Corrigenda for 2021 Classification Technical Rules

2021. 11. 11

* Please note that this corrigenda is for the printed version of the 2021 Classification Technical Rules, and the PDF files posted on the website have been corrected.

PART 1

Present

〈Rule〉 Pt 1

CHAPTER 2 PERIODICAL AND OTHER SURVEYS

403. Requirements of survey

3. For additional requirements applicable to water level detectors fitted on single hold cargo ships, refer **Sec 14.**

〈Guidance〉 Pt 1

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

Ship Types	Remarks
5-1. Bulk Carrier	(12) : The additional notation, **HC,** is normally assigned to a ship with the double bottom structure specially strengthened for the carriage of heavy cargoes having mass density, ***g***, specified in **Pt 3, Ch 7, 101. 7** of the Rules, not less than 1.25(t/m^3).

Amendment

〈Rule〉 Pt 1

CHAPTER 2 PERIODICAL AND OTHER SURVEYS

403. Requirements of survey

3. For additional requirements applicable to water level detectors fitted on single hold cargo ships, refer **Sec 15.**

〈Guidance〉 Pt 1

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

Ship Types	Remarks
5-1. Bulk Carrier	(12) : The additional notation, **HC,** is normally assigned to a ship with the double bottom structure specially strengthened for the carriage of heavy cargoes having mass density, γ, specified in **Pt 3, Ch 7, 101. 7** of the Rules, not less than 1.25(t/m^3).

Note

CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME

105. Acceptance criteria for the corrosion

2.

(1) Acceptance criteria for pitting corrosion

(A) Side structures: for bulk carriers and double skin bulk carriers
If pitting intensity in an area where coating is required, according to Ch 3, Sec 5 of IACS Common Structural Rules for Bulk Carriers(**Pt 11**) or Sub-part 1, Ch 3, Sec 4 of IACS Common Structural Rules for Bulk Carriers and Oil Tankers(**Pt 13**), is higher than 15 % (see **Fig 1.2.1**), thickness measurements are to be performed to check the extent of pitting corrosion. The 15 % is based on pitting or grooving on only one side of a plate.

(B) Other structures
For plates with pitting intensity less than 20 % (see **Fig 1.2.1**), the measured thickness, t_m of any individual measurement is to meet the lesser of the following criteria:

(2) Acceptance criteria for edge corrosion

(A) Provided that the overall corroded height of the edge corrosion of the flange, or web in the case of flat bar stiffeners, is less than 25 % (see **Fig 1.2.2**), of the stiffener flange breadth or web height, as applicable, the measured thickness, t_m, is to meet the lesser of the following criteria:

(3) Acceptance criteria for grooving corrosion

(A) Where the groove breadth is a maximum of 15 % of the web height, but not more than 30 mm (see **Fig 1.2.3**), the measured thickness, t_m, in the grooved area is to meet the lesser of the following criteria:

〈Rule〉 Pt 1

CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME

105. Acceptance criteria for the corrosion

2.

(1) Acceptance criteria for pitting corrosion

(A) Side structures: for bulk carriers and double skin bulk carriers
If pitting intensity in an area where coating is required, according to Ch 3, Sec 5 of IACS Common Structural Rules for Bulk Carriers(**Pt 11**) or Sub-part 1, Ch 3, Sec 4 of IACS Common Structural Rules for Bulk Carriers and Oil Tankers(**Pt 13**), is higher than 15 % (**Ch 3** see **Fig 1.2.3**), thickness measurements are to be performed to check the extent of pitting corrosion. The 15 % is based on pitting or grooving on only one side of a plate.

(B) Other structures
For plates with pitting intensity less than 20 % (**Ch 3** see **Fig 1.2.3**), the measured thickness, t_m of any individual measurement is to meet the lesser of the following criteria:

(2) Acceptance criteria for edge corrosion

(A) Provided that the overall corroded height of the edge corrosion of the flange, or web in the case of flat bar stiffeners, is less than 25 % (**Ch 3** see **Fig 1.2.4**), of the stiffener flange breadth or web height, as applicable, the measured thickness, t_m, is to meet the lesser of the following criteria:

(3) Acceptance criteria for grooving corrosion

(A) Where the groove breadth is a maximum of 15 % of the web height, but not more than 30 mm (**Ch 3** see **Fig 1.2.5**), the measured thickness, t_m, in the grooved area is to meet the lesser of the following criteria:

현 행	개 정 안	비고
〈Rules〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 15 Hull Surveys for General Dry Cargo Ships 1504. Special Survey 1. ~ 6. 〈omitted〉 7. Additional Annual Survey requirements for single hold cargo ships (See 1501. 1 (1)) after determining compliance with SOLAS II-1/25 *(2020)* For ships(Refer to the 1502. 7) complying with the requirements of SOLAS II-1/25 for hold water level detectors, the Annual Survey is to include an examination and a test, at random, of the water ingress detection system and of their alarms.	〈Rules〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 15 Hull Surveys for General Dry Cargo Ships 1504. Special Survey 1. ~ 6. 〈same as the current Rules〉 7. Additional Annual Survey requirements for single hold cargo ships (See 1501. 1 (1)) after determining compliance with SOLAS II-1/25 *(2020)* For ships(Refer to the 1502. 7) complying with the requirements of SOLAS II-1/25 for hold water level detectors, ~~the Annual Survey is to include an examination and a test, at random, of the water ingress detection system and of their alarms.~~ the Special Survey is to include an examination and a test of the all water ingress detection system and their alarms.	

현 행	개 정 안	비고
〈Guidance〉 Pt 1	〈Guidance〉 Pt 1	
Annex 1-5 Thickness Measurement Method for Hull Structural Members	**Annex 1-5 Thickness Measurement Method for Hull Structural Members**	
Table 1 Wear limit on members	Table 1 Wear limit on members	

Wear relating to the Shearing Strength	The shearing strength evaluation is to be carried out in any of the following cases when the thickness measurement for the longitudinal strength evaluation is carried out in accordance with the separate requirements specified by the Society. 1) For oil tankers(including chemical tankers), the average corrosion of any stake in side shell or longitudinal bulkhead exceeds the followings, Class I : 2.0 mm Class II : 3.0 mm 2) For liquefied gas carriers, the average corrosion of any stake in side shell bulkhead exceeds the followings, or Class I : 1.5 mm Class II : 2.5 mm 3) For bulk carriers(including ore carriers) intended for alternate loading, the average corrosion of any stake in side shell or longitudinal bulkhead exceeds the followings Class I : 1.5 mm Class II : 2.5 mm

Wear relating to the Shearing Strength	The shearing strength evaluation is to be carried out in any of the following cases when the thickness measurement for the longitudinal strength evaluation is carried out in accordance with the separate requirements specified by the Society. 1) For oil tankers(including chemical tankers), the average corrosion of any stake in side shell or longitudinal bulkhead exceeds the followings, Class I : 2.0 mm Class II : 3.0 mm 2) For liquefied gas carriers, the average corrosion of any stake in side shell ~~bulkhead~~ exceeds the followings, or Class I : 1.5 mm Class II : 2.5 mm 3) For bulk carriers(including ore carriers) intended for alternate loading, the average corrosion of any stake in side shell or longitudinal bulkhead exceeds the followings Class I : 1.5 mm Class II : 2.5 mm

현 행	개 정 안	비고
〈Rules〉 Pt 1 CHAPTER 1 CLASSIFICATION Section 7 Responsibilities and Cooperation Duties of the Owners **704. Cooperation Duties** ***(2017)*** Notwithstanding the general duty of confidentiality owed by the Society to its clients as specified in **805.**, the Society's clients hereby accept that the Society will participate in Early Warning Scheme which requires each Society to provide the involved Societies (the Classification Societies classing a sister or a similar ship to the one involved in the incident) with relevant technical information (but not including any drawings relating to the ship which may be the specific property of another party) on serious hull structural and engineering systems failures, as defined in the Early Warning Scheme (Refer to IACS PR No.2A Procedure for Hull Failure Incident Reporting and PR No.2B Procedure for Early Warning of Serious Hull Failure Incidents – "Early Warning Scheme – EWS") to enable such useful information to be shared and utilized to facilitate the proper working of Early Warning Scheme. The Society will provide its client with written details of such information upon sending the same to the involved Societies.	〈Rules〉 Pt 1 CHAPTER 1 CLASSIFICATION Section 7 Responsibilities and Cooperation Duties of the Owners **704. Cooperation Duties** ***(2017)*** Notwithstanding the general duty of confidentiality owed by the Society to its clients as specified in 806. **805.**, the Society's clients hereby accept that the Society will participate in Early Warning Scheme which requires each Society to provide the involved Societies (the Classification Societies classing a sister or a similar ship to the one involved in the incident) with relevant technical information (but not including any drawings relating to the ship which may be the specific property of another party) on serious hull structural and engineering systems failures, as defined in the Early Warning Scheme (Refer to IACS PR No.2A Procedure for Hull Failure Incident Reporting and PR No.2B Procedure for Early Warning of Serious Hull Failure Incidents – "Early Warning Scheme – EWS") to enable such useful information to be shared and utilized to facilitate the proper working of Early Warning Scheme. The Society will provide its client with written details of such information upon sending the same to the involved Societies.	

현 행	개 정 안	비고
〈Rules〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 2 Annual Survey **203. Machinery, electrical installations and additional installations** 1. ~ 24. 〈Omitted〉 **25.** Gas-fuelled ships other than ships carrying liquefied gases in bulk and ships carrying CNG in bulk are also to meet with the requirements in **Ch 2, 201.** of the **Guidance for Gas-fuelled Ships,** in addition to the requirements in this section. 〈Omitted〉	〈Rules〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 2 Annual Survey **203. Machinery, electrical installations and additional installations** 1. ~ 24. 〈Same as present〉 25. Gas-fuelled ships other than ships carrying liquefied gases in bulk and ships carrying CNG in bulk are also to meet with the requirements in **Ch 4, 301.** of the **Rules/Guidance for the Classification of Ships Using Low-flashpoint Fuels,** in addition to the requirements in this section. 〈Same as present〉	

현 행	개 정 안	비고
CHAPTER 2 PERIODICAL AND OTHER SURVEYS **Section 7 Surveys of Propeller Shaft and Stern Tube Shaft, Etc.** **703. Open System Water Lubricated Shafts** **1. Shaft survey methods** (1) Method4 **【See Guidance】** (A) ~ (F) 〈Omitted〉 (G) Recording the bearing weardown measurements (after re-installation) 〈Omitted〉	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 7 Surveys of Propeller Shaft and Stern Tube Shaft, Etc.** **703. Open System Water Lubricated Shafts** **1. Shaft survey methods** (1) Method4 **【See Guidance】** (A) ~ (F) 〈Same as present〉 ~~(G) Recording the bearing weardown measurements (after re-installation)~~ 〈Same as present〉	

현 행	개 정 안	비고
〈Rule〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 3 Intermediate Survey **303. Machinery, electrical installations and additional installations** 1. ~ 8. 〈Omitted〉 **9.** Gas-fuelled ships other than ships carrying liquefied gases in bulk and ships carrying CNG in bulk are also to meet with the requirements in **Ch 2, 202.** of the **Guidance for Gas-fuelled Ships,** in addition to the requirements in this section. 〈Omitted〉 Section 5-1 Special Survey (Machinery, Electrical Installations and Additional Installations) **502. Requirements of survey** 1. ~ 5. 〈Omitted〉 **6.** Gas-fuelled ships other than ships carrying liquefied gases in bulk and ships carrying CNG in bulk are also to meet with the requirements in **Ch 2, 203.** of the **Guidance for Gas-fuelled Ships**, in addition to the requirements in this section. 〈Omitted〉	〈Rule〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 3 Intermediate Survey **303. Machinery, electrical installations and additional installations** 1. ~ 8. 〈Omitted〉 **9.** Gas-fuelled ships other than ships carrying liquefied gases in bulk and ships carrying CNG in bulk are also to meet with the requirements in Ch 4, 302. of the Rules/Guidance for the Classification of Ships Using Low-flashpoint Fuels, in addition to the requirements in this section. 〈Same as present〉 Section 5-1 Special Survey (Machinery, Electrical Installations and Additional Installations) **502. Requirements of survey** 1. ~ 5. 〈Omitted〉 **6.** Gas-fuelled ships other than ships carrying liquefied gases in bulk and ships carrying CNG in bulk are also to meet with the requirements in Ch 4, 303. of the Rules/Guidance for the Classification of Ships Using Low-flashpoint Fuels, in addition to the requirements in this section. 〈Same as present〉	

Present	Amendments	비고
〈Rule〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 1 General **101. Definitions** The definitions of terms used in **Ch 2** and **Ch 3** are to be as specified in the followings, unless otherwise specified elsewhere. **10.** A **transverse section** includes all longitudinal members contributing to longitudinal hull girder strength, such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom and longitudinal bulkhead and as applicable for the different ship types, relevant lognitudinals, hopper side bottom in top wing tank, inner sides. For a transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections. An example of typical transverse section in way of cargo hold is shown **Fig. 1.2.1** *(2020)*	〈Rule〉 Pt 1 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 1 General **101. Definitions** The definitions of terms used in **Ch 2** and **Ch 3** are to be as specified in the followings, unless otherwise specified elsewhere. **10.** A **transverse section** includes all longitudinal members contributing to longitudinal hull girder strength, such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom, hopper sloping, topside sloping and longitudinal bulkhead ~~and as applicable for the different ship types, relevant lognitudinals, hopper side bottom in top wing tank, inner sides.~~ For a transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections. An example of typical transverse section in way of cargo hold is shown **Fig. 1.2.1** *(2020)*	

Present	Amendments	비고
〈Rule〉 Pt 1 CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME Section 1 General 103. Documentation on board 1. ~ 2. 〈omitted〉 I3. Supporting documents (1) The following additional documentation is to be available onboard. (A) Main structural plans of cargo (holds) and ballast tanks (for vessels built under IACS Common Structural Rules(**Pt 11**, **Pt 12** or **Pt 13**), these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold/tank transverse section in all cargo holds/tanks)	〈Rule〉 Pt 1 CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME Section 1 General 103. Documentation on board 1. ~ 2. 〈omitted〉 I3. Supporting documents (1) The following additional documentation is to be available onboard. (A) Main structural plans of cargo holds, cargo tanks and ballast tanks (for vessels built under IACS Common Structural Rules(**Pt 11**, **Pt 12** or **Pt 13**), these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold/tank transverse section in all cargo holds/tanks)	

현 행	개 정 안	비고
〈Guidance〉 Pt 1	〈Guidance〉 Pt 1	
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**	
Section 3 Intermediate Survey *(2021)*	**Section 3 Intermediate Survey *(2021)***	
303. Machinery, electrical installations and additional installations *(2021)*	**303. Machinery, electrical installations and additional installations *(2021)***	
1. ~ 3. 〈Omitted〉	1. ~ 3. 〈Same as present〉	
4. In application to **303. 2** (3) of the Rules, "the Guidance" means that it is to be confirmed that the requirements specified in **902. 3** apply to the ship. **【See Rule】**	**4.** In application to **303. 2** (3) of the Rules, "the Guidance" means that it is to be confirmed that the requirements specified in **902. 2** apply to the ship. **【See Rule】**	
〈Omitted〉	〈Same as present〉	
Section 5-1 Special Survey (Machinery, Electrical Installations and Additional Installations)	**Section 5-1 Special Survey (Machinery, Electrical Installations and Additional Installations)**	
502. Requirements of survey	**502. Requirements of survey**	
1. ~ 2. 〈Omitted〉	1. ~ 2. 〈Same as present〉	
3. In application to **502. 1** (1) (d) of the Rules, "the Guidance" means the survey method in accordance with the manufacturer's maintenance manual. Nevertheless the extent of items may specially considered in accordance with the manufacturer's maintenance manual. Engines for passenger ships may also be overhauled(or opened up) in accordance with **902. 3.** (2) of the Guidance. *(2018)* **【See Rule】**	**3.** In application to **502. 1** (1) (d) of the Rules, "the Guidance" means the survey method in accordance with the manufacturer's maintenance manual. Nevertheless the extent of items may specially considered in accordance with the manufacturer's maintenance manual. Engines for passenger ships may also be overhauled(or opened up) in accordance with **902. 2.** (2) of the Guidance. *(2018)* **【See Rule】**	
〈Omitted〉	〈Same as present〉	

Present	Amendments	비고

〈Guidance〉 Pt 1

Annex 1-1 Character of Classification

Additional Special Feature Notations	Relevant Requirements
〈omitted〉	
LNG Ready D	to ships for which the generic Design is prepared in accordance with **Ch 2, Sec 2 of the Guidance for LNG Fuel Ready Ships**.
LNG Ready I (SR, FT, TV, FS, BS, ME, AE, B, ME-C, AE-C, B-C) *(2017)*	to ships for which parts of the systems are installed with the detailed design in accordance with **Ch 2, Sec 3** of the **Guidance for LNG Fuel Ready Ships**
CEmS-EGC(S)-D. O, C, H *(2021)*	to ships comply with the additional requirements for the exhaust gas cleaning system specified in **Ch 3 Sec.2** of the Guidance for Prevention System of Pollution from ships. (Type Approval & Certification of Classification) *(2021)*
CEmS-LSF *(2021)*	to ships using low sulphur fuel without exhaust gas cleaning system specified in **Ch 3 Sec.1** of the Guidance for Prevention System of Pollution from ships.

〈Guidance〉 Pt 1

Annex 1-1 Character of Classification

Additional Special Feature Notations	Relevant Requirements
〈same as the current Guidances〉	
LNG Ready D	to ships for which the generic Design is prepared in accordance with **Ch 2, Sec 3 of the Guidance for LNG Fuel Ready Ships**.
LNG Ready I (SR, FT, TV, FS, BS, ME, AE, B, ME-C, AE-C, B-C) *(2017)*	to ships for which parts of the systems are installed with the detailed design in accordance with **Ch 2, Sec 4** of the **Guidance for LNG Fuel Ready Ships**
CEmS-EGC(S)-D. O, C, H *(2021)*	to ships comply with the additional requirements for the exhaust gas cleaning system specified in **Ch 3 Sec.2** of the Guidance for Prevention System of Pollution from ships. (Type Approval & Certification of Classification) *(2021)*
CEmS-LSF *(2021)*	to ships using low sulphur fuel without exhaust gas cleaning system specified in **Ch 3 Sec.1** of the Guidance for Prevention System of Pollution from ships.

Present	Amendments	remark
# CHAPTER 1 CLASSIFICATION ## Section 9 Suspension/Withdrawal of Class and Reclassification **901. Suspension/Reinstatement of class** 1. ~ 4. 〈omitted〉 5. When a vessel is intended for a demolition voyage with any periodical survey overdue, the vessel's class suspension may be held in abeyance and consideration may be given to allow the vessel to proceed on a single direct ballast voyage from the lay up or final discharge port to the demolition yard. In such cases an Interim Certificate of Classification with conditions for the voyage noted may be issued provided the attending Surveyor finds the vessel in satisfactory condition to proceed for the intended voyage. 〈here in after, omitted〉	# CHAPTER 1 CLASSIFICATION ## Section 9 Suspension/Withdrawal of Class and Reclassification **901. Suspension/Reinstatement of class** 1. ~ 4. 〈same as the current Rules〉 5. When a vessel is intended for a demolition voyage with any periodical survey overdue, the vessel's class suspension may be held in abeyance and consideration may be given to allow the vessel to proceed on a single direct ballast voyage from the lay up or final discharge port to the demolition yard. In such cases a Conditional Certificate of Classification ~~an Interim Certificate of Classification~~ with conditions for the voyage noted may be issued provided the attending Surveyor finds the vessel in satisfactory condition to proceed for the intended voyage. 〈here in after, same as the current Rules〉	

PART 2

Present	Amendment	Note
〈Guidance〉 Pt 2 **Annex 2-7 Guidance for non-destructive testing of ship hull steel welds** **1. General** (8) **NDT plan** (E) In general start/stop points in welds made using automatic (mechanized) welding processes are to be examined using RT or UT, except for internal members where the extent of testing is to be agreed with the attending surveyor. *(2021)* **5. Radiographic Testing(RT)** (1) **Methods of radiography** (E) Consideration may be given for reduction of inspection frequency for automated welds where quality assurance techniques indicate consistent satisfactory quality. The number of checkpoints is to be increased if the proportion of non-conforming indications is abnormally high. *(2021)* **9. Unacceptable indications and repairs *(2021)*** (2) When unacceptable indications are found, additional areas of the same weld length shall be examined unless it is agreed with the surveyor and fabricator that the indication is isolated without any doubt. In case of automatic welded joints, additional NDT shall be extended to all areas of the same weld length.	**〈Guidance〉 Pt 2** **Annex 2-7 Guidance for non-destructive testing of ship hull steel welds** **1. General** (8) **NDT plan** (E) In general start/stop points in welds made using automatic or fully mechanized welding processes are to be examined using RT or UT, except for internal members where the extent of testing is to be agreed with the attending surveyor. *(2021)* **5. Radiographic Testing(RT)** (1) **Methods of radiography** (E) Consideration may be given for reduction of inspection frequency for automated or fully mechanized welds where quality assurance techniques indicate consistent satisfactory quality. The number of checkpoints is to be increased if the proportion of non-conforming indications is abnormally high. *(2021)* **9. Unacceptable indications and repairs *(2021)*** (2) When unacceptable indications are found, additional areas of the same weld length shall be examined unless it is agreed with the surveyor and fabricator that the indication is isolated without any doubt. In case of automatic or fully mechanized welded joints, additional NDT shall be extended to all areas of the same weld length.	

Present	Amendment	Note

〈Rules〉 Pt 2

CHAPTER 1 MATERIALS

302. Rolled steel plates for boiler

5. Mechanical properties

The mechanical properties of steel plates are to comply with the requirements given in **Table 2.1.12.**

Table 2.1.12 Mechanical Properties *(2019)*

Grade	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	
			*R*1*A*	*R*10
*RSP*24	235 min.	410 ~ 550	21 min.	25 min.
*RSP*30	295 min.	450 ~ 590	19 min.	23 min.
*RSP*32	315 min.	480 ~ 620	17 min.	21 min.
*RSP*30*A*	295 min.	450 ~ 590	19 min.	23 min.
*RSP*32*A*	315 min.	480 ~ 620	17 min.	21 min.

NOTE:
(1) ~ (3) 〈Omitted〉
(4) In case where the elongation of *RSP*46*A* and *RSP*49*A* steel plate with thickness over 6mm and less than 20 mm is insufficient within 3 % of the specified value, It will be able to regard as satisfactory if the elongation of the gauge length 50 mm which includes a rupture part is of 25 % or more.

〈Rules〉 Pt 2

CHAPTER 1 MATERIALS

302. Rolled steel plates for boiler

5. Mechanical properties

The mechanical properties of steel plates are to comply with the requirements given in **Table 2.1.12.**

Table 2.1.12 Mechanical Properties *(2019)*

Grade	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	
			*R*1*A*	*R*10
*RSP*24	235 min.	410 ~ 550	21 min.	25 min.
*RSP*30	295 min.	450 ~ 590	19 min.	23 min.
*RSP*32	315 min.	480 ~ 620	17 min.	21 min.
*RSP*30*A*	295 min.	450 ~ 590	19 min.	23 min.
*RSP*32*A*	315 min.	480 ~ 620	17 min.	21 min.

NOTE:
(1) ~ (3) 〈Same as the present Rules〉
(4) In case where the elongation of *RSP*30*A* and *RSP*32*A* steel plate with thickness over 6mm and less than 20 mm is insufficient within 3 % of the specified value, It will be able to regard as satisfactory if the elongation of the gauge length 50 mm which includes a rupture part is of 25 % or more.

PART 3

Present	Amendment	Note
〈Guidance〉 Pt 3 Ch1 GENERAL 405. Application of steels 【See Rule】 1. The steels used for the rounded gunwale are to be treated as shear strake. In such a case, width of a strake plate is to be not less than 1,300 mm for ship length L up to 100 m and 2,600 mm for L being not less than 250 m. When the ship length is between 100 m and 250 m, breadth is not to be less than the value which is obtained by interpolation.	〈Guidance〉 Pt 3 Ch1 GENERAL 405. Application of steels 【See Rule】 1. The steels used for the rounded gunwale are to be treated as sheer strake. In such a case, width of a strake plate is to be not less than 1,300 mm for ship length L up to 100 m and 2,600 mm for L being not less than 250 m. When the ship length is between 100 m and 250 m, breadth is not to be less than the value which is obtained by interpolation.	

Present	Amendment	Reason
〈Guidance〉 Pt 3 **Annex 3-3 Guidance for the Fatigue Strength Assessment of Ship Structures** **6. Spectral fatigue analysis** (4) Short-term response (A) Since the wave is assumed to be stationary in a short-term sea state, its statistical properties are specified by the wave spectrum. The wave spectrum for the different sea states can be given by the following Pierson-Moskowitz wave spectrum. $$S_\eta(\omega|H_s,T_z) = \frac{H_s^2}{4\pi}\left(\frac{2\pi}{T_z}\right)^4\omega^{-5}\exp\left[-\frac{1}{\pi}\left(\frac{2\pi}{T_z}\right)^4\omega^{-4}\right]$$ where, ω = wave frequency (rad/sec) H_s = significant wave height T_z = wave period	〈Guidance〉 Pt 3 **Annex 3-3 Guidance for the Fatigue Strength Assessment of Ship Structures** **6. Spectral fatigue analysis** (4) Short-term response (A) Since the wave is assumed to be stationary in a short-term sea state, its statistical properties are specified by the wave spectrum. The wave spectrum for the different sea states can be given by the following Bretschneider or two parameter Pierson-Moskowitz spectrum. $$S_\eta(\omega|H_s,T_z) = \frac{H_s^2}{4\pi}\left(\frac{2\pi}{T_z}\right)^4\omega^{-5}\exp\left[-\frac{1}{\pi}\left(\frac{2\pi}{T_z}\right)^4\omega^{-4}\right]$$ where, ω = wave frequency (rad/sec) H_s = significant wave height T_z = wave period	

PART 4

Present	Amendment	Note
〈Rule〉 Pt 4 Ch1 RUDDERS 903. Bearing clearances 【See Guidance】 With metal bearings clearances are not to be less than d_{bs}/1000+1.0 (mm) on the diameter. where : d_{bs} = the internal diameter of bush (mm). If non-metallic bearing material is applied, the bearing clearance is to be specially determined considering the material's swelling and thermal expansion properties. This clearance not is to be taken less than 1.5 mm on bearing diameter. unless a smaller clearance is supported by the manufacture's recommendation and there is documented evidence of satisfactory service history with a reduced clearance. Ch 1 RUDDERS Section 1 General 107. Equivalence 1. This Society may accept alternatives to requirements given in this Chapter provided they are deemed to be equivalent according to Pt 1, 104. or 105. of the Guidance.	〈Rule〉 Pt 4 Ch1 RUDDERS 903. Bearing clearances 【See Guidance】 With metal bearings clearances are not to be less than d_{bs}/1000+1.0 (mm) on the diameter. where : d_{bs} = the internal diameter of bush (mm). If non-metallic bearing material is applied, the bearing clearance is to be specially determined considering the material's swelling and thermal expansion properties. This clearance is not to be taken less than 1.5 mm on bearing diameter unless a smaller clearance is supported by the manufacture's recommendation and there is documented evidence of satisfactory service history with a reduced clearance. Ch 1 RUDDERS Section 1 General 107. Equivalence 1. This Society may accept alternatives to requirements given in this Chapter provided they are deemed to be equivalent according to Pt 1, 105. of the Rules.	

Present	Amendment	Note
〈Guidance〉 Pt 4 Ch 1 RUDDERS Section 11 Propeller Nozzles 1101. Application 【See Rule】 In **1101. 1** of the Rules, the term "specially considered" means the cases as considered in accordance with **Pt 1, Ch 1, 104.** or **105.** of the Guidance. Ch 2 HATCHWAYS AND OTHER DECK OPENINGS Section 5 Hatch cover details – Closing Arrangement, Securing Devices and Stoppers 502. General 【See Rule】 In **502. 6** of the Rules, the term "considered by the Society" means the cases as considered in accordance with **Pt 1, Ch 1, 104.** or **105.** of the Guidance. Ch 11 ACCESS TO AND WITHIN SPACES, ~ 〈omission〉 BULK CARRIERS Section 2 Technical Provisions for Means of Access for Inspections 202. Technical provisions 【See Rule】 **7.** In application of **202. 9** (6) of the Rules, ~ 〈omission〉 In **202. 9** (7) the Rules, the "other means of access, approved by and acceptable to this Society" means the case where the means are approved by **Pt 1, Ch 1, 104.** or **105.** of the Guidance or equivalent means.	〈Guidance〉 Pt 4 Ch 1 RUDDERS Section 11 Propeller Nozzles 1101. Application 【See Rule】 In **1101. 1** of the Rules, the term "specially considered" means the cases as considered in accordance with **Pt 1, Ch 1, 105.** of the Rules. Ch 2 HATCHWAYS AND OTHER DECK OPENINGS Section 5 Hatch cover details – Closing Arrangement, Securing Devices and Stoppers 502. General 【See Rule】 In **502. 6** of the Rules, the term "considered by the Society" means the cases as considered in accordance with **Pt 1, Ch 1, 105.** of the Rules. Ch 11 ACCESS TO AND WITHIN SPACES, ~ 〈omission〉 BULK CARRIERS Section 2 Technical Provisions for Means of Access for Inspections 202. Technical provisions 【See Rule】 **7.** In application of **202. 9** (6) of the Rules, ~ 〈omission〉 In **202. 9** (7) the Rules, the "other means of access, approved by and acceptable to this Society" means the case where the means are approved by **Pt 1, Ch 1, 105.** of the Rules. or equivalent means.	

PART 7

Present	Amendment	Note
〈Rule〉 Pt 7 Ch 3 BULK CARRIERS 301. General 【See Guidance】 **2.** The scantlings of structural members in double bottom tanks intended to be deep tanks are to be correspondingly in accordance with the requirements in **Pt 3,** Ch 7**,** as well as the requirements in this Section. However, the thickness of inner bottom plating need not be increased by 1 mm as given in **Pt 3, Ch 15, 208.** for the top plating of deep tanks.	〈Rule〉 Pt 7 Ch 3 BULK CARRIERS 301. General 【See Guidance】 **2.** The scantlings of structural members in double bottom tanks intended to be deep tanks are to be correspondingly in accordance with the requirements in **Pt 3,** Ch 15**,** as well as the requirements in this Section. However, the thickness of inner bottom plating need not be increased by 1 mm as given in **Pt 3, Ch 15, 208.** for the top plating of deep tanks.	

Present	Amendment	Note
〈Rules〉 Pt 7 ## Ch 2 ORE CARRIERS ### 201. General **2.** The height of double bottoms is to be determined in such a manner that the center of gravity of the ship is sufficiently high in full load condition. However, the height h is not to be less than that obtained from the following formula. $h = B/20$ However, in no case is the value of h to be less than 0.76 m~~, and need not be taken as more than 2 m~~.	〈Rules〉 Pt 7 ## Ch 2 ORE CARRIERS ### 201. General **2.** The height of double bottoms is to be determined in such a manner that the center of gravity of the ship is sufficiently high in full load condition. However, the height h is not to be less than that obtained from the following formula. $h = B/20$ However, in no case is the value of h to be less than 0.76 m.	

Present	Amendment	Note
〈Rules〉 Pt 7 Ch 3 BULK CARRIERS Section 9 Hatch Covers and Hatch Coamings of Cargo Holds 906. Corrosion addition and steel renewal **1. Hatch covers** (1) For all the structure (plating and secondary stiffeners) of single skin hatch covers, the corrosion addition t_s is to be 2.0 mm. (2) For pontoon hatch covers, the corrosion addition is to be: 2.0 mm for the top and bottom plating 1.5 mm for the internal structures. (3) For single skin hatch covers and for the plating of pontoon hatch covers, steel renewal is required where the gauged thickness is less than $t_{net}+0.5$mm. (4), (5) 〈omission〉 (6) For the internal structure of pontoon hatch covers, thickness gauging is required when plating renewal is to be carried out or when this is deemed necessary, at the discretion of the Society's Surveyor, on the basis of the plating corrosion or deformation condition. In these cases, steel renewal for the internal structures is required where the gauged thickness is less than t_{net}.	〈Rules〉 Pt 7 Ch 3 BULK CARRIERS Section 9 Hatch Covers and Hatch Coamings of Cargo Holds 906. Corrosion addition and steel renewal **1. Hatch covers** (1) For all the structure (plating and secondary stiffeners) of single skin hatch covers, the corrosion addition t_s is to be 2.0 mm. (2) For double skin hatch covers, the corrosion addition is to be: 2.0 mm for the top and bottom plating 1.5 mm for the internal structures. (3) For single skin hatch covers and for the plating of double skin hatch covers, steel renewal is required where the gauged thickness is less than $t_{net}+0.5$mm. (4), (5) 〈same as current〉 (6) For the internal structure of double skin hatch covers, thickness gauging is required when plating renewal is to be carried out or when this is deemed necessary, at the discretion of the Society's Surveyor, on the basis of the plating corrosion or deformation condition. In these cases, steel renewal for the internal structures is required where the gauged thickness is less than t_{net}.	

Present	Amendment	Note
〈Guidance〉 Pt 7 Ch 1 OIL TANKERS Section 3 Longitudinal Frames and Beams in Cargo Oil Spaces 303. Attachment 【See Rule】 **4.** The connection of transverse bulkheads and brackets are to be rounded or levelled, as shown in **Fig 7.1.14.** (2) The connection of end brackets and bulkhead plating is to be reinforced to avoid hard spots, as shown in **Fig 7.1.15.**	〈Guidance〉 Pt 7 Ch 1 OIL TANKERS Section 3 Longitudinal Frames and Beams in Cargo Oil Spaces 303. Attachment 【See Rule】 **4.** The connection of transverse bulkheads and brackets are to be rounded or levelled, as shown in **Fig 7.1.14.** (2) The connection of end brackets and bulkhead plating is to be reinforced to avoid hot spots, as shown in **Fig 7.1.15.**	

Present	Amendment	Note
〈Guidance〉 Pt 7	〈Guidance〉 Pt 7	
# Ch 2 ORE CARRIERS	# Ch 2 ORE CARRIERS	
## Section 1 General	## Section 1 General	
101. Application 【See Rule】	101. Application 【See Rule】	
3. In application to **101. 4** of the Rules, the term "deemed appropriate by the Society" means to comply with the direct strength calculation specified in **Pt 3, Ch 1, 206.** of the Rules, or to accept in accordance with **Pt 1, Ch 1,** 104. of the Guidance.	**3.** In application to **101. 4** of the Rules, the term "deemed appropriate by the Society" means to comply with the direct strength calculation specified in **Pt 3, Ch 1, 206.** of the Rules, or to accept in accordance with **Pt 1, Ch 1,** 105. of the Rules.	
# Ch 4 CONTAINER SHIPS	# Ch 4 CONTAINER SHIPS	
## Section 1 General	## Section 1 General	
101. Application 【See Rule】	101. Application 【See Rule】	
In application to **101. 4** of the Rules, the term "discretion of the Society" means to comply with the direct strength calculation specified in **Pt 3, Ch 1, 206.** of the Rules, or to accept in accordance with **Pt 1, Ch 1,** 104. of the Guidance.	In application to **101. 4** of the Rules, the term "discretion of the Society" means to comply with the direct strength calculation specified in **Pt 3, Ch 1, 206.** of the Rules, or to accept in accordance with **Pt 1, Ch 1,** 105. of the Rules.	

Present	Amendment	Note
〈Guidance〉 Pt 7	〈Guidance〉 Pt 7	
# Ch 10 DOUBLE HULL TANKER	# Ch 10 DOUBLE HULL TANKER	
## Section 1 General	## Section 1 General	
103. Minimum thickness With respect to the requirements of **103. 1** of the Rules, this requirements are applicable to cargo oil tank and deep tank with larger length or width than $0.1L + 5.0(\mathrm{m})$. 【See Rule】	103. Minimum thickness 【See Rule】 With respect to the requirements of **103. 1** of the Rules, this requirements are applicable to cargo oil tank and deep tank with larger length or width than $0.1L + 5.0(\mathrm{m})$.	
104. Minimum distance between asphalt cargo tank and the adjacent members For asphalt carrier which all cargo tanks are independent tank, the requirements of **Ch 1 Sec 1 101. 4** are applicable to these ships.	~~104. Minimum distance between asphalt cargo tank and the adjacent members~~ ~~For asphalt carrier which all cargo tanks are independent tank, the requirements of **Ch 1 Sec 1 101. 4** are applicable to these ships~~	
## Annex 7-2 Guidance for the Container Securing Arrangements	## Annex 7-2 Guidance for the Container Securing Arrangements	
8. Determination and application of forces	8. Determination and application of forces	
Table 5 Dynamic motion combination factor (2019)	Table 5 Dynamic motion combination factor (2019)	

		C_{XS}
OSPH	1	0.6
	2	-0.6

		C_{XS}
OSPH	1	-0.6
	2	0.6

Present	Amendment	Note
〈Rules〉 Pt 7	〈Rules〉 Pt 7	
Ch 1 OIL TANKERS	**Ch 1 OIL TANKERS**	
Section 6 Relative Deformation of Wing Tanks	**Section 6 Relative Deformation of Wing Tanks**	
601. Relative deformation of wing tanks 【See Guidance】	601. Relative deformation of wing tanks 【See Guidance】	
For vertical corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	For vertical corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	
For horizontal corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	For horizontal corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	
Ch 2 ORE CARRIERS	**Ch 2 ORE CARRIERS**	
Section 5 Relative Deformation of Wing Tanks	**Section 5 Relative Deformation of Wing Tanks**	
501. Relative deformation of wing tanks 【See Guidance】	501. Relative deformation of wing tanks 【See Guidance】	
For vertical corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	For vertical corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	
For horizontal corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	For horizontal corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	

Present	Amendment	Note
〈Rules〉 Pt 7 CHAPTER 3 BULK CARRIERS Section 9 Hatch Covers and Hatch Coamings of Cargo Holds 904. Hatch coamings and local details 3. Net scantlings of longitudinal and transverse secondary stiffeners $Z = \frac{1000 S_{coam} l^2 SP_{coam}}{m c_P \sigma_{a,coam}}$ where, m = 16 in general = 12 for the end spans	〈Rules〉 Pt 7 CHAPTER 3 BULK CARRIERS Section 9 Hatch Covers and Hatch Coamings of Cargo Holds 904. Hatch coamings and local details 3. Net scantlings of longitudinal and transverse secondary stiffeners $Z = \frac{1000 S_{coam} l^2 SP_{coam}}{m c_P \sigma_{a,coam}}$ where, m = 16 in general = 12 for the end spans	

Present	Amendment	Note
〈Guidance〉 Pt 7 Annex 7-5 **2. Evaluation of Allowable Hold Loading of Cargo Hold No. 1 with Cargo Hold No. 1 Flooded, for Existing Bulk Carrier** (3) Shear capacity of the double bottom of hold No. 1 (E) In calculating the shear strength, the net thickness of floors and girders is to be used. The net thickness $t_{\neq t}$, in mm, is given by: $t_{\neq t} = t - t_c \quad (\mathrm{mm})$	〈Guidance〉 Pt 7 Annex 7-5 **2. Evaluation of Allowable Hold Loading of Cargo Hold No. 1 with Cargo Hold No. 1 Flooded, for Existing Bulk Carrier** (3) Shear capacity of the double bottom of hold No. 1 (E) In calculating the shear strength, the net thickness of floors and girders is to be used. The net thickness $t_{\neq t}$, in mm, is given by: $t_{net} = t - t_c \quad (\mathrm{mm})$	

Present	Amendment	Note
〈Rules〉 Pt 7	〈Rules〉 Pt 7	
Ch 1 OIL TANKERS	**Ch 1 OIL TANKERS**	
Section 6 Relative Deformation of Wing Tanks	**Section 6 Relative Deformation of Wing Tanks**	
601. Relative deformation of wing tanks 【See Guidance】	601. Relative deformation of wing tanks 【See Guidance】	
For vertical corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	For vertical corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	
For horizontal corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	For horizontal corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	
Ch 2 ORE CARRIERS	**Ch 2 ORE CARRIERS**	
Section 5 Relative Deformation of Wing Tanks	**Section 5 Relative Deformation of Wing Tanks**	
501. Relative deformation of wing tanks 【See Guidance】	501. Relative deformation of wing tanks 【See Guidance】	
For vertical corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	For vertical corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	
For horizontal corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	For horizontal corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	

Present

〈Guidance〉 Pt 7

Annex 7-11 Guidance on Providing Safe Working Conditions for Securing of Containers on Deck

Table 1 Working and transit area dimension

Dimension (see Fig)	Description	Requirement (mm)
A	〈omit〉	min. 750
B	〈omit〉	min. 600
C1	Distance from lashing bridge fencing to container stack (**Fig 2**)	max 1,100
C2	〈omit〉	min. 220
	〈omit〉	

(Notes)
B Measured between the centers of the lashing plates.
C1 Measured from inside of fencing.
C2, C3 Measured from center of lashing plate to end of container.
F, K Measured to inside of fencing.
GL Measured from end of container to inside of fencing.
GT Measured to inside of fencing.
I Measured to inside of fencing.
J Measured to inside of fencing.
* may be increased to 1,300㎜ depending on the approval of Flag state.

Amendment

〈Guidance〉 Pt 7

Annex 7-11 Guidance on Providing Safe Working Conditions for Securing of Containers on Deck

Table 1 Working and transit area dimension

Dimension (see Fig)	Description	Requirement (mm)
A	〈omit〉	min. 750
B	〈omit〉	min. 600
C1	Distance from lashing bridge fencing to container stack (**Fig 2**)	max 1,100*
C2	〈omit〉	min. 220
	〈omit〉	

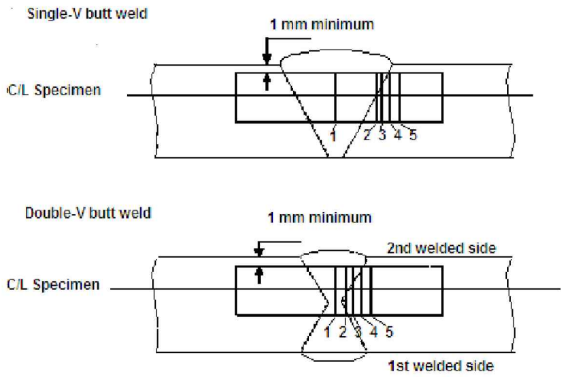
(Notes)
B Measured between the centers of the lashing plates.
C1 Measured from inside of fencing.
C2, C3 Measured from center of lashing plate to end of container.
F, K Measured to inside of fencing.
GL Measured from end of container to inside of fencing.
GT Measured to inside of fencing.
I Measured to inside of fencing.
J Measured to inside of fencing.
* may be increased to 1,300㎜ depending on the approval of Flag state.

Note

Present	Amendment	Note
〈Guidance〉 Pt 7 Annex 7-5 2. Evaluation of Allowable Hold Loading of Cargo Hold No. 1 with Cargo Hold No. 1 Flooded, for Existing Bulk Carrier (3) Shear capacity of the double bottom of hold No. 1 (E) In calculating the shear strength, the net thickness of floors and girders is to be used. The net thickness $t_{\neq t}$, in mm, is given by: $t_{\neq t} = t - t_c \quad (\mathrm{mm})$	〈Guidance〉 Pt 7 Annex 7-5 2. Evaluation of Allowable Hold Loading of Cargo Hold No. 1 with Cargo Hold No. 1 Flooded, for Existing Bulk Carrier (3) Shear capacity of the double bottom of hold No. 1 (E) In calculating the shear strength, the net thickness of floors and girders is to be used. The net thickness $t_{\neq t}$, in mm, is given by: $t_{net} = t - t_c \quad (\mathrm{mm})$	

PART 7 (CH5, 6)

Present	Amendment	Note
〈Rules〉 Pt 7 Ch 5 SHIPS CARRYING LIQUEFIED GASES IN BULK Section 1 General **101. Application (IGC Code 1.1)** 【See Guidance】 **2.** (1) Unless expressly provided otherwise, this Chapter apply to ships whose keels are laid, or which are at a similar stage of construction where: (A) construction identifiable with the ship begins; and (B) assembly of that ship has commenced, comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less, on or after 1 July 2016. **508. Piping fabrication and joining details** **4.** In application to **508. 5** of the Rules, the term "the Society may consider alternative arrangementse" means the acceptance in accordance with **Pt 1, Ch 1, 104.** of the Guidance. 【See Rule】	〈Rules〉 Pt 7 Ch 5 SHIPS CARRYING LIQUEFIED GASES IN BULK Section 1 General **101. Application (IGC Code 1.1)** 【See Guidance】 **2.** (1) Unless expressly provided otherwise, this Chapter apply to ships whose keels are laid on or after 1 July 2016, or which are at a similar stage of construction where: (A) construction identifiable with the ship begins; and (B) assembly of that ship has commenced, comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is less, **508. Piping fabrication and joining details** **4.** In application to **508. 5** of the Rules, the term "the Society may consider alternative arrangementse" means the acceptance in accordance with **Pt 1, Ch 1, 105.** of the Rules. 【See Rule】	

Present	Amendment	Note
〈Rules〉 Pt 7 **Section 2 Ship Survival Capability and Location of Cargo Tanks** 207. Survival requirements (IGC Code 2.7) 【See Guidance】 **2. At final equilibrium after flooding:** (1) the righting lever curve ~ 〈omit〉. Within this range, the immersion of any of the openings listed in **1** (1) and other openings capable of being closed weathertight may be permitted; and **Section 6 Materials of Construction and Quality Control** 603. General test requirements and specifications (IGC Code 6.3) 【See Guidance】 **2. Toughness test** (3) 〈omit〉. The specimens shall be taken generally at each of the following locations, as shown in **Figure 7.5.18**, on the centreline of the welds, the fusion line and 1 mm, 3 mm and 5 mm from the fusion line. Fig. 7.5.18  	**〈Rules〉 Pt 7** **Section 2 Ship Survival Capability and Location of Cargo Tanks** 207. Survival requirements (IGC Code 2.7) 【See Guidance】 **2. At final equilibrium after flooding:** (1) the righting lever curve ~ 〈same as current〉. Within this range, the immersion of any of the openings listed in **1** (1) and other openings capable of being closed weathertight may be permitted (see. **Fig. 7.5.6**); and **Section 6 Materials of Construction and Quality Control** 603. General test requirements and specifications (IGC Code 6.3) 【See Guidance】 **2. Toughness test** (3) 〈same as current〉. The specimens shall be taken generally at each of the following locations, as shown in **Figure 7.5.18**, on the centreline of the welds, the fusion line and 1 mm, 3 mm and 5 mm from the fusion line. Fig. 7.5.18 〈same as current〉 Notch location in **Fig. 7.5.18** .1 Centreline of the weld .2 Fusion line (F.L.) .3 In heat affected zone(HAZ), 1 mm from the F.L. .4 In HAZ, 3 mm from the F.L. .5 In HAZ, 5 mm from the F.L	

Present	Amendment	Note
〈Rules〉 Pt 7	**〈Rules〉 Pt 7**	
605. Welding of metallic materials and non-destructive testing (IGC Code 6.5)	**605. Welding of metallic materials and non-destructive testing (IGC Code 6.5)**	
3. Welding procedure tests for cargo tanks and process pressure vessels 【See Guidance】	**3. Welding procedure tests for cargo tanks and process pressure vessels 【See Guidance】**	
(5) Each test shall satisfy the following requirements: (A) tensile tests: cross-weld tensile strength shall not be less than the specified minimum tensile strength for the appropriate parent materials. For aluminium alloys, reference shall be made to **418. 1** (3) with regard to the requirements for weld metal strength of under-matched welds (where the weld metal has a lower tensile strength than the parent metal). In every case, the position of fracture shall be recorded for information.	(5) Each test shall satisfy the following requirements: (A) tensile tests: cross-weld tensile strength shall not be less than the specified minimum tensile strength for the appropriate parent materials. For materials such as aluminum alloys, reference shall be made to **418. 1** (3) with regard to the requirements for weld metal strength of under-matched welds (where the weld metal has a lower tensile strength than the parent metal). In every case, the position of fracture shall be recorded for information.	
Ch 6 Ships Carrying Dangerous Chemicals in Bulk	**Ch 6 Ships Carrying Dangerous Chemicals in Bulk**	
Section 1 General	**Section 1 General**	
106. Definitions (IBC Code 1.3)	**106. Definitions (IBC Code 1.3)**	
21. "Machinery spaces" are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces.	**21. "Machinery spaces"** are all machinery spaces of category A and all other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces.	
22. "MARPOL 73/78" means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.	**22. "MARPOL 73/78"** means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997, as amended.	

Present	Amendment	Note
〈Rules〉 Pt 7	〈Rules〉 Pt 7	
Ch 1 OIL TANKERS	**Ch 1 OIL TANKERS**	
Section 6 Relative Deformation of Wing Tanks	**Section 6 Relative Deformation of Wing Tanks**	
601. Relative deformation of wing tanks 【See Guidance】	601. Relative deformation of wing tanks 【See Guidance】	
For vertical corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	For vertical corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	
For horizontal corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	For horizontal corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	
Ch 2 ORE CARRIERS	**Ch 2 ORE CARRIERS**	
Section 5 Relative Deformation of Wing Tanks	**Section 5 Relative Deformation of Wing Tanks**	
501. Relative deformation of wing tanks 【See Guidance】	501. Relative deformation of wing tanks 【See Guidance】	
For vertical corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	For vertical corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad athwartships \quad (\mathrm{m})}{b}$	
For horizontal corrugation : $\frac{Girth \quad \leq ngth \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	For horizontal corrugation : $\frac{Girth \quad length \quad of \quad ship \quad in \quad depthwise \quad (\mathrm{m})}{D}$	

Present	Amendment	Note
〈Rules〉 Pt 7 CHAPTER 3 BULK CARRIERS Section 9 Hatch Covers and Hatch Coamings of Cargo Holds 904. Hatch coamings and local details **3. Net scantlings of longitudinal and transverse secondary stiffeners** $Z = \frac{1000 S_{coam} l^2 SP_{coam}}{m c_P \sigma_{a,coam}}$ where, m = 16 in general = 12 for the end spans	〈Rules〉 Pt 7 CHAPTER 3 BULK CARRIERS Section 9 Hatch Covers and Hatch Coamings of Cargo Holds 904. Hatch coamings and local details **3. Net scantlings of longitudinal and transverse secondary stiffeners** $Z = \frac{1000 S_{coam} l^2 SP_{coam}}{m c_P \sigma_{a,coam}}$ where, m = 16 in general = 12 for the end spans	

Present	Amendment	Note
〈Guidance〉 Pt 7 Annex 7-5 2. Evaluation of Allowable Hold Loading of Cargo Hold No. 1 with Cargo Hold No. 1 Flooded, for Existing Bulk Carrier (3) Shear capacity of the double bottom of hold No. 1 (E) In calculating the shear strength, the net thickness of floors and girders is to be used. The net thickness $t_{\neq t}$, in mm, is given by: $t_{\neq t} = t - t_c \quad (\mathrm{mm})$	〈Guidance〉 Pt 7 Annex 7-5 2. Evaluation of Allowable Hold Loading of Cargo Hold No. 1 with Cargo Hold No. 1 Flooded, for Existing Bulk Carrier (3) Shear capacity of the double bottom of hold No. 1 (E) In calculating the shear strength, the net thickness of floors and girders is to be used. The net thickness $t_{\neq t}$, in mm, is given by: $t_{net} = t - t_c \quad (\mathrm{mm})$	

Present	Amendment	Note
〈Rules〉 - Pt 7-2 **Ch.6 Ships Carrying Dangerous Chemicals in Bulk** **Section 1 General** 106. Definitions (IBC Code 1.3) 23. **"Noxious liquid substance"** means any substance indicated in the pollution Category column of chapter 17 or 18 of the International Chemical Code, or the current MEPC.2/Circular or provisionally assessed under the provisions of regulation 6.3 of MARPOL Annex II as falling into category X, Y or Z.	〈Rules〉 - Pt 7-2 **Ch.6 Ships Carrying Dangerous Chemicals in Bulk** **Section 1 General** 106. Definitions (IBC Code 1.3) 23. **"Noxious liquid substance"** means any substance indicated in the pollution Category column of chapter 17 or 18 of the International Bulk Chemical Code, or the current MEPC.2/Circular or provisionally assessed under the provisions of regulation 6.3 of MARPOL Annex II as falling into category X, Y or Z.	

PART 10

Present	Amendment	Note
〈Rule〉 Pt 10 Ch7 DOUBLE BOTTOMS 202. Manholes 1. Manholes may be provided on centre girders in every frame space outside 0.75 L amidships. 2. Manholes may be provided on centre girders in alternate frame spaces for 0.75 L amidships, provided that the depth of holes does not exceed one-third of the depth of centre girder.	〈Rule〉 Pt 10 Ch7 DOUBLE BOTTOMS 202. Lightening holes 1. Lightening holes may be provided on centre girders in every frame space outside 0.75 L amidships. 2. Lightening holes may be provided on centre girders in alternate frame spaces for 0.75 L amidships, provided that the depth of holes does not exceed one-third of the depth of centre girder.	
〈Guidance〉 Pt 10 Ch 8 FRAMES 301. Application 【See Rule】 In application to **301. 2** of the Rules, the term "specially considered" means the compliance with **Pt 7,** Ch 1**, Sec 7** of the Rules, or the acceptance in accordance with **Pt 1, Ch 1, 104.** of the Guidance.	〈Guidance〉 Pt 10 Ch8 FRAMES 301. Application 【See Rule】 In application to **301. 2** of the Rules, the term "specially considered" means the compliance with **Pt 7,** Ch 3**, Sec 7** of the Rules, or the acceptance in accordance with **Pt 1, Ch 1, 104.** of the Guidance.	

Present	Amendment	Note
〈Rules〉 Pt 10	〈Rules〉 Pt 10	
Ch14 WATERTIGHT BULKHEADS	**Ch14 WATERTIGHT BULKHEADS**	
203. Stiffeners 【See Guidance】	**203. Stiffeners** 【See Guidance】	
where :	where :	
l = span measured between the adjacent supports of stiffeners including the length of connection (mm). Where girders are provided, it is the distance from the heel of end connection to the first girder or the distance between the girders.	l = span measured between the adjacent supports of stiffeners including the length of connection (m). Where girders are provided, it is the distance from the heel of end connection to the first girder or the distance between the girders.	
S = spacing of stiffeners (m)	S = spacing of stiffeners (m)	
h = vertical distance measured from the midpoint of l for vertical stiffeners, and from the midpoint of distance between the adjacent stiffeners for horizontal stiffeners, to the top of bulkhead deck at the centre line of ship (mm). Where the vertical distance is less than 6.0 m, h is to be taken as 1.2 m greater than 0.8 times the vertical distance.	h = vertical distance measured from the midpoint of l for vertical stiffeners, and from the midpoint of distance between the adjacent stiffeners for horizontal stiffeners, to the top of bulkhead deck at the centre line of ship (m). Where the vertical distance is less than 6.0 m, h is to be taken as 1.2 m greater than 0.8 times the vertical distance.	

Present	Amendment	Note
〈Guidance〉 Pt 10	〈Guidance〉 Pt 10	
CHAPTER 1 GENERAL	CHAPTER 1 GENERAL	
Section 2 General	Section 2 General	
Table 10.1.1 Minimum dimension and lightening of the members	Table 10.1.1 Minimum dimension and lightening of the members	
Min. thickness of deck 30 m3	Min. thickness of deck 30 m^3	
Table 10.1.2 Height of sills of hatch coaming and other access openings	Table 10.1.2 Height of sills of hatch coaming and other access openings	
less than 0.45 m2 0.45~1.5 m2	less than 0.45 m^2 0.45~1.5 m^2	
202. Exception in application 【See Rule】 In application to **202.** of the Rules, the term "the discretion of the Society" means the compliance with the direct strength calculation specified in **Pt 3, Ch 1, 206.** of the Rules, or the acceptance in accordance with **Pt 1, Ch 1, 104.** of the Guidance.	202. Exception in application 【See Rule】 In application to **202.** of the Rules, the term "the discretion of the Society" means the compliance with the direct strength calculation specified in **Pt 3, Ch 1, 206.** of the Rules, or the acceptance in accordance with **Pt 1, Ch 1, 105.** of the Rules.	
Section 3 Materials, Welding and Construction	Section 3 Materials, Welding and Construction	
301. Materials 【See Rule】	301. Materials 【See Rule】	
4. In application to **301. 4** of the Rules, the term "the discretion of the Society" means the acceptance in accordance with **Pt 1, Ch 1,** 104. of the Guidance. **【See Rule】**	**4.** In application to **301. 4** of the Rules, the term "the discretion of the Society" means the acceptance in accordance with **Pt 1, Ch 1,** 105. of the Rules. **【See Rule】**	

Present	Amendment	Note
〈Guidance〉 Pt 10	〈Guidance〉 Pt 10	
CHAPTER 8 FRAMS	CHAPTER 8 FRAMS	
Section 1 General	Section 1 General	
104. Frames in boiler spaces and in way of bossing 【See Rule】 In application to **104. 2** of the Rules, the term "the satisfaction of the Society" means the acceptance in accordance with **Pt 1, Ch 1,** 104. of the Guidance.	104. Frames in boiler spaces and in way of bossing 【See Rule】 In application to **104. 2** of the Rules, the term "the satisfaction of the Society" means the acceptance in accordance with **Pt 1, Ch 1,** 105. of the Rules.	
Section 3 Transverse Hold Frames	Section 3 Transverse Hold Frames	
301. Application 【See Rule】 In application to **301. 2** of the Rules, the term "specially considered" means the compliance with **Pt 7, Ch 1, Sec 7** of the Rules, or the acceptance in accordance with **Pt 1, Ch 1,** 104. of the Guidance.	301. Application 【See Rule】 In application to **301. 2** of the Rules, the term "specially considered" means the compliance with **Pt 7, Ch 1, Sec 7** of the Rules, or the acceptance in accordance with **Pt 1, Ch 1,** 105. of the Rules.	
CHAPTER 19 HATCHWAYS AND OTHER DECK OPENINGS	CHAPTER 19 HATCHWAYS AND OTHER DECK OPENINGS	
Section 2 Hatchways	Section 2 Hatchways	
203. Height of hatchway coamings【See Rule】 **3.** In application to 203. 6 of the Rules, the term "satisfaction of the Society" means the acceptance in accordance with Pt 1, Ch 1, 104. of the Guidance.【See Rule】	203. Height of hatchway coamings【See Rule】 **3.** In application to 203. 6 of the Rules, the term "satisfaction of the Society" means the acceptance in accordance with Pt 1, Ch 1, 105. of the Rules.【See Rule】	
Section 4 Hatchways Closed by Weathertight Covers fitted with Gaskets and Clamping Devices	Section 4 Hatchways Closed by Weathertight Covers fitted with Gaskets and Clamping Devices	
401. Steel weathertight covers【See Rule】 **2.** In application to 401. 6 of the Rules, the term "specially considered" means the acceptance in accordance with Pt 1, Ch 1, 104. of the Guidance.	401. Steel weathertight covers【See Rule】 **2.** In application to 401. 6 of the Rules, the term "specially considered" means the acceptance in accordance with Pt 1, Ch 1, 105. of the Rules.	

Present	Amendment	Note
〈Guidance〉 Pt 10 CHAPTER 22 EQUIPMENT NUMBER AND EQUIPMENT Section 1 General Table 10.22.1 **Danforth anchor and ropes** Tow Line Length (mm) Mooring Line Length (mm)	〈Guidance〉 Pt 10 CHAPTER 22 EQUIPMENT NUMBER AND EQUIPMENT Section 1 General Table 10.22.1 **Danforth anchor and ropes** Tow Line Length (m) Mooring Line Length (m)	

PART 13

Common Structural Rules for Bulk Carriers and Oil Tankers

Corrigenda 1 to 01 January 2021 version

Notes: (1) This Corrigenda enters into force on 1st July 2021

Contents

PART 1 GENERAL HULL REQUIREMENTS

CHAPTER 1
RULE GENERAL PRINCIPLES

SECTION 3
VERIFICATION OF COMPLIANCE

2 DOCUMENTS TO BE SUBMITTED

2.2 Submission of plans and supporting calculations

2.2.1 Plans and supporting calculations are to be submitted for approval

Table 1: Plans and supporting calculation to be submitted for approval

Plan or supporting calculation	Containing also information on
[Omitted]	[Omitted]
Sea chests, stabiliser recesses, etc	-
~~Plan of manholes~~	-
Plan of access to and escape from spaces	-
[Omitted]	[Omitted]

2.2.2 Plans to be submitted for information

In addition to those in [2.2.1], the following plans are to be submitted to the Society for information:

a) General arrangement.

b) Capacity plan, indicating the volume and position of the centre of gravity of all compartments and tanks.

c) Lines plan, when deemed necessary by the Society.

d) Hydrostatic curves.

e) Lightweight distribution.

f) Docking plan.

g) Arrangement of lifting appliances

h) Plan of manholes

SECTION 4
SYMBOLS AND DEFINITIONS

2 SYMBOLS

2.1 Ship's main data

2.1.1

Table 2: Ship's main data

Terms	Definition	Units
[Omitted]	[Omitted]	[Omitted]

T_{BAL-H}	Heavy ballast draught at midship	m
T_{BAL-E}	Emergency ballast draught or gale ballast draught at midship	m
[Omitted]	[Omitted]	[Omitted]

Table 7: Definition of terms

Terms	Definition
[Omitted]	[Omitted]
Corrugation	- Plating arranged in a corrugated fashion, shedder and gusset plates excluded.
[Omitted]	[Omitted]

3 DEFINITIONS

3.1 Principal Particulars

3.1.9 Lightweight

The lightweight is the ship displacement, in t, complete in all respects, but without cargo, consumable~~,~~ stores, ~~passengers and~~ crew and their effects, and without any liquids on board except that machinery and piping fluids, such as lubricants and hydraulics, are at operating levels

CHAPTER 2
GENERAL ARRANGEMENT DESIGN

SECTION 3
COMPARTMENT ARRANGEMENT

7 BALLAST TANKS

7.1 Capacity and disposition of ballast tanks

7.1.1

[Omitted]

- In addition, for oil tankers, the moulded draught amidships, T_{mid}, excluding any hogging or sagging correction, is not to be less than:
  $T_{mid} = 2.0 + 0.02$ ~~L~~L_{LL}, in m

[Omitted]

CHAPTER 3
STRUCTURAL DESIGN PRINCIPLES

SECTION 1
MATERIALS

2 Hull structural steel

2.3 Steel grades

Table 5: Minimum material grades for ships with length exceeding 250 m

Structural member category (1)	Material grade
~~Shear~~ Sheer strake at strength deck	Grade E/EH within 0.4 *L* amidships
Stringer plate in strength deck	Grade E/EH within 0.4 *L* amidships
Bilge strake	Grade D/DH within 0.4 *L* amidships
(1) Single strakes required to be of Grade D/DH or Grade E/EH as shown in the above table and within 0.4 *L* amidships are to have breadths not less than 800+5 *L* (mm), need not be greater than 1800 (mm), unless limited by the geometry of the ship's design.	

SECTION 6
STRUCTURAL DETAIL PRINCIPLES

2 GENERAL PRINCIPLES

2.3 Connection of longitudinal members not contributing to the hull girder longitudinal strength

2.3.1

Where the hull girder stress at the strength deck or at the bottom as defined in Ch 5, Sec 1, [2.2.2] is higher than the permissible stress as defined in Ch 5, Sec 1, [2.2.1] for normal strength steel, longitudinal members not contributing to the hull girder longitudinal strength and welded to the strength deck or bottom plating and ~~bilge strake~~ bilge plating, such as longitudinal hatch coamings, gutter bars, strengthening of deck openings, bilge keel, are to be made of steel with the same specified minimum yield stress as the strength deck or bottom structure steel.

3 STIFFENERS

3.2 Bracketed end connection of non-continuous stiffeners

3.2.5 Brackets at the ends of non-continuous stiffeners

[Omitted]

For connections similar to item (b) in Figure 3, but not lapped, the bracket arm length is to comply with

$l_{bkt} \geq 2.0\ h_{stf}$

[Omitted]

5 INTERSECTION OF STIFFENERS AND PRIMARY SUPPORTING MEMBERS

5.2 Connection of stiffeners to PSM

5.2.7

Where the web stiffener of the PSM is parallel to the web of the intersecting stiffener, but not connected to it, the offset PSM web stiffener is to be located in close proximity to the slot edge as shown in Figure 10. The ends of the offset web stiffeners are to be suitably tapered and softened.

~~Locations where the web stiffener of the PSM are not connected to the intersecting stiffeners as well as the detail arrangements are to be specially considered on the basis of their ability to transmit load with equivalent effectiveness to that of [5.2.2] through [5.2.7]. Details of calculations made and/or testing procedures and results are to be submitted.~~

7 DOUBLE BOTTOM STRUCTURE

7.5 Bilge keel

7.5.3 Ground bars

Bilge keels are not to be welded directly to the shell plating. A ground bar, or doubler, is to be fitted on the shell plating as shown in Figure 18 and Figure 19. In general, the ground bar is to be continuous.
The gross thickness of the ground bar is not to be less than the gross thickness of the ~~bilge strake~~ bilge plating or 14 mm, whichever is the lesser.

10 BULKHEAD STRUCTURE

10.5 Non-tight bulkheads

10.5.2 Non-tight bulkheads not acting as pillars

In general, the maximum spacing of stiffeners fitted on non-tight bulkheads not acting as pillars is to be:
- 0.9 m, for transverse bulkheads.
- Two frame spacings, with a maximum of 1.5 m, for longitudinal bulkheads.

The net thickness of bulkhead stiffener, in mm, is not to be less than:
$t = 3 + 0.015\ L_2$
The depth of bulkhead stiffener of flat bar type is in general not to be less than 1/12 of stiffener length.
A smaller depth of stiffener may be accepted based on calculations showing compliance with ~~Ch 6, Sec 5~~ Ch 10, Sec 4, [2.2] and Ch 8.

SECTION 7
STRUCTURAL IDEALISATION

Symbols

φ_w : Angle, in deg, between the stiffener or primary supporting member web and the attached plating, see Figure 14. φ_w is to be taken equal to 90 deg if the angle is ~~greater than or equal to~~ between 75 and 105 deg including 75 and 105 deg.

1 STRUCTURAL IDEALISATION OF STIFFENERS AND PRIMARY SUPPORTING MEMBERS

1.4 Geometrical properties of stiffeners and primary supporting members

1.4.3 Effective shear depth of stiffeners

The effective shear depth of stiffeners, d_{shr}, in mm, is to be taken as:

$d_{shr}=(h_{stf}-0.5t_{c\text{-}stf}+t_p+0.5t_{c\text{-}pl})\sin\varphi_w$

where:

h_{stf} : Height of stiffener, in mm, as defined in Ch 3, Sec 2, Figure 2.

t_p : Net thickness of the stiffener attached plating, in mm, as defined in Ch 3, Sec 2, Figure 2.

t_{c_stf} :Corrosion addition, in mm, of considered stiffener as given in Ch 3, Sec 3.

t_{c_pl} : Corrosion addition, in mm, of attached plate of the stiffener considered as given in Ch 3, Sec 3.

~~φ_w : Angle, in deg, as defined in Figure 14. φ_w is to be taken as 90 degrees if the angle is greater than or equal to 75 degrees.~~

1.4.4 Elastic net section modulus and net moment of inertia of stiffeners

The elastic net section modulus, Z, in cm^3 and the net moment of inertia, I, in cm^4 of stiffeners, is to be taken as:

$Z = Z_{stf}\sin\varphi_w$

$I = I_{st}\sin^2\varphi_w$

where:

Z_{stf} : Net section modulus of the stiffener, in cm^3, considered perpendicular to its attached plate, i.e. with φ_w = 90 deg.

I_{st} : Net moment of inertia of the stiffener, in cm^4, considered perpendicular to its attached plate, i.e. with φ_w = 90 deg.

~~φ_w : Angle, in deg, as defined in Figure 14. φ_w is to be taken as 90 degrees if the angle is greater than or equal to 75 degrees.~~

Figure14: Angle between stiffener web and attached plating

1.4.6 Effective net plastic section modulus of stiffeners

The effective net plastic section modulus, Z_{pl}, of stiffeners, in cm^3, which is used for assessment against impact loads, is to be taken as:

$$Z_{pl}=\frac{f_w\,h_w{}^2\,t_w}{2000}+\frac{(2\gamma-1)A_f\,h_{f-ctr}}{1000}$$ for $75° \le \varphi_w \le$ ~~90~~105°

$$Z_{pl}=\frac{f_w\,h_w{}^2\,t_w\sin\phi_w}{2000}+\frac{(2\gamma-1)A_f\left(h_{f-ctr}\sin\phi_w-b_{f-ctr}\left|\cos\phi_w\right|\right)}{1000}$$ for $\varphi_w < 75°$ or $\varphi_w > 105°$

where:

[Omitted]

t_f : Net flange thickness, in mm.

- t_f = 0 for flat bar stiffeners.
- For bulb profiles t_f is defined in [1.4.1].

1.4.7 Primary supporting member web not perpendicular to attached plating

Where the primary supporting member web is not perpendicular to the attached plating, the actual net shear area, in cm^2, and the actual net section modulus, in cm^3, can be obtained from the following formulae:

- Actual net shear area:

  $A_{sh-n50} = A_{sh-0-n50}\sin\varphi_w$ ~~for $\varphi_w < 75°$~~

  ~~$A_{sh-n50} = A_{sh-0-n50}$ for $75° \leq \varphi_w \leq 90°$~~

- Actual net section modulus:

  $Z_{n50} = Z_{perp-n50}\sin\varphi_w$ ~~for $\varphi_w < 75°$~~

  ~~$Z_{n50} = Z_{perp-n50}$ for $75° \leq \varphi_w \leq 90°$~~

where:

$A_{sh-0-n50}$: Actual net shear area, in cm^2, of the primary supporting member assumed to be perpendicular to the attached plating, to be taken equal to:

~~$$A_{sh-0-n50} = \left(h_w + t_{f-n50} + t_{p-n50}\right) t_{w-n50}\, 10^{-2}$$~~

$$A_{sh-0-n50} = \left(h_{eff} + t_{f-n50} + t_{p-n50}\right) t_{w-n50}\, 10^{-2}$$

$Z_{perp-n50}$: Actual section modulus, in cm^3, with its attached plating of the primary supporting member assumed to be perpendicular to the attached plating.

3 STIFFENERS

3.2 Load calculation points

3.2.2 LCP for hull girder bending stress

The load calculation point for the hull girder bending stresses is defined as follows:

- For prescriptive yielding verification according to Ch 6 and Ch 10, Sec 4:
  - At the middle of the full length, ℓ, of the considered stiffener.
  - At the reference point given in Figure 23.

[Omitted]

CHAPTER 4
LOADS

SECTION 4
HULL GIRDER LOADS

2 VERTICAL STILL WATER HULL GIRDER LOADS

2.3 Vertical still water shear force

2.3.2 Minimum still water shear force in harbour/sheltered water conditions for oil tankers

[Omitted]
b) For oil tankers with two cargo tanks across the breadth of the ship:
~~$Q_{sw\text{-}min}$~~ $Q_{sw\text{-}p\text{-}min} = \pm 0.45 \rho g B_{local} \ell_{tk} T_{SC}$
and is to be taken as maximum value of $Q_{sw\text{-}p\text{-}min}$ calculated for cargo/ballast tanks forward and aft of the transverse bulkhead.

SECTION 6
INTERNAL LOADS

1 PRESSURE DUE TO LIQUID

1.5 Dynamic pressure in flooded conditions

1.5.1 Dynamic pressure in flooded compartment

The dynamic pressure, P_{fd}, in kN/m^2, for watertight boundaries of flooded compartments is to be taken as:
[Omitted]
$f_{ull\text{-}l}$, $f_{ull\text{-}t}$: Longitudinal and transverse correction factors:

When $z_{FD} \gtrless z_0$, *full-l* and *full-t* are to be taken as defined in [1.3.1].

When $z_{FD} \leqq z_0$, *full-l* = 1.0 and *full-t* = 1.0.

6 SLOSHING PRESSURES IN TANKS

6.3 Sloshing pressures due to longitudinal liquid motion

6.3.2 Effective sloshing length

The effective sloshing length, ℓ_{slh}, in m, is to be taken as defined in Table 11.

Table 11: (omitted)

where:
α_{WT}: Transverse wash bulkhead coefficient, to be taken as (see Figure 11)

$$\alpha_T = \frac{A_{OWT}}{A_{tk-t-h}}$$

For tanks with changing shape along the length and/or with wash bulkhead of different shape the transverse wash bulkhead coefficient, α_{WT}, may be taken as the weighted average of all wash bulkhead locations in the tank given as:

$$\alpha_{WT} = \frac{\sum_{i=1}^{n_{WT}} \frac{A_{OWT_i}}{A_{tk-t-h_i}}}{n_{WT}}$$

[Omitted]

6.4 Sloshing pressures due to transverse liquid motion

6.4.2 Effective sloshing breadth

The effective sloshing breadth, b_{slh}, in m, is to be taken as in Table 12, but not less than 0.3B.

Table 12: (omitted)

Where:

n_{WL}: Number of longitudinal wash bulkheads in the tank.

α_{WL}: Longitudinal wash bulkhead coefficient:

$$\alpha_{WL} = \frac{A_{OWL}}{A_{tk-L-h}}$$

For tanks with changing shape along the breadth and/or with wash bulkhead of different shape the longitudinal wash bulkhead coefficient, α_{WL}, may be taken as the weighted average of all wash bulkhead locations in the tank given as:

$$\alpha_{WL} = \frac{\sum_{i=1}^{n_{WL}} \frac{A_{OWL_i}}{A_{tk-L-h_i}}}{n_{WL}}$$

α_{grd}: Girder coefficient, to be taken as:

$$\alpha_{grd} = \frac{A_{O-grd-h}}{A_{tk-L-h}}$$

For tanks with changing shape along the breadth and/or with girder of different shape the girder coefficient, α_{grd}, may be taken as the weighted average of all girder locations in the tank given as:

$$\alpha_{grd} = \frac{\sum_{i=1}^{n_{grd}} \frac{A_{O-grd-h_i}}{A_{tk-L-h_i}}}{n_{grd}}$$

[omitted]

7 DESIGN PRESSURE FOR TANK TESTING

7.1 Definition

Table 13 : Design testing load height z_{ST}

Compartment	z_{ST}
Double bottom tanks(1)	The greater of the following: $z_{ST} = z_{top} + h_{air}$ $z_{ST} = z_{bd}$
Hopper side tanks, topside tanks, double side tanks, fore and after peaks used as tank	The greater of the following: $z_{ST} = z_{top} + h_{air}$ $z_{ST} = z_{top} + 2.4$

Tank bulkheads, deep tanks, fuel oil bunkers	The greater of the following: $z_{ST} = z_{top} + h_{air}$ $z_{ST} = z_{top} + 2.4$ $z_{ST} = z_{top} + 0.1P_{PV}$
Ballast hold	$z_{ST} = z_h + 0.9$
Chain locker ~~(if aft of collision bulkhead)~~	$z_{ST} = z_C$
Independent tanks	The greater of the following: $z_{ST} = z_{top} + h_{air}$ $z_{ST} = z_{top} + 0.9$
Ballast ducts	Testing load height corresponding to ballast pump maximum pressure
where: z_{bd} : Z coordinate, in m, of the bulkhead deck. z_h : Z coordinate, in m, of the top of hatch coaming. z_C : Z coordinate, in m, of the top of the chain pipe. **(1)** For double bottom tanks connected with hopper side tanks, topside tanks or double side tanks, z_{ST} corresponding to "Hopper side tanks, topside tanks, double side tanks, fore and aft peaks used as tank, cofferdams" is applicable.	

SECTION 8
LOADING CONDITIONS

4 BULK CARRIERS

4.1 Specific design loading condition

4.1.4 Cargo loading condition for BC-A

As required for BC-B, plus:

At least one cargo loaded condition with specified holds empty, with cargo density 3.0 t/m^3, and the same filling ratio (cargo mass/hold cubic capacity) in all loaded cargo holds at scantling draught with all ballast tanks empty.

The combination of specified empty holds is to be indicated with the additional service feature {~~h~~Holds a, b, … may be empty}.

In such cases where the design cargo density applied is different from 3.0 t/m^3, the maximum density of the cargo that the ship is allowed to carry is to be indicated in the loading manual. If the maximum density is less than 3.0 t/m^3 then the additional service feature {~~h~~Holds a, b, … may be empty with maximum cargo density x.y t/m^3} is to be indicated as defined in Ch 1, Sec 1, [3.2.1].

4.2 Design load combinations for direct strength analysis

4.2.1 Application general loading patterns

The following loading patterns are to be applied:

a) Any cargo hold carrying M_{Full} with fuel oil tanks in way of the cargo hold, if any, being 100% full and ballast water tanks in the double bottom in way of the cargo hold being empty, at scantling draught.

b) Any cargo hold carrying minimum 50% of M_H, with all double bottom tanks and all fuel oil tanks in way of the cargo hold being empty, at scantling draught.

c) Any cargo hold taken empty, with all double bottom tanks and all fuel oil tanks in way of the cargo hold being empty, at the deepest ballast draught. Where a topside and double bottom tank are permanently connected as a common tank, the following conditions are to be considered:

[omitted]

4.2.2 Multiport conditions

The following multiport conditions are applicable to all types of bulk carriers except when the service feature {no MP} is assigned:

a) Any cargo hold carrying M_{Full} with fuel oil tanks in way of the cargo hold, if any, being 100% full and ballast water tanks in the double bottom in way of the cargo hold being empty, at 67% of scantling draught.
b) Any cargo hold taken empty with all double bottom tanks and all fuel oil tanks in way of the cargo hold being empty, at 83% of scantling draught.
c) Any two adjacent cargo holds carrying M_{Full} with the next holds being empty, with fuel oil tanks in way of the cargo hold, if any, being 100% full and ballast water tanks in the double bottom in way of the cargo hold being empty, at 67% of the scantling draught. This requirement to the mass of the cargo and fuel oil ~~in double bottom~~ tanks in way of the cargo hold applies also to the condition where the adjacent hold is filled with ballast.
d) Any two adjacent cargo holds being empty with the next holds being full, with all double bottom tanks and fuel oil tanks in way of the cargo hold being empty, at 75% of scantling draught.

4.2.3 Alternate conditions

The following alternate conditions are applicable to BC-A only:

a) Cargo holds which are intended to be empty at scantling draught, being empty with all double bottom tanks and fuel oil tanks in way of the cargo hold also being empty.

[omitted]

4.2.4 Heavy ballast condition

The following condition applies to ballast holds only:

- Cargo holds which are designed as ballast water holds, being 100% full of ballast water including hatchways, with all double bottom tanks and fuel oil tanks in way of the cargo hold being 100% full, at any heavy ballast draught. For ballast holds adjacent to topside wing, hopper and double bottom tanks, it shall be strengthwise acceptable that the ballast holds are filled when the topside wing, hopper, stool, and double bottom tanks are empty.

4.2.5 Additional harbour condition for all bulk carriers

The following additional harbour conditions apply to all bulk carriers:

a) At reduced draught during loading and unloading in harbour, the maximum allowable mass in a cargo hold may be increased by 15% of the maximum mass allowed at the scantling draught in seagoing condition, but is not to exceed the mass allowed at scantling draught in the seagoing condition. The minimum required mass may be reduced by the same amount.

b) Any single cargo hold holding the maximum allowable seagoing mass at 67% of scantling draught, in harbour condition~~.~~ with fuel oil tanks in way of the cargo hold, if any, being 100% full and ballast water tanks in the double bottom in way of the cargo hold being empty.

Any two adjacent cargo holds carrying M_{Full} with the next holds being empty, with fuel oil tanks ~~in the double bottom~~ in way of the cargo hold, if any, being 100% full and ballast water tanks in the double bottom in way of the cargo hold being empty, at 67% of scantling draught, in harbour condition.

CHAPTER 5
HULL GIRDER STRENGTH

SECTION 1 HULL GIRDER YIELDING STRENGTH

3 HULL GIRDER SHEAR STRENGTH ASSESSMENT

3.4 Effective net thickness for longitudinal bulkheads between cargo tanks of oil tankers

3.4.6 Equivalent net thickness of corrugation

The equivalent net thickness, in mm, of the corrugation of vertical and horizontal corrugated bulkheads, $t_{cor\text{-}n50}$, to be used for the calculation of the effective net shear area of $A_{3\text{-}n50}$ in Table 7 and for the unit shear flow, is given as follows:

$$t_{cor-n50} = \frac{t_{w-gr} + t_{f-gr}}{2} \cdot \frac{S_c}{c + a} - 0.5t_c$$

where:

$t_{w\text{-}gr}$: Gross corrugation web thickness, in mm.
$t_{f\text{-}gr}$: Gross corrugation flange thickness, in mm.
S_c : Projected length of one corrugation, in mm, as defined in Ch 3, Sec 6, Figure 21.
c : Breadth of corrugation web, in mm, as defined in Ch 3, Sec 6, Figure 21.
a : Breadth of corrugation flange, in mm, as defined in Ch 3, Sec 6, Figure 21.

CHAPTER 6
HULL LOCAL SCANTLING

SECTION 4
PLATING

1 PLATING SUBJECTED TO LATERAL PRESSURE

1.2 Plating of corrugated bulkheads

1.2.1 Cold, hot formed and built-up corrugations

The net thicknesses, t in mm, of the web and flange plates of corrugated bulkheads are not to be taken less than the greatest value calculated for all applicable design load sets, as defined in Ch 6, Sec 2, [2.1.3], given by:

$$t = 0.0158 b_p \sqrt{\frac{|P|}{C_{CB} R_{eH}}}$$

where:

b_p : Breadth of plane corrugation plating:

b_p = ~~c~~ $b_{f\text{-}ca}$ for flange plating, in mm, as defined in Ch 3, Sec 6, Figure 21.

b_p = ~~c~~ $b_{w\text{-}ca}$ for web plating, in mm, as defined in Ch 3, Sec 6, Figure 21.

C_{CB} : Permissible bending stress coefficient for corrugated bulkhead plating taken equal to:

[omitted]

2 SPECIAL REQUIREMENTS

2.2 Bilge plating

2.2.1 Definition of bilge ~~area~~ plating

The definition of bilge ~~area~~ plating is given in Ch 1, Sec 4, [3.8.1].

2.4 Sheer strake

2.4.2 Welded Sheer strake

The net thickness of a welded sheer strake is not to be less than the offered net thickness of the adjacent ~~2 m width~~ side plating, provided this adjacent side plating is located entirely within the top wing tank or double side tank as the case may be.

CHAPTER 7
DIRECT STRENGTH ANALYSIS

SECTION 2
CARGO HOLD STRUCTURAL STRENGTH ANALYSIS

4 LOAD APPLICATION

4.4 Procedure to adjust hull girder shear forces and bending moments

4.4.7 Method 2 for vertical shear force adjustment at both bulkheads

[Omitted]

Table 8 : Formulae for calculation of vertical loads for adjusting vertical shear forces

$\delta w_1 = \frac{\Delta Q_{aft}(2l - l_2 - l_3) + \Delta Q_{fwd}(l_2 + l_3)}{(n_1 - 1)(2l - l_1 - 2l_2 - l_3)} + \delta w_1'$
$\delta w_2 = \frac{(W1 + W3)}{(n_2 - 1)} = \frac{(\Delta Q_{aft} - \Delta Q_{fwd})}{(n_2 - 1)}$
$\delta w_3 = \frac{-\Delta Q_{fwd}(2l - l_1 - l_2) - \Delta Q_{aft}(l_1 + l_2)}{(n_3 - 1)(2l - l_1 - 2l_2 - l_3)} - \delta w_3'$
[OMITTED]
[OMITTED]

[Omitted]

CHAPTER 8
BUCKLING

SECTION 1 GENERAL

3 DEFINITION

3.2 Buckling utilization factor

3.2.2.

For combined loads, the utilisation factor, η_{act}, is to be defined as the ratio of the equivalent applied ~~equivalent~~ stress and the corresponding buckling capacity, as shown in Figure 1, and is to be taken as:

$$\eta_{act} = \frac{W_{act}}{W_u} = \frac{1}{\gamma_c}$$

Where:

W_{act} : Equivalent applied ~~equivalent~~ stress, in N/mm^2~~.~~, the actual applied stress are given in Sec 3 and Sec 4 respectively for buckling assessment by prescriptive and direct strength analysis.

~~$W_{act} = \sqrt{\sigma_x^2 + \sigma_y^2 + \tau^2}$ for plate~~

~~$W_{act} = \sigma_a + \sigma_b + \sigma_w$ for stiffener~~

W_u : Equivalent buckling capacity, in N/mm^2, ~~to be taken as:~~ for plates and stiffeners, their respective buckling or ultimate capacities are given in Sec 5.

~~$W_u = \sqrt{\sigma_{cx}^2 + \sigma_{cy}^2 + \tau_c^2}$ for plate~~

~~$W_u = \frac{R_{eH} - s}{s}$ for stiffener~~

γ_c : Stress multiplier factor at failure

For each typical failure mode, the corresponding capacity of the panel is calculated by applying the actual stress combination and then increasing or decreasing the stresses proportionally until collapse.
Figure 1 illustrates the buckling capacity and the buckling utilisation factor of a structural member subject to σ_x and σ_y stresses.

SECTION 2 SLENDERNESS REQUIREMENTS

3 STIFFENERS

3.1 Proportions of stiffeners

3.1.3 Bending stiffness of stiffeners

The net moment of inertia, in cm^4, of the stiffener with the effective width of attached plate, Seff, about the neutral axis parallel to the attached plating, is not to be less than the minimum value given by:

[Omitted]

5 BRACKETS

5.1 Tripping brackets

5.1.1 Unsupported flange length

…

$S_{b\text{-}min}$: Minimum unsupported flange length taken as:

$S_{b\text{-}min}$ = 3.0 m for ~~the cargo tank/hold region, on~~ tank/hold boundaries or ~~the~~ hull envelope including external decks.

$S_{b\text{-}min}$ = 4.0 m for other areas.

6 OTHER STRUCTURES

6.2 Edge reinforcement in way of openings

6.2.1 Depth of edge stiffener

When fitted as shown in Figure 2, the depth of web, h_w in mm, of edge stiffeners in way of openings is not to be less than:

$h_w = C\ell\sqrt{\frac{R_{eH}}{235}}$ or 50 mm, whichever is greater.

Where:

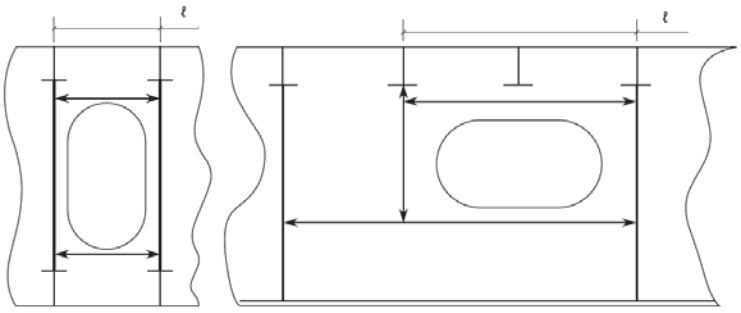
C : Slenderness coefficient taken as:

$C = 50$

R_{eH} : Specified minimum yield stress of the edge stiffener material, in N/mm^2.

ℓ : Length of edge stiffener in way of opening, in m, as defined in Figure 2.

Figure 2 : Typical edge reinforcements



SECTION 3 PRESCRIPTIVE BUCKLING REQUIREMENT

1 GENERAL

1.1 Scope

1.1.1

This section applies to plate panels including curved plate panels and stiffeners subject to hull girder compression and shear stresses. In addition the following structural members subject to compressive stresses are to be checked:

~~• Corrugation of transverse vertically corrugated bulkhead.~~

- Corrugation of longitudinal corrugated bulkhead.
- Strut.
- Pillar.
- Cross tie.

3 BUCKLING CRITERIA

3.4 Vertically corrugated ~~transverse and~~ longitudinal bulkheads

3.4.1

The shear buckling strength of vertically corrugated ~~transverse and~~ longitudinal bulkheads is to satisfy the following criterion:

$\eta_{Shear} \leq \eta_{all}$

where:

[Omitted]

τ_{bhd}: Hull girder ~~S~~shear stress, in N/mm^2, in the longitudinal bulkhead ~~taken~~ as defined in [2.1.2]

~~· For longitudinal bulkheads: hull girder shear stress defined in [2.1.2]~~

~~· For transverse bulkheads: shear stress in the corrugation defined in Pt 2, Ch 1, Sec 3, [3.2.1].~~

[Omitted]

SECTION 4 BUCKLING REQUIREMENTS FOR DIRECT STRENGTH ANALYSIS

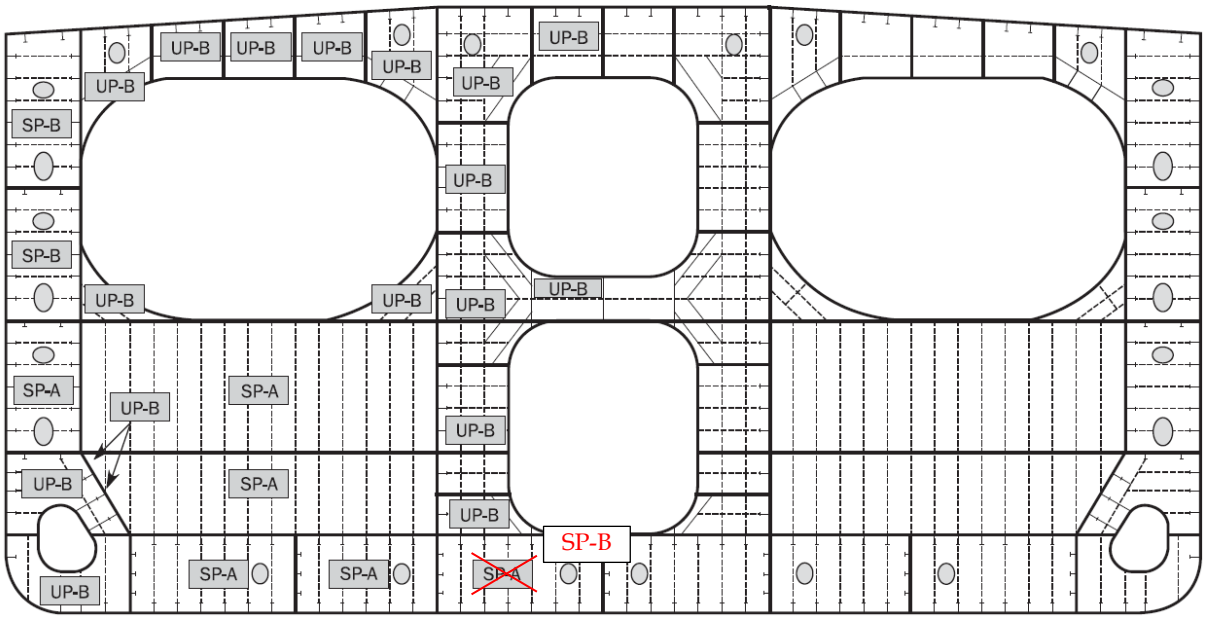
2 STIFFENED AND UNSTIFFENED PANELS

2.2 Stiffened panels

2.2.2

[Omitted]

Figure 4 : Cross tie



3 CORRUGATED BULKHEAD

3.2 Reference stress

3.2.4

Where more than one plate thicknesses are used for flange or web panel, maximum stress is to be obtained for each thickness range and to be checked with the buckling criteria for each thickness.

SECTION 5 BUCKLING CAPACITY

2 BUCKLING CAPACITY OF PLATES AND STIFFENERS

2.1 Overall stiffened panel capacity

2.1.2

The stress multiplier factor $\gamma_{GEB,bi}$ for the stiffened panel subjected to biaxial loads is taken as:

$$\gamma_{GEB,bi} = \frac{\pi^2}{L_{B1}^2 L_{B2}^2} \frac{[D_{11}L_{B2}^4 + 2(D_{12}+D_{33})n^2 L_{B1}^2 L_{B2}^2 + n^4 D_{22} L_{B1}^4]}{L_{B2}^2 N_x + n^2 L_{B1}^2 K_{tran} N_y}$$

where:

[Omitted]

$\sigma_{x,av}$: Average stress, in N/mm^2, for both plate and stiffener with Poisson correction, taken as:

$$\sigma_{x,av} = \sigma_x - \nu\sigma_y A_s/(A_p + A_s) \geq 0 \qquad \text{for } \sigma_x > 0 \text{ and } \sigma_y > 0$$

$$\sigma_{x,av} = \sigma_x \qquad \text{for } \sigma_x \leq 0 \text{ or } \sigma_y \leq 0$$

[Omitted]

2.1.3

[Omitted]

where:

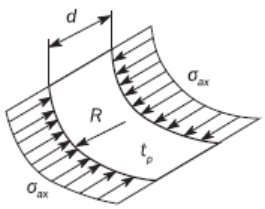
$N_{xy} = \tau t_p$

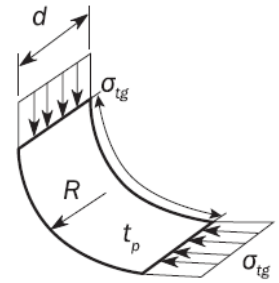
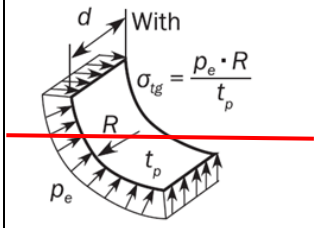
2.2 Plate capacity

2.2.6 Curved plate panels

[Omitted]

Table 4: Buckling and reduction factor for curved plate panel with $R/t_p \leq 2500$

Case	Aspect Ratio	Buckling factor *K*	Reduction factor *C*
1 	$\frac{d}{R} \leq 0.5\sqrt{\frac{R}{t_p}}$	$K = 1 + \frac{2}{3}\frac{d^2}{Rt_p}$	For general application: $C_{ax} = 1$ for $\lambda \leq 0.25$ $C_{ax} = 1.233 - 0.933\lambda$ for $0.25 < \lambda \leq 1$ $C_{ax} = 0.3/\lambda^3$ for $1 < \lambda \leq 1.5$ $C_{ax} = 0.2/\lambda^2$ for $\lambda > 1.5$ For curved single fields, e.g. ~~bilge strake~~ bilge plating, which are bounded by plane
	$\frac{d}{R} > 1.63\sqrt{\frac{R}{t_p}}$	$K = 0.267\frac{d^2}{RRt_p}\left[3 - \frac{d}{R}\sqrt{\frac{t_p}{R}}\right] \geq 0.4\frac{d^2}{Rt_p}$	

			panels as shown in Ch 6, Sec 4, Figure 1: $C_{tg} = \frac{0.65}{\lambda^2} \leq 1.0$
2~~a~~  ~~2b~~  p_e = external pressure in [N/mm²]	$\frac{d}{R} \leq 1.63\sqrt{\frac{R}{t_p}}$	$K = \frac{d}{\sqrt{Rt_p}} + 3\frac{(Rt_p)^{0.175}}{d^{0.35}}$	For general application: $C_{tg} = 1$ for $\lambda \leq 0.4$ $C_{tg} = 1.274 - 0.686\lambda$ for $0.4 < \lambda \leq 1.2$ $C_{tg} = \frac{0.65}{\lambda^2}$ for $\lambda > 1.2$ For curved single fields, e.g. ~~bilge strake~~ bilge plating, which are bounded by plane panels as shown in Ch 6, Sec 4, Figure 1: $C_{tg} = \frac{0.8}{\lambda^2} \leq 1.0$
	$\frac{d}{R} > 1.63\sqrt{\frac{R}{t_p}}$	$K = 0.3\frac{d^2}{R^2} + 2.25\left(\frac{R^2}{dt_p}\right)^2$	
[Omitted]			

2.2.7 Applied normal and shear stresses to plate panels

The normal stresses, σ_x and σ_y, in N/mm², to be applied for the overall stiffened panel capacity and the plate panel capacity calculations, as given in [2.1.1] and [2.2.1] respectively, are to be taken as follows:

- For FE analysis, the reference stresses as defined in Ch 8, Sec 4, [2.4].
- For prescriptive assessment of the overall stiffened panel capacity and the plate panel capacity, the axial or transverse compressive stresses calculated according to Ch 8, Sec 3, [2.2.1], at load calculation points of the considered stiffener or the considered elementary plate panel, as defined in Ch 3, Sec 7, [3] and [2], respectively. However, in case of transverse stiffening arrangement, the transverse compressive stress used for the assessment of the overall stiffened panel capacity is to be taken as the compressive stress calculated at load calculation points of the stiffener attached plating, as defined in Ch 3, Sec 7, [2].
- For grillage analysis where the stresses are obtained based on beam theory, the stress taken as:

  $\sigma_x = \frac{\sigma_{xb} + \upsilon\sigma_{yb}}{1 - \upsilon^2}$

  $\sigma_y = \frac{\sigma_{yb} + \upsilon\sigma_{xb}}{1 - \nu^2}$

  where

  σ_{xb}, σ_{xb}: Stress, in N/mm², from grillage beam analysis respectively along x or y axis of the ~~attached~~ plate attached to the PSM web~~of girders~~.

[Omitted]

- For grillage beam analysis, $\tau = 0$ in the ~~attached~~ plate attached to the PSM web~~of girders~~.

APPENDIX 1 STRESS BASED REFERENCE STRESSES

2 REFERENCE STRESSES

2.1 Regular Panel

2.1.2 Transverse stress

[Omitted]

The unknown coefficients ~~C and D~~ A and B must yield zero first partial derivatives, ∂Π with respect to ~~C and D~~ A and B, respectively.

CHAPTER 10
OTHER STRUCTURES

SECTION 1
FORE PART

3 STRUCTURE SUBJECTED TO IMPACT LOADS

3.3 Bow impact

3.3.6 Primary supporting members

[Omitted]

g) The net web thickness of each primary supporting member, tw, in mm including decks/bulkheads ~~in way of~~ directly welded to the side shell is not to be less than:

[Omitted]

SECTION 3
AFT PART

3 STREN FRAMES

3.1 General

3.1.2

Cast steel and fabricated stern frames are to be strengthened by adequately spaced horizontal plates with gross thickness not less than 80% of required thickness for stern frames, t_1, as defined in Table 1 or Table 2. Abrupt changes of section are to be avoided in castings; all sections are to have adequate tapering radius.

CHAPTER 12
CONSTRUCTION

SECTION 3
DESIGN OF WELD JOINTS

2 TEE OR CROSS JOINT

2.4 Partial or full penetration welds

2.4.6 Locations required for partial penetration welding

Partial penetration welding as defined in [2.4.2], is to be used in the following locations (see examples in Figure 3):

a) Connection of hopper sloping plate to longitudinal bulkhead (inner hull) or horizontal girder in double side space.

b) Longitudinal/transverse bulkhead primary supporting member end connections to the double bottom.

c) Corrugated bulkhead lower stool supporting floors to inner bottom.

d) Corrugated bulkhead gusset and shedder plates.

e) Lower 15% of the length of built-up corrugation of vertical corrugated bulkheads

f) Structural elements in double bottom below bulkhead primary supporting members and stool plates, except in way of [2.4.5] i).

g) Lower hopper plate to inner bottom.

h) Horizontal stringers on bulkheads in way of their bracket toe and the heel.

2.5 Weld size criteria

[Omitted]

Table 2 : Weld factors for different structural members

Hull area	Connection			f_{weld}
	Of		To	
[Omitted]				
Deck	Strength deck	$t_{as\_built} \geq 13$	Side shell plating within 0.6L midship	PPW (3)
			Elsewhere	0.48
		$t_{as\_built} < 13$	Side shell plating	0.48
[Omitted]				
Machinery Space	Centre girder		Keel and inner bottom	0.48
	Floor		Centre girder and engine foundation girder	0.48
	Engine foundation girders		Top plate ~~and primary hull structure~~ of main engine bed and inner bottom plate, where applicable	PPW (3)
	Floors and girders		Inner bottom and shell plate	0.38

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

(2) Continuous welding.

(3) PPW: Partial penetration welding in accordance with [2.4.2]. When one side partial penetration weld is adopted, f_{weld} = 0.48 is to be used for the fillet.

(4) FPW: Full penetration welding in accordance with [2.4.2].

(5) Bulkheads of superstructure and deckhouses are to be considered in the row corresponding to "Superstructure and deck house".

Table 3 : Weld Factors for Miscellaneous Fittings and Equipment

Item		Connection to	f_{weld}
Hatch cover	Primary supporting members	~~Watertight/oil-tight joints~~ At ends(10% of span) of PSM	0.48(1)
		Elsewhere	0.24
	Stiffeners	At ends ~~of stiffeners~~	0.38 (2)
		Elsewhere	0.20
Mast, derrick post, crane pedestal, etc.		Deck / Underdeck reinforced structure	0.43
Deck machinery seat		Deck	0.24
Mooring equipment seat		Deck	0.43
Ring for access hole type cover		Anywhere	0.43
Stiffening of side shell doors and weathertight doors		Anywhere	0.24
Frames of shell and weathertight doors		Anywhere	0.43
Coaming of ventilator and air pipe		Deck	0.43
Ventilators, etc., fittings		Anywhere	0.24
~~Ventilators, air pipes, etc., coaming to deck~~		~~Deck~~	~~0.43~~
Scupper and discharge		Deck	0.55
Bulwark stay		Deck	0.24
Bulwark plating		Deck	0.43
Guard rail, stanchion		Deck	0.43
Cleats and fittings		Hatch coaming and hatch cover	0.60 (3)

(1) For bulk carrier hatch covers f_{weld} = 0.38 ~~for watertight joints~~

(2) For bulk carrier hatch covers f_{weld} = 0.24 at ends of stiffeners

(3) Minimum weld factor. Where $t_{as\text{-}built}$ >11.5 mm, ℓ_{leg} need not exceed $0.62t_{as\text{-}built}$. Penetration welding may be require depending on design.

CHAPTER 13
SHIP IN OPERATION – RENEWAL CRITERIA

SECTION 2
ACCEPTANCE CRITERIA

1 GENERAL

1.2 Definition

1.2.1 Deck zone

The deck zone includes all the following items contributing to the hull girder strength:

…

- For oil tankers: elements above or crossed by the 0.9D level line above the baseline such as:
  - Strength deck plating.
  - Deck stringer.
  - Sheer strake.
  - Inner hull and other plane longitudinal bulkheads upper most strake.
  - Topside tank sloped plating, including horizontal and vertical strakes.
  - Longitudinal upper stool.
  - Longitudinal stiffeners, girders and stringers connected to the above mentioned plating.

1.2.2 Bottom zone

The bottom zone includes the following items contributing to the hull girder strength:

- For bulk carriers: elements up to the upper level of the hopper sloping plating or up to and including the inner bottom plating if there is no hopper tank:
  - Keel plate.
  - Bottom plating.
  - Bilge plating.
  - Bottom girders.
  - Inner bottom plating.
  - Hopper tank sloping plating, and horizontal plating, if any.
  - ~~Longitudinal stiffeners connected to the above mentioned plating.~~
  - Side shell plating.
  - Plane longitudinal bulkheads lower strake.
  - Longitudinal stiffeners connected to the above mentioned plating.
- For oil tankers: elements up to the upper level of the hopper sloping plating or up to and including the inner bottom plating if there is no hopper tank
  - Keel plate.
  - Bottom plating.
  - Bilge plating.
  - Plane longitudinal bulkheads lower strake.

- Bottom girders
- ~~Longitudinal stiffeners connected to the above mentioned plating.~~
- Inner bottom plating.
- Hopper tank sloping plating, and horizontal plating, if any.
- Side shell plating.
- Longitudinal lower stool.
- Longitudinal stiffeners connected to the above mentioned plating.

PART 2 SHIP TYPES

CHAPTER 1
BULK CARRIERS

SECTION 3 HULL LOCAL SCANTLINGS

SYMBOLS

[Omitted]

s_{cw} : Plate width, in mm, taken as the width of the corrugation flange ~~d~~$b_{f\text{-}cg}$ or the web ~~c~~$b_{w\text{-}cg}$, whichever is greater, see Pt 1, Ch 3, Sec 6, Figure 21.

~~s_c~~s_{cg} : Half pitch, in mm, of the corrugation flange as defined in Pt 1, Ch 3, Sec 6, Figure 21.

3 TRANSVERSE VERTICALLY CORRUGATED WATERTIGHT BULKHEADS SEPARATING CARGO HOLDS IN FLOODED CONDITION

3.2 Bending, shear and buckling check

3.2.1 Bending capacity and shear capacity

[Omitted]

A_{shr} : Net shear area, in cm^2, of one half pitch corrugation. The calculated net shear area is to consider possible reduced shear efficiency due to non-straight angles between the corrugation webs and flanges. In general, the reduced shear area may be obtained by multiplying the web sectional area by sin ~~ϕ~~Φ.

~~ϕ~~Φ : Angle between the web and the flange, see Pt 1, Ch 3, Sec 6, Figure 21.

[Omitted]

3.2.2 Shear buckling check of the bulkhead corrugation webs

[Omitted]

τ_E : Euler shear buckling stress, in N/mm^2, to be taken as:

$$\tau_E = 0.9\, k_t\, E \left(\frac{t_w}{\text{~~c~~}}\right)^2 b_{w\text{-}cg}$$

[Omitted]

~~c~~$b_{w\text{-}cg}$: Width, in mm, of the corrugation webs as shown in Pt 1, Ch 3, Sec 6, Figure 21.

3.3 Net section modulus ~~at the lower end~~ of the corrugations

3.3.1 Effective flange width

The net section modulus ~~at the lower end~~ of the corrugations is to be calculated with the compression flange having an effective flange width b_{eff} not larger than the following formula:

$b_{eff} = C_E$ ~~d~~$b_{f\text{-}cg}$

[omitted]

B : Coefficient to be taken equal to:

$$\beta = \frac{b_{f\text{-}cg}}{\text{~~a~~}\, t_f} \sqrt{\frac{R_{eH}}{E}}$$

~~d~~ $b_{f\text{-}cg}$: Width, in mm, of the corrugation flange as shown in Pt 1, Ch 3, Sec 6, Figure 21.

t_f : Net flange thickness, in mm.

3.3.3 Effective shedder plates

Provided that effective shedder plates are fitted as shown in Figure 4, when calculating the section modulus at the lower end of the corrugations (Sections '1' in Figure 4), the net area, in cm^2, of flange plates may be increased by l_{SH} to be taken as:

$$l_{SH} = 2.5 \cdot 10^{-3} \frac{b_{f\text{-}cg}}{\sqrt{t_f\, t_{SH}}} \quad \text{without being taken greater than } 2.5 \frac{b_{f\text{-}cg}}{t_f} 10^{-3}$$

Where:

~~a~~ $b_{f\text{-}cg}$: Width, in mm, of the corrugation flange as shown in Pt 1, Ch 3, Sec 6, Figure 21.

[omitted]

4 ALLOWABLE HOLD LOADING FOR BC-A & BC-B SHIPS IN FLOODED CONDITIONS

4.1 Evaluation of double bottom capacity and allowable hold loading

4.1.4 Allowable hold loading

[Omitted]

h_B : Level of cargo, in m, to be taken as:

$$h_B = \frac{P}{\rho_C g}$$

[Omitted]

z_F : Flooded level, in m, as defined in Pt 1, Ch 4, Sec 6, ~~[3.1.3]~~[3.2.3].

[Omitted]

SECTION 4
HULL LOCAL SCANTLING FOR BULK CARRIERS L < 150M

SYMBOLS

[Omitted]

ϕ : ~~Major diameter~~ Depth of the openings in parallel to web depth of primary support members, in m.

[Omitted]

3 TRANSVERSE CORRUGATED BULKHEADS OF BALLAST HOLDS

3.2 Net section modulus

3.2.1

The net section modulus Z, in cm^3, of corrugated bulkhead of ballast holds, subjected to lateral pressure are not to be less than the values obtained from the following formula:

$$Z = K \frac{P s_{cg} \ell^2}{f_{bdg}\, C_s\, R_Y}$$

where:

[Omitted]

~~s_c~~ s_{cg} : Half pitch length, in mm, of the corrugation, as defined in Pt 1, Ch 3, Sec 6, Figure 21.

[Omitted]

4 PRIMARY SUPPORTING MEMBERS

4.2 Design load sets

4.2.2 Loading conditions

Table 3: Design load sets for primary supporting members in cargo hold region

Item	Design load set	Load component	Draught	Design load	Loading condition
Bulk cargo hold assigned as ballast hold	WB-4	$P_{in} - P_{ex}$ (1)	T_{BAL-H} ~~(3)~~	S+D	Heavy ballast condition
	WB-6	P_{in}	-	S	Harbour/test condition
Bulk cargo hold	BC-11	$P_{in} - P_{ex}$ (1)	T_{SC}	S+D	Cargo loading condition
	BC-12	$P_{in} - P_{ex}$ (1)	-	S	Harbour condition
Compartments not carrying liquids	FD-1(2)	P_{in}	T_{SC}	S+D	Flooded condition
	FD-2(2)	P_{in}		S	Flooded condition

(1) P_{ex} is to be considered for external shell only

(2) FD-1 and FD-2 are not applicable to external shell

~~(3) Minimum draught among heavy ballast conditions is to be used.~~

SECTION 5
CARGO HATCH COVERS

2 ARRANGEMENTS

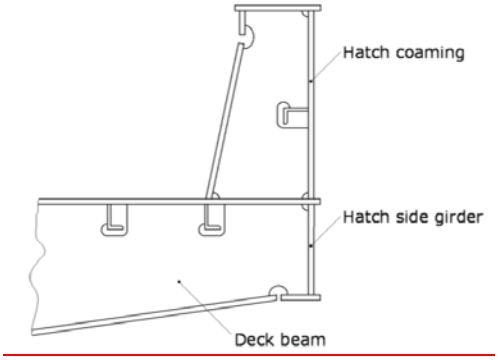
2.3 Hatch coamings

2.3.3

Longitudinal coamings are to be vertically extended at least to the lower edge of deck beams or hatch side girders below deck are to be fitted in line with longitudinal coamings. Extended coaming plates are to be flanged or fitted with face bars or half-round bars at the level of lower edge of the deck beams. Figure 1 gives an example.

- Where they are not part of continuous deck girders, the lower edge of longitudinal coamings including below deck structure as an extension measure above are to extend for at least two frame spaces beyond the end of the hatch openings.
- Where ~~longitudinal coamings~~ they are part of continuous deck girders, their scantlings are to be as required in Pt 1, Ch 6, Sec 6 and Pt 1, Ch 8, Sec 3.

Figure 1: Example of extension to lower edge of deck beams of longitudinal coaming by fitting a hatch side girder



5 STRENGTH CHECK

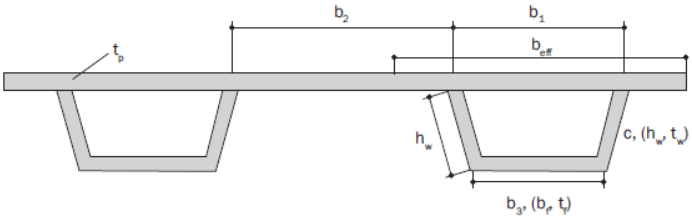
5.1 Stiffeners

5.1.1 Net Section modulus and net shear sectional area

[Omitted]

2

Figure ~~1~~: Example of hatch cover fitted with U type stiffener



5.3 Stiffeners

5.3.3 Net Section modulus and net shear sectional area

The net section modulus Z, in cm^3, and the net shear sectional area A_{shr}, in cm^2, of a stiffener subject to lateral pressure are to be taken not less than given by the following formulae:

$$Z = \frac{(F_S P_S + F_W P_W)\ s \cdot \ell_s^2}{f_{bc}\ \sigma_a}\ 10^{-3}$$

$$A_{shr} = \frac{5(F_S P_S + F_W P_W)\ s\ \ell_s}{\tau_a}\ 10^{-2}$$

[Omitted]

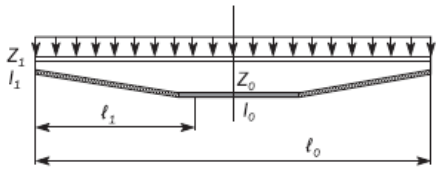
5.5 Stiffeners

5.5.1

[Omitted]

3

Figure ~~2~~: Variable cross section stiffener



6 HATCH COAMING

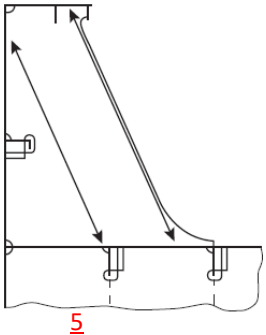
6.3 Scantlings

6.3.3 Coaming stays

[Omitted]

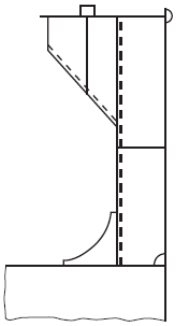
4

Figure ~~3~~: Coaming stay (example 1)



5

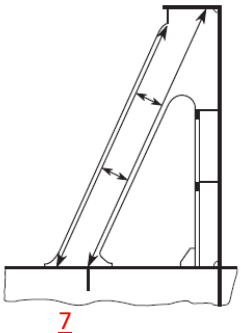
Figure ~~4~~: Coaming stay (example 2)



[Omitted]

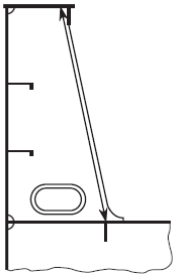
6

Figure ~~5~~: Coaming stay (example 3)



7

Figure ~~6~~: Coaming stay (example 4)



CHAPTER 2
OIL TANKERS

SECTION 2 STRUCTURE DESIGN PRINCIPLES

1 CORROSION PROTECTION

1.2 Internal cathodic protection systems

1.2.2

Permanent magnesium or magnesium alloy anodes in tanks ~~made of, or alloyed with magnesium~~ are not acceptable, except in tanks solely intended for water ballast that are not adjacent to cargo tanks.

[Omitted]

SECTION 4 HULL OUTFITTING

1 SUPPORTING STRUCTURES FOR COMPONENTS USED IN EMERGENCY

1.6 Scantling requirements

1.6.3 Permissible stresses

For the design load given in [1.5.2], the shear stresses and normal stresses, including bending stresses induced in the supporting structure and welds, in way of strong-points and fairleads, are not to be exceed the permissible values given below based on the gross thickness of the structure:

- Normal stress, 1.00 R_{eH}.
- Shear stress, 0.58 R_{eH}.

Allowable buckling utilization factor is to be used as given in Ch 8, Sec 1, Table 1, for static and dynamic load scenario, S+D. Buckling assessment method is to be used according to Pt 1, Ch 8, Sec 4, [2].

PART 15

Amendment	Note
Summary of changes | \ | (Amendment Type / No.) | Adoption Date | Rule Version Date | Effective Date | | 1 | Corrigenda 1 | 24 Aug 2021 | 01 Jan 2021 | 01 Jan 2021 | | | | | | |	The adoption date of **Corrigenda 1** is the day after internal opinion inquiry process is finished.
Corrigenda 1: **Chapter 1 General principles** **Section 3 – Verification of compliance** **2. Document to be submitted** **2.2 Submission of plans and supporting calculations** **2.2.1 Plans and supporting calculations are to be submitted for approval** [omitted] **Table 1 : Plans and supporting calculation to be submitted for approval** | Plan or supporting calculation | Containing also information on | | [omitted] | [omitted] | | ~~Plan of manholes~~ | ~~–~~ | | [omitted] | [omitted] | **2.2.2 Plans to be submitted for information** [omitted] g) Arrangement of lifting appliances h) Plan of manholes	'Plan of manholes' item is moved from **Table 1** to **[2.2.2]** Plans to be submitted for information.

Amendment	Note
Chapter 3 Structural Design principles **Section 1 – Materials** **2. Hull structural steel** **2.3 Steel grades** **2.3.2** [omitted] **Table 5 : Minimum material grades for ships greater than 250 m in length** Structural member category(1) / Material grade • Sheaer strake at strength deck — Grade E/EH within 0.4 L amidships • Stringer plate in strength deck — Grade E/EH within 0.4 L amidships • Bilge strake — Grade D/DH within 0.4 L amidships (1) Single strakes required to be of grade D/DH or grade E/EH and within 0.4 L amidships are to have breadths not less than (800 + 5 L) mm, but need not be greater than 1800 mm, unless limited by the geometry of the ship's design.	Term is modified to be in line with naming convention in **Ch 1, Sec 4, [3.6.1] Figure 4** and **[3.7.1] Table 7**. Correction is made to keep consistency in the foot note of **Table 5**.
Chapter 5 Hull Girder Strength **Section 1 – Hull Girder Yield Strength** **2. Hull girder bending assessment** **2.1 Genral** **2.1.2** The k material factors are to be defined with respect to the materials used for the bottom and deck members contributing to the longitudinal strength according to **[1]**. When material factors for higher strength steels are used, the requirements in **[2.45]** apply.	Cross Reference has been corrected.

Amendment	Note
Chapter 6 Hull Local Scantling **Section 3 – Minimum Thickness** **Symbols** For symbols not defined in this section, refer to **Ch 1, Sec 4**. L_2 : Reference rule length, in m, taken as lesser of L and 300 m. **Chapter 9 Fatigue** **Section 3 – Fatigue Evaluation** **Symbols** ... [omitted] T_C : Time in corrosive environment, in years, within the duration of the design fatigue life ($\sout{T_D}$ T_{DF}) as defined in **[5.3.1].** $\sout{T_D}$ $\sout{\text{: Design life, in years, as defined in [5.3.1].}}$ T_{DF} : Design fatigue life, in year, as defined in **Ch 9, Sec 1.** ... [omitted] f_0 : Factor taking into account time in seagoing operations excluding time in loading and unloading, repairs, etc **5.2 Elementary fatigue damage** **5.2.1** ... [omitted] N_D : Total number of wave cycles experienced by ship during the design fatigue life, taken as: $\sout{N_D = 31.557 \times 10^6 (f_0 T_D) / (41 \log L)}$ $N_D = 31.557 \times 10^6 (f_0 T_{DF}) / (41 \log L)$	Missing definition of L_2 is added. Clarify that the definition of design fatigue life T_{DF} (T_D, T_{DF} have very similar definition of the design fatigue life)

Amendment	Note
f_0 : Factor taking into account time in seagoing operations excluding time in loading and unloading, repairs, etc **5.3 Combined fatigue damage** **5.3.1** The combined fatigue damage in protected in-air environment and unprotected corrosive environment for each loading condition (j) is to be calculated as follows: ~~$D_{(j)} = D_{E,air\ (j)} \cdot \frac{T_D - T_C}{T_D} + D_{E,corr(j)} \cdot \frac{T_C}{T_D}$~~ $D_{(j)} = D_{E,air\ (j)} \cdot \frac{T_{DF} - T_C}{T_{DF}} + D_{E,corr(j)} \cdot \frac{T_C}{T_{DF}}$ ... [omitted] $T_{D,25}$: Minimum design life, in years, to be taken as 25 years. ~~T_D : Design life, in years, specified by the designer.~~ T_C : Time in corrosive environment, in years, within the duration of the design fatigue life (~~T_D~~ T_{DF}) to be taken as: ~~$T_C = T_D - (T_{D,25} - T_{C,25})$~~ $T_C = T_{DF} - (T_{D,25} - T_{C,25})$ **5.5 Fatigue life calculation** **5.5.1** The fatigue life, T_F, is taken as: ~~$T_F = \frac{T_D}{D_{air}}$~~ $T_F = \frac{T_{DF}}{D_{air}}$ if ~~$\frac{T_D}{D_{air}} \leq (T_D - T_C)$~~ $\frac{T_{DF}}{D_{air}} \leq (T_{DF} - T_C)$ ~~$T_F = T_D - T_C + (\frac{T_D}{D_{air}} - T_D + T_C)\frac{D_{air}}{D_{corr}}$~~ $T_F = T_{DF} - T_C + (\frac{T_{DF}}{D_{air}} - T_{DF} + T_C)\frac{D_{air}}{D_{corr}}$ otherwise .... [omitted]	

Amendment	Note
Chapter 1 General principles **Section 2 - Rule Principles** **5. Rule design method** **5.3 Load-capacity based requirements**	
Table 1 : Load scenarios and corresponding rule requirements	Sloshing loads for scantling(refer to **Ch 6, Sec 4, [2.7.2]** below) contains static pressure and impact pressure itself, acceptance criteria is modified to be correct as **AC-SD**. The proposal of this corrigenda is to avoid unintentional and too conservative consequence effect for the current designs.

Operation	Load type	Design load scenario	Acceptance criteria
Seagoing operations			
Transit	Static and dynamic loads in heavy weather	S+D	AC-SD
	Impact loads in heavy weather	Impact (I)	AC-I
	Internal sloshing loads	Sloshing (SL)	AC-SD
	Cyclic wave loads	Fatigue (F)	-
[omitted]	[omitted]	[omitted]	[omitted]

Chapter 6 Hull Local Scantling **Section 4 - Plating** **2. Special requirements** **2.7 Plating in cargo tank boundary** **2.7.2 By sloshing pressure**	Refer to **Ch 1, Sec 2, [5.3] Table 1** above.

The net thickness of plating, t in mm, subjected to sloshing pressures is not to be less than:

$$t = 0.0158\,\alpha_p\, b\,\sqrt{\frac{P_{slh} + P_{ls}}{C_{a-slh}\,R_{eH}}}$$

[omitted]

β : Coefficient of AC-SD as defined in **Table 1**.

α : Coefficient of AC-SD as defined in **Table 1**.

$C_{a-\max}$: Maximum permissible bending stress coefficient of AC-SD as defined in **Table 1**.

Amendment	Note
Section 5 - Stiffener **2. Special requirements** **2.1 Section modulus of stiffener attached on cargo tank boundary** **2.7.2 By sloshing pressure in cargo tanks** The net section modulus Z in cm^3, of stiffeners subject to sloshing pressure is not to be taken less than: $$Z = \frac{\left| P_{slh} + P_{ls} \right| s \, \ell_{bdg}^2}{f_{bdg} \, C_{s-slh} \, R_{eH}}$$ [omitted] β_s : Coefficient of AC-SD as defined in **Table 2**. α_s : Coefficient of AC-SD as defined in **Table 2**. $C_{s-\max}$: Maximum permissible bending stress coefficient of AC-SD as defined in **Table 2**.	Refer to **Ch 1, Sec 2, [5.3] Table 1** above.
Chapter 3 Structural Design Principles **Section 7 - Structural Idealisation** **1. Strucutral idealisation of stiffeners and primary support members** **1.3 Effective breadth** **1.3.1 Stiffeners** The effective breadth, b_{eff}, in mm, of the attached plating to be considered in the actual net section modulus for the yielding check of stiffeners is to be obtained from the following formulae: a) Where the plating extends on both sides of the stiffener: ~~$b_{eff} = 100\ell$~~ $b_{eff} = 200\ell$, or ~~$b_{eff} = 30\ell + 0.42s$~~ $b_{eff} = s$ whichever is lesser. b) Where the plating extends on one side of the stiffener (i.e. stiffeners bounding openings): ~~$b_{eff} = 50\ell$~~ $b_{eff} = 100\ell$, or ~~$b_{eff} = 0.15\ell + 0.21s$~~ $b_{eff} = 0.5s$	Current rule text regarding the effective breadth is found different from other KR Rules and CSR. It need to be in line with other Classification Societies' Rule including CSR.

Amendment	Note
whichever is lesser. [omitted]	

OTHER RULES AND GUIDANCE

현 행	개 정 안	비고
⟨Rules and Guidance for the Classification of Mobile Offshore Units⟩ CHAPTER 2 CLASSIFICATION AND SURVEYS Section 3 Surveys 303. Special survey 4. Special Survey No. 1 (1) Hull, structure and equipments (A) All units (f) All special and primary application structures (as defined in Ch 3, Sec 10) and identified critical structural areas are to be subjected to Close-up Survey. Table 2.1 Minimum requirements for Thickness Measurements at Special Survey (continued) 2. Self-elevating units (NOTES) 1) Categories of structural members(primary structural members, secondary structural members and special portions of structural members) are defined in Ch 3, 1002. Table 2.1 Minimum requirements for Thickness Measurements at Special Survey (continued) 3. Column-stabilized units (NOTES) 1) Categories of structural members(primary structural members, secondary structural members and special portions of structural members) are defined in Ch 3, 1002.	⟨Rules and Guidance for the Classification of Mobile Offshore Units⟩ CHAPTER 2 CLASSIFICATION AND SURVEYS Section 3 Surveys 303. Special survey 4. Special Survey No. 1 (1) Hull, structure and equipments (A) All units (f) All special and primary application structures (as defined in Ch 3, Sec 2 ~~Sec 10~~) and identified critical structural areas are to be subjected to Close-up Survey. Table 2.1 Minimum requirements for Thickness Measurements at Special Survey (continued) 2. Self-elevating units (NOTES) 1) Categories of structural members(primary structural members, secondary structural members and special portions of structural members) are defined in Ch 3, 202. ~~1002.~~ Table 2.1 Minimum requirements for Thickness Measurements at Special Survey (continued) 3. Column-stabilized units (NOTES) 1) Categories of structural members(primary structural members, secondary structural members and special portions of structural members) are defined in Ch 3, 202. ~~1002.~~	

Present

〈Guidance〉 Approval of Manufacturing Process and Type Approval

Ch 3 TYPE APPROVAL

Section 25 Securing Devices

2502. Type tests

Table 3.25.1 Design Braking Loads and Proof Loads *(2020)*

Item			Min. design breaking load (kN)		Min. proof load	
			$SWL \leq 400$	$SWL > 400$	〈omission〉	
Lashings	Wire ripe		3 × SWL	–		
	Rod	mild steel	3 × SWL			
		higher tensile steel	2 × SWL			
	Chain	mild steel	3 × SWL			
		higher tensile steel	2.5 × SWL			
Fittings and securing devices			2 × SWL	SWL+ 400		

NOTES:
1. Higher tensile steel is defined for this purpose as steel having a yield less than 315 N/mm^2
2. Breaking and proof loads for lashings of material other than ste considered.

Amendment

〈Guidance〉 Approval of Manufacturing Process and Type Approval

Ch 3 TYPE APPROVAL

Section 25 Securing Devices

2502. Type tests

Table 3.25.1 Design Braking Loads and Proof Loads *(2020)*

Item			Min. design breaking load (kN)		Min. proof load	
			$SWL \leq 400$	$SWL > 400$	〈omission〉	
Lashings	Wire ripe		3 × SWL	–		
	Rod	mild steel	2 × SWL			
		higher tensile steel	2 × SWL			
	Chain	mild steel	2.5 × SWL			
		higher tensile steel	3 × SWL			
Fittings and securing devices			2 × SWL	SWL+ 400		

NOTES:
1. Higher tensile steel is defined for this purpose as steel having a yield less than 315 N/mm^2
2. Breaking and proof loads for lashings of material other than ste considered.

Note

Present	Amendments	비고
⟨Rules for the Classification of Steel Barges⟩ CHAPTER 1 GENERAL Section 2 General 201. ~ 202. ⟨omitted⟩ 203. Equivalency The equivalence of alternative and novel features which deviate from or are not directly applicable to the **Rules** is to be in accordance with **Pt 1, Ch 1** of the **Rules for the Classification of Steel Ships**. *(2020)*	⟨Rules for the Classification of Steel Barges⟩ CHAPTER 1 GENERAL Section 2 General 201. ~ 202. ⟨Same as the current Rules⟩ 203. Equivalency The equivalence of alternative and novel features which deviate from or are not directly applicable to the **Rules** is to be in accordance with **Pt 1, Ch 1, 105.** of the **Rules for the Classification of Steel Ships**. *(2020)*	

Present	Amendments	Remarks
〈Rules of Mobile Offshore Units〉 CHAPTER 1 GENERAL Section 1 General 101. ~ 103. 〈omitted〉 104. Equivalency The equivalence of alternative and novel features which deviate from or are not directly applicable to the Rules is to be in accordance with **Pt 1 Ch 1 104.** of **Rules for the Classification of Steel Ships.**	〈Rules of Mobile Offshore Units〉 CHAPTER 1 GENERAL Section 1 General 101. ~ 103. 〈Same as the current Rules〉 104. Equivalency The equivalence of alternative and novel features which deviate from or are not directly applicable to the Rules is to be in accordance with **Pt 1 Ch 1 105.** of **Rules for the Classification of Steel Ships.**	

Present	Amendments	Remarks
〈Rules of Mobile Offshore Drilling Units〉 CHAPTER 1 GENERAL Section 1 General 101. ~ 103. 〈omitted〉 104. Equivalency The equivalence of alternative and novel features which deviate from or are not directly applicable to the Rules is to be in accordance with **Pt 1 Ch 1 104.** of **Rules for the Classification of Steel Ships.**	〈Rules of Mobile Offshore Drilling Units〉 CHAPTER 1 GENERAL Section 1 General 101. ~ 103. 〈Same as the current Rules〉 104. Equivalency The equivalence of alternative and novel features which deviate from or are not directly applicable to the Rules is to be in accordance with **Pt 1 Ch 1 105.** of **Rules for the Classification of Steel Ships.**	