Amendments of Guidance

(External Review)

Pt. 3 Hull Structures

2021. 01.

Hull Rule Development Team

Pt.3 Hull Structures

Present	Amendment	Reason
〈Guidance〉 **Annex 3-2 Guidance for the Direct Strength Assessment**	〈Guidance〉 **Annex 3-2 Guidance for the Direct Strength Assessment**	
I. General 〈omitted〉	I. General 〈same as the current Rules〉	
II. Direct Global Structural Analysis	II. Direct Global Structural Analysis	
1.General 〈omitted〉	1.General 〈same as the current Rules〉	
2. Hydrodynamic model 〈omitted〉	2. Hydrodynamic model 〈same as the current Rules〉	
3. Structural model	3. Structural model	
(1) Modeling of structure 〈omitted〉	(1) Modeling of structure 〈same as the current Rules〉	
(2) Boundary conditions The boundary conditions for the global structure model should reflect simple supporting. This is obtained through the example shown **Table 2** and **Fig 2.** The fixation points should be located far away from the areas of interest. 〈newly added〉	(2) Boundary conditions The boundary conditions for the global structure model should reflect simple supporting. This is obtained through the example shown **Table 2** and **Fig 2.** The fixation points should be located far away from the areas of interest. However, when it is necessary to evaluate the area near the boundary condition, or in the case of wave load conditions in which reaction force occurs largely in the boundary condition, the boundary condition can be replaced by using the inertia relief method. In this case, data on the unbalanced force are to be submitted to the Society and discussed in order to confirm the accuracy of the load transfer.	

Table 2 Boundary condition

Location	Displacement		
	δx	δy	δz
Point A	1	1	1
Point B	0	1	1
Point C	0	1	0
(Notes) 1 : constrained 0 : Free			

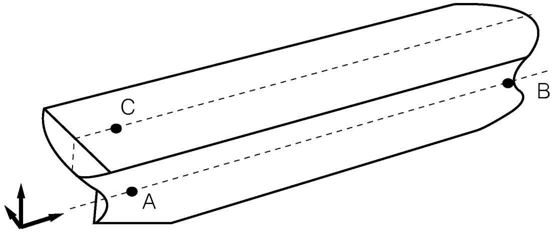


Fig 2 Boundary condition

III. Guidance for the Hold Analysis 〈omitted〉

IV. Buckling strength calculation 〈omitted〉 ⚓

Table 2 Boundary condition

Location	Displacement		
	δx	δy	δz
Point A	1	1	1
Point B	0	1	1
Point C	0	1	0
(Notes) 1 : constrained 0 : Free			

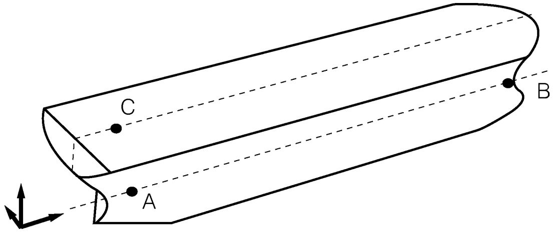


Fig 2 Boundary condition

III. Guidance for the Hold Analysis 〈same as the current Rules〉

IV. Buckling strength calculation 〈same as the current Rules〉 ⚓

Present	Amendment	Note
〈Rules〉 CHAPTER 7 Double Bottoms Section 8 Construction of Strengthened Bottom Forward **801., 803. 〈omit〉** **804. Scantlings** **1.** 〈omit〉 $Z=0.53KCPal^2$ (cm^3) where: l = spacing of solid floors (m).	〈Rules〉 CHAPTER 7 Double Bottoms Section 8 Construction of Strengthened Bottom Forward **801., 803. 〈same as the present Rule〉** **804. Scantlings** **1.** 〈same as the present Rule〉 $Z=0.53KCPal^2$ (cm^3) where: l = spacing of solid floors (m).	
a = $0.774l$. Where, however, the spacing of longitudinal shell stiffeners or bottom longitudinals in not more than $0.774l$, a is to be taken as the spacing.	a = $0.774l$. Where, however, the spacing of longitudinal shell stiffeners or bottom longitudinals is not more than $0.774l$, a is to be taken as the spacing.	- 오류수정 (TST4700-684-2020)
C = coefficient obtained from the following formula: 〈omit〉 β = slope of the ship's bottom obtained from the following formula, but C_2/β need not be taken as greater than 11.43. $\beta=\frac{0.0025L}{b}$ b = horizontal distance measured at the station $0.2L$ from the stem, from the center line of ship to the intersection of the horizontal line $0.0025L$ above the top of keel with the shell plating(m). **(See Fig 3.7.2)**	C = coefficient obtained from the following formula: 〈same as the present Rule〉 β = slope of the ship's bottom obtained from the following formula, but C_2/β need not be taken as greater than 11.43. $\beta=\frac{0.0025L}{b}$ b = horizontal distance measured at the station $0.2L$ from the stem, from the center line of ship to the intersection of the horizontal line $0.0025L$ above the top of keel with the shell plating(m). **(See Fig 3.7.2)**	
~~β = slope of the ship's bottom obtained from the following formula, but C_2/β need not be taken as greater than 11.43.~~ ~~b = horizontal distance measured at the station $0.2L$ from the stem, from the center line of ship to the intersection of the horizontal line $0.0025L$ above the top of keel with the shell plating(m). (See Fig 3.7.2)~~ 〈omit〉	〈same as the present Rule〉	- β, b 중복항목 삭제 (TST4700-684-2020)

Present

CHAPTER 9 Web Frames and Side Stringers

Section 1 General

101. Application

1. The requirements in Sec 2 and 3 apply to the structures stiffened by side stringers supporting the transverse ordinary frames specified in Ch 8, 303. and web frames supporting side stringers.
2. The requirements in Sec 4 apply to the structures stiffened by side transverse supporting the longitudinal frames specified in Ch 7, 401.

CHAPTER 10 Beams

Section 2 Deck Load

Line	Position of deck	a			
		Beams(1), Deck plating	Pillars	Deck girders	b
I	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉
II	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉
III	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉
IV	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉

NOTE:
(1) 〈omit〉
(2) 〈omit〉
(3) n case of deck girders other than (2).

Amendment

CHAPTER 9 Web Frames and Side Stringers

Section 1 General

101. Application

1. The requirements in Sec 2 and 3 apply to the structures stiffened by side stringers supporting the transverse ordinary frames specified in Ch 8, 303. and web frames supporting side stringers.
2. The requirements in Sec 4 apply to the structures stiffened by side transverse supporting the longitudinal frames specified in Ch 8, 401.

CHAPTER 10 Beams

Section 2 Deck Load

Line	Position of deck	a			
		Beams(1), Deck plating	Pillars	Deck girders	b
I	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉
II	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉
III	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉
IV	〈omit〉	〈omit〉	〈omit〉	〈omit〉	〈omit〉

NOTE:
(1) 〈omit〉
(2) 〈omit〉
(3) In case of deck girders other than (2).

Note

- 오류수정 (TST4700-684-2020)

- 오류수정 (TST4700-684-2020)

Present	Amendment	Note
CHAPTER 12 Pillars **Section 2 Scantling of Pillars** **201. Sectional area【See Guidance】** 1. The sectional area of pillars is not to be less than that obtained from the following formula: $A = \frac{0.223KW}{2.72 - \frac{l}{k_0\sqrt{K}}}$ (cm^2) where l = distance from the top of inner bottom, deck or other structures on which the pillars are based to the underside of beam or girder supported by the pillars (m). (See Fig 3.12.1) k_0 = minimum radius of gyration of the section of pillars (m). **CHAPTER 13 ARRANGEMENTS TO RESIST PANTING** **Section 2 Arrangements to Resist Panting forward the Collision Bulkhead**	**CHAPTER 12 Pillars** **Section 2 Scantling of Pillars** **201. Sectional area【See Guidance】** 1. The sectional area of pillars is not to be less than that obtained from the following formula: $A = \frac{0.223KW}{2.72 - \frac{l}{k_0\sqrt{K}}}$ (cm^2) where l = distance from the top of inner bottom, deck or other structures on which the pillars are based to the underside of beam or girder supported by the pillars (cm). (See Fig 3.12.1) k_0 = minimum radius of gyration of the section of pillars (cm).	- 오류수정 (TST4700-684-2020)

Present	Amendment	Note
CHAPTER 13 Arrangements to Resist Panting **Section 2 Arrangements to Resist Panting forward the Collision Bulkhead** **203. Transverse framing** 1. 〈omit〉 2. Transverse framing (1) 〈omit〉 (2) 〈omit〉 (3) Where transverse frames are supported by side stringers: (a) The scantlings of side stringers are not to be less than those obtained from the following formula: 〈omit〉 d_0 = depth of side stringers (mm). In the calculation of t_1, however, the depth of slot for longitudinals, if any, is to be deducted from the depth of side stringers. Where the depth of side stringers is divided by horizontal stiffeners, the divided depth may be taken as t_0 in the calculation of t_2.	**CHAPTER 13 Arrangements to Resist Panting** **Section 2 Arrangements to Resist Panting forward the Collision Bulkhead** **203. Transverse framing** 1. 〈omit〉 2. Transverse framing (1) 〈omit〉 (2) 〈omit〉 (3) Where transverse frames are supported by side stringers: (a) The scantlings of side stringers are not to be less than those obtained from the following formula: 〈omit〉 d_0 = depth of side stringers (mm). In the calculation of t_1, however, the depth of slot for transverse frames, if any, is to be deducted from the depth of side stringers. Where the depth of side stringers is divided by horizontal stiffeners, the divided depth may be taken as t_0 in the calculation of t_2.	- 오류수정 (TST4700-684-2020)

Present	Amendment	Note
CHAPTER 15 Deep Tank **Section 1 General** **104. Minimum thickness【See Guidance】** In wing tanks and hold tanks with the length or breadth which exceeds $0.1L+5.0$ (mm) and in topside tanks and hopper tanks, the thickness of girders, struts and the brackets and bulkhead plates is not to be less than that given by Table 3.15.1 in accordance with the length of ship. 〈omit〉 **Section 2 Bulkheads of Deep Tanks** **204. Girders supporting bulkhead stiffeners【See Guidance】** 1. 〈omit〉 2. 〈omit〉 3. The thickness of plates of web part is not to be less than that obtained from the following formulae, whichever is the greater: 〈omit〉 where: S, h and l = as specified in Par 1. S_1 = spacing of web stiffeners or the depth of girders, whichever is the greater (mm). d_1 = depth of the girder at the location considered, reduced by the depth of slots for stiffeners (mm) 〈omit〉	**CHAPTER 15 Deep Tank** **Section 1 General** **104. Minimum thickness【See Guidance】** In wing tanks and hold tanks with the length or breadth which exceeds $0.1L+5.0$ (m) and in topside tanks and hopper tanks, the thickness of girders, struts and the brackets and bulkhead plates is not to be less than that given by Table 3.15.1 in accordance with the length of ship. 〈omit〉 **Section 2 Bulkheads of Deep Tanks** **204. Girders supporting bulkhead stiffeners【See Guidance】** 1. 〈omit〉 2. 〈omit〉 3. The thickness of plates of web part is not to be less than that obtained from the following formulae, whichever is the greater: 〈omit〉 where: S, h and l = as specified in Par 1. S_1 = spacing of web stiffeners or the depth of girders, whichever is the smaller (mm). d_1 = depth of the girder at the location considered, reduced by the depth of slots for stiffeners (mm) 〈omit〉	- 오류수정 (TST4700-684-2020)

Present	Amendment	Note
〈Rules〉 **CHAPTER 14 Waterhight Bulkheads** **Section 2 Construction** **203. Stiffeners【See Guidance】** The section modulus of bulkhead stiffeners is not to be less than that obtained from the following formula: $Z = CShl^2$ (cm^3) 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. 〈omit〉	〈Rules〉 **CHAPTER 14 Waterhight Bulkheads** **Section 2 Construction** **203. Stiffeners【See Guidance】** The section modulus of bulkhead stiffeners is not to be less than that obtained from the following formula: $Z = CShl^2$ (cm^3) where: 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. 〈omit〉	- 오류수정 (TST4700-684-2020)

Amendments of Guidance

(Internal Review)

Pt. 4 Hull Equipments

2021. 1.

Hull Rule Development Team

Present	Amendment	Note
Section 5 Rudder Stocks **503. Deformations** Before significant reductions in rudder stock diameter due to the application of steels with yield stresses exceeding 235 (N/mm^2) are granted, the Society may require the evaluation of the rudder stock deformations. Large deformations of the rudder stock are to be avoided in order to avoid excessive edge pressures in way of bearings.	**Section 5 Rudder Stocks** **503. Deformations** Before significant reductions in rudder stock diameter are granted due to the application of steels with specified minimum yield stresses exceeding 235 (N/mm^2) are granted, the Society may require the evaluation of the rudder stock deformations. Large deformations of the rudder stock are to be avoided in order to avoid excessive edge pressures in way of bearings.	

Amendments of the Guidance

(draft)

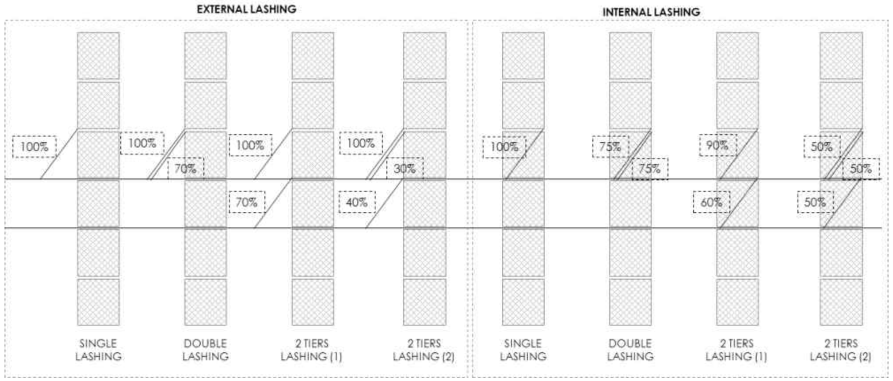
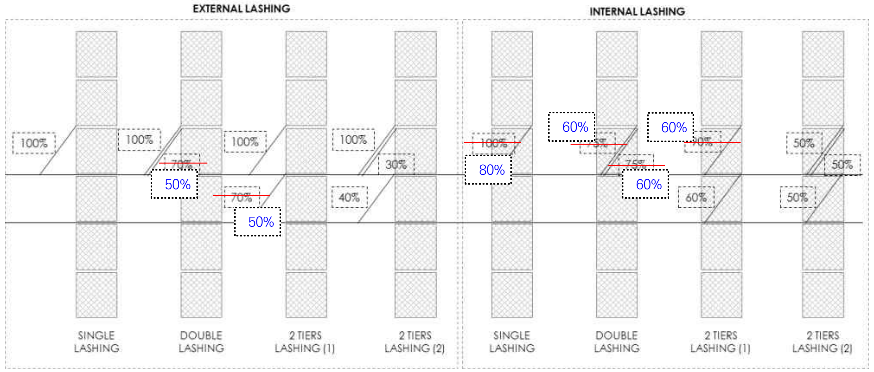
Pt. 7 Ships of Special Service-1

Annex 7-2 Guidance for the Container Securing Arrangements

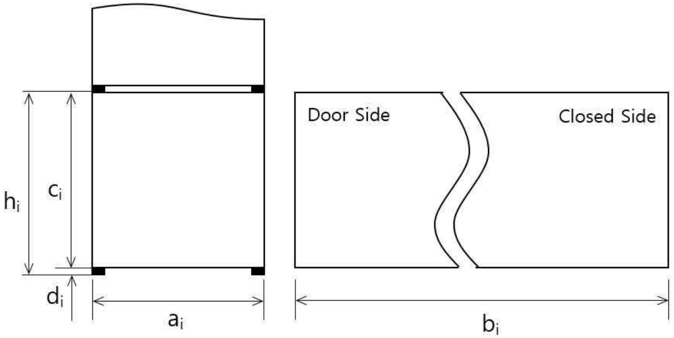
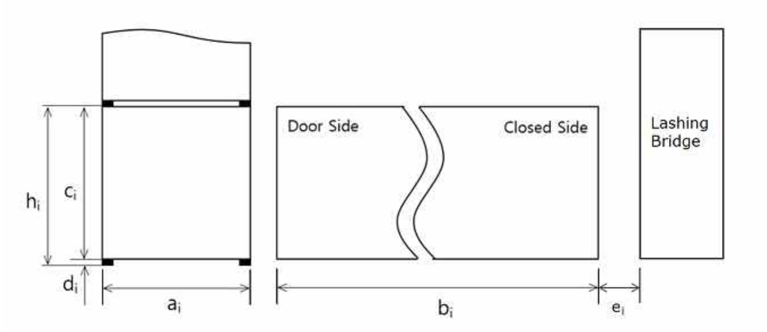
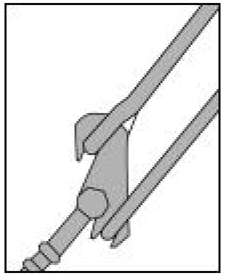
2021. 01.

Hull Rule Development Team

Present	Amendment	Note
〈Guidance〉	**〈Guidance〉**	
Annex 7-2 Guidance for the Container Securing Arrangements	**Annex 7-2 Guidance for the Container Securing Arrangements**	
1. ~ 6. 〈omit〉	**1. ~ 7.** 〈same as current〉	
7. Container support structure ***(2019)***	**7. Container support structure** ***(2021)***	
(1) General	(1) General	
(A) Drawings for lashing bridges, cell guides, container supports and other container support structures are to be submitted to the Society for approval.	(A) Drawings for lashing bridges, cell guides, container supports and other container support structures are to be submitted to the Society for approval.	
(B) The lower part of fixed container securing system of hatch covers and hull structures should be suitably reinforced	(B) The lower part of fixed container securing system of hatch covers and hull structures should be suitably reinforced	
(C) FE(Finite Element) method or Grillage analysis can be used for the strength evaluation. The modeling and evaluation should be of a gross scantling, and the element size should be such that the behavior of the structure can be faithfully reproduced.	(C) FE(Finite Element) method or Grillage analysis can be used for the strength evaluation. The modeling and evaluation should be of a gross scantling, and the element size should be such that the behavior of the structure can be faithfully reproduced.	
(D) The evaluation of the hatch cover strength is to be in accordance with the requirements in **Pt 4, Ch 2** of the Rules.	(D) The evaluation of the hatch cover strength is to be in accordance with the requirements in **Pt 4, Ch 2** of the Rules.	
(E) If a lashing bridge of the Mickey Mouse type is applied, special considerations should be taken to constrain the lateral displacement of the structure.	(E) If a lashing bridge of the Mickey Mouse type is applied, special considerations should be taken to constrain the lateral displacement of the structure.	
	(F) If requested by the owner or deemed necessary by the Society, vibration evaluation on the lashing bridge can be performed. *(2021)*	
(2) Structural strength evaluation (A) ~ (B) 〈omit〉 (C) Loads (a) Design loads 〈omit〉	(2) Structural strength evaluation (A) ~ (B) 〈same as current〉 (C) Loads (a) Design loads 〈same as current〉	

Present	Amendment	Note
(b) Combination of design loads (i) Lashing bridge 〈omit〉 The design loads should be the value calculated according to the container stowage arrangement. Where SWLs are used as design loads, the values shown in **Fig 3** can be used.  **Fig 3 Examples for load distribution of SWLs as design loads** ***(2019)*** (ii) ~ (iv) 〈omit〉 (D) ~ (F) 〈omit〉 (3) Vibration analysis 〈omit〉	(b) Combination of design loads (i) Lashing bridge 〈same as current〉 The design loads should be the value calculated according to the container stowage arrangement. Where SWLs are used as design loads, the values shown in **Fig 3** can be used.  **Fig 3 Examples for load distribution of SWLs as design loads** ***(2021)*** (ii) ~ (iv) 〈same as current〉 (D) ~ (F) 〈same as current〉 (3) Vibration analysis 〈same as current	

Present	Amendment	Note
8. Determination and application of forces	8. Determination and application of forces	
(1) Symbols and definitions *(2019)*	(1) Symbols and definitions *(2021)*	
(A) Definitions and symbols of terms are as follows.	(A) Definitions and symbols of terms are as follows.	
⟨omit⟩	⟨omit⟩	
a_i : distance between center of container corner casting (m), (see **Fig 5**)	a_i : distance between center of container corner casting (m), (see **Fig 5**)	
a_x, a_y, a_z : acceleration of x, y, z -direction $(\mathrm{m/sec^2})$	a_x, a_y, a_z : acceleration of x, y, z -direction $(\mathrm{m/sec^2})$	
b_i, c_i : length and height of the i-th container (m), (see **Fig 5**)	b_i, c_i : length and height of the i-th container (m), (see **Fig 5**)	
d_i : height of the i-th container fitting between containers in way of vertical direction (m), (see **Fig 5**)	d_i : height of the i-th container fitting between containers in way of vertical direction (m), (see **Fig 5**)	
	e_i : The horizontal gap between the container and the lashing bridge (mm) $e_i = 0$: without lashing bridge, $e_i = 700$ ~ 1,300 : with lashing bridge	
f_h, f_p, f_r : route specific reduction factor for heave, pitch, roll motion, (see **Table 8**)	f_h, f_p, f_r : route specific reduction factor for heave, pitch, roll motion, (see **Table 8**)	
⟨omit⟩	⟨omit⟩	
k_r : radius of roll gyration(m), generally 0.35*B*	k_r : radius of roll gyration(m), generally 0.35*B*	
ℓ_i : length of lashing device at the bottom of i-th container (mm)	ℓ_i : length of lashing device at the bottom of i-th container (mm) $l_i = \sqrt{a_i^2 + c_i^2 + e_i^2}$	
n : number of total tiers in a row	n : number of total tiers in a row	
⟨omit⟩	⟨omit⟩	

Present	Amendment	Note
 〈Front〉 〈Side〉 Fig 5 Dimension of container	 〈Front〉 〈Side〉 Fig 5 Dimension of container	
(2) ~ (3) 〈omit〉	(2) ~ (3) 〈omit〉	
8. Determination and application of forces	8. Determination and application of forces	
(4) Arrangements incorporating lashings	(4) Arrangements incorporating lashings	
(A), (B) 〈omit〉	(A), (B) 〈same as current〉	
(C) In the case of a para-lashing arrangement where two lashing rods and two turnbuckles are attached to adjacent corner castings, each cross-section area is set to 100% of the single rod section area. In the case of para-lashing arrangement in which one turnbuckle and two lashing rods are used in combination, shown on (**Fig 8**), equivalent cross-section area is set to 150% of the single rod section area. (2019)	(C) In the case of a para-lashing arrangement where two lashing rods and two turnbuckles are attached to adjacent corner castings, total cross-section area is set to the sum of each rod section area. In the case of para-lashing arrangement in which one turnbuckle and two lashing rods are used in combination, shown on (**Fig 8**), the same section area is used. (2021)	- equalizing device  Fig 8
Fig 8 〈omission〉	**Fig 8 〈same as current〉**	
(D) ~ (I) 〈omit〉	(D) ~ (I) 〈same as current〉	
(5) ~ (6) 〈omit〉	(5) ~ (6) 〈same as current〉	
9. 〈omit〉	**9.** 〈same as current〉	

Amendments of the Guidance

(draft)

Pt. 7 Ships of Special Service-2

2021. 01

Hull Rule Development Team

Present	Amendment	Note
〈Guidance〉	〈Guidance〉	
Ch.5 Ships Carrying Liquefied Gases in Bulk	**Ch.5 Ships Carrying Liquefied Gases in Bulk**	
Section 4 Cargo Containment	**Section 4 Cargo Containment**	
403. ~ 419. 〈omission〉	**403. ~ 419. 〈same as current〉**	
420. Construction processes 【See Rule】	**420. Construction processes 【See Rule】**	
1. ~ 5. 〈omission〉	**1. ~ 5. 〈same as current〉**	
6. Examination before and after the first loaded voyage (Only if the LNG Vessels)	**6. Examination before and after the first loaded voyage (Only if the LNG, LPG Vessels)**	
In accordance with the requirements in **420. 3** (5) & (7) of the Rules, it is preferred that Gas Trial and Cargo Loading Tests are finished at the shipyard, but either or both of these may be postponed until after entering into a voyage and the survey requirements are as follows	In accordance with the requirements in **420. 3** (5) & (7) of the Rules, it is preferred that Cargo Loading Tests are finished at the shipyard, but either or both of these may be postponed until after entering into a voyage and the survey requirements are as follows	
(1) First Loading (Considered to be full loading) : 〈omission〉	(1) First Loading (Considered to be full loading) : 〈same as current〉	
(2) First Unloading : 〈omission〉	(2) First Unloading : 〈same as current〉	
421. ~ 428. 〈omission〉	**421. ~ 428. 〈same as current〉**	

Amendments of the Guidance

(draft)

Pt. 7 Ships of Special Service-2

2021. 01

Hull Rule Development Team

현행	개정안	개정사유
〈Guidance〉 **Ch. 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 6 Materials of Construction and Quality Control** **603, 604. 〈omission〉** **605. Welding of metallic materials and non-destructive testing** **1. ~ 3.** 〈omission〉 **4. Production weld tests** (1) 〈omission〉 (2) For the purpose of the requirements in **605. 5** (1) of the Rules, the number of test specimens for production weld tests of secondary barriers may be reduced to the extent as deemed appropriate by the Society considering the experience of same welding procedures in past, workmanship and quality control. In general, intervals of production weld tests for secondary barriers may be approximately 200 mm of butt weld joints and the tests are to be representative of each welding position. Test requirements are to be in accordance with **605. 3** (5). of Rules. *(2017)* (3) 〈omission〉 **5. 〈omission〉** **606. 〈omission〉**	**〈Guidance〉** **Ch. 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 6 Materials of Construction and Quality Control** **603, 604. 〈omission〉** **605. Welding of metallic materials and non-destructive testing** **1. ~ 3.** 〈omission〉 **4. Production weld tests** (1) 〈omission〉 (2) For the purpose of the requirements in **605. 5** (1) of the Rules, the number of test specimens for production weld tests of secondary barriers may be reduced to the extent as deemed appropriate by the Society considering the experience of same welding procedures in past, workmanship and quality control. In general, intervals of production weld tests for secondary barriers may be approximately 200 m of butt weld joints and the tests are to be representative of each welding position. Test requirements are to be in accordance with **605. 3** (5). of Rules. *(2017)* (3) 〈omission〉 **5. 〈omission〉** **606. 〈omission〉**	

Amendments of the Guidance relating to the Rules

(External Opinion Inquiry)

Pt. 8 Fire Protection and Fire Extinction

2021. 01.

Rule Development Team

- Main Amendments -

(1) Effective Date : 1 June 2021(based on application date for classification)

◉ Reflection of internal request for rule revision

Present	Amendment	Note
CHAPTER 2 PROBABILITY OF IGNITION **Section 1 ~ 3 〈omitted〉** **Section 4 Cargo Areas of Tankers** **401. Separation of cargo oil tanks** **1. 〈omitted〉** **2.** In applying 401. 2 of the Rules, arrangement of main cargo control stations, control stations, accommodation spaces and service spaces is to comply with the following requirements: **【See Rule】** (1) Main cargo control stations, control stations, accommodation spaces and service spaces(including chain lockers) are not to make point contact or linear contact with cargo oil tanks or s1op tanks. However, they may make point contact or linear contact with cargo pump rooms and cofferdams. (2) Main cargo control stations, control stations, accommodation spaces and service spaces need not **3. ~ 7. 〈omitted〉** **402. ~ 410. 〈omitted〉**	**CHAPTER 2 PROBABILITY OF IGNITION** **Section 1 ~ 3 〈same as the present〉** **Section 4 Cargo Areas of Tankers** **401. Separation of cargo oil tanks** **1. 〈same as the present〉** **2.** In applying 401. 2 of the Rules, arrangement of main cargo control stations, control stations, accommodation spaces and service spaces is to comply with the following requirements: **【See Rule】** (1) Main cargo control stations, control stations, accommodation spaces and service spaces(including chain lockers) are not to make point contact or linear contact with cargo oil tanks or slop tanks. ~~However, they may make point contact or linear contact with cargo pump rooms and cofferdams.~~ (2) Main cargo control stations, control stations, accommodation spaces and service spaces need not **3. ~ 7. 〈same as the present〉** **402. ~ 410. 〈same as the present〉**	- Reflection of internal request for rule revision(HUT4000-63-2021)

<table>
<tr><th>Present</th><th>Amendment</th><th>Note</th></tr>
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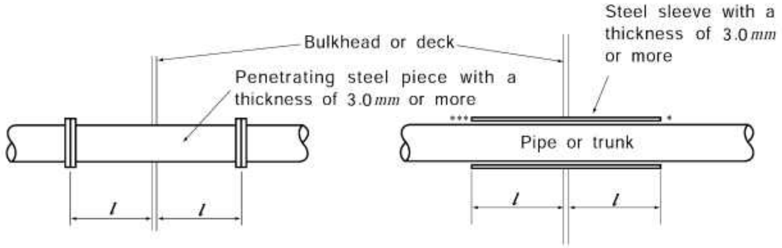
Annex 8-2 Penetrations through Divisions

1. Penetrations of Pipes or Trunks

1.1 Penetrations through “A” and “B” class divisions (steel or equivalent material) *(2020)*
〈omitted〉

1.2 Pipes and trunks made of materials readily rendered ineffective by heat (PVC, FRP, aluminium alloy, lead, etc)

<table>
<tr><th>Division</th><th>Details of penetrations</th></tr>
<tr><td>"A" class division</td><td>

The thickness of penetrating pieces or steel sleeves may be that of the carbon steel pipes for ordinary piping of national standard according to their nominal diameter.</td></tr>
<tr><td>"B" class division</td><td>〈omitted〉</td></tr>
<tr><td colspan="2">〈omitted〉</td></tr>
</table>

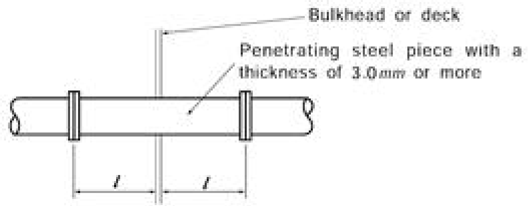
</td>
<td>

Annex 8-2 Penetrations through Divisions

1. Penetrations of Pipes or Trunks

1.1 Penetrations through “A” and “B” class divisions (steel or equivalent material) *(2020)*
〈same as the present〉

1.2 Pipes and trunks made of materials readily rendered ineffective by heat (PVC, FRP, aluminium alloy, lead, etc)

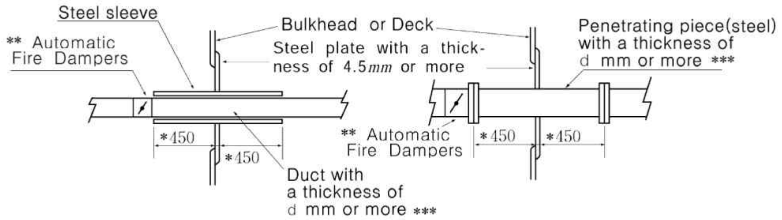
<table>
<tr><th>Division</th><th>Details of penetrations</th></tr>
<tr><td>"A" class division</td><td>

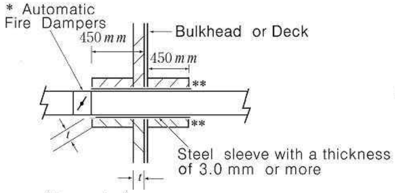
The thickness of penetrating pieces ~~or steel sleeves~~ may be that of the carbon steel pipes for ordinary piping of national standard according to their nominal diameter.</td></tr>
<tr><td>"B" class division</td><td>〈same as the present〉</td></tr>
<tr><td colspan="2">〈same as the present〉</td></tr>
</table>

</td>
<td>- Reflection of internal request for rule revision</td>
</tr>
</table>

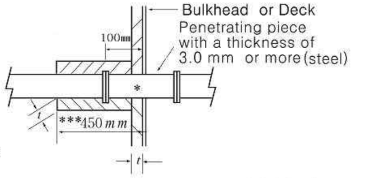
<table>
<tr><th>Present</th><th>Amendment</th><th>Note</th></tr>
<tr>
<td>

2. Penetrations of Ventilation Ducts

<table>
<tr><th>Division</th><th>Penetrations of ventilation ducts</th></tr>
<tr><td>"A" class</td><td>


* When free cross–sectional Duct area $\leq 0.02\ m^2$, it may be reduced to 100 mm (Only, in the case of the deck, wholly laid on the lower side of the decks pierced)
** When free cross–sectional Duct area $> 0.075\ m^2$
*** $0.075\ m^2 \leq A \leq 0.45\ m^2$: $d = 4.0$ mm
$A > 0.45\ m^2$: $d = 5.0$ mm
A: free cross–sectional area of the duct
</td></tr>
<tr><td>"B" class</td><td>〈omitted〉</td></tr>
<tr><td>Prevention of heat treatment</td><td>


* (If needed)
** May be omitted except in cases where fire damper



* Free cross–sectional area $\leq 0.02\ m^2$
*** In case the penetrations passes the FTP code test(In case of having the equal fire integrity with 450mm) or In case penetration piece and duct connection part have a structure that heat can not be transferred, 100mm is admitted.
</td></tr>
<tr><td colspan="2">〈omitted〉</td></tr>
</table>

3. 〈omitted〉

</td>
<td>

2. Penetrations of Ventilation Ducts

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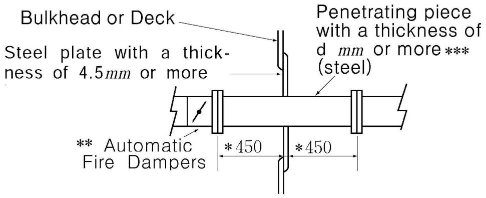
<tr><th>Division</th><th>Penetrations of ventilation ducts</th></tr>
<tr><td>"A" class</td><td>


* When free cross–sectional Duct area(A) $\leq 0.02\ mm^2$, it may be reduced to 100 mm (Only, in the case of the deck, wholly laid on the lowed side of the decks pierced)
** When $A > 0.075\ mm^2$
*** $A < 0.075\ m^2$: $d = 3.0$ mm
$0.075 \leq A \leq 0.45\ m^2$: $d = 4$ mm
$A > 0.45\ m^2$: $d = 5$ mm
</td></tr>
<tr><td>"B" class</td><td>〈same as the present〉</td></tr>
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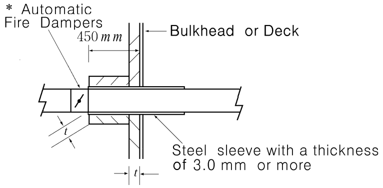
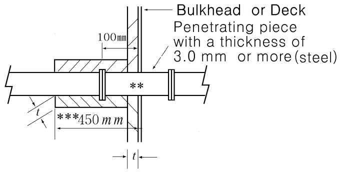


* (If needed)



** Free cross–sectional area $\leq 0.02\ m^2$
*** In case the penetrations passes the FTP code test(In case of having the equal fire integrity with 450mm) or In case penetration piece and duct connection part have a structure that heat can not be transferred, 100mm is admitted.
</td></tr>
<tr><td colspan="2">〈same as the present〉</td></tr>
</table>

3. 〈same as the present〉

</td>
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–Reflection of internal request for rule revision

–Reflection of internal request for rule revision

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

Amendments of the Guidance relating to the Rules

(External Opinion Inquiry)

Pt. 9 Additional Installations

2021. 01.

Hull Rule Development Team

- Main Amendments -

(1) Effective Date : 1 Juen 2021(based on application date for certification)

◉ Reflection of internal request for rule revision

Present	Amendment	Not~
CHAPTER 2 CARGO HANDLING APPLIANCES	**CHAPTER 2 CARGO HANDLING APPLIANCES**	
Section 1 〈omitted〉	**Section 1 〈same as the present〉**	
Section 2 Surveys	**Section 2 Surveys**	
201. ~ 204. 〈omitted〉	**201. ~ 204. 〈same as the present〉**	
205. Load Tests 【See Rule】	**205. Load Tests 【See Rule】**	
1. Load Tests	**1. Load Tests**	
In application to **205.** of the Rules, the followings are to be applied.	In application to **205.** of the Rules, the followings are to be applied.	
(1) ~ (4) 〈omitted〉	(1) ~ (4) 〈same as the present〉	
(5) In application to **Table 9.2.2**, the "load as considered appropriate by the Society" means the case where the test load are $1.1 \times SWL$.	~~(5) In application to **Table 9.2.2**, the "load as considered appropriate by the Society" means the case where the test load are $1.1 \times SWL$.~~	
Section 3 ~ 8 〈omitted〉	**Section 3 ~ 8 〈same as the present〉**	

Amendments of the Rules

(draft)

Pt10 Hull Structures and Equipment of Small Steel Ship

2021. 01.

Hull Rule Development Team

Present

〈Rules〉

CHAPTER 10 BEAMS

Section 2 Deck Load

201. Value of h **【See Guidance】**

1. 〈omission〉

2. Deck load h (kN/m^2) for the weather deck is to be as specified in the following (1) to (4):

(1), (2) 〈omission〉

(3) Notwithstanding the provision in (1) and (2), h is not to be less than that obtained from the formulae given by **Table 10.10.2,** but to be taken as 12.8 where h ~~for decks~~ is less than 12.8.

(4) 〈omission〉

Table 10.10.2 Minimum value of h

Column	Position of Deck	h	C		
			Beams	Pillars, Longitudinal and transverse deck girders	Deck Plating
I and II	〈omission〉	$C\sqrt{L+50}$	2.85	1.37	4.20
III	〈omission〉		1.37	1.18	2.05
IV	〈omission〉	$C\sqrt{L}$	1.95	1.47	2.95
Second tier super-structure deck above the freeboard deck			1.28	0.69	1.95

3. 〈omission〉

Amendment

〈Rules〉

CHAPTER 10 BEAMS

Section 2 Deck Load

201. Value of h **【See Guidance】**

1. 〈same as current〉

2. Deck load h (kN/m^2) for the weather deck is to be as specified in the following (1) to (4):

(1), (2) 〈same as current〉

(3) Notwithstanding the provision in (1) and (2), h is not to be less than that obtained from the formulae given by **Table 10.10.2,** but to be taken as 12.8 where h is less than 12.8.

(4) 〈same as current〉

〈same as current〉

3. 〈same as current〉

Note

OTHER RULES AND GUIDANCE

(Guidance for Ships for Navigation in Ice)

2021. 01.

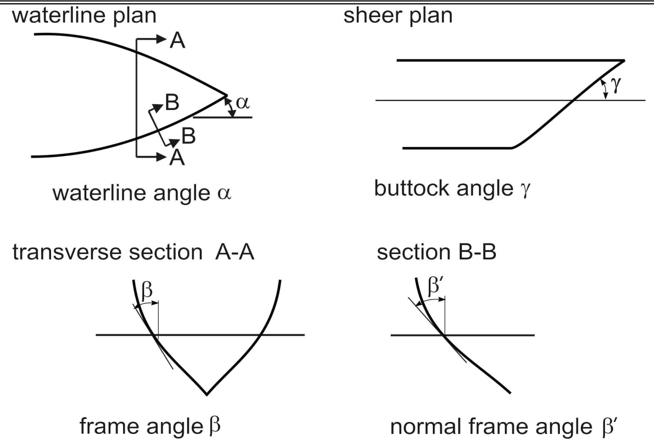
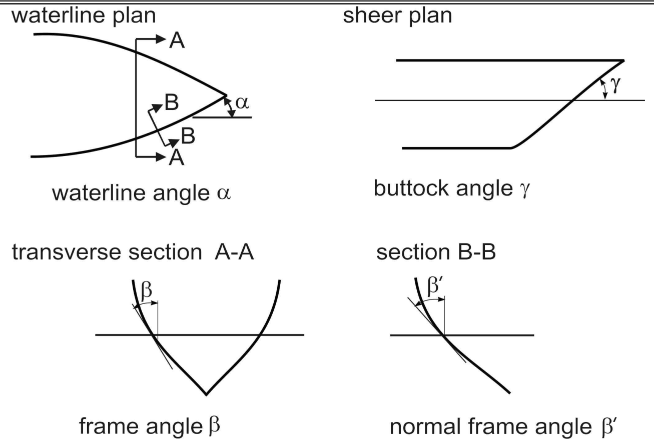
Hull Rule Development Team

Present	Amendment	Note
CHAPTER 2 SHIPS FOR NAVIGATION IN POLAR WATERS **Section 1 (oimission)** **Section 2 Structural Requirements for Polar Class Ships** **201. ~~Application~~** 1. These requirements are to be applied to ships of Polar Class mentioned in Sec 1.	**CHAPTER 2 SHIPS FOR NAVIGATION IN POLAR WATERS** **Section 1 (same as current)** **Section 2 Structural Requirements for Polar Class Ships** **201. General** 1. Application These requirements are to be applied to ships of Polar Class mentioned in Sec 1. 2. Definitions (1) The length L_{UI} is the distance, in m, measured horizontally from the fore side of the stem at the intersection with the upper ice waterline (UIWL) to the after side of the rudder post, or the centre of the rudder stock if there is no rudder post. L_{UI} is not to be less than 96%, and need not be greater than 97%, of the extreme length of the upper ice waterline (UIWL) measured horizontally from the fore side of the stem. In ships with unusual stern and bow arrangement the length L_{UI} will be specially considered. (2) The ship displacement D_{UI} is the displacement, in kt, of the ship corresponding to the upper ice waterline (UIWL). Where multiple waterlines are used for determining the UIWL, the displacement is to be determined from the waterline corresponding to the greatest displacement.	

Present	Amendment	Note
202. Hull areas	**202. Hull areas**	
1. The ice strengthening regions of all Polar Class ships is divided into regions reflecting the magnitude of the loads that are expected to act upon them. In the longitudinal direction, there are four regions: Bow, Bow Intermediate, Midbody and Stern. The Bow Intermediate, Midbody and Stern regions are further divided in the vertical direction into the Bottom, Lower and Icebelt regions. The extent of each ice strengthening region is illustrated in Fig 2.1.	1. The ice strengthening regions of all Polar Class ships is divided into regions reflecting the magnitude of the loads that are expected to act upon them. In the longitudinal direction, there are four regions: Bow, Bow Intermediate, Midbody and Stern. The Bow Intermediate, Midbody and Stern regions are further divided in the vertical direction into the Bottom, Lower and Icebelt regions. The extent of each ice strengthening region is illustrated in Fig 2.1.	
2. The upper ice waterline (UIWL) and lower ice waterline (LIWL) are as defined in 103. 1.	2. The upper ice waterline (UIWL) and lower ice waterline (LIWL) are as defined in 103. 1.	
3. Fig 2.1 notwithstanding, at no time is the boundary between the Bow and Bow Intermediate regions to be forward of the intersection point of the line of the stem and the ship baseline.	3. Fig 2.1 notwithstanding, at no time is the boundary between the Bow and Bow Intermediate regions to be forward of the intersection point of the line of the stem and the ship baseline.	
4. Fig 2.1 notwithstanding, the aft boundary of the Bow region need not be more than 0.45 L aft of the ~~forward perpendicular (FP).~~	4. Fig 2.1 notwithstanding, the aft boundary of the Bow region need not be more than 0.45 L aft of the fore side of the stem at the intersection with the upper ice waterline (UIWL).	
5. The boundary between the bottom and lower regions is to be taken at the point where the shell is inclined 7° from horizontal.	5. The boundary between the bottom and lower regions is to be taken at the point where the shell is inclined 7° from horizontal.	
6. If a ship is intended to operate astern in ice regions, the aft section of ships is to be designed using the Bow and Bow Intermediate ice strengthening region requirements.	6. If a ship is intended to operate astern in ice regions, the aft section of ships is to be designed using the Bow and Bow Intermediate ice strengthening region requirements.	
7. Fig 2.1 notwithstanding, if the ship is assigned the additional notation “Icebreaker”, the forward boundary of the stern region is to be at least 0.04 L forward of the section where the parallel ship side at the upper ice waterline (UIWL) ends.	7. Fig 2.1 notwithstanding, if the ship is assigned the additional notation “Icebreaker”, the forward boundary of the stern region is to be at least 0.04 L_{UI} forward of the section where the parallel ship side at the upper ice waterline (UIWL) ends.	
203. Design ice loads	**203. Design ice loads**	
1. General (oimission)	**1. General (same as current)**	
2. Glancing impact load characteristics The parameters defining the glancing impact load characteristics are reflected in the Class Factors listed in **Table 2.2** and **Table 2.2-1**.	**2. Glancing impact load characteristics** The parameters defining the glancing impact load characteristics are reflected in the Class Factors listed in **Table 2.2** and **Table 2.2-1**.	

Present	Amendment	Note
(1) Bow area (A) In the Bow area, the force (F), line load (Q), pressure (P) and load patch aspect ratio (AR) associated with the glancing impact load scenario are functions of the hull angles measured at the upper ice waterline. The influence of the hull angles is captured through calculation of a bow shape coefficient (fa). The hull angles are defined in **Fig 2.2.** (B) The waterline length of the bow region is generally to be divided into 4 sub-regions of equal length. The force (F), line load (Q), pressure (P) and load patch aspect ratio (AR) are to be calculated with respect to the mid-length position of each sub-region (each maximum of F, Q and P is to be used in the calculation of the ice load parameters P_{avg}, b and w). (C) The Bow area load characteristics for bow forms defined in **203. 1.** (5) are determined as follows: (a) Shape coefficient, fa_i, is to be taken as $fa_i = \min(fa_{i,1}\,; fa_{i,2}\,; fa_{i,3})$ where $fa_{i,1} = (0.097 - 0.68(x/L - 0.15)^2) \times \alpha_i / \sqrt{\beta_i'}$ $fa_{i,2} = 1.2 \times CF_F / (\sin\beta_i' \times CF_C \times D^{0.64})$ $fa_{i,3} = 0.60$ (b) Force, F_i $F_i = fa_i \times CF_C \times D^{0.64}$ (MN) (c) Load patch aspect ratio, AR_i $AR_i = 7.46 \times \sin\beta_i' \geq 1.3$ (d) Line load, Q_i $Q_i = F_i^{0.61} \times CF_D / AR_i^{0.35}$ (MN/m)	(1) Bow area (A) In the Bow area, the force (F), line load (Q), pressure (P) and load patch aspect ratio (AR) associated with the glancing impact load scenario are functions of the hull angles measured at the upper ice waterline. The influence of the hull angles is captured through calculation of a bow shape coefficient (fa). The hull angles are defined in **Fig 2.2.** (B) The waterline length of the bow region is generally to be divided into 4 sub-regions of equal length. The force (F), line load (Q), pressure (P) and load patch aspect ratio (AR) are to be calculated with respect to the mid-length position of each sub-region (each maximum of F, Q and P is to be used in the calculation of the ice load parameters P_{avg}, b and w). (C) The Bow area load characteristics for bow forms defined in **203. 1.** (5) are determined as follows: (a) Shape coefficient, fa_i, is to be taken as $fa_i = \min(fa_{i,1}\,; fa_{i,2}\,; fa_{i,3})$ where $fa_{i,1} = (0.097 - 0.68(x/L_{UI} - 0.15)^2) \times \alpha_i / \sqrt{\beta_i'}$ $fa_{i,2} = 1.2 \times CF_F / (\sin\beta_i' \times CF_C \times D_{UI}{}^{0.64})$ $fa_{i,3} = 0.60$ (b) Force, F_i $F_i = fa_i \times CF_C \times D_{UI}{}^{0.64}$ (MN) (c) Load patch aspect ratio, AR_i $AR_i = 7.46 \times \sin\beta_i' \geq 1.3$ (d) Line load, Q_i $Q_i = F_i^{0.61} \times CF_D / AR_i^{0.35}$ (MN/m)	계수 표기 방법 변경 L ==〉 L_{UI} D ==〉 D_{UI}

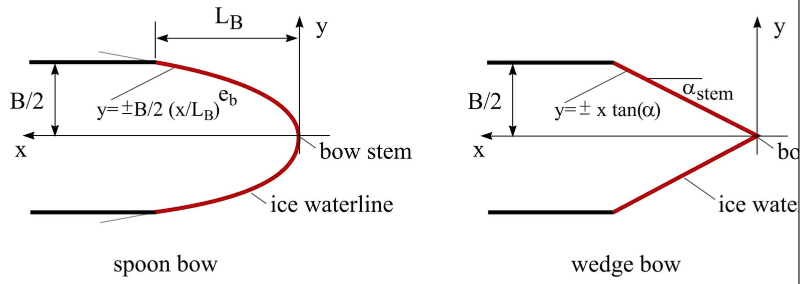
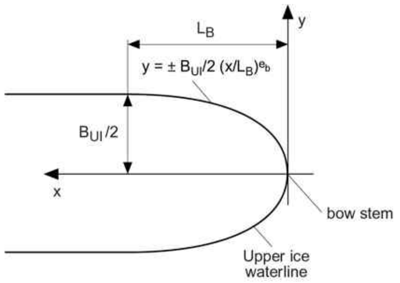
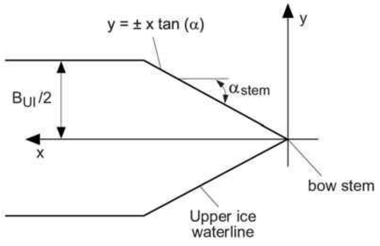
Present	Amendment	Note
(e) Pressure, P_i $P_i = F_i^{0.22} \times CF_D^2 \times AR_i^{0.3}$ (MPa) where i = sub-region considered L = ~~ship~~ length as defined in ~~**Pt 1, Ch 1, 102.** of the Rules but measured on the upper ice waterline (UIWL) (m)~~ x = distance from the ~~forward perpendicular (FP)~~ to station under consideration (m) α = waterline angle (deg), see **Fig 2.2** β' = normal frame angle (deg), see **Fig 2.2** D = ~~ship~~ displacement (kt), not to be taken less than 5 kt CF_C = crushing failure class factor from **Table 2.2** CF_F = flexural failure class factor from **Table 2.2** CF_D = load patch dimensions class factor from **Table 2.2**	(e) Pressure, P_i $P_i = F_i^{0.22} \times CF_D^2 \times AR_i^{0.3}$ (MPa) where i = sub-region considered L_{UI} = length as defined in **201. 2** (m) x = distance from the forward fore side of the stem at the intersection with the upper ice waterline (UIWL) to station under consideration (m) α = waterline angle (deg), see **Fig 2.2** β' = normal frame angle (deg), see **Fig 2.2** D_{UI}= displacement (kt), not to be taken less than 5 kt CF_C = crushing failure class factor from **Table 2.2** CF_F = flexural failure class factor from **Table 2.2**	

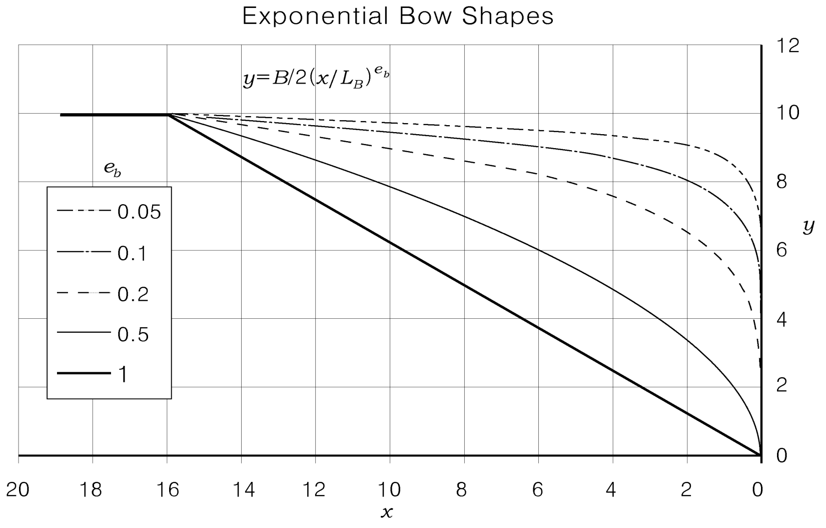
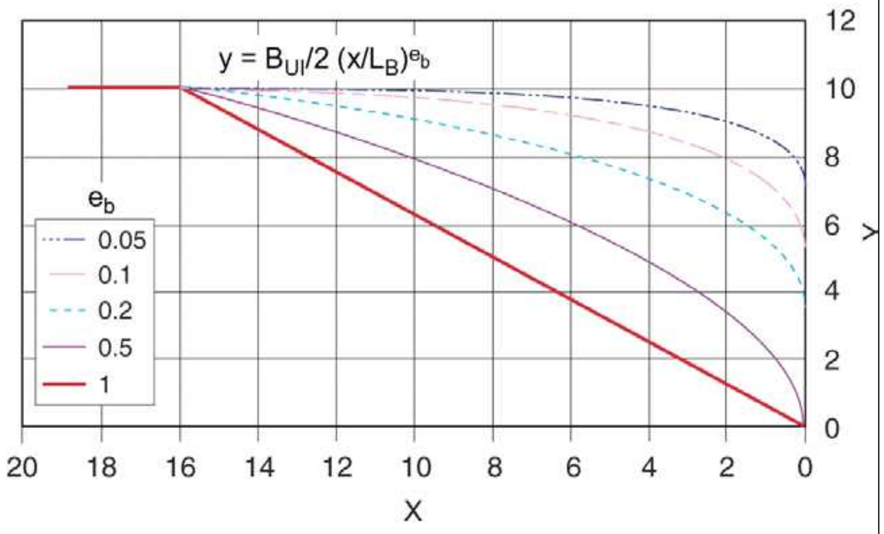
Present	Amendment	Note
 Note: β' = normal frame angle at upper ice waterline [deg] α = upper ice waterline angle [deg] γ = buttock angle at upper ice waterline (angle of buttock line measured from vertical) [deg] $\tan\beta = \tan\gamma / \tan\alpha$ $\tan\beta' = \tan\beta / \cos\alpha$ **Fig 2.2 Definition of hull angles** (D) The Bow area load characteristics for bow forms defined in **203. 1.** (6) are determined as follows: *(2017)* (a) Shape coefficient, fa_i, is to be taken as $fa_i = \alpha_i / 30$ (b) Force, F_i $F_i = fa_i \times CF_{CV} \times D^{0.47}$ (MN) (c) Line load, Q_i $Q_i = F_i^{0.22} \times CF_{QV}$ (MN/m)	 Note: β' = normal frame angle at upper ice waterline [deg] α = upper ice waterline angle [deg] γ = buttock angle at upper ice waterline (angle of buttock line measured from vertical) [deg] $\tan\beta = \tan\gamma / \tan\alpha$ $\tan\beta' = \tan\beta / \cos\alpha$ **Fig 2.2 Definition of hull angles** (D) The Bow area load characteristics for bow forms defined in **203. 1.** (6) are determined as follows: *(2017)* (a) Shape coefficient, fa_i, is to be taken as $fa_i = \alpha_i / 30$ (b) Force, F_i $F_i = fa_i \times CF_{CV} \times D_{UI}^{0.47}$ (MN) (c) Line load, Q_i $Q_i = F_i^{0.22} \times CF_{QV}$ (MN/m)	

Present	Amendment	Note
(d) Pressure, P_i $P_i = F_i^{0.56} \times CF_{PV}$ (MPa) where i = sub-region considered α = waterline angle (deg), see **Fig 2.2** D = ~~ship~~ displacement (kt), not to be taken less than 5 kt CF_{CV} = crushing failure class factor from **Table 2.2-1** CF_{QV} = flexural failure class factor from **Table 2.2-1** CF_{PV} = pressure class factor from **Table 2.2-1**	(d) Pressure, P_i $P_i = F_i^{0.56} \times CF_{PV}$ (MPa) where i = sub-region considered α = waterline angle (deg), see **Fig 2.2** D_{UI}= displacement (kt), not to be taken less than 5 kt CF_{CV} = crushing failure class factor from **Table 2.2-1** CF_{QV} = flexural failure class factor from **Table 2.2-1** CF_{PV} = pressure class factor from **Table 2.2-1**	
(2) Hull areas other than the bow (A) In the hull area other than the bow, the force (F_{NonBow}) and line load (Q_{NonBow}) used in the determination of the load patch dimensions (b_{NonBow}, w_{NonBow}) and design pressure (P_{avg}) are determined as follows: (a) Force, F_{NonBow} $F_{NonBow} = 0.36 \times CF_C \times DF$ (MN) (b) Line Load, Q_{NonBow} $Q_{NonBow} = 0.639 \times F^{0.61}_{NonBow} \times CF_D$ (MN/m) where CF_C = crushing failure class factor from **Table 2.2** DF = ship displacement factor = $D^{0.64}$ if $D \le CF_{DIS}$ = $CF_{DIS}^{0.64} + 0.10(D - CF_{DIS})$ if $D > CF_{DIS}$	(2) Hull areas other than the bow (A) In the hull area other than the bow, the force (F_{NonBow}) and line load (Q_{NonBow}) used in the determination of the load patch dimensions (b_{NonBow}, w_{NonBow}) and design pressure (P_{avg}) are determined as follows: (a) Force, F_{NonBow} $F_{NonBow} = 0.36 \times CF_C \times DF$ (MN) (b) Line Load, Q_{NonBow} $Q_{NonBow} = 0.639 \times F^{0.61}_{NonBow} \times CF_D$ (MN/m) where CF_C = crushing failure class factor from **Table 2.2** DF = ship displacement factor = $D_{UI}^{0.64}$ if $D \le CF_{DIS}$ = $CF_{DIS}^{0.64} + 0.10(D - CF_{DIS})$ if $D > CF_{DIS}$	

Present	Amendment	Note
D = ship displacement (kt), not to be taken less than 10 kt CF_{DIS}= displacement class factor from **Table 2.2** CF_D = load patch dimension class factor from **Table 2.2**	D_{UI}= ship displacement (kt), not to be taken less than 10 kt CF_{DIS}= displacement class factor from **Table 2.2** CF_D = load patch dimension class factor from **Table 2.2**	

Present	Amendment	Note
209. Longitudinal strength **1. Application** **2. Design vertical ice force at the bow** The design vertical ice force at the bow, F_{IB}, is to be taken as: $F_{IB} = \min(F_{IB,1} ; F_{IB,2})$ (MN) where $F_{IB,1} = 0.534K_I^{0.15} \sin^{0.2}\gamma_{stern}(DK_h)^{0.5} CF_L$ (MN) $F_{IB,2} = 1.2\ CF_F$ (MN) K_I = indentation parameter = K_f / K_h (1) for the case of a blunt bow form $K_f = \left(\frac{2CB^{(1-e_b)}}{(1+e_b)}\right)^{0.9} \tan(\gamma_{stem})^{-0.9(1+e_b)}$ (2) for the case of wedge bow form ($\alpha_{stem} < 80$ deg), $e_b = 1$ and the above simplifies to $K_f = \left(\frac{\tan(\alpha_{stem})}{\tan^2(\gamma_{stem})}\right)^{0.9}$ $K_h = 0.01A_{wp}$ (MN/m) CF_L = Longitudinal Strength Class Factor from **Table 2.2** e_b = bow shape exponent which best describes the water-plane (see **Fig 2.7** and 2.**8**) = 1.0 for a simple wedge bow form = 0.4 to 0.6 for a spoon bow form = 0 for a landing craft bow form	**209. Longitudinal strength** **1. Application** **2. Design vertical ice force at the bow** The design vertical ice force at the bow, F_{IB}, is to be taken as: $F_{IB} = \min(F_{IB,1} ; F_{IB,2})$ (MN) where $F_{IB,1} = 0.534K_I^{0.15} \sin^{0.2}\gamma_{stern}(DK_h)^{0.5} CF_L$ (MN) $F_{IB,2} = 1.2\ CF_F$ (MN) K_I = indentation parameter = K_f / K_h (1) for the case of a blunt bow form $K_f = \left(\frac{2CB^{(1-e_b)}}{(1+e_b)}\right)^{0.9} \tan(\gamma_{stem})^{-0.9(1+e_b)}$ (2) for the case of wedge bow form ($\alpha_{stem} < 80$ deg), $e_b = 1$ and the above simplifies to $K_f = \left(\frac{\tan(\alpha_{stem})}{\tan^2(\gamma_{stem})}\right)^{0.9}$ $K_h = 0.01A_{wp}$ (MN/m) CF_L = Longitudinal Strength Class Factor from **Table 2.2** e_b = bow shape exponent which best describes the water-plane (see **Fig 2.7** and 2.**8**) = 1.0 for a simple wedge bow form = 0.4 to 0.6 for a spoon bow form = 0 for a landing craft bow form	

Present	Amendment	Note
An approximate e_b determined by a simple fit is acceptable. γ_{stem}= stem angle to be measured between the horizontal axis and the stem tangent at the upper ice waterline (deg) (buttock angle as per **Fig 2.2** measured on the centerline) α_{stem}= waterline angle measured in way of the stem at the upper ice waterline (UIWL) [deg] (see **Fig 2.2**) $C = \frac{1}{2\ (L_B\,/\,B)^{e_b}}$ B = ~~ship~~ moulded breadth (m) L_B = bow length used in the equation $y = B/2\ (x/L_B)^{e_b}$ (m) (see **Fig 2.7** and 2.8) D = ~~ship~~ displacement (kt), where $D_{\min}$ = 10 kt A_{wp} = ~~ship~~ waterplane area (m^2) CF_F = Flexural Failure Class Factor from **Table 2.2** ~~Where applicable, draught dependent quantities are to be determined at the waterline corresponding to the loading condition under consideration.~~  spoon bow wedge bow **Fig 2.7 Bow shape definition**	An approximate e_b determined by a simple fit is acceptable. γ_{stem}= stem angle to be measured between the horizontal axis and the stem tangent at the upper ice waterline (deg) (buttock angle as per **Fig 2.2** measured on the centerline) α_{stem}= waterline angle measured in way of the stem at the upper ice waterline (UIWL) [deg] (see **Fig 2.2**) $C = \frac{1}{2\ (L_B\,/\,B)^{e_b}}$ B_{UI}= moulded breadth corresponding to the upper ice water-line (UIWL) (m) L_B = bow length used in the equation $y = B/2\ (x/L_B)^{e_b}$ (m) (see **Fig 2.7** and 2.8) D_{UI} = displacement (kt), where $D_{\min}$ = 10 kt A_{wp} = waterplane area corresponding to the upper ice water-line (UIWL) (m^2) CF_F = Flexural Failure Class Factor from **Table 2.2**  Spoon bow  Wedge bow	

Present	Amendment	Note
 **Fig 2.8 Illustration of e_b effect on the bow shape for B = 20 and L_B =16** **3. Design vertical ice shear force** (1) The design vertical ice shear force, F_I, along the hull girder is to be taken as: $F_I = C_f\ F_{IB}$ (MN) where C_f = longitudinal distribution factor to be taken as follows: (a) Positive shear force $C_f = 0.0$ between the aft end of L and $0.6\,L$ from aft $C_f = 1.0$ between $0.9L$ from aft and the forward end of L	 **3. Design vertical ice shear force** (1) The design vertical ice shear force, F_I, along the hull girder is to be taken as: $F_I = C_f\ F_{IB}$ (MN) where C_f = longitudinal distribution factor to be taken as follows: (a) Positive shear force $C_f = 0.0$ between the aft end of L_{UI} and $0.6\,L_{UI}$ from aft $C_f = 1.0$ between $0.9L_{UI}$ from aft and the forward end of L_{UI}	

Present	Amendment	Note
(b) Negative shear force $C_f = 0.0$ at the aft end of L $C_f = -0.5$ between $0.2L$ and $0.6L$ from aft $C_f = 0.0$ between $0.8L$ from aft and the forward end of L Intermediate values are to be determined by linear interpolation (2) The applied vertical shear stress, τ_a, is to be determined along the hull girder in a similar manner as in **Pt 2 Ch 3, 402. 2 of the Rules for the Classification of Steel Ships** of the Rules by substituting the design vertical ice shear force for the design vertical wave shear force. **4. Design vertical ice bending moment** (1) The design vertical ice bending moment, M_I, along the hull girder is to be taken as: $M_I = 0.1 C_m L \sin^{-0.2}(\psi) F_{IB}$ (MN-m) where L = ~~ship~~ length (rule length as defined in ~~**Pt 2, Ch 1, 102 of the Rules for the Classification of Steel Ships.** of the Rules) but measured on the upper ice waterline~~ (m) ψ = stem angle to be measured between the horizontal axis and the stem tangent at the upper ice waterline (deg) F_{IB} = design vertical ice force at the bow (MN)	(b) Negative shear force $C_f = 0.0$ at the aft end of L_{UI} $C_f = -0.5$ between $0.2L_{UI}$ and $0.6L_{UI}$ from aft $C_f = 0.0$ between $0.8L_{UI}$ from aft and the forward end of L_{UI} Intermediate values are to be determined by linear interpolation (2) The applied vertical shear stress, τ_a, is to be determined along the hull girder in a similar manner as in **Pt 2 Ch 3, 402. 2 of the Rules for the Classification of Steel Ships** of the Rules by substituting the design vertical ice shear force for the design vertical wave shear force. **4. Design vertical ice bending moment** (1) The design vertical ice bending moment, M_I, along the hull girder is to be taken as: $M_I = 0.1 C_m L \sin^{-0.2}(\psi) F_{IB}$ (MN-m) where L_{UI} = length (rule length as defined in 202. 2) (m) ψ = stem angle to be measured between the horizontal axis and the stem tangent at the upper ice waterline (deg) F_{IB} = design vertical ice force at the bow (MN)	

Present	Amendment	Note
C_m = longitudinal distribution factor for design vertical ice bending moment to be taken as follows: $C_m = 0.0$ at the aft end of L $C_m = 1.0$ between $0.5L$ and $0.7L$ from aft $C_m = 0.3$ at $0.95L$ from aft $C_m = 0.0$ at the forward end of L Intermediate values are to be determined by linear interpolation ~~Where applicable, draught dependent quantities are to be determined at the waterline corresponding to the loading condition under consideration.~~ (2) The applied vertical bending stress, σ_a, is to be determined along the hull girder in a similar manner as in **Pt 2, Ch 1, 402. 1 of the Rules for the Classification of Steel Ships.** of the Rules, by substituting the design vertical ice bending moment for the design vertical wave bending moment. The ship still water bending moment is to be taken as the ~~maximum sagging moment~~. ⚓	C_m = longitudinal distribution factor for design vertical ice bending moment to be taken as follows: $C_m = 0.0$ at the aft end of L_{UI} $C_m = 1.0$ between $0.5L_{UI}$ and $0.7L_{UI}$ from aft $C_m = 0.3$ at $0.95L_{UI}$ from aft $C_m = 0.0$ at the forward end of L_{UI} Intermediate values are to be determined by linear interpolation (2) The applied vertical bending stress, σ_a, is to be determined along the hull girder in a similar manner as in **Pt 2, Ch 1, 402. 1 of the Rules for the Classification of Steel Ships.** of the Rules, by substituting the design vertical ice bending moment for the design vertical wave bending moment. The ship still water bending moment is to be taken as the permissible still water bending moment in sagging condition. ⚓	

Amendments of the Rules Guidance

Notation Guide

2021. 01.

Hull Rule Development Team

Present	Amendment	Note
Ch.2 2-1 SHIP TYPE - SPECIAL FEATURE NOTATIONS **5. Bulk Carrier** NOTATIONS (Special Feature Notations) GRAB[X] DESCRIPTIONS GRAB[X] : to be assigned to ships with holds designed for loading/unloading by grabs having a maximum specific weight up to [X] tons in compliance with the requirements of **Pt 11, Ch 12, Sec 1** or **Pt 13, Sub-part 2, Ch 1, Sec 6 of the Rules**, the GRAB[X] notation is mandatory for ships having one of BC-A or BC-B, according to **Pt 11, Ch 1, Sec 1** or **Pt 13, Sub-part 1, Ch 1, Sec 1 of the Rules** and these ships are to be complied with for an unladen grab weight X equal to or greater than 20 tons. ~~For all other ships GRAB[X] is voluntary.~~	Ch.2 2-1 SHIP TYPE - SPECIAL FEATURE NOTATIONS **5. Bulk Carrier** NOTATIONS (Special Feature Notations) GRAB[X] DESCRIPTIONS GRAB[X] : to be assigned to ships with holds designed for loading/unloading by grabs having a maximum specific weight up to [X] tons in compliance with the requirements of **Pt 11, Ch 12, Sec 1** or **Pt 13, Sub-part 2, Ch 1, Sec 6 of the Rules**, the GRAB[X] notation is mandatory for ships having one of BC-A or BC-B, according to **Pt 11, Ch 1, Sec 1** or **Pt 13, Sub-part 1, Ch 1, Sec 1 of the Rules** and these ships are to be complied with for an unladen grab weight X equal to or greater than 20 tons.	

Present	Amendment	Note

Present

2-2 Remarks of SHIP TYPE - SPECIAL FEATURE NOTATIONS

Ship Types	Special Feature Notations		Notations Remarks
(10)	A		(10) ~ (14) 〈omit〉
5-1. *(2017)* Bulk Carrier (Double Skin)(11-1) 'ESP'(11-2) 'ESP'(EXP)(11-2) (CSR)(11-4)	〈omit〉	GRAB[X][*4] 〈omit〉	*1 ~ *3 : 〈omit〉 *4 : 〈omit〉, the GRAB[X] notation is mandatory for ships having one of BC-A or BC-B, according to Pt 11, Ch 1, Sec 1 or Pt 13, Sub-part 1, Ch 1, Sec 1 of the Rules and these ships are to be complied with for an unladen grab weight X equal to or greater than 20 tons. ~~For all other ships GRAB[X] is voluntary~~. *5 ~ *8 : 〈omit〉
5-2. *(2017)* Bulk Carrier(14) (Double Skin)(11-1) (CSR)(11-4)			
5.3. *(2017)* Self-Unloading Bulk Carrier 'ESP'(11-3) (Double Skin)(11-1)			

Amendment

2-2 Remarks of SHIP TYPE - SPECIAL FEATURE NOTATIONS

Notations Remarks	특기사항		비고
(10)	A		(10) ~ (14) 〈same as current〉
5-1. *(2017)* Bulk Carrier (Double Skin)(11-1) 'ESP'(11-2) 'ESP'(EXP)(11-2) (CSR)(11-4)	〈same as current〉	GRAB[X][*4] 〈same as current〉	*1 ~ *3 : 〈same as current〉 *4 : 〈omit〉, the GRAB[X] notation is mandatory for ships having one of BC-A or BC-B, according to Pt 11, Ch 1, Sec 1 or Pt 13, Sub-part 1, Ch 1, Sec 1 of the Rules and these ships are to be complied with for an unladen grab weight X equal to or greater than 20 tons. *5 ~ *8 : 〈same as current〉
5-2. *(2017)* Bulk Carrier(14) (Double Skin)(11-1) (CSR)(11-4)			
5.3. *(2017)* Self-Unloading Bulk Carrier 'ESP'(11-3) (Double Skin)(11-1)			

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Present	Amendment	Note

Ch. 3 ADDITIONAL SPECIAL FEATURE NOTATIONS

Additional Special Feature Notations	Relevant Requirements
Grab	ships which do not comply with the IACS CSR for Bulk Carriers and where cargo holds are protected from loading/discharge equipment in accordance with the requirements specified in Pt 7, Annex 7-7, 2 of the Guidance.

〈Note〉

Ship Types Special Feature Notations Remarks	Ship Type	Rule
GRAB[X]	CSR Bulk Carrier BC-A 또는 BC-B	Rule Pt 11 Ch 2 or Rule Pt 13 Sub-part 2 Ch 1
	Ore Carrier, Ore / Oil Carrier Ore / Chemical Carrier Oil / Bulk / Ore Carrier	Guidance Pt 7 Ch2 101. 2
Additional Special Feature Notations	Ship Type	Rule
Grab	-	Guidance Pt 7 Annex 7-7 2 (not CSR Bulk carrier)