula. However, when its service area is restricted within smooth water, it is to be at the discretion of the Society. $S = K(L_1 + L_2)$ S : length of tow-line (m) L_1 : length of tugboats or half length of barge (m) L_2 : length of barge (m) K : the value obtained from following table **103. Total resistance of towed ships** **1.** Total resistance of towed ships is to be in accordance with followings and the values may be the requirements for determining the bollard pull of the tugboats.	**CHAPTER 3 TOWING ARRANGEMENTS** **Section 1 Towing arrangements and resistances** **101. Towing arrangements** ***(2020)*** Towing arrangements in tug boats are divided into towing equipment and towing arrangements and specified generally as follows: **102. Tow-lines** **1.** The length of tow-lines is determined by the following formula. However, when its service area is restricted within smooth water, it is to be at the discretion of the Society. $S = K(L_1 + L_2)$ S : length of tow-line (m) L_1 : length of tug boats or half length of barge (m) L_2 : length of barge (m) K : the value obtained from following table **103. Total resistance of towed ships** **1.** Total resistance of towed ships is to be in accordance with followings and the values may be the requirements for determining the bollard pull of the tug boats.	규칙 1편 부록 1-1 의 선종부호 15-1. 에 따라 tugboat를 tug boat로 수정함 : English only

Present	Amendments	Reason
CHAPTER 4 SURVEY OF TOWINGS **Section 1 Survey of towing** **101. Application** The requirements in this Chapter apply to the checking of seaworthiness of barges and tugboats, and to the safety inspection of towing arrangement (hereinafter referred to as the "survey of towing") by Owner's request before cargo transportation. **102. Submission of data** **1.** The Owner is to submit the application for survey of towing and following data to the Society. (2) Certificate for bollard pull of tugboats specified in **Ch 2. 106** (3) Towing plans including followings (A) Main information of tugboats and barges **2.** In case of the tugboats and barges holding the certificates of towing approved by the Society already, the data as specified in **1.** (1) and (C) and (E) of (3) are to be submitted and the others may be dispensed with. **104. Survey of towing** **1.** The survey of towing by tugboats is to be carried out as following: **105. Towing Certificates** **1.** Where the tugboats, barges and towing arrangements have undergone the survey to the satisfaction of the Surveyor, the certificate of towing is to be issued. **3.** Notwithstanding the requirement in **Par 2**, the Society may issue the towing certificate with one year validity for tugboats and barges if they are classed with any classification society and intended to sail for specific sailing route periodically provided that: (1) the classification of tugboats and barges is to be maintained.	**CHAPTER 4 SURVEY OF TOWINGS** **Section 1 Survey of towing** **101. Application** The requirements in this Chapter apply to the checking of seaworthiness of barges and tug boats, and to the safety inspection of towing arrangement (hereinafter referred to as the "survey of towing") by Owner's request before cargo transportation. **102. Submission of data** **1.** The Owner is to submit the application for survey of towing and following data to the Society. (2) Certificate for bollard pull of tug boats specified in **Ch 2. 106** (3) Towing plans including followings (A) Main information of tug boats and barges **2.** In case of the tug boats and barges holding the certificates of towing approved by the Society already, the data as specified in **1.** (1) and (C) and (E) of (3) are to be submitted and the others may be dispensed with. **104. Survey of towing** **1.** The survey of towing by tug boats is to be carried out as following: **105. Towing Certificates** **1.** Where the tug boats, barges and towing arrangements have undergone the survey to the satisfaction of the Surveyor, the certificate of towing is to be issued. **3.** Notwithstanding the requirement in **Par 2**, the Society may issue the towing certificate with one year validity for tug boats and barges if they are classed with any classification society and intended to sail for specific sailing route periodically provided that: (1) the classification of tug boats and barges is to be maintained	규칙 1편 부록 1-1의 선종부호 15-1.에 따라 tugboat를 tug boat로 수정함 : English only

<table>
<tr><th>Present</th><th>Amendments</th><th>Reason</th></tr>
<tr><td>

〈Ruels for the Classification of Steel Barges〉

CHAPTER 1 GENERAL

Section 2 General

201. Application 【See Guidance】

1. The requirements in this rule are applied to steel barges(hereinafter referred to as "barges") generally pulled or pushed by tug, intended to be registered and classed.

CHAPTER 4 LONGITUDINAL STRENGTH

Section 2 Bending Strength

201. Section modules of hull

2. The longitudinal bending moments in still water, M_s, are taken the maximum sagging and hogging moments calculated for all of designed loaded and ballast conditions by the method deemed appropriate by the Society. Furthermore, in a pusher barge, the effect of the joint part is to be considered to the longitudinal bending moment.

CHAPTER 20 MACHINERY

Section 4 Auxiliaries and Piping Arrangement

407. Bilge systems 【See Guidance】

13. For unmanned barges, it may not be provided a permanently installed bilge system, however, portable bilge pumping equipment including hand pumps or acceptable measure(s) for drainage shall be arranged for each compartment(s). The pump(s) or measure(s) can be operated on board the barge or on board the tug. *(2023)*

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〈Ruels for the Classification of Steel Barges〉

CHAPTER 1 GENERAL

Section 2 General

201. Application 【See Guidance】

1. The requirements in this rule are applied to steel barges(hereinafter referred to as "barges") generally pulled or pushed by a tug boat, intended to be registered and classed.

CHAPTER 4 LONGITUDINAL STRENGTH

Section 2 Bending Strength

201. Section modules of hull

2. The longitudinal bending moments in still water, M_s, are taken the maximum sagging and hogging moments calculated for all of designed loaded and ballast conditions by the method deemed appropriate by the Society. Furthermore, in a integrated pusher barge, the effect of the joint part is to be considered to the longitudinal bending moment.

CHAPTER 20 MACHINERY

Section 4 Auxiliaries and Piping Arrangement

407. Bilge systems 【See Guidance】

13. For unmanned barges, it may not be provided a permanently installed bilge system, however, portable bilge pumping equipment including hand pumps or acceptable measure(s) for drainage shall be arranged for each compartment(s). The pump(s) or measure(s) can be operated on board the barge or on board the tug boat. *(2023)*

</td><td>

규칙 1편 부록 1-1의 선종부호 15-1.에 따라 tug를
tug boat로 수정함
: English only

</td></tr>
</table>

Present	Amendments	Reason
〈Guidance Relating to the Ruels for the Classification of Steel Barges〉 **CHAPTER 1 GENERAL** **201. Application 【See Rules】** **2.** The barge intended to be registered as pusher-barge are to be in accordance with the Appendix 1 "Special requirements for push-er-barges". **ANNEX 1 SPECIAL REQUIREMENTS FOR PUSHER-BARGES** **1. Application** (1) The requirements of this Annex apply to the barges intended to be classed as pusher-barges which are barges connected to pusher that are operated by the pushing of pusher. **2. Definition** (2) Soft connection : Soft connection is a combination method where a barge and pusher is connected to allow relative motion with one or more degree(s) of freedom during a voyage. Pusher-barge con-nected by this method is to engage in coastal services. **3. Longitudinal strength** (1) Calculation of longitudinal strength (A) Longitudinal strength of pusher-barge with hard connection is calculated accordance with **Ch 4** of the rules using length of connection L_c. (B) Longitudinal strength of pusher-barge with soft connection is calculated accordance with **Ch 4** of the rules using length of connection L.	**〈Guidance Relating to the Ruels for the Classification of Steel Barges〉** **CHAPTER 1 GENERAL** **201. Application 【See Rules】** **2.** The barge intended to be registered as integrated pusher barges are to be in accordance with the Appendix 1 "Special requirements for integrated pusher barges". **ANNEX 1 SPECIAL REQUIREMENTS FOR INTEGRATED PUSHER BARGES** **1. Application** (1) The requirements of this Annex apply to the barges intended to be classed as integrated pusher barges which are barges con-nected to pusher that are operated by the pushing of pusher. **2. Definition** (2) Soft connection : Soft connection is a combination method where a barge and pusher is connected to allow relative motion with one or more degree(s) of freedom during a voyage. Intergrated pusher barge connected by this method is to engage in coastal services. **3. Longitudinal strength** (1) Calculation of longitudinal strength (A) Longitudinal strength of integrated pusher barges with hard connection is calculated accordance with **Ch 4** of the rules using length of connection L_c. (B) Longitudinal strength of integrated pusher barges with soft connection is calculated accordance with **Ch 4** of the rules using length of connection L.	규칙 1편 부록 1-1의 선종부호 18. Barge의 특기사항에 언급된 Integrated pusher barge로 수정함 : English only

Present	Amendments	Reason
4. Calculation of scantlings (1) Scantlings of pusher Scantlings of pusher are to comply with the "Rules for the Classification of Steel Ship" using length of pusher only. In case of pusher-barge with hard connection, scantlings of the pusher's hull structure(deck, shell, frame, superstructures, deckhouses, etc.) which will be exposed to wave loading when the pusher is acting as part of the combined unit(pusher + barge) should be designed using L_c. In this case, the scantlings are to be not less than the scantlings complying with the pusher's length only. **6. Type of pusher-barges** Pusher-barges are classified into two types and are to comply with **Table 1**. **Table 1 Type and Application of Pusher-Barge** **7. Connection structure of pusher-barge** (1) For the stress assessment of all strength members related with connection of pusher and barge, direct calculation is to be carried out. (A) Where deemed necessary by the Society, the wave hull girder loads and the forces transmitted through the connection are to be calculated from a direct calculation of the pusher-barge combination motion and acceleration in irregular waves, unless such data are available from similar ships. (B) These loads are to be obtained as the most probable that the pusher-barge combination may experience during its operating life for a probability level of 10^{-8}. For this calculation, the wave statistics relevant to the area of navigation and weather condition are to be taken into account.	**4. Calculation of scantlings** (1) Scantlings of pusher Scantlings of pusher are to comply with the "Rules for the Classification of Steel Ship" using length of pusher only. In case of integrated pusher barge with hard connection, scantlings of the pusher's hull structure(deck, shell, frame, superstructures, deck-houses, etc.) which will be exposed to wave loading when the pusher is acting as part of the combined unit(pusher + barge) should be designed using L_c. In this case, the scantlings are to be not less than the scantlings complying with the pusher's length only. **6. Type of integrated pusher barges** Integrated pusher barges are classified into two types and are to comply with **Table 1**. **Table 1 Type and Application of Integrated pusher barge** **7. Connection structure of integrated pusher barge** (1) For the stress assessment of all strength members related with connection of pusher and barge, direct calculation is to be carried out. (A) Where deemed necessary by the Society, the wave hull gird-er loads and the forces transmitted through the connection are to be calculated from a direct calculation of the integrated pusher barge combination motion and acceleration in irregular waves, unless such data are available from similar ships. (B) These loads are to be obtained as the most probable that the integrated pusher barge combination may experience during its operating life for a probability level of 10^{-8}. For this calcu-lation, the wave statistics relevant to the area of navigation and weather condition are to be taken into account.	규칙 1편 부록 1-1의 선종부호 18. Barge의 특기사항에 언급된 Integrated pusher barge로 수정함 : English only

Present	Amendments	Remarks
〈Guidance for Approval of Service Suppliers〉 Appendix Part C – Approval of Service Suppliers not listed in IACS UR Z17 *(2020)* 2. Firms engaged in Visual and/or Sampling Check & Testing for Hazardous Materials(IHM) 2.1 Extent of Engagement 〈omitted〉 2.2 Operators (1) The Supervisor shall be qualified, and licensed as required, according to a recognized national or international industrial standard, for the hazards specified, and have a minimum 2 years' experience on it. (2) The operators carrying out the sampling/visual check hall be qualified, and licensed as required, according to a recognized national or international industrial standard, for the hazards specified, and have a minimum 1 year experience on it. 2.3 Procedures and instructions 〈omitted〉 2.4 Equipment and Facilities 〈omitted〉 2.5 Sampling analysis and testing 〈omitted〉 2.6 Reporting 〈omitted〉 2.7 Verification 〈omitted〉	〈Guidance for Approval of Service Suppliers〉 Appendix Part C – Approval of Service Suppliers not listed in IACS UR Z17 *(2020)* 2. Firms engaged in Visual and/or Sampling Check & Testing for Hazardous Materials(IHM) 2.1 Extent of Engagement 〈same as the current omitted〉 2.2 ~~Operators~~ Supervisor (1) The Supervisor shall be qualified, and licensed as required, according to a recognized national or international industrial standard, for the hazards specified, and have a minimum 2 years' experience on it. 2.3 Operator ~~(2)~~ (1) The operators carrying out the sampling/visual check hall be qualified, and licensed as required, according to a recognized national or international industrial standard, for the hazards specified, and have a minimum 1 year experience on it. ~~2.3~~ 2.4 Procedures and instructions 〈omitted〉 ~~2.4~~ 2.5 Equipment and Facilities 〈omitted〉 ~~2.5~~ 2.6 Sampling analysis and testing 〈omitted〉 ~~2.6~~ 2.7 Reporting 〈omitted〉 ~~2.7~~ 2.8 Verification 〈omitted〉	- Typo

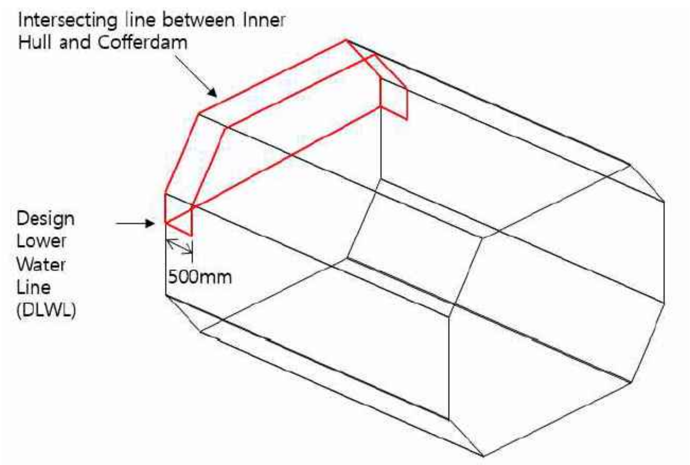
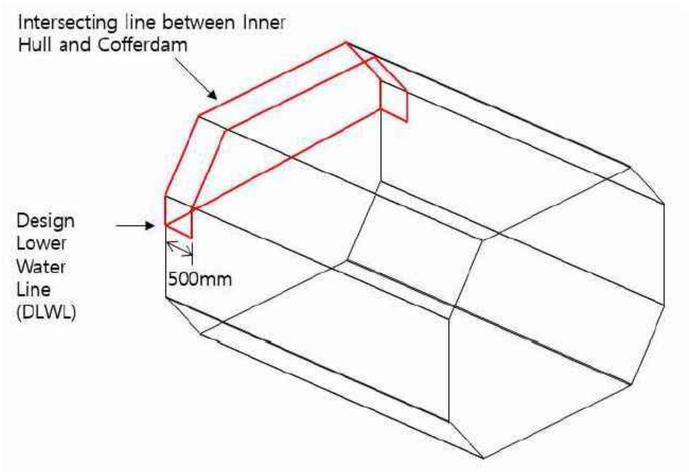
Present	Amendment	Reason
〈Rules and Guidance for the Classification of FRP Ships〉	〈Rules and Guidance for the Classification of FRP Ships〉	
CHAPTER 1 ~ CHAPTER 3 〈Omitted〉	CHAPTER 1 ~ CHAPTER 3 〈Same as the present Rule〉	
CHAPTER 4 MOULDING	CHAPTER 4 MOULDING	
Section 1 〈Omitted〉	Section 1 〈Same as the present Rule〉	
Section 2 Laminating and Moulding	Section 2 Laminating and Moulding	
201. ~ 206. <Omitted>	201. ~ 206. <Same as the present Rule>	
207 Repair	207. Repair	- 서식 통일
1. ~ 2. 〈Omitted〉	1. ~ 2. 〈Same as the present Rule〉	
208. <Omitted>	208. <Same as the present Rule>	
Section 3 ~ Section 8 〈Omitted〉	Section 3 ~ Section 8 〈Same as the present Rule〉	
CHAPTER 5 ~ CHAPTER 7 〈Omitted〉	CHAPTER 5 ~ CHAPTER 7 〈Same as the present Rule〉	

Present	Amendment	Reason
CHAPTER 8 FRAMES **Section 1 General** 101 Application 1. ~ 2. 〈Omitted〉 102 Frames in Way of Deep Tanks 〈Omitted〉 **Section 2 Construction** 201 Construction of Frames 1. ~ 2. 〈Omitted〉 202 Cores for Frames 1. ~ 2. 〈Omitted〉 **Section 3 Spacing of Frames** 301 Spacing of Frames 1. ~ 2. 〈Omitted〉 302 Consideration for Especially Large Frame Spacing 〈Omitted〉 **Section 4 Frames** 401. ~ 402. <Omitted> 403 Web Frames supporting Side Longitudinals 〈Omitted〉 404 Hat−type Construction 〈Omitted〉	**CHAPTER 8 FRAMES** **Section 1 General** 101. Application 1. ~ 2. 〈Same as the present Rule〉 102. Frames in Way of Deep Tanks 〈Same as the present Rule〉 **Section 2 Construction** 201. Construction of Frames 1. ~ 2. 〈Same as the present Rule〉 202. Cores for Frames 1. ~ 2. 〈Same as the present Rule〉 **Section 3 Spacing of Frames** 301. Spacing of Frames 1. ~ 2. 〈Same as the present Rule〉 302. Consideration for Especially Large Frame Spacing 〈Same as the present Rule〉 **Section 4 Frames** 401. ~ 402. <Omitted> 403. Web Frames supporting Side Longitudinals 〈Same as the present Rule〉 404. Hat−type Construction 〈Same as the present Rule〉	- 서식 통일

Present	Amendment	Reason
CHAPTER 9 BOTTOM CONSTRUCTION **Section 1 ~ Section 5 〈Omitted〉** **Section 6 Double Bottoms** 601. ~ 605. <Omitted> 606 Bottom Longitudinals 1. ~ 2. 〈Omitted〉 **Section 7 ~ Section 8 〈Omitted〉** **CHAPTER 10 ~ CHAPTER 12 〈Omitted〉** **CHAPTER 13 DEEP TANKS** **Section 1 〈Omitted〉** **Section 2 Bulkhead Laminates of Deep Tanks** 201. ~ 204. <Omitted> 205 Girders supporting Bulkhead Stiffeners 〈Omitted〉 206. <Omitted> 207 Structural Members forming Top and Bottom of Deep Tanks 〈Omitted〉 **Section 3 〈Omitted〉**	**CHAPTER 9 BOTTOM CONSTRUCTION** **Section 1 ~ Section 5 〈Same as the present Rule〉** **Section 6 Double Bottoms** 601. ~ 605. <Same as the present Rule> 606. Bottom Longitudinals 1. ~ 2. 〈Same as the present Rule〉 **Section 7 ~ Section 8 〈Same as the present Rule〉** **CHAPTER 10 ~ CHAPTER 12 〈Same as the present Rule〉** **CHAPTER 13 DEEP TANKS** **Section 1 〈Same as the present Rule〉** **Section 2 Bulkhead Laminates of Deep Tanks** 201. ~ 204. <Same as the present Rule> 205. Girders supporting Bulkhead Stiffeners 〈Same as the present Rule〉 206. <Same as the present Rule> 207. Structural Members forming Top and Bottom of Deep Tanks 〈Same as the present Rule〉 **Section 3 〈Same as the present Rule〉**	- 서식 통일

Present	Amendment	Reason
CHAPTER 14 ~ CHAPTER 15 〈Omitted〉 **CHAPTER 16 HATCHWAY OPENINGS, MACHINERY OPENINGS AND OTHER DECK OPENINGS** **Section 1 General** 101 Application 〈Omitted〉 **Section 2 Hatchway Openings** 201 Height of Hatch Coamings 〈Omitted〉 202. <Omitted> **Section 3 Machinery Openings** 301. ~ 302. <Omitted> 303 Machinery Casings provided in Enclosed Parts 〈Omitted〉 304 Position of Fittings 〈Below Omitted〉	**CHAPTER 14 ~ CHAPTER 15 〈Same as the present Rule〉** **CHAPTER 16 HATCHWAY OPENINGS, MACHINERY OPENINGS AND OTHER DECK OPENINGS** **Section 1 General** 101. Application 〈Same as the present Rule〉 **Section 2 Hatchway Openings** 201. Height of Hatch Coamings 〈Same as the present Rule〉 202. <Same as the present Rule> **Section 3 Machinery Openings** 301. ~ 302. <Same as the present Rule> 303. Machinery Casings provided in Enclosed Parts 〈Same as the present Rule〉 304. Position of Fittings 〈Below Same as the present Rule〉	- 서식 통일

Present	Amendment	Reason
〈Guidance of Heat Transfer Analysis for Ships Carrying Liquefied Gases in Bulk/Ships Using Liquefied Gases as Fuels〉 **CHAPTER 2 HEAT TRANSFER ANALYSIS FOR MEMBRANE TYPE** **Section 1 Analytical Heat Transfer Analysis** 101. Analysis Procedure 1. Procedure of analytical heat transfer analysis (1) The analytical heat transfer analysis is performed according to the flowchart in Fig~~ure~~ 2.1. (A) As shown in Fig~~ure~~ 2.2, the work to divide the compartment for analytical two-dimensional heat transfer analysis into sections is performed. (B) ~ (H) 〈Omitted〉 2. 〈Omitted〉 102. Modeling 1. 1-Dimensional heat transfer analysis model (1) The one-dimensional heat transfer analysis model provides the information necessary to understand the analytical heat transfer analysis method and the two-dimensional model is an extension of the one-dimensional model. The one-dimensional heat transfer analysis model is considered as a horizontal and vertical model and an example is shown in Fig~~ure~~ 2.3. (2) ~ (5) 〈Omitted〉 2. ~ 3. <Omitted> 103. ~ 105. <Omitted>	〈Guidance of Heat Transfer Analysis for Ships Carrying Liquefied Gases in Bulk/Ships Using Liquefied Gases as Fuels〉 **CHAPTER 2 HEAT TRANSFER ANALYSIS FOR MEMBRANE TYPE** **Section 1 Analytical Heat Transfer Analysis** 101. Analysis Procedure 1. Procedure of analytical heat transfer analysis (1) The analytical heat transfer analysis is performed according to the flowchart in Fig 2.1. (A) As shown in Fig 2.2, the work to divide the compartment for analytical two-dimensional heat transfer analysis into sections is performed. (B) ~ (H) 〈Same as the present Guidance〉 2. 〈Same as the present Guidance〉 102. Modeling 1. 1-Dimensional heat transfer analysis model (1) The one-dimensional heat transfer analysis model provides the information necessary to understand the analytical heat transfer analysis method and the two-dimensional model is an extension of the one-dimensional model. The one-dimensional heat transfer analysis model is considered as a horizontal and vertical model and an example is shown in Fig 2.3. (2) ~ (5) 〈Same as the present Guidance〉 2. ~ 3. <Same as the present Guidance> 103. ~ 105. <Same as the present Guidance>	- 서식 통일

Present	Amendment	Reason
Section 2 FEM ~~HEAT TRANSFER ANALYSIS~~ 201. ~ 202. <Omitted> 203. Calculation Conditions 1. General (1) 〈Omitted〉 (2) Convection, radiation and conduction according to the environment of each member should be considered as shown in Fig~~ure~~ 2.10 and Table 2.19. (3) 〈Omitted〉 204. Result Derivation 1. General (1) 〈Omitted〉 2. Selection of steel grade (1) 〈Omitted〉 (2) As shown in Fig~~ure~~ 2.11, 〈Omitted〉.  Fig~~ure~~ 2.11 Important consideration range in steel selection 3. <Omitted>	**Section 2 FEM Heat Transfer Analysis** 201. ~ 202. <Same as the present Guidance> 203. Calculation Conditions 1. General (1) 〈Same as the present Guidance〉 (2) Convection, radiation and conduction according to the environment of each member should be considered as shown in Fig 2.10 and Table 2.19. (3) 〈Same as the present Guidance〉 204. Result Derivation 1. General (1) 〈Same as the present Guidance〉 2. Selection of steel grade (1) 〈Same as the present Guidance〉 (2) As shown in Fig 2.11, 〈Same as the present Guidance〉.  Fig 2.11 Important consideration range in steel selection 3. <Same as the present Guidance>	- 서식 통일

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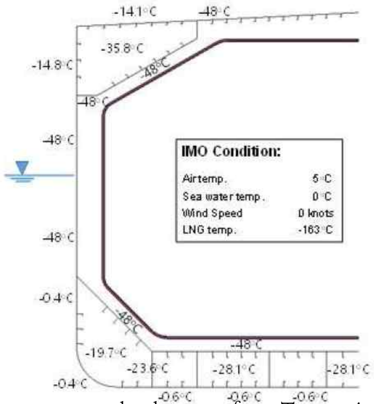
CHAPTER 3 HEAT TRANSFER ANALYSIS FOR INDEPENDENT TYPE A TANK

Section 1 Analytical Heat Transfer Analysis

101. ~ 104. <Omitted>

105. Result Derivation

1. 〈Omitted〉
2. Fig~~ure~~ 3.1 illustrates calculation results performed for a midship section of a type A LNG Carrier using analytical method.



Fig~~ure~~ 3.1 Temperature calculation for Type A tank using analytical method

Section 2 FEM ~~HEAT TRANSFER ANALYSIS~~

201. ~ 203. <Omitted>

204. Result Derivation

1. 〈Omitted〉
2. A sample 2D model of the type A hull for heat transfer analysis is presented in Fig~~ure~~ 3.2.
3. As shown ‘d’ in Fig~~ure~~ 3.3, 〈Omitted〉

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CHAPTER 3 HEAT TRANSFER ANALYSIS FOR INDEPENDENT TYPE A TANK

Section 1 Analytical Heat Transfer Analysis

101. ~ 104. <Same as the present Guidance>

105. Result Derivation

1. 〈Same as the present Guidance〉
2. Fig 3.1 illustrates calculation results performed for a midship section of a type A LNG Carrier using analytical method.

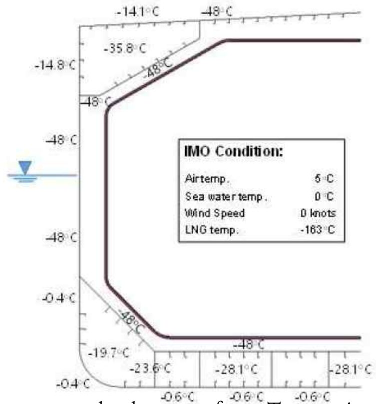

Fig 3.1 Temperature calculation for Type A tank using analytical method

Section 2 FEM <u>Heat Transfer Analysis</u>

201. ~ 203. <Same as the present Guidance>

204. Result Derivation

1. 〈Same as the present Guidance〉
2. A sample 2D model of the type A hull for heat transfer analysis is presented in Fig 3.2.
3. As shown ‘d’ in Fig 3.3, 〈Same as the present Guidance〉

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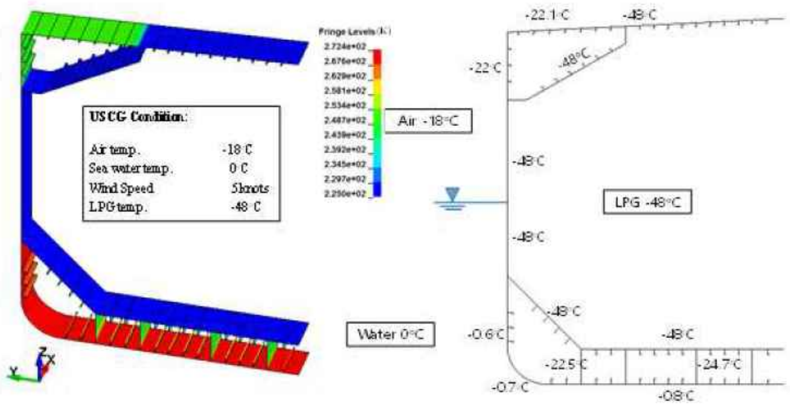
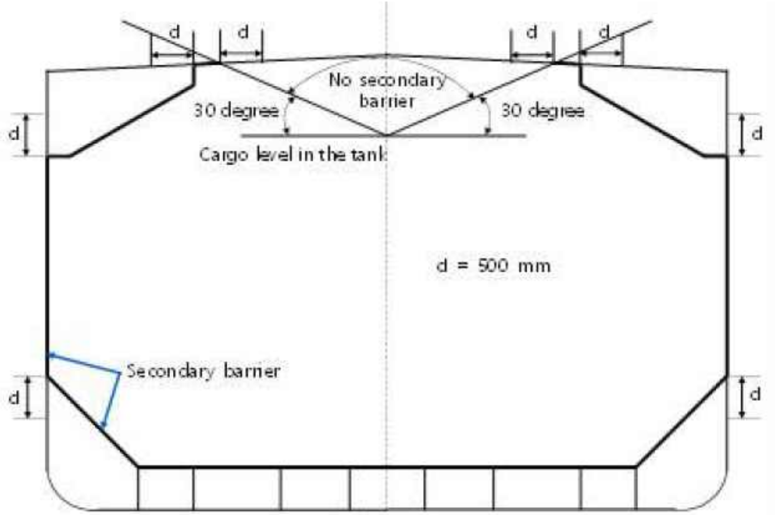


Fig~~ure~~ 3.2 Temperature calculation for type A tank using 2D FEM



Fig~~ure~~ 3.3 Application range extension of secondary steel for type A tank

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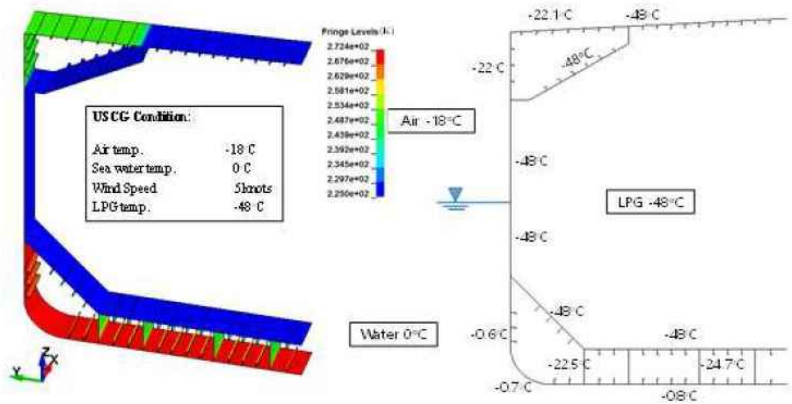

Fig 3.2 Temperature calculation for type A tank using 2D FEM

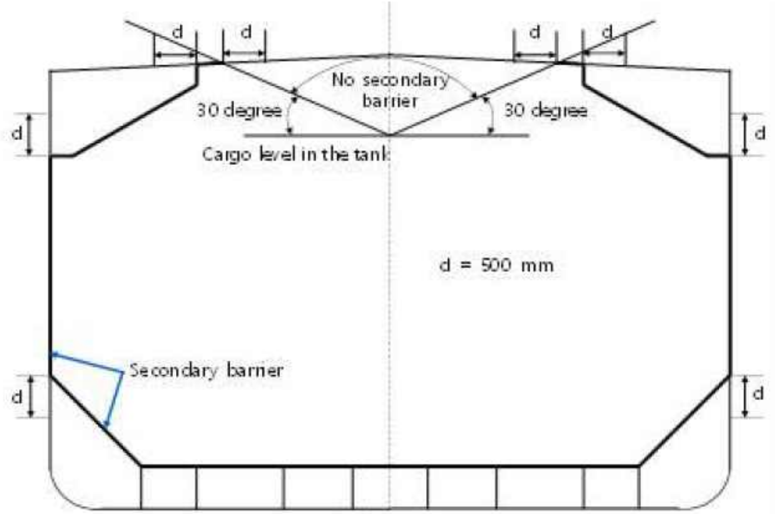

Fig 3.3 Application range extension of secondary steel for type A tank

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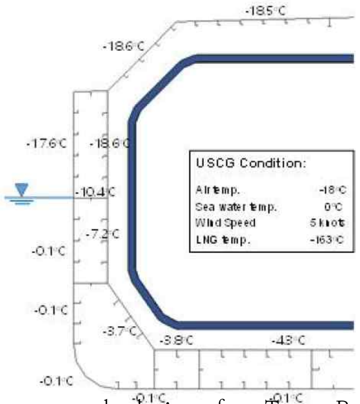
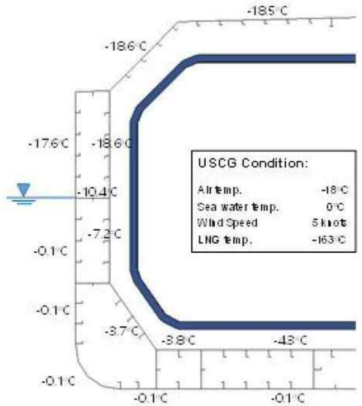
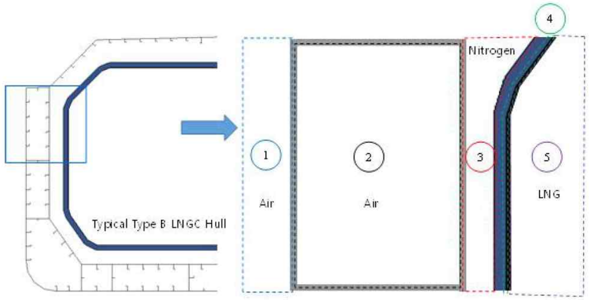
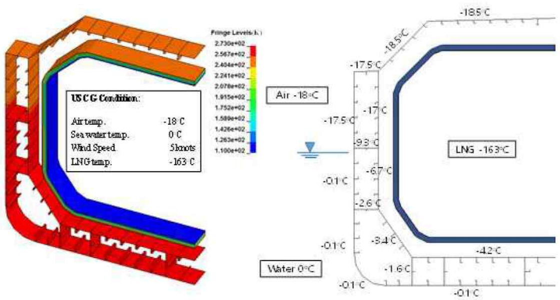
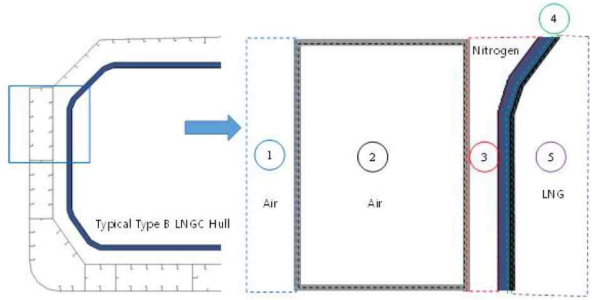
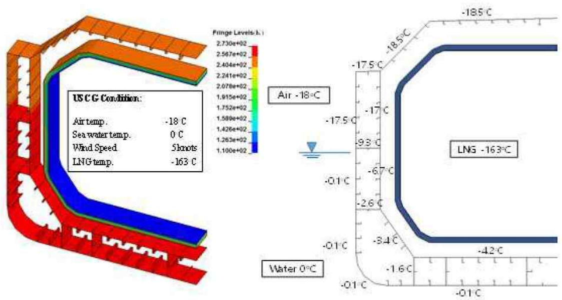
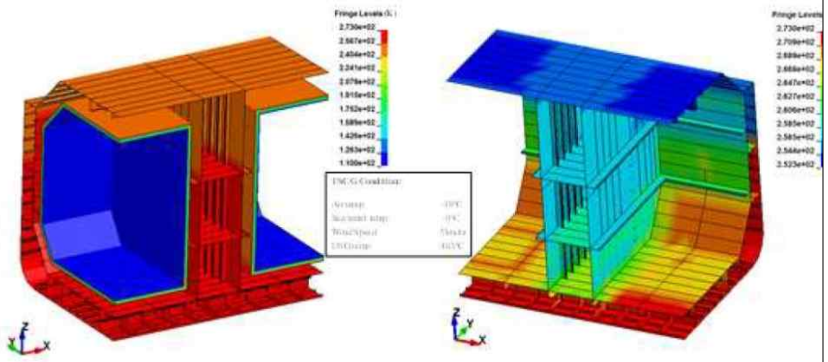
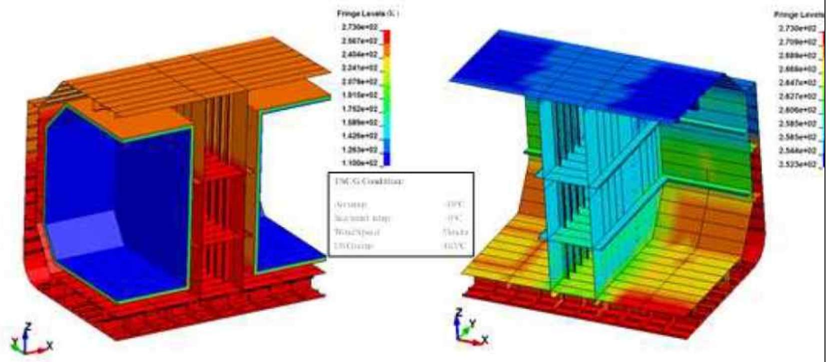
Present	Amendment	Reason
# CHAPTER 4 HEAT TRANSFER ANALYSIS FOR INDEPENDENT TYPE B TANK ## Section 1 Analytical Heat Transfer Analysis 101. ~ 104. <Omitted> 105. Result Derivation 1. 〈Omitted〉 2. Fig~~ure~~ 4.1 illustrates a temperature calculation results performed for a midship section of a Type B LNG carrier using analytical method.  Fig~~ure~~ 4.1 Temperature calculation for Type B tank using analytical method ## Section 2 FEM ~~HEAT TRANSFER ANALYSIS~~ 201. ~ 202. <Omitted> 203. Calculation Conditions 1. 〈Omitted〉 2. Fig~~ure~~ 4.2 and Table 4.1 presents the application of FEM to modeling of overall heat transfer in the independent type B tank and the required input data for each form of heat energy transfer.	# CHAPTER 4 HEAT TRANSFER ANALYSIS FOR INDEPENDENT TYPE B TANK ## Section 1 Analytical Heat Transfer Analysis 101. ~ 104. <Same as the present Guidance> 105. Result Derivation 1. 〈Same as the present Guidance〉 2. Fig 4.1 illustrates a temperature calculation results performed for a midship section of a Type B LNG carrier using analytical method.  Fig 4.1 Temperature calculation for Type B tank using analytical method ## Section 2 FEM Heat Transfer Analysis 201. ~ 202. <Same as the present Guidance> 203. Calculation Conditions 1. 〈Same as the present Guidance〉 2. Fig 4.2 and Table 4.1 presents the application of FEM to modeling of overall heat transfer in the independent type B tank and the required input data for each form of heat energy transfer.	- 서식 통일

Present	Amendment	Reason
204. Result Derivation 1. 〈Omitted〉 2. ~~Figure 4-3~~ is one example of temperature analysis result for 2D FEM midship section. 3. ~~Figure 4-4~~ illustrates a temperature calculation results performed for 3D FEM including cofferdam.  Fig~~ure~~ 4.2 Finite element modeling in heat transfer analysis of hull with independent type B tank at Temperature calculation  ~~Figure 4-3~~ Temperature distribution calculation by 2D FEM heat transfer analysis	**204. Result Derivation** 1. 〈Same as the present Guidance〉 2. Fig 4.3 is one example of temperature analysis result for 2D FEM midship section. 3. Fig 4.4 illustrates a temperature calculation results performed for 3D FEM including cofferdam.  Fig 4.2 Finite element modeling in heat transfer analysis of hull with independent type B tank at Temperature calculation  Fig 4.3 Temperature distribution calculation by 2D FEM heat transfer analysis	- 서식 통일

Present	Amendment	Reason
 ~~Figure 4-4~~ Temperature distribution in the cofferdam calculated by 3D FEM heat transfer analysis <Below Omitted>	 Fig 4.4 Temperature distribution in the cofferdam calculated by 3D FEM heat transfer analysis <Below Same as the present Guidance>	- 서식 통일

Present	Amendment	Reason
see below	see below	- 서식 통일

Present

〈Guidance for Approval of Manufacturing Process and Type Approval, Etc〉

CHAPTER 3 TYPE APPROVAL

Section 1 ~ Section 25 〈Omitted〉

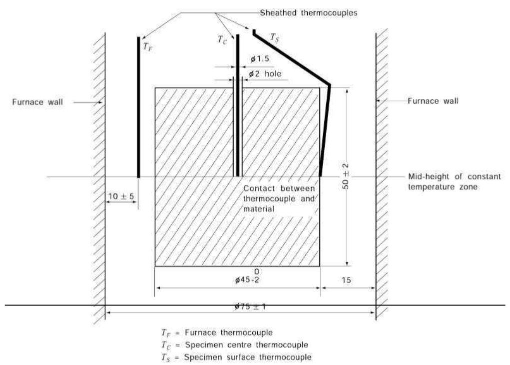
Section 26 Fire Protection Materials

2601. ~ 2603. <Omitted>

2604. Test methods

1. Test method for non-combustible material 〈Omitted〉

Table 3.26.2 Test method for non-combustible material

Item	Requirements
Test specimens	<Omitted>
Preparation of specimens	<Omitted>
Conditioning	<Omitted>
Observations during test	(A) ~ (D) 〈Omitted〉 

Amendment

〈Guidance for Approval of Manufacturing Process and Type Approval, Etc〉

CHAPTER 3 TYPE APPROVAL

Section 1 ~ Section 25 〈Same as the present Guidance〉

Section 26 Fire Protection Materials

2601. ~ 2603. <Same as the present Guidance>

2604. Test methods

1. Test method for non-combustible material 〈Same as the present Guidance〉

Table 3.26.2 Test method for non-combustible material

Item	Requirements
Test specimens	<Same as the present Guidance>
Preparation of specimens	<Same as the present Guidance>
Conditioning	<Same as the present Guidance>
Observations during test	(A) ~ (D) 〈Same as the present Guidance〉
Expression of results	<Same as the present Guidance>
Classification of materials	<Same as the present Guidance>
Others	<Same as the present Guidance>

Reason

- 서식 통일

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<tr><td>Expression of results</td><td><Omitted></td></tr>
<tr><td>Classification of materials</td><td><Omitted></td></tr>
<tr><td>Others</td><td><Omitted></td></tr>
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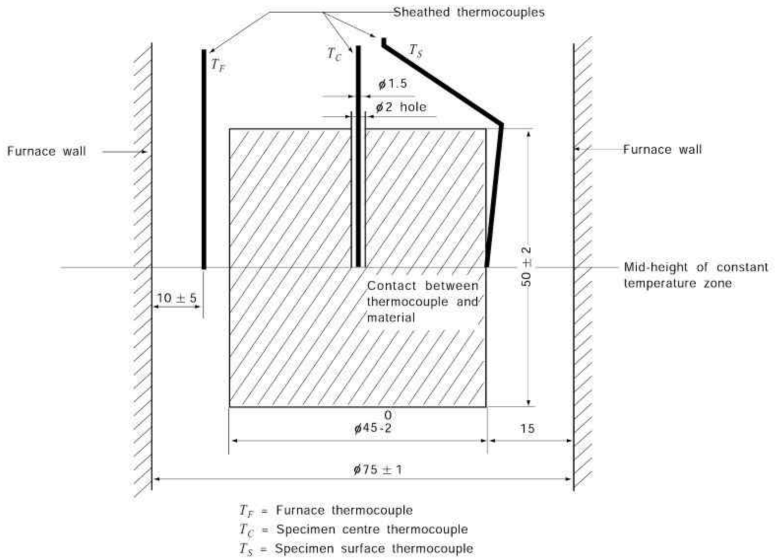

Fig 3.26.1 Relative position of furnace, specimen and thermocouple position

〈Below Same as the present Guidance〉
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Present	Amendment	Note
Guidances Relating to the Rules for the Classification of Ships Using Low-flashpoint Fuels **Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel** *(2021)* **Section 8 Bunkering** 〈Omitted〉	Guidances Relating to the Rules for the Classification of Ships Using Low-flashpoint Fuels **Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel** *(2021)* **Section 8 Bunkering** 〈Omitted〉	
804. Manifold **Ch 5, 401.** of this **Rules** is to be applied.	**804. Manifold** **Ch ~~5~~8, 401.** of this **Rules** is to be applied.	- Correction for typo error. (Ch 5 → Ch 8)
805. Provisions for bunkering system **1.** **Ch 8, 101. 4 ~ 7** of this **Rules** is to be applied. **2.** In the bunkering line, as close to the connection point as possible, there should be a manually operated stop valve and a remotely operated shutdown valve arranged in series. Alternatively, a combined manually operated and remote shutdown valve may be provided. It should be possible to operate this remotely operated valve from the bunkering control station. **3.** For chemical tankers using cargo as fuel, If there is a system that is deemed suitable for its goa and function in this **section**, the requirements of this **section** may not apply. 〈Omitted〉	**805. Provisions for bunkering system** **1.** **Ch 8, ~~101~~501. 4 ~ 7** of this **Rules** is to be applied. **2.** In the bunkering line, as close to the connection point as possible, there should be a manually operated stop valve and a remotely operated shutdown valve arranged in series. Alternatively, a combined manually operated and remote shutdown valve may be provided. It should be possible to operate this remotely operated valve from the bunkering control station. **3.** For chemical tankers using cargo as fuel, If there is a system that is deemed suitable for its goa and function in this **section**, the requirements of this **section** may not apply. 〈Omitted〉	- Correction for typo error. (101. → 501.)

Present	Amendment	Note
Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)* **Section 9 Fuel Supply to Consumer** 〈Omitted〉 **906. Safety functions of the fuel supply system** **1.** All fuel piping should be arranged for gas-freeing and inerting. **2.** Fuel tank inlet and outlet valves should be as close to the tank as possible. Valves required to be operated under normal operation, such as when fuel is supplied to consumers or during bunkering, should be remotely operated if not easily accessible. **3.** The main fuel supply line to each consumer or set of consumers should be equipped with an automatically-operated master fuel valve. The master fuel valve(s) should be situated in the part of the piping that is outside the machinery space containing methyl/ethyl alcohol-fuelled consumer(s). The master fuel valve(s) should automatically shut off the fuel supply in accordance with **1502. 3** and **table 1**. **4.** Means of manual emergency shutdown of fuel supply to the consumers or set of consumers should be provided on the primary and secondary escape routes from the consumer compartment, at a location outside consumer space, outside the fuel preparation space and at the bridge. The activation device should be arranged as a physical button, duly marked and protected against inadvertent operation and operable under emergency lighting. 〈Omitted〉	**Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)*** **Section 9 Fuel Supply to Consumer** 〈Omitted〉 **906. Safety functions of the fuel supply system** **1.** All fuel piping should be arranged for gas-freeing and inerting. **2.** Fuel tank inlet and outlet valves should be as close to the tank as possible. Valves required to be operated under normal operation, such as when fuel is supplied to consumers or during bunkering, should be remotely operated if not easily accessible. **3.** The main fuel supply line to each consumer or set of consumers should be equipped with an automatically-operated master fuel valve. The master fuel valve(s) should be situated in the part of the piping that is outside the machinery space containing methyl/ethyl alcohol-fuelled consumer(s). The master fuel valve(s) should automatically shut off the fuel supply in accordance with **1502. ~~3~~2** and **table 1**. **4.** Means of manual emergency shutdown of fuel supply to the consumers or set of consumers should be provided on the primary and secondary escape routes from the consumer compartment, at a location outside consumer space, outside the fuel preparation space and at the bridge. The activation device should be arranged as a physical button, duly marked and protected against inadvertent operation and operable under emergency lighting. 〈Omitted〉	- Correction for typo error. (1502.3 → 1502.2)

Present	Amendment	Note
Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)* **Section 16 Training, Drills and Emergency Exercises** **1601. Goal** The goal of this **Section** is to ensure that seafarers on board ships to which this **Annex** apply, are adequately qualified, trained and experienced. **1.** Methyl/ethyl alcohol fuel-related drills and exercises should be incorporated into schedule for periodical drills. **2.** Ch 16, **101. 2** of this **Rules** is to be applied. **3.** The response and safety system for hazards and accident control should be reviewed and tested. **4.** The company should ensure that seafarers on board ships using fuels should have completed training to attain the abilities that are appropriate to the capacity to be filled and duties and responsibilities to be taken up. **5.** The master, officers, ratings and other personnel on ships using fuels should be trained and qualified in accordance to the regulation V/3 of the STCW Convention and section A-V/3 of the STCW Code, taking into account the specific hazards of the methyl/ethyl alcohol used as fuel.	**Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)*** **Section 16 Training, Drills and Emergency Exercises** **1601. Goal** The goal of this **Section** is to ensure that seafarers on board ships to which this **Annex** apply, are adequately qualified, trained and experienced. **1.** Methyl/ethyl alcohol fuel-related drills and exercises should be incorporated into schedule for periodical drills. **2.** Ch ~~16~~17, **101. 2** of this **Rules** is to be applied. **3.** The response and safety system for hazards and accident control should be reviewed and tested. **4.** The company should ensure that seafarers on board ships using fuels should have completed training to attain the abilities that are appropriate to the capacity to be filled and duties and responsibilities to be taken up. **5.** The master, officers, ratings and other personnel on ships using fuels should be trained and qualified in accordance to the regulation V/3 of the STCW Convention and section A-V/3 of the STCW Code, taking into account the specific hazards of the methyl/ethyl alcohol used as fuel.	- Correction for typo error. (Ch 16 → Ch 17)

Present	Amendment	Note
Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel ***(2021)*** **Section 17 Operation** **1701. Goal** **Ch 18, 101.** of this **Rules** is to be applied. **1702. Functional requirements** **Ch 18, 201.** of this **Rules** is to be applied. **1703. Maintenance** **1.** Maintenance and repair procedures should include considerations with respect to the fuel containment system and adjacent spaces. Special consideration should be given to the toxicity of fuel. **2. Ch 18, 301.** 1 of this **Rules** is to be applied. 〈Omitted〉	**Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel** ***(2021)*** **Section 17 Operation** **1701. Goal** **Ch 18, 101.** of this **Rules** is to be applied. **1702. Functional requirements** **Ch 18, 201.** of this **Rules** is to be applied. **1703. Maintenance** **1.** Maintenance and repair procedures should include considerations with respect to the fuel containment system and adjacent spaces. Special consideration should be given to the toxicity of fuel. **2. Ch 18, 301.** ~~1~~3 of this **Rules** is to be applied. 〈Omitted〉	- Correction for typo error. (Ch 18. 301.1 → Ch.18. 301.3)

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Guidances Relating to the Rules for the Classification of Ships Using Low-flashpoint Fuels

PART 5 MACHINERY SYSTEM

CHAPTER 3 PRIME MOVERS, POWER TRANSMISSION SYSTEMS AND LIFT DEVICES, ETC.

Section 1 General

101. Application

1. In application to **Ch 3, Sec 101, 1** of the Rules, it shall be complied with the requirement of **Pt 5, Ch 3, 203** and **204** of **Rules for the Classification of Steel Ships**.

〈Omitted〉

(2) Propeller shaft and stern tube shaft

(B) For propeller shaft and stern tube shaft with corro-sion-resistant materials or without effective protection against seawater corrosion it shall be applied to **Pt 5, Ch 3, 204** of **Guidance for the Classification of Steel Ships**.

(C) For a ship of 25 m in length and belows, the following formula shall be complied with

$$d_p = K_s \cdot \sqrt[3]{\frac{P}{n}} \quad (\mathrm{mm})$$

P, n : according to **Pt 5, Ch 3, 204** of **Rules for the Classification of Steel Ships**

K_5 : factor concerning material of shaft is to be complied with the requirement giv-en in **Table 5.3.1** of the Guidance

(D) For a ship restricted in coastal service, it may be re-duced to 95 % of values calculated by (A) or (B) above.

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Guidances Relating to the Rules for the Classification of Ships Using Low-flashpoint Fuels

PART 5 MACHINERY SYSTEM

CHAPTER 3 PRIME MOVERS, POWER TRANSMISSION SYSTEMS AND LIFT DEVICES, ETC.

Section 1 General

101. Application

1. In application to **Ch 3, Sec 101, 1** of the Rules, it shall be complied with the requirement of **Pt 5, Ch 3, 203** and **204** of **Rules for the Classification of Steel Ships**.

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K_5 : factor concerning material of shaft is to be complied with the requirement given in **Table 5.3.1** of the Guidance

(D) For a ship restricted in coastal service, it may be re-duced to 95 % of values calculated by (A) or (B) above.

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- Correction for typo error. (Ks → K_5)

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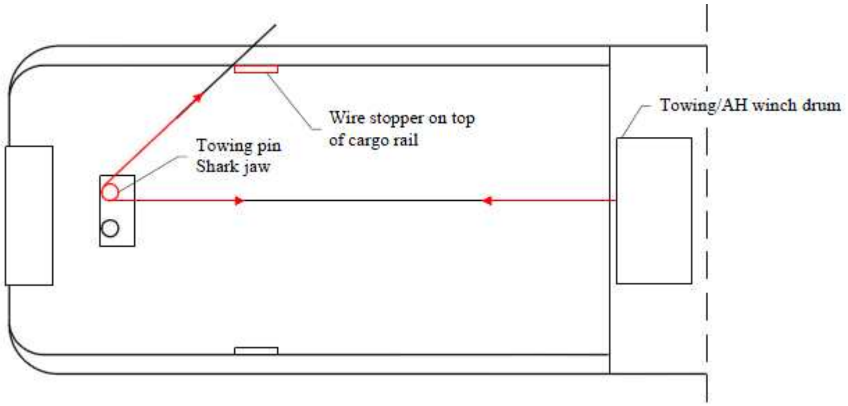
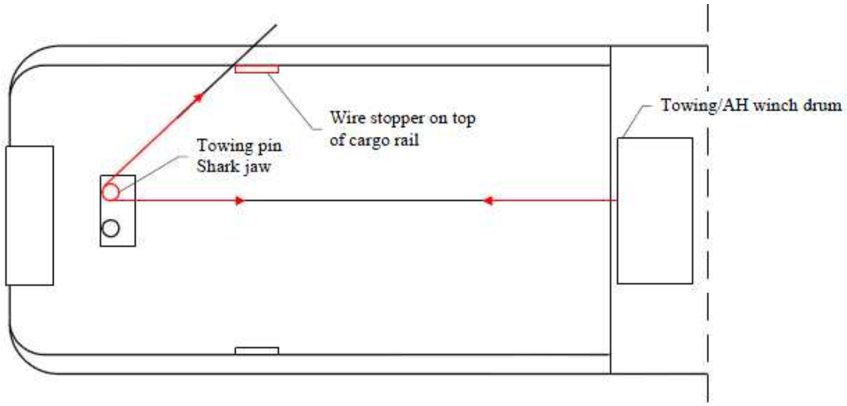
Present	Amendment	Note
〈Guidance for Approval of Manufacturing Process and Type Approval, Etc.〉 CHAPTER 3 TYPE APPROVAL Section 25 Securing Devices 2504. Test requirements of additional special feature notation HHS(High Holding Securing) *(2021)* 1. 2. 3. Fig. 3.25.4 4. 5. 6. Fig. 3.25.5 7. 2505. Test requirements of additional special feature notation HHT(High Holding Twistlock) *(2021)* Table 3.25.4 HHS/HHT – Test Loads and Test Modes *(2021)* **Fig. 3.25.2 Configuration of HHS test equipment (fully automatic twistlock)** ***(2021)*** **Table 3.25.5 HHS/HHT – Twistlock function test load** ***(2021)*** **Fig. 3.25.3 Configuration of HHS test equipment (semi-automatic twistlock)** ***(2021)***	〈Guidance for Approval of Manufacturing Process and Type Approval, Etc.〉 CHAPTER 3 TYPE APPROVAL Section 25 Securing Devices 2504. Test requirements of additional special feature notation HHS(High Holding Securing) *(2021)* 1. 2. 3. 4. 5. 6. 7. Table 3.25.4 HHS/HHT – Test Loads and Test Modes *(2021)* **Fig. 3.25.2 Configuration of HHS test equipment (fully automatic twistlock)** ***(2021)*** **Table 3.25.5 HHS/HHT – Twistlock function test load** ***(2021)*** **Fig. 3.25.3 Configuration of HHS test equipment (semi-automatic twistlock)** ***(2021)*** Fig. 3.25.4 Fig. 3.25.5 2505. Test requirements of additional special feature notation HHT(High Holding Twistlock) *(2021)*	

Present	Correction	Reason
〈Guidance for OSV〉 CHAPTER 5 ANCHOR HANDLING AND TOWING VESSELS Section 1 General 〈omission〉 Section 2 Stability 201. ~ 202. 〈omission〉 203 Intact Stability Guidelines for Towing  Figure 5.3 Tow Line Arrangement	〈Guidance for OSV〉 CHAPTER 5 ANCHOR HANDLING AND TOWING VESSELS Section 1 General 〈same as present〉 Section 2 Stability 201. ~ 202. 〈same as present〉 203. Intact Stability Guidelines for Towing  Figure 5.3 Tow Line Arrangement	−Typo :add "." −Typo : Figure → Fig

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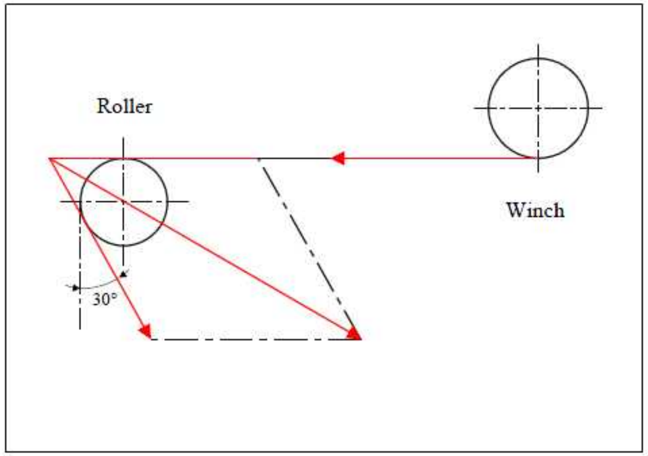
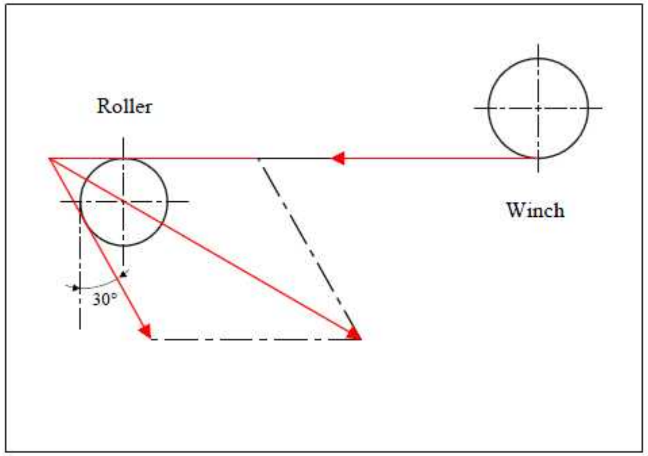
 Figure 5.4 Application for Roller Load	 Fig~~ure~~ 5.4 Application for Roller Load	−Typo : Figure → Fig

Present	Correction	Reason

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〈Guidance for Recreational Crafts〉

Section 2 Pressure Adjusting Factors

201. ~ 202. 〈omission〉

203 Dynamic load factor, n_{CG}

Table 6.6. Minimum height, $H_{B,\min}$, of the cockpit bottom

Dimensions in metres

Design category	Height, $H_{B,\min}$
A	0.15
B	0.1
C	0.075
D	0.05
NOTE Greater heights than these minimum values may be required to fulfil the maximum acceptable draining time according to **305. 2**	

Table 9.2 – Tensile values for connectors

Conductor size mm^2	Tensile force N	Conductor size mm^2	Tensile force N	Conductor size mm^2	Tensile force N
0.75	40	6	200	50	400
1	60	10	220	70	440
1.5	130	16	260	95	550
2.5	150	25	310	120	660
4	170	35	350	150	770

Correction

〈Guidance for Recreational Crafts〉

Section 2 Pressure Adjusting Factors

201. ~ 202. 〈same as present〉

203. Dynamic load factor, n_{CG}

Table 6.6 Minimum height, $H_{B,\min}$, of the cockpit bottom

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1	60	10	220	70	440
1.5	130	16	260	95	550
2.5	150	25	310	120	660
4	170	35	350	150	770

Reason

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Present	Correction	Reason
〈Guidance for Large Yachts〉	〈Guidance for Large Yachts〉	
CHAPTER 3 HATCHWAYS, WINDOWS AND OTHER OPENINGS	CHAPTER 3 HATCHWAYS, WINDOWS AND OTHER OPENINGS	
Section 2 Bulwarks, Freeing Ports, Side Scuttles, Ventilators	Section 2 Bulwarks, Freeing Ports, Side Scuttles, Ventilators	-Typo :202=>203
201. ~ 202. 〈omission〉	201. ~ 202. 〈same as present〉	
202. Freeing ports	20~~2~~3. Freeing ports	
Section 3 Windows	Section 3 Windows	-Typo :303=>302
301. Windows 〈omission〉	301. Windows 〈same as present〉	
303. Deadlights	30~~3~~2. Deadlights	
CHAPTER 1 FIRE PROTECTION	CHAPTER 1 FIRE PROTECTION	
Section 1 General	Section 1 General	-Typo :103=>104
101. ~ 103. 〈omission〉	101. ~ 103. 〈same as present〉	
103. General requirements	10~~3~~4. General requirements	
⚓	⚓	

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〈Guidance for Ships for Navigation in Ice〉

CHAPTER1 STRENGTHENING FOR NAVIGATION IN ICE

Section 3 Hull Structural Design

307. Ice stringers

1. Stringer within the ice belt 〈omission〉

2. Stringers outside the ice belt

The section modulus Z and the effective shear area A of a stringer situated outside the ice belt but supporting ice strengthened frames are not to be less than that obtained from the following formula:

$$Z = \frac{f_9 f_{10} P_d \, h l^2}{m \, \sigma_y}(1 - h_s/l_s) \times 10^6 \ \text{(cm}^3\text{)},$$

$$A = \frac{\sqrt{3} f_9 f_{10} f_{11} P_d \, h \, l}{2\sigma_y}(1 - h_s/l_s) \times 10^4 \ \text{(cm}^2\text{)}$$

P_d = as specified in **301.1.**

h = as specified in **Table 1.5.** However, the product $P_d \times h$ is not to be taken as less than 0.15 $\mathrm{MN/m}$.

l = span of the stringer (m).

m_s = boundary condition factor as defined in **306.**

l_s = the distance to the adjacent ice stringer (m).

h_s = the shortest distance from the considering stringer to the ice belt (m).

f_6 = factor which takes account of load to the transverse frames is to be taken as 0.80.

f_{10} = safety factor of stringer ; to be taken as 1.8

f_{11} = factor which takes account the maximum shear force versus load location and the shear stress distribution; f_{11} = 1.2

σ_y = as specified in **302.2.**

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〈Guidance for Ships for Navigation in Ice〉

CHAPTER1 STRENGTHENING FOR NAVIGATION IN ICE

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σ_y = as specified in **302.2.**

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:$f_6 => f_9$

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Present	Correction	Reason
Table 3.11 Application of material classes and grades – Structures exposed at low temperatures (table below)		−Typo :Table 3.11 =>Table 3.10

Table 3.11 Application of material classes and grades – Structures exposed at low temperatures

Structural member category	Material class	
	Within 0.4L amidships	Outside 0.4L amidships
○ SECONDARY: – Deck plating exposed to weather, in general – Side plating above LIWL – Transverse bulkheads above LIWL	I	I
○ PRIMARY: – Strength deck plating [1] – Continuous longitudinal members above strength deck, excluding longitudinal hatch coamings – Longitudinal bulkhead above LIWL – Top wing tank bulkhead above LIWL	II	I
○ SPECIAL: – Sheer strake at strength deck [2] – Stringer plate in strength deck [2] – Deck strake at longitudinal bulkhead [3] – Continuous longitudinal hatch coamings [4]	III	II
○ Shell plating, frame and welded stem/sten of ice strengthening region 1 for Arctic7 class ships	I	I
○ Shell plating, frame and welded stem/sten of ice strengthening region 1 for Arctic8 ~ Arctic9 class ships and Icebreakers	II	II

Notes :

[1] Plating at corners of large hatch openings to be specially considered. Class Ⅲ or grade *E*, *EH*32, *EH*36 and *EH*40 to be applied in positions where high local stresses may occur.

[2] Not to be less than grade *E*, *EH*32, *EH*36 and *EH*40 within 0.4L amidships in ships with length exceeding 250 m

[3] In ships with a breadth exceeding 70 m at least three deck strakes to be class Ⅲ.

[4] Not to be less than grade *D*, *DH*32, *DH*36 and *DH*40.

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Table 3.1~~1~~0 Application of material classes and grades – Structures exposed at low temperatures

<table>
<tr><th rowspan="2">Structural member category</th><th colspan="2">Material class</th></tr>
<tr><th>Within 0.4L amidships</th><th>Outside 0.4L amidships</th></tr>
<tr><td>○ SECONDARY:
– Deck plating exposed to weather, in general
– Side plating above LIWL
– Transverse bulkheads above LIWL</td><td>Ⅰ</td><td>Ⅰ</td></tr>
<tr><td>○ PRIMARY:
– Strength deck plating [1]
– Continuous longitudinal members above strength deck, excluding longitudinal hatch coamings
– Longitudinal bulkhead above LIWL
– Top wing tank bulkhead above LIWL</td><td>Ⅱ</td><td>Ⅰ</td></tr>
<tr><td>○ SPECIAL:
– Sheer strake at strength deck [2]
– Stringer plate in strength deck [2]
– Deck strake at longitudinal bulkhead [3]
– Continuous longitudinal hatch coamings [4]</td><td>Ⅲ</td><td>Ⅱ</td></tr>
<tr><td>○ Shell plating, frame and welded stem/sten of ice strengthening region 1 for Arctic7 class ships</td><td>Ⅰ</td><td>Ⅰ</td></tr>
<tr><td>○ Shell plating, frame and welded stem/sten of ice strengthening region 1 for Arctic8 ~ Arctic9 class ships and Icebreakers</td><td>Ⅱ</td><td>Ⅱ</td></tr>
<tr><td colspan="3">Notes :
[1] Plating at corners of large hatch openings to be specially considered. Class Ⅲ or grade E, EH32, EH36 and EH40 to be applied in positions where high local stresses may occur.
[2] Not to be less than grade E, EH32, EH36 and EH40 within 0.4L amidships in ships with length exceeding 250 m
[3] In ships with a breadth exceeding 70 m at least three deck strakes to be class Ⅲ.
[4] Not to be less than grade D, DH32, DH36 and DH40.</td></tr>
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:Table 3.11
=>Table 3.10</td>
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Present	Correction	Reason
Table 3.12 Material grade requirements for classes I, II and III at low temperatures (Class I table below)		−Typo :Table 3.12 =>Table 3.11

Class I

Plate thickness in (mm)	-20/-25 °C		-26/-35 °C		-36/-45 °C		-46/-55 °C	
	MS	*HT*	*MS*	*HT*	*MS*	*HT*	*MS*	*HT*
$t \le 10$	*A*	*AH*	*B*	*AH*	*D*	*DH*	*D*	*DH*
$10 < t \le 15$	*B*	*AH*	*D*	*DH*	*D*	*DH*	*D*	*DH*
$15 < t \le 20$	*B*	*AH*	*D*	*DH*	*D*	*DH*	*E*	*EH*
$20 < t \le 25$	*D*	*DH*	*D*	*DH*	*D*	*DH*	*E*	*EH*
$25 < t \le 30$	*D*	*DH*	*D*	*DH*	*E*	*EH*	*E*	*EH*
$30 < t \le 35$	*D*	*DH*	*D*	*DH*	*E*	*EH*	*E*	*EH*
$35 < t \le 45$	*D*	*DH*	*E*	*EH*	*E*	*EH*	-	*FH*
$45 < t \le 50$	*E*	*EH*	*E*	*EH*	-	*FH*	-	*FH*

Present	Correction	Reason
	Table 3.1~~2~~1 Material grade requirements for classes I, II and III at low temperatures (see table below)	−Typo :Table 3.12 =>Table 3.11

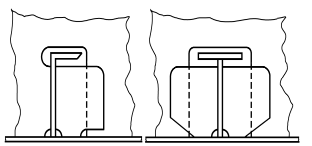
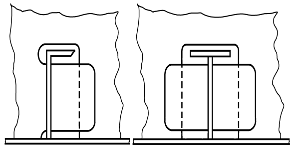
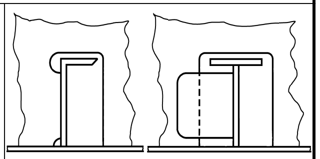
Table 3.1~~2~~1 Material grade requirements for classes I, II and III at low temperatures

Class I

Plate thickness in (mm)	-20/-25 °C		-26/-35 °C		-36/-45 °C		-46/-55 °C	
	MS	*HT*	*MS*	*HT*	*MS*	*HT*	*MS*	*HT*
$t \le 10$	*A*	*AH*	*B*	*AH*	*D*	*DH*	*D*	*DH*
$10 < t \le 15$	*B*	*AH*	*D*	*DH*	*D*	*DH*	*D*	*DH*
$15 < t \le 20$	*B*	*AH*	*D*	*DH*	*D*	*DH*	*E*	*EH*
$20 < t \le 25$	*D*	*DH*	*D*	*DH*	*D*	*DH*	*E*	*EH*
$25 < t \le 30$	*D*	*DH*	*D*	*DH*	*E*	*EH*	*E*	*EH*
$30 < t \le 35$	*D*	*DH*	*D*	*DH*	*E*	*EH*	*E*	*EH*
$35 < t \le 45$	*D*	*DH*	*E*	*EH*	*E*	*EH*	-	*FH*
$45 < t \le 50$	*E*	*EH*	*E*	*EH*	-	*FH*	-	*FH*

Present	Correction	Reason
Table 3.14 The intersections of plate structures with main framing		−Typo :Table 3.14 =>Table 3.15

Table 3.14 The intersections of plate structures with main framing

Ship class	Sketch of structure		
			
Icebreaker5, Icebreaker6	Fore peak, after peak, region 1, 2 with longitudinal framing	Regions 2, A3, B3, D3, A4, B4	Other regions as per Table 3.9
Icebreaker3, Icebreaker4	Fore peak, after peak, region 1, 2 with longitudinal framing	Regions 1 and 2 (except fore peak and after peak) A3, B3, D3	
Arctic7 ~ Arctic9	Fore peak, region 1 with longitudinal framing	Regions 1 and 2 (except fore peak), A3, A4, B3, B4	
Arctic5, Arctic6	Fore peak, region A1, B1, C1 with longitudinal framing	Regions 1 (except fore peak), 2 , A3, B3	
Arctic4	—	Regions 1, A2, B2, A3, B3	

Present	Correction	Reason
	Table 3.145 The intersections of plate structures with main framing	−Typo :Table 3.14 =>Table 3.15

Table 3.145 The intersections of plate structures with main framing

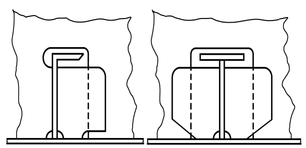
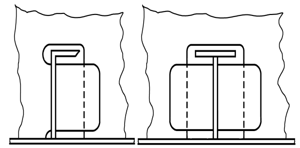
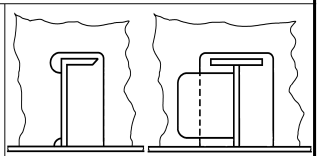
Ship class	Sketch of structure		
			
Icebreaker5, Icebreaker6	Fore peak, after peak, region 1, 2 with longitudinal framing	Regions 2, A3, B3, D3, A4, B4	Other regions as per Table 3.9
Icebreaker3, Icebreaker4	Fore peak, after peak, region 1, 2 with longitudinal framing	Regions 1 and 2 (except fore peak and after peak) A3, B3, D3	
Arctic7 ~ Arctic9	Fore peak, region 1 with longitudinal framing	Regions 1 and 2 (except fore peak), A3, A4, B3, B4	
Arctic5, Arctic6	Fore peak, region A1, B1, C1 with longitudinal framing	Regions 1 (except fore peak), 2 , A3, B3	
Arctic4	—	Regions 1, A2, B2, A3, B3	

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Table 3.39 Location of ice damage

<table>
<tr><th>Item No.</th><th>Arctic class</th><th>Location of ice damage mentioned in 504. 1</th></tr>
<tr><td>1</td><td>Arctic4 ~ Arctic9</td><td rowspan="2">Anywhere in the ice damage area</td></tr>
<tr><td>2</td><td>Ice strengthened salvage ships with Arctic5 ~ Arctic9 class</td></tr>
<tr><td>3</td><td>Ice strengthened ships with Arctic5 and Arctic6 class not mentioned in item 2</td><td>Between watertight bulkheads, platforms, decks and plating[1]. With the hull length $L_f < 100m$ it is permitted not to comply with the requirements for damage trim and stability where engine room located aft is flooded in case of ice damage.</td></tr>
<tr><td>4</td><td>Ice strengthened ships with Arctic4 class not mentioned in item 2</td><td>Between watertight bulkheads, platforms, decks and plating[1]. With the hull length $L_f < 125m$ it is permitted not to comply with the requirements for damage trim and stability where engine room located aft is flooded in case of ice damage.</td></tr>
<tr><td colspan="3">Note [1] : Where the distance between two consecutive watertight structures is less than the extent of damage, relative adjacent compartments shall be considered a single floodable compartment when checking damage stability.</td></tr>
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=>Table 3.48

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Present	Correction	Reason
	Table 3.~~39~~48 Location of ice damage	－Typo :Table 3.39 =>Table 3.48

Item No.	Arctic class	Location of ice damage mentioned in **504. 1**
1	Arctic4 ~ Arctic9	Anywhere in the ice damage area
2	Ice strengthened salvage ships with Arctic5 ~ Arctic9 class	
3	Ice strengthened ships with Arctic5 and Arctic6 class not mentioned in item 2	Between watertight bulkheads, platforms, decks and plating[1]. With the hull length $L_f < 100m$ it is permitted not to comply with the requirements for damage trim and stability where engine room located aft is flooded in case of ice damage.
4	Ice strengthened ships with Arctic4 class not mentioned in item 2	Between watertight bulkheads, platforms, decks and plating[1]. With the hull length $L_f < 125m$ it is permitted not to comply with the requirements for damage trim and stability where engine room located aft is flooded in case of ice damage.
Note [1] : Where the distance between two consecutive watertight structures is less than the extent of damage, relative adjacent compartments shall be considered a single floodable compartment when checking damage stability.		

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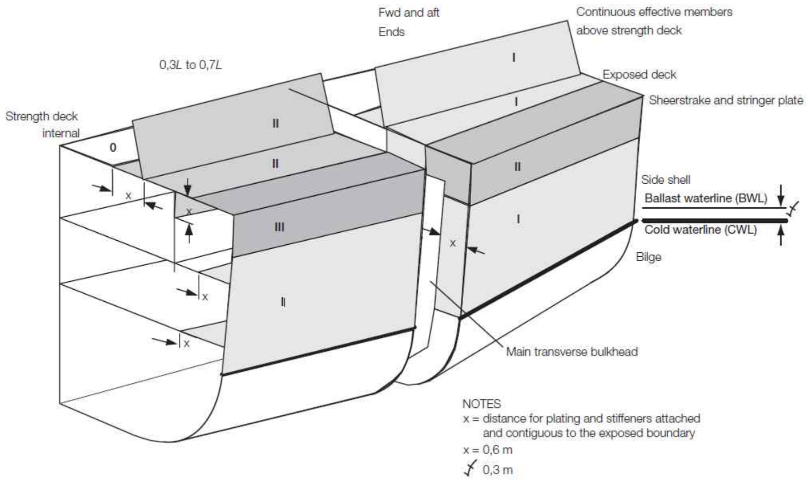

Fig. 4.2 Distribution of material classes for cold weather

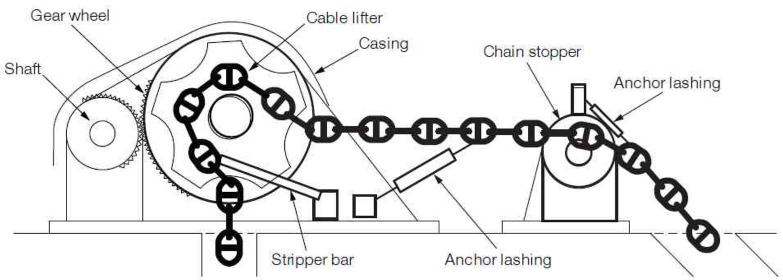

Fig. 4.3 Mooring and anchoring sub-components
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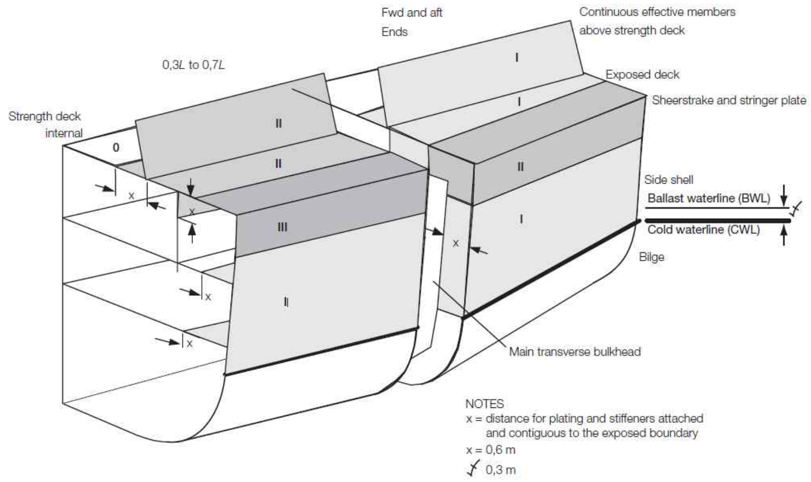
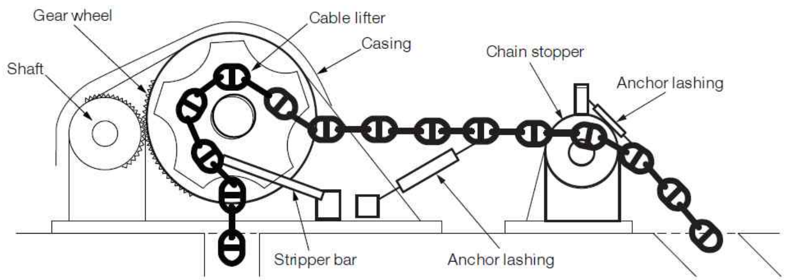


Fig~~.~~ 4.2 Distribution of material classes for cold weather



Fig~~.~~ 4.3 Mooring and anchoring sub-components
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Fig. 4.3 =>Fig 4.3
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Present	Correction	Reason
〈Rules for the Classification of High Speed and Light Crafts〉 **PART 1 CLASSIFICATION AND SURVEYS** **CHAPTER 1 CLASSIFICATION** **Section 1 General** **101. Application** 1. ~ 5. 〈omission〉 **6. Vehicle load method and securing device** (1) ~ (3) 〈omission〉 (4) Strength of securing device (A) The definitions of terms that are used to assess the strength of the securing devices are as follows. W = total weight of vehicle(load + vehicle weight) (ton) x, y, z = longitudinal, transverse and vertical distance from the center of rolling and pitching to the center of under consideration vehicle, respectively ϕ, ψ = rolling and pitching angle of ship as specified in **Table 1** respectively (deg) (see **Fig. 1**) T_r, T_p = rolling and pitching cycle of ship as specified in **Table 1** respectively (sec) V = vertical force to deck during rolling and pitching of ship (ton) (see **Fig. 1**) H_r = force acting to transverse direction which is parallel to deck during rolling of ship (ton) (see **Fig. 1**) H_p = force acting to longitudinal direction which is parallel to deck during pitching of ship (ton) (see **Fig. 1**) M_r = overturing moments during rolling of ship (ton-m) (see **Fig. 2**) SF_r, SF_p = forces acting on vehicle which is parallel to longitudinal and transverse deck respectively (ton)	〈Rules for the Classification of High Speed and Light Crafts〉 **PART 1 CLASSIFICATION AND SURVEYS** **CHAPTER 1 CLASSIFICATION** **Section 1 General** **101. Application** 1. ~ 5. 〈same as present〉 **6. Vehicle load method and securing device** (1) ~ (3) 〈same as present〉 (4) Strength of securing device (A) The definitions of terms that are used to assess the strength of the securing devices are as follows. W = total weight of vehicle(load + vehicle weight) (ton) x, y, z = longitudinal, transverse and vertical distance from the center of rolling and pitching to the center of under consideration vehicle, respectively ϕ, ψ = rolling and pitching angle of ship as specified in **Table 1.1.1** respectively (deg) (see **Fig. 1.1.1**) T_r, T_p = rolling and pitching cycle of ship as specified in **Table 1.1.1** respectively (sec) V = vertical force to deck during rolling and pitching of ship (ton) (see **Fig. 1.1.1**) H_r = force acting to transverse direction which is parallel to deck during rolling of ship (ton) (see **Fig. 1.1.1**) H_p = force acting to longitudinal direction which is parallel to deck during pitching of ship (ton) (see **Fig. 1.1.1**) M_r = overturing moments during rolling of ship (ton-m) (see **Fig. 1.1.2**) SF_r, SF_p = forces acting on vehicle which is parallel to longitudinal and transverse deck respectively (ton)	-Typo :Table 1 =>Table 1.1.1 Table 2 =>Table 1.1.2 Fig. 1 => Fig 1.1.1 Fig. 2 => Fig 1.1.2

Present	Correction	Reason
b_m = full width of vehicle (m) (see **Fig. 2)** b_t = spacing of wheels (m) (see **Fig. 2)** h_m = height from deck to the center of gravity of the vehicle (m) (see **Fig. 2)** L_r, L_p = sum of the transverse and longitudinal horizontal component which movable securing devices can withstand (ton) M_l = sum of the force to resist for vehicle overturning moment by movable securing devices (ton) n = number of movable securing devices used for one vehicle α, β = transverse and longitudinal angle between movable securing devices and deck respectively (deg) (see **Fig. 2)** h = height from deck to the point of vehicle securing (m) (see **Fig. 2)** T = safety working load of movable securing devices which is divided breaking load with safety factor of **Table 1** (ton) μ = friction coefficients between vehicle and deck, as shown below tire(rubber) / non-slipped paint: 0.7 tire(rubber) / steel deck: 0.3 steel / steel deck: 0.1(when dry) steel / steel deck: 0.0(when wet) timber / steel deck: 0.3 (B) The loads acting on the securing device is to be determined in consideration of the movements of ship which is described in the **Table 1.**	b_m = full width of vehicle (m) (see **Fig. 1.1.2)** b_t = spacing of wheels (m) (see **Fig. 1.1.2)** h_m = height from deck to the center of gravity of the vehicle (m) (see **Fig. 1.1.2)** L_r, L_p = sum of the transverse and longitudinal horizontal component which movable securing devices can withstand (ton) M_l = sum of the force to resist for vehicle overturning moment by movable securing devices (ton) n = number of movable securing devices used for one vehicle α, β = transverse and longitudinal angle between movable securing devices and deck respectively (deg) (see **Fig. 1.1.2)** h = height from deck to the point of vehicle securing (m) (see **Fig. 1.1.2)** T = safety working load of movable securing devices which is divided breaking load with safety factor of **Table 1.1.1** (ton) μ = friction coefficients between vehicle and deck, as shown below tire(rubber) / non-slipped paint: 0.7 tire(rubber) / steel deck: 0.3 steel / steel deck: 0.1(when dry) steel / steel deck: 0.0(when wet) timber / steel deck: 0.3 (B) The loads acting on the securing device is to be determined in consideration of the movements of ship which is described in the **Table 1.1.1.**	

Present	Correction	Reason

Present

Table 1 Ship motion

Rolling		Pitching		Safety factor
degree	cycle 3)	degree	cycle	
10°	cycle of ship	5°	5 sec	4 over

(Note)

1. KG' is the value obtained from the following formula.

$$KG' = 0.5(KG + KB)$$

KG = the vertical position of the centric of the ship
KB = the vertical position of the buoyancy centric of the ship

2. The centric of pitching is to be longitudinal position of the centric of the ship.
3. The rolling cycle of the ship may be taken from T_R of **Pt 3, Ch 2, 203. 2.** of the Rule.

(C) Each component of the loads caused by motions of the ship is shown in **Fig. 1** and **Table 2**.

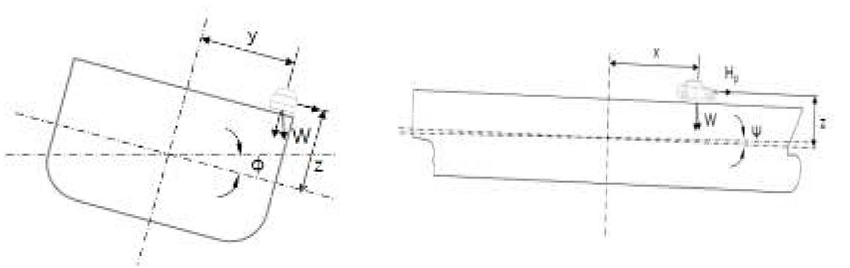

Fig. 1 Motions of the ship

Correction

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Rolling		Pitching		Safety factor
degree	cycle 3)	degree	cycle	
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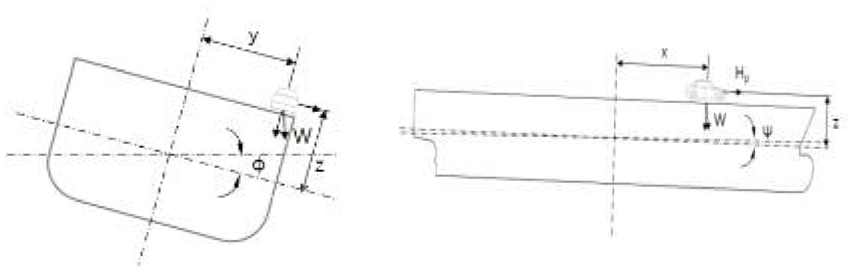

Fig. 1.1.1 Motions of the ship

Present	Correction	Reason

Present

Table 2 Load components

Type		Load components (ton)		
		Vertical force	Horizontal force	
			transverse	longitudinal
Static load	Rolling	$W\cos\phi$	$W\sin\phi$	–
	Pitching	$W\cos\psi$	–	$W\sin\psi$
	Combination	$W\cos(0.71\phi)\cos(0$	$W\sin(0.71\phi)$	$W\sin(0.71\psi)$
Dynamic load	Rolling	$0.07024W\frac{\phi}{T_r^2}y$	$0.070247W\frac{\phi}{T_r^2}$	–
	Pitching	$0.07024W\frac{\psi}{T_p^2}x$	–	$0.07024W\frac{\psi}{T_p^2}z$

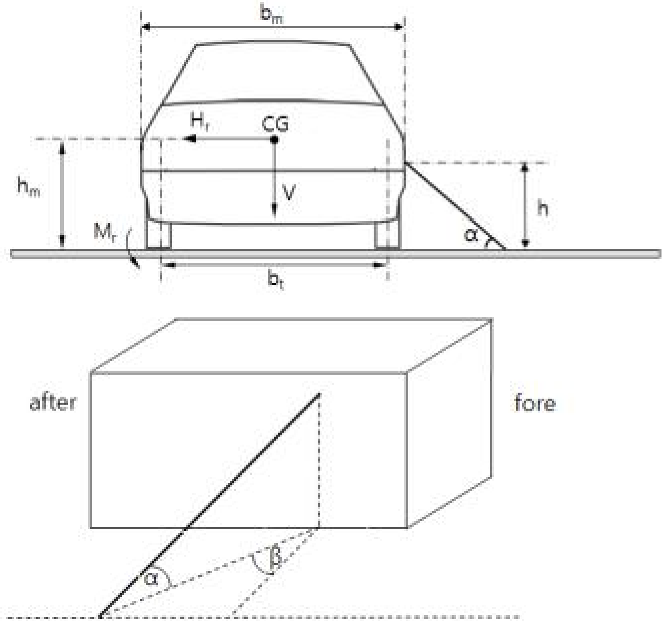

Fig. 2 Various dimensions during vehicle securing

Correction

Table 1.1.2 Load components

Type		Load components (ton)		
		Vertical force	Horizontal force	
			transverse	longitudinal
Static load	Rolling	$W\cos\phi$	$W\sin\phi$	–
	Pitching	$W\cos\psi$	–	$W\sin\psi$
	Combination	$W\cos(0.71\phi)\cos(0$	$W\sin(0.71\phi)$	$W\sin(0.71\psi)$
Dynamic load	Rolling	$0.07024W\frac{\phi}{T_r^2}y$	$0.070247W\frac{\phi}{T_r^2}$	–
	Pitching	$0.07024W\frac{\psi}{T_p^2}x$	–	$0.07024W\frac{\psi}{T_p^2}z$

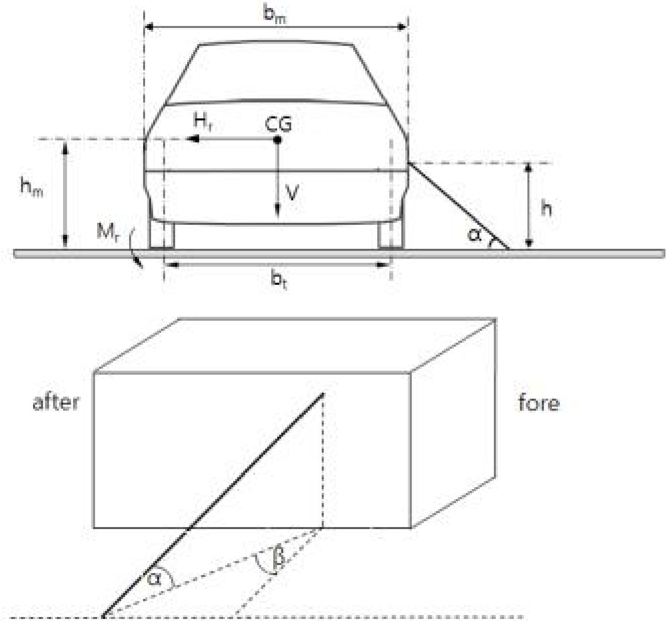

Fig. 1.1.2 Various dimensions during vehicle securing

Reason

Present	Correction	Reason

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Annex 3-1 Guidance for the Direct Strength Assessment

1. Direct strength calculation of steel ships

⟨omit⟩

(D) Allowable stresses

(a) Allowable stress level for stiffeners is given in **Table 3.1.**

(b) Stiffeners are in no case to have web and flange thickness less than given in **Pt 3, Ch 3, 601.**

Table 3.1 Allowable Stresses for Stiffeners

Nominal local bending stress	General	$\sigma = 180/K \quad (\mathrm{N/mm^2})$
	Watertight bulkheads except collision bulkhead	$\sigma = 245/K \quad (\mathrm{N/mm^2})$
Combined local bending stress/girder stress / extreme longitudinal stress		$\sigma = 230 \sim 265/K^{(*)}$ (N/m
Nominal shear stress	General	$\tau = 90/K \quad (\mathrm{N/mm^2})$
	Watertight bulkheads except collision bulkhead	$\tau = 120/K \quad (\mathrm{N/mm^2})$
(*) : In case of girder stress, longitudinal stress is as specified in **Pt 3, Ch 3, 403.**		

Correction

Annex 3-1 Guidance for the Direct Strength Assessment

1. Direct strength calculation of steel ships

⟨omit⟩

(D) Allowable stresses

(a) Allowable stress level for stiffeners is given in **Table ~~3.~~1.**

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Nominal local bending stress	General	$\sigma = 180/K \quad (\mathrm{N/mm^2})$
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	Watertight bulkheads except collision bulkhead	$\tau = 120/K \quad (\mathrm{N/mm^2})$
(*) : In case of girder stress, longitudinal stress is as specified in **Pt 3, Ch 3, 403.**		

Reason

-Typo
:Table 3.1
=>Table 1

Present	Correction	Reason
⟨omit⟩ (D) Allowable stresses (a) The equivalent stress is defined as: $\sigma_e = \sqrt{\sigma_x^2 + \sigma_y^2 - \sigma_x \sigma_y + 3\tau^2}$ σ_x : normal stress in x-direction σ_y : normal stress in y-direction τ : Shear stress in the xy-plane (b) For girders in general, the following stresses given in **Table 3.2** are normally acceptable.	⟨omit⟩ (D) Allowable stresses (a) The equivalent stress is defined as: $\sigma_e = \sqrt{\sigma_x^2 + \sigma_y^2 - \sigma_x \sigma_y + 3\tau^2}$ σ_x : normal stress in x-direction σ_y : normal stress in y-direction τ : Shear stress in the xy-plane (b) For girders in general, the following stresses given in **Table ~~3.~~2** are normally acceptable.	-Typo :Table 3.2 =>Table 2

Present	Correction	Reason

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Table 3.2 Allowable Stresses for Girders

	Girders in general	For girders on watertight bulkheads except for the collision bulkhead	For transverse structures and partial longitudinal structures supporting deckhouses, containers etc. in the rolling and pitching conditions
Normal stress(σ)	160 $/K\,(\mathrm{N/mm^2}$	220 $/K\,(\mathrm{N/mm^2})$	$210/K\,(\mathrm{N/mm^2})$
Mean shear stress(τ)	90 $/K\,(\mathrm{N/mm^2}$	120 $/K\,(\mathrm{N/mm^2})$	$115/K\,(\mathrm{N/mm^2})$
	with one plate flange	with one plate flange	with one plate flange
	100 $/K\,(\mathrm{N/mm^2}$	130 $/K\,(\mathrm{N/mm^2})$	$125/K\,(\mathrm{N/mm^2})$
	with two plate flanges	with two plate flanges	with two plate flanges
Equivalent stress(σ_e)	180 $/K\,(\mathrm{N/mm^2}$	240 $/K\,(\mathrm{N/mm^2})$	$230/K\,(\mathrm{N/mm^2})$

Correction

Table ~~3.~~2 Allowable Stresses for Girders

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	with two plate flanges	with two plate flanges	with two plate flanges
Equivalent stress(σ_e)	180 $/K\,(\mathrm{N/mm^2}$	240 $/K\,(\mathrm{N/mm^2})$	$230/K\,(\mathrm{N/mm^2})$

Reason

-Typo
:Table 3.2
=>Table 2

Present	Correction	Reason

Present

〈omit〉

(D) Allowable stresses

Allowable stress level for stiffeners is given in **Table 3.3.**

Table 3.3 Allowable Stresses for Stiffeners

Nominal local bending stress	$\sigma = 160/K(\mathrm{N/mm^2})$
Combined local bending stress or girder stress or longitudinal stress	$\sigma = 220/K(\mathrm{N/mm^2})$
Nominal shear stress	$\tau = 90/K(\mathrm{N/mm^2})$

〈omit〉

(c) For girders in general, the following stresses given in **Table 3.4** are normally acceptable.

Table 3.4 Allowable Stresses for Girders

Normal stress(σ)	$160/K\,(\mathrm{N/mm^2})$
Mean shear stress(τ)	$90/K\,(\mathrm{N/mm^2})$ with one plate flange $100/K\,(\mathrm{N/mm^2})$ with two plate flanges
Equivalent stress(σ_e)	$180/K\,(\mathrm{N/mm^2})$

Correction

〈omit〉

(D) Allowable stresses

Allowable stress level for stiffeners is given in **Table ~~3.~~3.**

Table ~~3.~~3 Allowable Stresses for Stiffeners

Nominal local bending stress	$\sigma = 160/K(\mathrm{N/mm^2})$
Combined local bending stress or girder stress or longitudinal stress	$\sigma = 220/K(\mathrm{N/mm^2})$
Nominal shear stress	$\tau = 90/K(\mathrm{N/mm^2})$

〈omit〉

(c) For girders in general, the following stresses given in **Table ~~3.~~4** are normally acceptable.

Table ~~3.~~4 Allowable Stresses for Girders

Normal stress(σ)	$160/K\,(\mathrm{N/mm^2})$
Mean shear stress(τ)	$90/K\,(\mathrm{N/mm^2})$ with one plate flange $100/K\,(\mathrm{N/mm^2})$ with two plate flanges
Equivalent stress(σ_e)	$180/K\,(\mathrm{N/mm^2})$

Reason

−Typo
:Table 3.3
=>Table 3

−Typo
:Table 3.4
=>Table 4

Present	Correction	Reason
3. Direct strength calculation of FRP ships (1) General (A) Direct calculation using the full stiffness and strength properties of the laminates in all directions will be accepted based on the criteria given below. (a) Laminates are dimensioned in accordance with the Tsai-Wu composite strength criterion. (b) The failure strength ratio, R, for a ply in the Tsai-Wu failure criterion is expressed as: $(F_{ij}\,\sigma_i\,\sigma_j)\,R^2 + (F_i\,\sigma_i)\,R - 1 = 0$, i, j = 1, 2, 3, 4, 5, 6 Where $R \leq 1$ indicates ply failure. The terms in the failure criterion are defined in the notes in **Table 3.5** (c) All relevant load combinations for the laminate panel are to be considered. (2) Allowable stress and deflections (A) For direct calculations in accordance with (1) (A) (b), the failure strength ratio, R, is not to be less than the values given in **Table 3.5**. Core shear stresses in sandwich panels shall be in accordance with **Pt 3, Ch 5, Sec 5**. Panel deflections shall not be greater than specified in **Pt 3, Ch 5, Sec. 5** and **Sec 6.**	**3. Direct strength calculation of FRP ships** (1) General (A) Direct calculation using the full stiffness and strength properties of the laminates in all directions will be accepted based on the criteria given below. (a) Laminates are dimensioned in accordance with the Tsai-Wu composite strength criterion. (b) The failure strength ratio, R, for a ply in the Tsai-Wu failure criterion is expressed as: $(F_{ij}\,\sigma_i\,\sigma_j)\,R^2 + (F_i\,\sigma_i)\,R - 1 = 0$, i, j = 1, 2, 3, 4, 5, 6 Where $R \leq 1$ indicates ply failure. The terms in the failure criterion are defined in the notes in **Table ~~3.~~5** (c) All relevant load combinations for the laminate panel are to be considered. (2) Allowable stress and deflections (A) For direct calculations in accordance with (1) (A) (b), the failure strength ratio, R, is not to be less than the values given in **Table ~~3.~~5**. Core shear stresses in sandwich panels shall be in accordance with **Pt 3, Ch 5, Sec 5**. Panel deflections shall not be greater than specified in **Pt 3, Ch 5, Sec. 5** and **Sec 6.**	-Typo :Table 3.5 =>Table 5

<table>
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<tr>
<td>(2) Direct strength calculation of full ship structure
(A) Structural modeling
(a) The direct strength calculation is to be applied for the hull structure that contributes to the hull girder strength.
(b) In case of modeling with plate or shell element, in principle, the finite element division is divided into two or more elements between adjacent web frames in the longitudinal direction and by the spacing of longitudinals in the width direction. An example of the full ship structure model is shown in Figure 3.1.1.
(c) In case aluminum extruded members are used as structural members, the orthotropic elements or composed model with plate and stiffener elements should be used for the members.
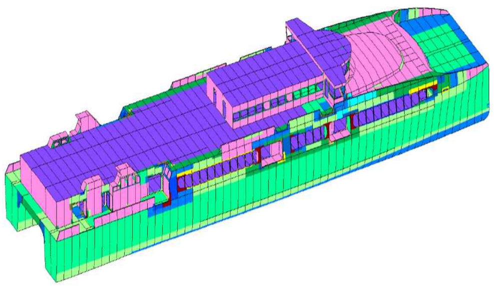
Figure 3.1.1 An example of the full ship structural model</td>
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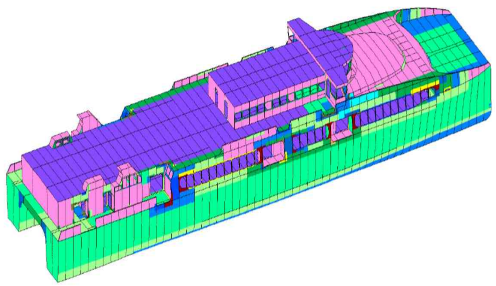
Figure ~~3.1.~~1 An example of the full ship structural model</td>
<td>−Typo
:Fig 3.1.1
=>Fig 1</td>
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(C) Load conditions (a) Full ship analysis is to be performed for the load cases derived from ship motion analysis acceptable to the Society. If the hull girder loads in **Pt 3, Ch 2, Sec 4 of the Rules** is applied instead of the loads from ship motion analysis, the strength evaluation can be performed for the load cases shown in **Table 3-6**. (b) In accordance with **Pt 3, Ch 2, Sec 3 304.~307. of the Rules**, the hull weight, cargo/passenger load and sea water pressure are to be applied in the structural model in advance applying the hull girder load. (c) For vertical bending moment, the larger moment is to be used compared with the bending moment (M_B) due to impact load in **Pt 3, Ch 2, Sec 4, 401. 2 of the Rules** and the hogging/sagging moment (M_{hog}, M_{sag}) in **401. 4.** In order to apply the vertical bending moment defined in the above regulation to the full ship model, the weight and buoyancy can be distributed in way of longitudinal direction of the hull as shown in the example in **Figure 3.1.2**. In the case of weight, the distributed loads can be applied to the deck by frame spacing, and in the case of buoyancy, the concentrated loads can be applied to the keel position by frame spacing as shown in **Figure 3.1.3**. (d) For the transverse bending moment (M_S), the horizontal split force (F_y) of **Pt 3, Ch 2, Sec 4, 402. 2.** (2) of the Rules can be applied as shown in **Figure 3.1.4**. (e) The longitudinal/transverse torsional moment of **Pt 3, Ch 2, Sec 4 402. 3** and **4** of the Rules can be applied to the bulkhead deck or keel by using pitch connecting force(F_p) as shown in **Figure 3.1.5**. This force is as follows.	(C) Load conditions (a) Full ship analysis is to be performed for the load cases derived from ship motion analysis acceptable to the Society. If the hull girder loads in **Pt 3, Ch 2, Sec 4 of the Rules** is applied instead of the loads from ship motion analysis, the strength evaluation can be performed for the load cases shown in **Table ~~3-~~6**. (b) In accordance with **Pt 3, Ch 2, Sec 3 304.~307. of the Rules**, the hull weight, cargo/passenger load and sea water pressure are to be applied in the structural model in advance applying the hull girder load. (c) For vertical bending moment, the larger moment is to be used compared with the bending moment (M_B) due to impact load in **Pt 3, Ch 2, Sec 4, 401. 2 of the Rules** and the hogging/sagging moment (M_{hog}, M_{sag}) in **401. 4.** In order to apply the vertical bending moment defined in the above regulation to the full ship model, the weight and buoyancy can be distributed in way of longitudinal direction of the hull as shown in the example in **Figure ~~3.1.~~2**. In the case of weight, the distributed loads can be applied to the deck by frame spacing, and in the case of buoyancy, the concentrated loads can be applied to the keel position by frame spacing as shown in **Figure ~~3.1.~~3**. (d) For the transverse bending moment (M_S), the horizontal split force (F_y) of **Pt 3, Ch 2, Sec 4, 402. 2.** (2) of the Rules can be applied as shown in **Figure ~~3.1.~~4**. (e) The longitudinal/transverse torsional moment of **Pt 3, Ch 2, Sec 4 402. 3** and **4** of the Rules can be applied to the bulkhead deck or keel by using pitch connecting force(F_p) as shown in **Figure ~~3.1.~~5**. This force is as follows.	-Typo :Fig 3.1.2 =>Fig 2 Fig 3.1.3 =>Fig 3 Fig 3.1.4 =>Fig 4 Fig 3.1.5 =>Fig 5 Table 3-6 => Table 6

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Table 3-6 Load cases for longitudinal strength evaluation of catamaran

No.	Load cases		Pt 3, Ch 2 of the Rules
1	Vertical bending moment (Hogging)	Max(Mhog , MB)	401.2.(2) ,401.4.(2)
2	Vertical bending moment (Sagging)	Max(Msag , MB)	401.2.(3), 401.4.(2)
3	Transverse bending moment	MS	402.2.(2)
4	Longitudinal/transverse torsional moment	MP + MT	402.3 및 402.4
5	Load combination 1	0.8 Max(Msag , MB) + 0.6(MP + MT)	
6	Load combination 2	0.6 Max(Msag , MB) + 0.8(MP + MT)	
7	Load combination 3	0.7Ms + (MP + MT)	
8	Load combination 4	Ms + 0.7(MP + Mt)	

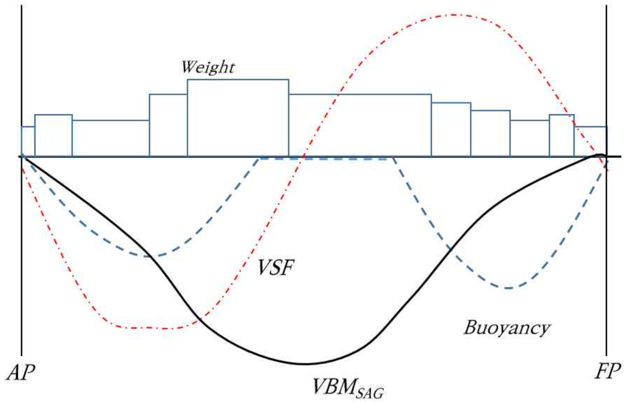

Figure 3.1.2 An example of weight, buoyancy, shear force and bending moment diagram
(refer to Figure 3.2.11 of the Rules)

Correction

Table ~~3-~~6 Load cases for longitudinal strength evaluation of catamaran

No.	Load cases		Pt 3, Ch 2 of the Rules
1	Vertical bending moment (Hogging)	Max(Mhog , MB)	401.2.(2) ,401.4.(2)
2	Vertical bending moment (Sagging)	Max(Msag , MB)	401.2.(3), 401.4.(2)
3	Transverse bending moment	MS	402.2.(2)
4	Longitudinal/transverse torsional moment	MP + MT	402.3 및 402.4
5	Load combination 1	0.8 Max(Msag , MB) + 0.6(MP + MT)	
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8	Load combination 4	Ms + 0.7(MP + Mt)	

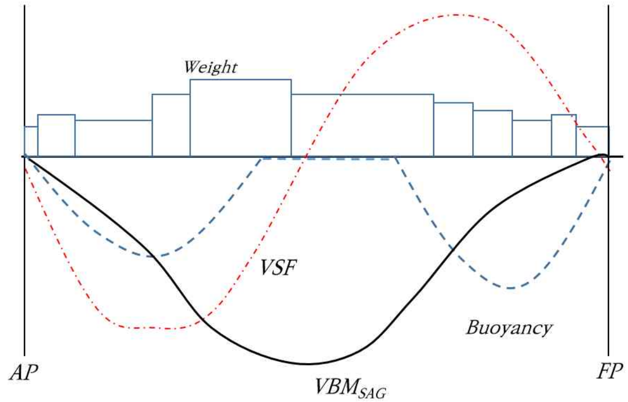

Figure ~~3.1.~~2 An example of weight, buoyancy, shear force and bending moment diagram
(refer to Figure 3.2.11 of the Rules)

Reason

-Typo
:Table 3-6 => Table 6

-Typo
:Fig 3.1.2 =>Fig 2

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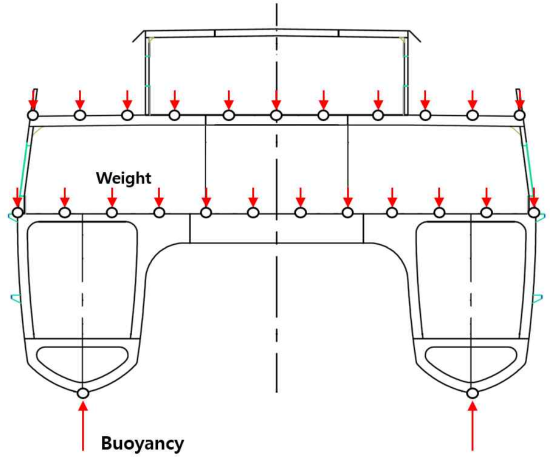
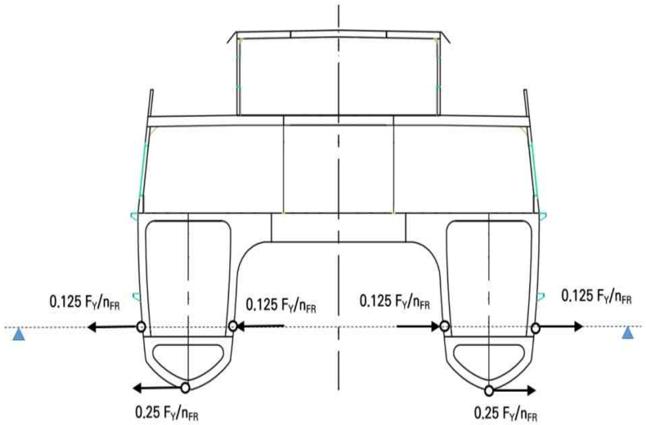
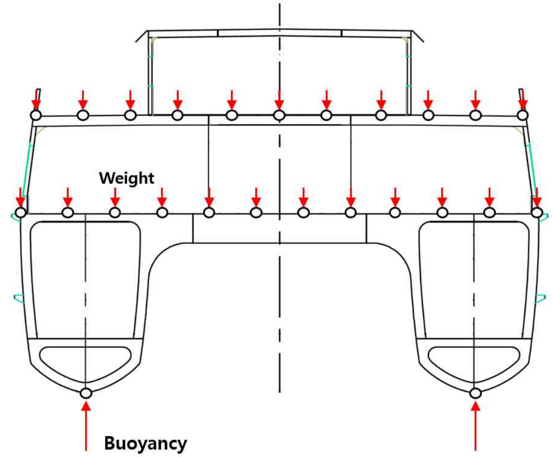
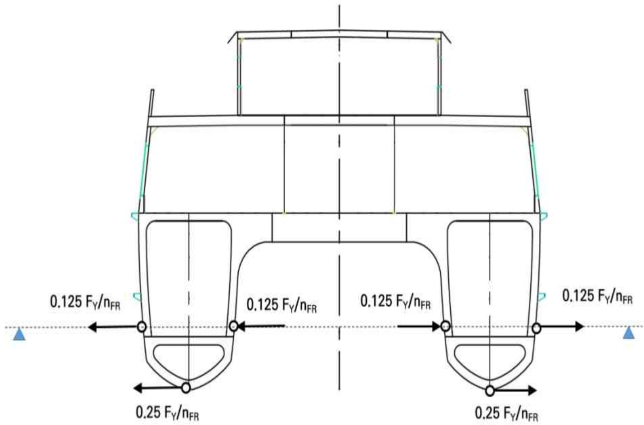
 Figure 3.1.3 An example for application of weight and buoyancy  Figure 3.1.4 Application of horizontal split force for transverse bending moment (nFr is no. of frames)	 Figure ~~3.1.~~3 An example for application of weight and buoyancy  Figure ~~3.1.~~4 Application of horizontal split force for transverse bending moment (nFr is no. of frames)	-Typo :Fig 3.1.3 =>Fig 3 Fig 3.1.4 =>Fig 4

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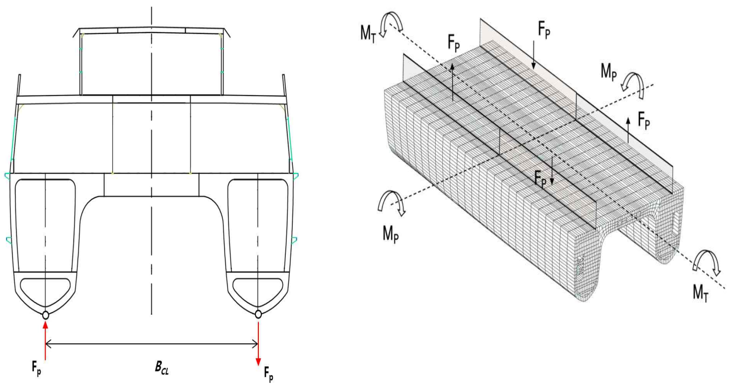

Figure 3.1.5 Application of pitch connecting force for longitudinal/transverse torsional moment

Table 3.5 Failure Strength Ratio, R

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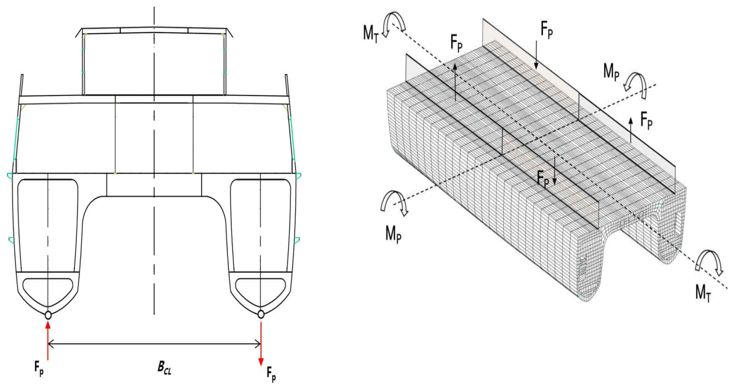

Figure ~~3.1.~~5 Application of pitch connecting force for longitudinal/transverse torsional moment

Table ~~3.~~5 Failure Strength Ratio, R

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=>Fig 5

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Table 5

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Annex 3-2 Guidance for Buckling Strength Calculation **1. Buckling Strength Calculation for Steel Ships** **〈omit〉** (B) Relationships for buckling strength calculation are as follow. (a) when $\sigma_{el} < \frac{\sigma_f}{2}$: $\sigma_c = \sigma_{el}$, when $\sigma_{el} > \frac{\sigma_f}{2}$: $\sigma_c = \sigma_f\left(1 - \frac{\sigma_f}{4\sigma_{el}}\right)$ (b) when $\tau_{el} < \frac{\tau_f}{2}$: $\tau_c = \tau_{el}$, when $\tau_{el} > \frac{\tau_f}{2}$: $\tau_c = \tau_f\left(1 - \frac{\tau_f}{4\tau_{el}}\right)$ (c) when the required σ_c or τ_c is known, the necessary σ_{el} or τ_{el} will from the above expressions of Johnson-Ostenfeld relationship be: $\sigma_{el} = \frac{\sigma_c}{K_{J-O}}$ and $\tau_{el} = \frac{\tau_c}{K_{J-O}}$ K_{J-O} : from **Fig 3.1** or from the formula as follow. $K_{J-O} = 1 - \left(\frac{\sigma_c\, or\, \tau_c}{0.5(\sigma_c \text{ or } \tau_c)} - 1\right)^2$ For $\frac{\sigma_c}{\sigma_f} < 0.5$, $K_{J-O} = 1$	**Annex 3-2 Guidance for Buckling Strength Calculation** **1. Buckling Strength Calculation for Steel Ships** **〈omit〉** (B) Relationships for buckling strength calculation are as follow. (a) when $\sigma_{el} < \frac{\sigma_f}{2}$: $\sigma_c = \sigma_{el}$, when $\sigma_{el} > \frac{\sigma_f}{2}$: $\sigma_c = \sigma_f\left(1 - \frac{\sigma_f}{4\sigma_{el}}\right)$ (b) when $\tau_{el} < \frac{\tau_f}{2}$: $\tau_c = \tau_{el}$, when $\tau_{el} > \frac{\tau_f}{2}$: $\tau_c = \tau_f\left(1 - \frac{\tau_f}{4\tau_{el}}\right)$ (c) when the required σ_c or τ_c is known, the necessary σ_{el} or τ_{el} will from the above expressions of Johnson-Ostenfeld relationship be: $\sigma_{el} = \frac{\sigma_c}{K_{J-O}}$ and $\tau_{el} = \frac{\tau_c}{K_{J-O}}$ K_{J-O} : from **Fig ~~3.~~1** or from the formula as follow. $K_{J-O} = 1 - \left(\frac{\sigma_c\, or\, \tau_c}{0.5(\sigma_c \text{ or } \tau_c)} - 1\right)^2$ For $\frac{\sigma_c}{\sigma_f} < 0.5$, $K_{J-O} = 1$	-Typo :Fig 3.1 =>Fig 1

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⟨omit⟩ (4) Plating (A) Plate panel in uni-axial compression (a) The ideal elastic buckling stress may be taken as: $\sigma_{el} = 0.9\, k\, E \left(\frac{t}{1000s} \right)^2 \quad (\mathrm{N/mm^2})$ k : coefficient in accordance with **Table 3.6** c = 1.21 (when stiffeners are angles or T-sections) = 1.10 (when stiffeners are bulb flats) = 1.05 (when stiffeners are flat bars) For double bottom panels the c-values may be multiplied by 1.1 φ : the ratio between the smaller and the larger compression stress assuming linear variation in accordance with **Table 3.2**	⟨omit⟩ (4) Plating (A) Plate panel in uni-axial compression (a) The ideal elastic buckling stress may be taken as: $\sigma_{el} = 0.9\, k\, E \left(\frac{t}{1000s} \right)^2 \quad (\mathrm{N/mm^2})$ k : coefficient in accordance with **Table ~~3.6~~1** c = 1.21 (when stiffeners are angles or T-sections) = 1.10 (when stiffeners are bulb flats) = 1.05 (when stiffeners are flat bars) For double bottom panels the c-values may be multiplied by 1.1 φ : the ratio between the smaller and the larger compression stress assuming linear variation in accordance with **~~Table~~Fig ~~3.~~2**	-Typo :Table 3.6 => Table 1 Table 3.2 =>Fig 2

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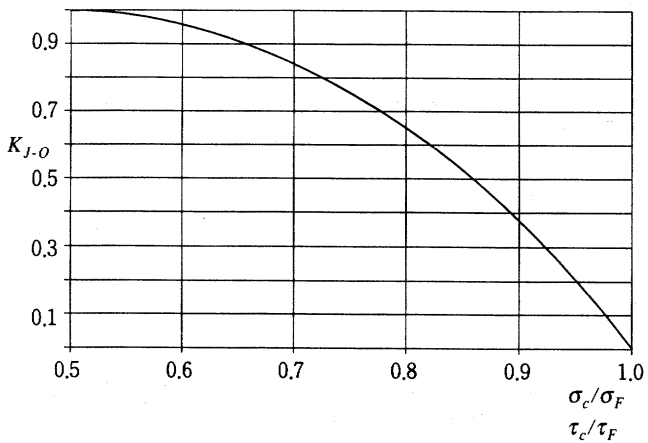
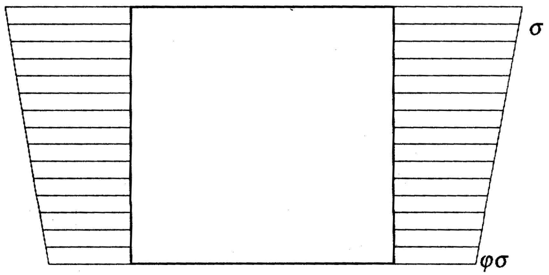
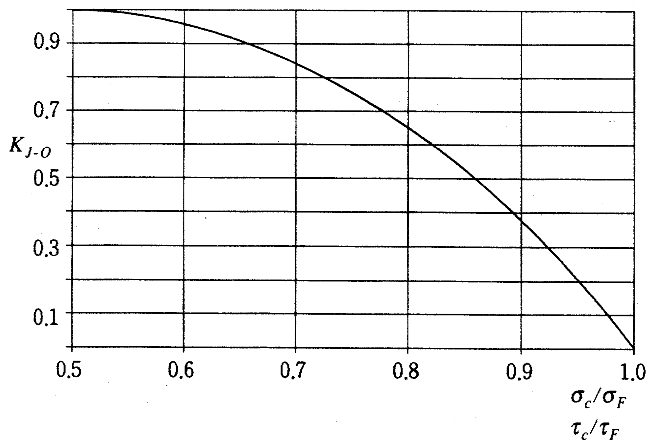
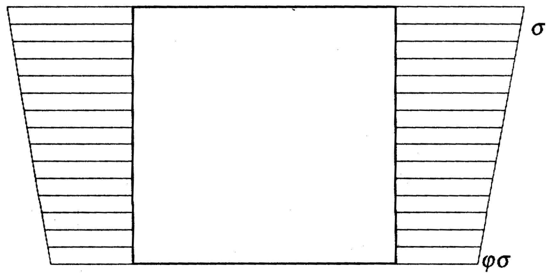
 Fig 3.1 Factor K_{J-O}  Fig 3.2 Buckling Stress Correction Factor	 Fig ~~3.~~1 Factor K_{J-O}  Fig ~~3.~~2 Buckling Stress Correction Factor	-Typo :Fig 3.1 =>Fig 1 Fig 3.2 =>Fig 2

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(C) Plate panel in bi-axial compression and shear (a) For plate panels subject to bi-axial compression and in addition to in-plane shear stresses the interaction is given as follows. $\frac{\sigma_{ax}}{\eta_x \sigma_{cx} q} - K \frac{\sigma_{ax} \sigma_{ay}}{\eta_x \eta_y \sigma_{cx} \sigma_{cy} q} + \left(\frac{\sigma_{ay}}{\eta_y \sigma_{cy} q} \right)^n \leq 1$ σ_{ax} : compression stress in longitudinal direction (perpendicular to stiffener spacing s) σ_{ay} : compression stress in transverse direction (perpendicular to the longer side l of the plate panel) σ_{cx} : critical buckling stress in longitudinal direction (perpendicular to stiffener spacing s) σ_{cy} : critical buckling stress in transverse direction (perpendicular to the longer side l of the plate panel) η_x, η_y = 1.0 : for plate panels where the longitudinal stress σ_a or other extreme stress is incorporated in and constitutes a major part of σ_{ax} or σ_{ay} = 0.95 η_G in other cases $K = c\beta^a$ c, a, n : factors given in **Table 3.7** $\beta = 1000 \frac{s}{t} \sqrt{\frac{\sigma_f}{E}}$, $q = 1 - \left(\frac{\tau_a}{\eta_t \tau_c} \right)^2$ $\eta_\tau = \eta$: as specified in (B) (b) above	(C) Plate panel in bi-axial compression and shear (a) For plate panels subject to bi-axial compression and in addition to in-plane shear stresses the interaction is given as follows. $\frac{\sigma_{ax}}{\eta_x \sigma_{cx} q} - K \frac{\sigma_{ax} \sigma_{ay}}{\eta_x \eta_y \sigma_{cx} \sigma_{cy} q} + \left(\frac{\sigma_{ay}}{\eta_y \sigma_{cy} q} \right)^n \leq 1$ σ_{ax} : compression stress in longitudinal direction (perpendicular to stiffener spacing s) σ_{ay} : compression stress in transverse direction (perpendicular to the longer side l of the plate panel) σ_{cx} : critical buckling stress in longitudinal direction (perpendicular to stiffener spacing s) σ_{cy} : critical buckling stress in transverse direction (perpendicular to the longer side l of the plate panel) η_x, η_y = 1.0 : for plate panels where the longitudinal stress σ_a or other extreme stress is incorporated in and constitutes a major part of σ_{ax} or σ_{ay} = 0.95 η_G in other cases $K = c\beta^a$ c, a, n : factors given in **Table ~~3.7~~2** $\beta = 1000 \frac{s}{t} \sqrt{\frac{\sigma_f}{E}}$, $q = 1 - \left(\frac{\tau_a}{\eta_t \tau_c} \right)^2$ $\eta_\tau = \eta$: as specified in (B) (b) above	-Typo :Table 3.7 => Table 2

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See Present below	See Correction below	-Typo :Table 3.6 => Table 1 :Table 3.7 => Table 2

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Table 3.6 Factor (k)

structure	Factor (k)
plating with longitudinal stiffeners (in the direction of compression stress)	$k = k_l = \frac{8.4}{\varphi + 1.1}$ $(0 \le \varphi \le 1$
plating with transverse stiffeners (perpendicular to the compression stress)	$k = k_s = c\left[1+\left(\frac{s}{l}\right)^2\right]^2 \frac{2.1}{\varphi + 1.1}$ $(0 \le \varphi$

Table 3.7 Factors a, c and n

	c	a	n
1.0 〈 l/s ≤ 1.5	0.78	-0.12	1.0
1.5 〈 l/s〈 8	0.80	0.04	1.2

Correction

Table ~~3.6~~1 Factor (k)

structure	Factor (k)
plating with longitudinal stiffeners (in the direction of compression stress)	$k = k_l = \frac{8.4}{\varphi + 1.1}$ $(0 \le \varphi \le 1$
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Table ~~3.7~~2 Factors a, c and n

	c	a	n
1.0 〈 l/s ≤ 1.5	0.78	-0.12	1.0
1.5 〈 l/s〈 8	0.80	0.04	1.2

Present	Correction	Reason
(6) Stiffeners Perpendicular to Direction of Compression For longitudinal structures, the moment of inertia of the stiffener section is not to be less than the follows. $I = \frac{0.09\ \sigma_a \sigma_{el} l^4 s}{t}$ (cm^4) l : span of stiffener (m) s : spacing of stiffener (m) t : plate thickness (mm) $\sigma_{el} = \frac{\sigma_c}{K_{J-O}}$, $\sigma_c = \frac{\sigma_a}{0.85}$ σ_a : actual compression stress$(\mathrm{N/mm^2})$, for the local load stress, the value of stress divided by η_G specified in (4) (A) (b) above. K_{J-O} : according to **Fig 3.1**	(6) Stiffeners Perpendicular to Direction of Compression For longitudinal structures, the moment of inertia of the stiffener section is not to be less than the follows. $I = \frac{0.09\ \sigma_a \sigma_{el} l^4 s}{t}$ (cm^4) l : span of stiffener (m) s : spacing of stiffener (m) t : plate thickness (mm) $\sigma_{el} = \frac{\sigma_c}{K_{J-O}}$, $\sigma_c = \frac{\sigma_a}{0.85}$ σ_a : actual compression stress$(\mathrm{N/mm^2})$, for the local load stress, the value of stress divided by η_G specified in (4) (A) (b) above. K_{J-O} : according to **Fig ~~3.~~1**	-Typo :Fig 3.1 =>Fig 1

Present	Correction	Reason
(4) Plating (A) Plate panel in uni-axial compression (a) The ideal elastic buckling stress may be taken as: $\sigma_{el} = 0.9\, k\, E \left(\frac{1}{1000\, s} \right)^2 \quad (\mathrm{N/mm^2})$ k : see **Table 3.6** c = 2.50 (when stiffeners are hollow profile with s/l〈0,5 and the enclosed area of the hollow profile is larger than 20 st) = 1.21 (when stiffeners are angles or T-sections) = 1.10 (when stiffeners are bulb flats) = 1.05 (when stiffeners are flat bars) For double bottom panels the c-values may be multiplied by 1.1. φ is the ratio between the smaller and the larger compressive stress assuming linear variation, see **Fig 3.2.**	(4) Plating (A) Plate panel in uni-axial compression (a) The ideal elastic buckling stress may be taken as: $\sigma_{el} = 0.9\, k\, E \left(\frac{1}{1000\, s} \right)^2 \quad (\mathrm{N/mm^2})$ k : see **Table ~~3.6~~1** c = 2.50 (when stiffeners are hollow profile with s/l〈0,5 and the enclosed area of the hollow profile is larger than 20 st) = 1.21 (when stiffeners are angles or T-sections) = 1.10 (when stiffeners are bulb flats) = 1.05 (when stiffeners are flat bars) For double bottom panels the c-values may be multiplied by 1.1. φ is the ratio between the smaller and the larger compressive stress assuming linear variation, see **Fig ~~3.~~2.**	-Typo :Table 3.6 => Table 1 :Fig 3.2 =>Fig 2

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(C) Plate panel in bi-axial compression and shear (a) For plate panels subject to bi-axial compression the interaction between the longitudinal and transverse buckling strength ratios is given by: $$\frac{\sigma_{ax}}{\eta_x \sigma_{ax} q} - K \frac{\sigma_{ax}\sigma_{ay}}{\eta_x \eta_y \sigma_{ax} \sigma_{ay} q} + \left(\frac{\sigma_{ay}}{\eta_y \sigma_{ay} q}\right)^n \leq 1$$ σ_{ax} : compressive stiffness in longitudinal direction (perpendicular to stiffener spacing s) σ_{ay} : compressive stress in transverse direction (perpendicular to the longer side l of the plate panel) σ_{cx} : critical buckling stress in longitudinal direction (perpendicular to stiffener spacing s) σ_{cy} : critical buckling stress in transverse direction (perpendicular to the longer side l of the plate panel) $\eta_x, \eta_y = 1.0$: for plate panels where the longitudinal stress σ_a or other extreme stress is incorporated and constitutes a major part in σ_{ax} or σ_{ay} $= 0.95\,\eta_G$: other cases $K = c\,\beta^a$ $c,\ a,\ n$: see **Table 3.7**	(C) Plate panel in bi-axial compression and shear (a) For plate panels subject to bi-axial compression the interaction between the longitudinal and transverse buckling strength ratios is given by: $$\frac{\sigma_{ax}}{\eta_x \sigma_{ax} q} - K \frac{\sigma_{ax}\sigma_{ay}}{\eta_x \eta_y \sigma_{ax} \sigma_{ay} q} + \left(\frac{\sigma_{ay}}{\eta_y \sigma_{ay} q}\right)^n \leq 1$$ σ_{ax} : compressive stiffness in longitudinal direction (perpendicular to stiffener spacing s) σ_{ay} : compressive stress in transverse direction (perpendicular to the longer side l of the plate panel) σ_{cx} : critical buckling stress in longitudinal direction (perpendicular to stiffener spacing s) σ_{cy} : critical buckling stress in transverse direction (perpendicular to the longer side l of the plate panel) $\eta_x, \eta_y = 1.0$: for plate panels where the longitudinal stress σ_a or other extreme stress is incorporated and constitutes a major part in σ_{ax} or σ_{ay} $= 0.95\,\eta_G$: other cases $K = c\,\beta^a$ $c,\ a,\ n$: see **Table ~~3.7~~2**	-Typo :Table 3.7 => Table 2

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(6) Stiffeners perpendicular to direction of compression
For stiffeners supporting plating subject to compression stresses perpendicular to the stiffener direction the moment of inertia of the stiffener section (including effective plate flange) is not to be less than:

$$I = \frac{0.81\sigma_a \sigma_{el} l^4 s}{t} \quad (\text{cm}^4)$$

l : span of stiffener (m)
s : spacing of stiffener (m)
t : plate thickness (mm)

$$\sigma_{el} = \frac{\sigma_c}{K_{J-O}}$$

$$\sigma_c = \frac{\sigma_a}{0.85}$$

σ_a : calculated extreme compressive stress, or ordinary local load stress divided by η_G
K_{J-O} : **Fig 3.1**

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