Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2)

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part C
Guidance for the Survey and Construction of Steel Ships Part C

Reason for Amendment

Part C of the Rules and Guidance for the Survey and Construction of Steel Ships was revised comprehensively in July 2022, and there are plans to continuously review it with the aim of improving their practicality and usability based on various feedback from relevant industry members.

Additionally, insights gained through research and development will be appropriately reflected in Part C to enhance safety and rationality.

Accordingly, relevant requirements are amended to reflect the results of the rule reviews and the research and development outcomes.

Outline of the Amendment

(1) Revises the composition of requirements regarding hold bulkheads.
(2) Revises the composition of requirements regarding side frames and clarifies their application.
(3) Revises the composition of requirements regarding simple girders with the aim of clarifying the requirements.
(4) Adds harbour condition for longitudinal strength assessments of container carriers.
(5) Revises the scope of application for correction coefficient for the aspect ratio in the local strength calculation formula of plate members.
(6) Specifies a simplified method for deriving stress due to hull girder loads as a reference in the early consideration of ship design.
(7) Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.
(8) Revises requirements regarding assessments for double hull structures based on feedback from ships applying Part C.
(9) Clarifies some definitions and corrects typographical errors.

Effective Date and application

1. This draft amendment applies to ships for which the date of contract for construction is on or after the date 6 months from the date of establishment.
2. Notwithstanding the provision of preceding 1, this draft amendment may apply, upon request, to ships for which the date of contract for construction is before the effective date.

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

ID:DH24-07

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part C HULL CONSTRUCTION AND EQUIPMENT** **Part 1 GENERAL HULL REQUIREMENTS** **Chapter 1 GENERAL** **1.1 General** **1.1.2 Application** **1.1.2.1 General** **1** The requirements in **Part C** apply to ships constructed of welded steel structures, composed of stiffened plate panels, having a length *L* (as defined in **2.1.2, Part A**) of not less than 90 *m*. However, the hull structure requirements for ships complying with either the following **(1)** or **(2)** may be in accordance with those specified in **Part C of the Rules for the Survey and Construction of Steel Ships** applicable to ships for which the date of contract for construction was before 1 July 2023 (hereinafter referred to as "**Old Part C**") may be applied. (1) Sister ships of ships subject to **Old Part C** for which	**RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part C HULL CONSTRUCTION AND EQUIPMENT** **Part 1 GENERAL HULL REQUIREMENTS** **Chapter 1 GENERAL** **1.1 General** **1.1.2 Application** **1.1.2.1 General** **1** The requirements in **Part C** apply to ships constructed of welded steel structures, composed of stiffened plate panels, having a length *L* (as defined in **2.1.2, Part A**) of not less than 90 *m*, and intended for unrestricted service. However, the hull structure requirements for ships complying with either the following **(1)** or **(2)** may be in accordance with those specified in **Part C of the Rules for the Survey and Construction of Steel Ships** applicable to ships for which the date of contract for construction was before 1 July 2023 (hereinafter referred to as "**Old Part C**") may be applied. (1) Sister ships of ships subject to **Old Part C** for which	Amendment (9) Clarifies some definitions and corrects typographical errors: Removes the underlined words because it can be misunderstood that ships to be classed for restricted service can be excluded from the application of Part C.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>
the date of contract for construction was before 1 January 2025
(2) Ships for which the date of contract for construction is before 1 January 2028 and whose length L_c is less than 200 m.
When Old Part C is applied, “Advanced Structural Rules” (abbreviated to ASR) defined in 1.2.1-4, Part A is not to be affixed.
2 Hull construction, equipment and scantlings of ships to be classed for restricted service may be appropriately modified depending on the condition of service in accordance with Annex 1.1 “Special Requirements for Restricted Service”.

1.4 Symbols and Definitions

1.4.2 Primary Symbols and Units

1.4.2.2 Ship’s Main Data
Unless otherwise specified, the symbols of a ship’s main data and their units used in Part C are those defined in Table 1.4.2-2.
</td><td>
the date of contract for construction was before 1 January 2025
(2) Ships for which the date of contract for construction is before 1 January 2028 and whose length L_c is less than 200 m.
When Old Part C is applied, “Advanced Structural Rules” (abbreviated to ASR) defined in 1.2.1-4, Part A is not to be affixed.
2 Hull construction, equipment and scantlings of ships to be classed for restricted service may be appropriately modified depending on the condition of service in accordance with Annex 1.1 “Special Requirements for Restricted Service”.

1.4 Symbols and Definitions

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1.4.2.2 Ship’s Main Data
Unless otherwise specified, the symbols of a ship’s main data and their units used in Part C are those defined in Table 1.4.2-2.
</td><td></td></tr>
</table>

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
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Table 1.4.2-2 Ship's Main Data

Symbol	Meaning	Unit
(Omitted)		
T_{BAL-E}	Emergency ballast draught at midship, which is a draught at an emergency ballast condition. The emergency ballast condition refers to a ballast condition involving a cargo oil tank loaded with ballast water at emergency or heavy weather conditions allowable under *Regulation 18 of Annex I to the MARPOL Convention*.	m
T_{BAL-F}	Bow draught in the ballast condition	m
T_{LC}	Midship draught in the loading condition to be considered	m
(Omitted)		

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Table 1.4.2-2 Ship's Main Data

Symbol	Meaning	Unit
(Omitted)		
T_{BAL-E}	Emergency ballast draught at midship, which is a draught at an emergency ballast condition. The emergency ballast condition refers to a ballast condition involving a cargo oil tank loaded with ballast water at emergency or heavy weather conditions allowable under *Regulation 18 of Annex I to the MARPOL Convention*.	m
T_{LC}	Midship draught in the loading condition to be considered	m
(Omitted)		

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Amendment (9)
Clarifies some definitions and corrects typographical errors:

Adds the definition of bow draught in the ballast condition

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Table 1.4.2-4 Loads

Symbol	Meaning	Unit
(Omitted)		
P_{dk}	Design uniform load due to cargoes, stores or other equipment loaded on deck.	kN/m^2
(Omitted)		

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Table 1.4.2-4 Loads

Symbol	Meaning	Unit
(Omitted)		
P_{dk}	Deck load due to unspecified cargoes or stores loaded on general cargo ships and the like	kN/m^2
(Omitted)		

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Amendment (9)
Clarifies some definitions and corrects typographical errors:

Clarifies the definition of deck load

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1.4.2.5 Scantlings

Unless otherwise specified, the symbols regarding scantlings and their units used in **Part C** are those defined in **Table 1.4.2-5**.

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Unless otherwise specified, the symbols regarding scantlings and their units used in **Part C** are those defined in **Table 1.4.2-5**.

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</table>

Amended	Original	Remarks

Table 1.4.2-5 Scantlings

Symbol	Meaning	Unit
(Omitted)		
~~d_e~~	~~Distance from the upper edge of the web to the top of the flange for $L3$ profiles~~	~~mm~~
(Omitted)		

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Deletes the definition of d_e because L3 profile is not used in Part C

Amended	Original	Remarks
Annex 1.1 SPECIAL REQUIREMENTS FOR RESTRICTED SERVICE	**Annex 1.1 SPECIAL REQUIREMENTS FOR RESTRICTED SERVICE**	
An1 General	**An1 General**	
An1.3.1 General **8** For ships having a freeboard length L_f no less than 80 m and not engaged on international voyages are not to comply with the damage stability requirements specified in **2.2.1.1-7, 2.3.2.1-2** and **2.4.1.1-1**, following **(1)** and **(2)** are to be met. (1) Ships are to have watertight hold bulkheads at reasonable intervals, in addition to the watertight bulkheads specified in **2.2.1.1** to **2.2.1.3**, so that the total number of watertight bulkheads will be no less than that specified in **Table An4**. Where the distance between two neighbouring bulkheads is less than $0.7\sqrt{L_C}$ (m), these two bulkheads are not counted as two bulkheads. (2) Where it is impracticable for the ship's trade, the	**An1.3.1 General** (Newly Added)	Amendment (1) Revises the composition of requirements regarding hold bulkheads. Transferred from Ch.2. For ships not engaged in international voyages with a Lf of 80 m or more that do not satisfy the requirements regarding damage stability as stipulated in

Amended	Original	Remarks
number of hold bulkheads of ships of special types may be reduced in accordance with **(a)** to **(c)**, taking into account the effect on the transverse strength of the hull. (a) Ships carrying long cargoes (rails, sheet piles or similar long cargoes), train ferries and car carriers may omit one bulkhead where the required number is 5 or less, and 2 bulkheads where the required number is 6 or more. (b) Ships having conveyor systems for handling cargoes may omit all hold bulkheads, if necessary. (c) Ships other than those specified above are, as a rule, not regarded as special type ships.		the SOLAS have been transferred from Chapter 2. In accordance with this change, the provision to reduce the total number of bulkheads by considering flooding into one compartment, which was originally specified, has been deleted. Ships with Lf of less than 80m are applied the requirements of Pert CS, so there is no change. Transferred from Ch.2.

Table An4 Total Number of Watertight Bulkheads

L_C (m) not less than	L_C (m) less than	Total number of watertight bulkheads
90	102	5
102	123	6
123	143	7
143	165	8
165	186	9
186	200	The number of bulkheads arranged in accordance with **Notes (1)**
200		The number of bulkheads arranged in accordance with **Note (1)** and **(2)**

Notes
(1) The ship has sufficient transverse strength of the hull.
(2) The number of bulkheads are to be deemed appropriate by the Society.

Amended	Original	Remarks
Chapter 2 GENERAL ARRANGEMENT DESIGN	**Chapter 2 GENERAL ARRANGEMENT DESIGN**	
2.2 Subdivision Arrangement	**2.2 Subdivision Arrangement**	
2.2.1 Arrangement of Watertight Bulkheads	**2.2.1 Arrangement of Watertight Bulkheads**	
2.2.1.4 Hold Bulkheads **1** For all ships to satisfy the applicable damage stability requirements, watertight hold bulkheads are to be fitted at reasonable intervals, in addition to the watertight bulkheads specified in **2.2.1.1** to **2.2.1.3**.	**2.2.1.4 Hold Bulkheads** **1** For ships in the following (1) to (4) to satisfy the applicable damage stability requirements, watertight hold bulkheads are to be fitted at reasonable intervals, in addition to the watertight bulkheads specified in **2.2.1.1** to **2.2.1.3**: (1) Ships complying with the requirements in **2.3** (including ships specified in **2.3.1.1(1)** to **(3)**) (2) Tankers in compliance with the requirements of **3.2.2, Part 3 of the Rules for Marine Pollution Prevention Systems** (3) Ships carrying liquefied gases in bulk or ships carrying dangerous chemicals in bulk (4) Ships in compliance with the requirements in **An2.1, Annex 1.1, Part 2-2 "Additional Requirements for Bulk Carriers under SOLAS Chapter XII"**	Clarifies that ships which applies to Part C are required to have watertight bulkheads to satisfy the requirements regarding damage stability.
(Deleted)	**2** Ships other than those listed in **-1** above are to have watertight hold bulkheads at reasonable intervals, in addition to the watertight bulkheads specified in **2.2.1.1** to **2.2.1.3**, so that the total number of watertight bulkheads will be no less than that specified in **Table 2.2.1-1**. Where the distance between two neighbouring bulkheads is less than $0.7\sqrt{L_C}$ (m), these two bulkheads are not counted as two bulkheads.	Transferred to Annex 1.1, An1.3.1.
(Deleted)	**3** Where it is impracticable to adhere to **-2** above due to	

Amended	Original	Remarks
	the requirements for the ship's trade, the number of hold bulkheads may be reduced in accordance with one of the following **(1)** to **(3)**, taking into account the effect of the smaller number of bulkheads on the transverse strength of the hull. Where the number of watertight bulkheads is decreased from that required according to the following **(2)**, an application for the omission of bulkheads stating the reasons for such omission is to be submitted by the shipowner to the Society: (1) The number of bulkheads specified by the requirements of **Note (1)** or **(2)** in **Table 2.2.1-1**. (2) For ships of special types, the number is in accordance with **(a)**, **(b)** or **(c)**: (a) Ships carrying long cargoes (rails, sheet piles or similar long cargoes), train ferries and car carriers may omit one bulkhead where the required number is 5 or less, and 2 bulkheads where the required number is 6 or more. (b) Ships having conveyor systems for handling cargoes may omit all hold bulkheads, if necessary. (c) Ships other than those specified above are, as a rule, not regarded as special type ships. (3) Where special consideration is given for improving the safety of ships by means such as that of a double hull, the arrangement of watertight bulkheads may be different from that required in the Rules.	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr>
<td>(Deleted)</td>
<td>
Table 2.2.1-1 Number of Watertight Bulkheads
<table>
<tr><th colspan="2">L_C (m)</th><th rowspan="2">Total number of watertight bulkheads</th></tr>
<tr><th>not less than</th><th>less than</th></tr>
<tr><td>90</td><td>102</td><td>5</td></tr>
<tr><td>102</td><td>123</td><td>6</td></tr>
<tr><td>123</td><td>143</td><td>7</td></tr>
<tr><td>143</td><td>165</td><td>8</td></tr>
<tr><td>165</td><td>186</td><td>9</td></tr>
<tr><td>186</td><td>200</td><td>The number of bulkheads arranged in accordance with Notes (1) and (2)</td></tr>
<tr><td>200</td><td></td><td>The number of bulkheads arranged in accordance with Note (2)</td></tr>
<tr><td colspan="3">(Notes)
(1) The ship has sufficient transverse strength of the hull.
(2) The final waterline does not exceed the upper surface of the bulkhead deck at the side of the ship even after any compartment, except the engine room, has been flooded under the load condition corresponding to the summer load water line. The permeability used in flooding calculations is to be in accordance with Tables 2.2.1-2 or 2.2.1-3.</td></tr>
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<td>Transferred to Annex 1.1, Table An4.</td>
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</table>

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>(Deleted)</td><td>

Table 2.2.1-2 Permeability of Cargo Holds

<table>
<tr><th>Cargo hold condition</th><th>Permeability</th></tr>
<tr><td>Empty</td><td>0.95</td></tr>
<tr><td>Loaded with general cargo</td><td>0.60</td></tr>
<tr><td>Loaded with timber</td><td>0.55</td></tr>
<tr><td>Loaded with ore</td><td>0.50</td></tr>
<tr><td>Loaded with cars or containers</td><td>$0.95 - 0.35 \times \frac{V_C}{V_0}$</td></tr>
<tr><td colspan="2">(Notes)
V_C: Volume (m^3) occupied by cars and/or containers
V_0: Moulded volume (m^3) of the compartment</td></tr>
</table>

</td><td></td></tr>
<tr><td>(Deleted)</td><td>

Table 2.2.1-3 Permeability of Deep Tanks

<table>
<tr><th>Tank condition</th><th>Permeability</th></tr>
<tr><td>Empty</td><td>0.95</td></tr>
<tr><td>Filled</td><td>0</td></tr>
<tr><td colspan="2">(Note)
For spaces loaded with special kinds of cargo, a suitable permeability is used depending on the kind of cargo.</td></tr>
</table>

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Chapter 3 STRUCTURAL DESIGN PRINCIPLES

3.3 Net Scantling Approach

Symbols

For symbols not defined in this Section, refer to **1.5**.
t: Net thickness (mm)

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Chapter 3 STRUCTURAL DESIGN PRINCIPLES

3.3 Net Scantling Approach

Symbols

For symbols not defined in this Section, refer to **1.5**.
t: Net thickness (mm)

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</table>

Amended	Original	Remarks
t_c: Corrosion addition (*mm*) t_{gr}: Gross thickness (*mm*) h_{stf}: Height (*mm*) of stiffener or primary supporting member h_w: Web height (*mm*) of stiffener or primary supporting member t_w: Web thickness (*mm*) of stiffener or primary supporting member b_f: Face plate width (*mm*) of stiffener or primary supporting member t_f: Face plate thickness (*mm*) of stiffener or primary supporting member t_p: Thickness (*mm*) of the plating attached to a stiffener or to a primary supporting member (hereinafter referred to as "attached plating")	t_c: Corrosion addition (*mm*) t_{gr}: Gross thickness (*mm*) h_{stf}: Height (*mm*) of stiffener or primary supporting member h_w: Web height (*mm*) of stiffener or primary supporting member t_w: Web thickness (*mm*) of stiffener or primary supporting member b_f: Face plate width (*mm*) of stiffener or primary supporting member t_f: Face plate thickness (*mm*) of stiffener or primary supporting member t_p: Thickness (*mm*) of the plating attached to a stiffener or to a primary supporting member (hereinafter referred to as "attached plating")	
(Deleted)	d_e: Distance (*mm*) from the upper edge of the web to the top of the flange for *L*3 profiles (*See* **Fig. 3.3.3-1**)	Amendment (9) Clarifies some definitions and corrects typographical errors: Deletes the definition of d_e because L3 profile is not used in Part C
d_f: Distance (*mm*) for the shorter extension of flange for *L*2 profiles (*See* **Fig. 3.3.3-1**) (Omitted)	d_f: Distance (*mm*) for the shorter extension of flange for *L*2 profiles (*See* **Fig. 3.3.3-1**) (Omitted)	
3.5 Minimum Requirements	**3.5 Minimum Requirements**	
3.5.2 Slenderness Requirements	**3.5.2 Slenderness Requirements**	
3.5.2.1 Application **1** All structural members are to meet the slenderness requirements specified in **3.5.2**, except for those listed below: ・ Bilge plates within the cylindrical part of the ship	**3.5.2.1 Application** **1** All structural members are to meet the slenderness requirements specified in **3.5.2**, except for those listed below: ・ Bilge plates within the cylindrical part of the ship	

Amended	Original	Remarks
and the radius gunwale ・ Structure members in superstructures and deck houses in cases where such members do not contribute to longitudinal strength. Pillars in superstructures and deckhouses are to comply with the applicable slenderness and proportion requirements specified in **3.5.2**. **2** Where structural members are deemed by the Society as having an effectiveness equivalent to those compliant with **3.5.2**, such members are to be deemed compliant with **3.5.2**. **3** Notwithstanding **-1** above, thickness of shell plating, deck, bulkhead and web of girder and stiffness of stiffener need not to comply with **3.5.2**, provided that buckling strength requirements specified in **5.3** and **8.6.2**, if applicable, are satisfied. <u>**4** Notwithstanding **-1** above, thickness of hatch cover plating and web of girder, and stiffness of stiffener need not comply with **3.5.2**, provided that buckling strength requirements specified in **14.6.5.6**, if applicable, are satisfied.</u>	and the radius gunwale ・ Structure members in superstructures and deck houses in cases where such members do not contribute to longitudinal strength. Pillars in superstructures and deckhouses are to comply with the applicable slenderness and proportion requirements specified in **3.5.2**. **2** Where structural members are deemed by the Society as having an effectiveness equivalent to those compliant with **3.5.2**, such members are to be deemed compliant with **3.5.2**. **3** Notwithstanding **-1** above, thickness of shell plating, deck, bulkhead and web of girder and stiffness of stiffener need not to comply with **3.5.2**, provided that buckling strength requirements specified in **5.3** and **8.6.2**, if applicable, are satisfied. (Newly Added)	Amendment (9) Clarifies some definitions and corrects typographical errors: In the case of the hatch cover, as with section -3, it should be clearly stated that slenderness requirements need not to be applied where a detailed buckling strength assessment is conducted.

Amended	Original	Remarks
3.6 Idealisation of Stiffeners and Primary Supporting Members **3.6.4 Shear Area, Effective Shear Depth, Section Modulus and Moment of Inertia for Stiffeners and Primary Supporting Members** **3.6.4.2 Effective Shear Depth of Stiffeners** The effective shear depth d_{shr} (*mm*) of stiffeners is to be taken as: $d_{shr} = (h_{stf} - 0.5t_{c-stf} + t_p + 0.5t_{c-pl})\sin\phi_w$ h_{stf} Height (*mm*) of stiffener as specified in **Fig. 3.3.3-1** t_p: Thickness (*mm*) of the stiffener attached plating as specified in **Fig. 3.3.3-1** t_{c-stf}: Corrosion addition (*mm*) of considered stiffener as given in **3.3.3** t_{c-pl}: Corrosion addition (*mm*) of attached plate of the stiffener considered as specified in **3.3.3** ϕ_W: Angle (*deg*) as specified in **Fig. 3.6.4-1**. ϕ_W is to be taken as 90 *degrees* if the angle is greater than or equal to 75 *degrees*	**3.6 Idealisation of Stiffeners and Primary Supporting Members** **3.6.4 Shear Area, Effective Shear Depth, Section Modulus and Moment of Inertia for Stiffeners and Primary Supporting Members** **3.6.4.2 Effective Shear Depth of Stiffeners** The effective shear depth d_{shr} (*mm*) of stiffeners is to be taken as: $d_{shr} = (h_{stf} - 0.5t_{c-stf} + t_p + 0.5t_{c-pl})\sin\phi_w$ h_{stf} Height (*mm*) of stiffener as specified in **Fig. 3.3.3-1** t_p: Thickness (*mm*) of the stiffener attached plating as specified in **Fig. 3.3.3-1** t_{c-stf}: Corrosion addition (*mm*) of considered stiffener as given in **3.2.5** t_{c-pl}: Corrosion addition (*mm*) of attached plate of the stiffener considered as specified in **3.2.5** ϕ_W: Angle (*deg*) as specified in **Fig. 3.6.4-1**. ϕ_W is to be taken as 90 *degrees* if the angle is greater than or equal to 75 *degrees*	Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the references

Amended	Original	Remarks
Chapter 4 LOADS **4.2 Ship Motions and Accelerations** **4.2.4 Envelope Accelerations** **4.2.4.1 Envelope Accelerations at Any Position** Envelope accelerations in the ship's longitudinal direction a_{Xe} (*m/s*^{2}), those in transverse direction a_{Ye} (*m/s*^{2}) and those in vertical direction a_{Ze} (*m/s*^{2}) at any position are given in **Table 4.2.4-1**.	**Chapter 4 LOADS** **4.2 Ship Motions and Accelerations** **4.2.4 Envelope Accelerations** **4.2.4.1 Envelope Accelerations at Any Position** Envelope accelerations in the ship's longitudinal direction a_{Xe} (*m/s*^{2}), those in transverse direction a_{Ye} (*m/s*^{2}) and those in vertical direction a_{Ze} (*m/s*^{2}) at any position are given in **Table 4.2.4-1**.	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">

Table 4.2.4-1 Envelope Accelerations a_{Xe}, a_{Ye} and a_{Ze} at Any Position

Direction	Envelope acceleration a_{Xe}, a_{Ye} and a_{Ze} (m/s^2)
Longitudinal direction	$a_{Xe} = 0.35\sqrt{{a_1}^2 + [g \cdot \sin\phi + a_5(z - z_G)]^2}$
Transverse direction	$a_{Ye} = \sqrt{{a_2}^2 + [g \cdot \sin\theta + a_4(z - z_G)]^2}$
Vertical direction	$a_{Ze} = \sqrt{{a_3}^2 + \{\max(0, C_{SS}[-g(1-\cos\phi) + a_5\lvert x - x_G\rvert])\}^2 + [\max(0, -g(1-\cos\theta) + a_4\lvert y\rvert)]^2}$

Notes:
x_G: X coordinate (m) at the centre of gravity of the ship to be taken as $x_G = \cancel{0.45}\underline{(0.36 + 0.2C_{B\_LC})}L_C$. However, the value calculated based on the weight distribution corresponding to the loading condition under consideration may be used.
z_G: Z coordinate (m) at the centre of gravity of the ship, the value(1) in the loading condition under consideration, which is described in the loading manual, is to be used.
a_1: Surge acceleration (m/s^2) at the centre of gravity of the ship, as given in **Table 4.2.3-1**
a_2: Sway acceleration (m/s^2) at the centre of gravity of the ship, as given in **Table 4.2.3-2**
a_3: Heave acceleration (m/s^2) at the centre of gravity of the ship, as given in **Table 4.2.3-3**
a_4: Roll angular acceleration (rad/s^2) at the centre of gravity of the ship, as given in **Table 4.2.3-4**
a_5: Pitch angular acceleration (rad/s^2) at the centre of gravity of the ship, as given in **Table 4.2.3-5**
θ: Roll angle (rad), as given in **Table 4.2.2-1**
ϕ: Pitch angle (rad), as given in **Table 4.2.2-2**
C_{SS}: Coefficient to be taken as:

$$C_{SS} = \min\left(0.3 + \frac{L_C}{325}, 1.0\right)$$

(1) The relevant requirements in **Part 2** may be applied where the value is not available.

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Amendment (7)
Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.

Improves accuracy of the simplified formula for X coordinate at the hull centre of gravity of the ship, so that it can be used for various hull shapes

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<tr><td>

4.4 Loads to be Considered in Local Strength

4.4.2 Maximum Load Condition

4.4.2.2 Lateral Loads

3 Notwithstanding **-2** above, <u>design uniform</u> load P_{dk} (kN/m^2) due to <u>cargoes, stores or other equipment loaded on deck,</u> is to be obtained from the following formula, but not to

</td><td>

4.4 Loads to be Considered in Local Strength

4.4.2 Maximum Load Condition

4.4.2.2 Lateral Loads

3 Notwithstanding **-2** above, deck load P_{dk} (kN/m^2) due to <u>unspecified cargoes and stores in</u> <u>general cargo ships, etc.</u>, is to be obtained from the following formula, but not to

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Amendment (9)
Clarifies some definitions and corrects typographical errors:

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</table>

Amended	Original	Remarks

Amended

be less than 0.

$P_{dk} = P_{dks} + P_{dkd}$

P_{dks}: Static pressure (kN/m^2) due to cargoes, stores or other equipment loaded on deck, as specified in **Table 4.4.2-2**

P_{dkd} : Dynamic pressure (kN/m^2) due to cargoes, stores or other equipment loaded on deck, as specified in **Table 4.4.2-2**

Table 4.4.2-2 Lateral Loads

External pressure P_{ex}	Internal pressure P_{in}	Deck loads P_{dk} and P_{GW}	
	(Omitted)	Design uniform load due to cargoes, stores or other equipment loaded on deck	Green sea pressure
P_{exs} (4.4.2.3-1)	(Omitted)	P_{dks} (4.4.2.7-1)	P_{GW} (4.4.2.8)
P_{exw} (4.4.2.3-2)	(Omitted)	P_{dkd} (4.4.2.7-2)	

Notes:
The numbers in parentheses ( ) indicate the sections of the referenced requirements.

4.4.2.3 External Pressure due to Seawater

1 Hydrostatic pressure P_{exs} (kN/m^2) corresponding to the scantling draught T_{SC} is to be considered (*See* **Table 4.4.2-3**).

2 Hydrodynamic pressure P_{exw} (kN/m^2) specified in **Table 4.4.2-4** is to be considered.

Original

be less than 0.

$P_{dk} = P_{dks} + P_{dkd}$

P_{dks} : Static pressure (kN/m^2) due to unspecified cargoes and stores in general cargo ships, as specified in **Table 4.4.2-2**

P_{dkd}: Dynamic pressure (kN/m^2) due to unspecified cargoes and stores in general cargo ships, as specified in **Table 4.4.2-2**

Table 4.4.2-2 Lateral Loads

External pressure P_{ex}	Internal pressure P_{in}	Deck loads P_{dk} and P_{GW}	
	(Omitted)	Unspecified cargoes and stores in general cargo ships, etc.	Green sea pressure
P_{exs} (4.4.2.3-1)	(Omitted)	P_{dks} (4.4.2.7-1)	P_{GW} (4.4.2.8)
P_{exw} (4.4.2.3-2)	(Omitted)	P_{dkd} (4.4.2.7-2)	

Notes:
The numbers in parentheses ( ) indicate the sections of the referenced requirements.

4.4.2.3 External Pressure due to Seawater

1 Hydrostatic pressure P_{exs} (kN/m^2) corresponding to the scantling draught T_{SC} is to be considered (*See* **Table 4.4.2-3**).

Remarks

Clarifies the definition of deck load

Amended	Original	Remarks

Table 4.4.2-4 Hydrodynamic Pressure P_{exw}

Position under consideration	Hydrodynamic pressure P_{exw} (kN/m^2)
$z \le T_{SC}$	$P_{exw} = 0.5C_R C_{NL} C_{WD}\left[(P_d - P_c)\cos\left(\left(2 - \frac{z}{T_{SC}} - C_{yB}\right)\frac{\pi}{2}\right) + (P_d + P_c)\right]$
$T_{SC} < z \le T_{SC} + h_W$	$P_{WL} - \rho g(z - T_{SC})$
$z > T_{SC} + h_W$	0

Notes:

C_R: Coefficient considering the effect of ship operation, to be taken as 0.85

C_{NL}: Coefficient considering nonlinear effects, to be taken as 0.9

C_{WD}: Coefficient for load condition, as given by the following formulae:

In *HF*,

For $x/L_C \le 0.2, C_{WD} = \left(-2.6 - 1.2C_{yB}\right)\frac{x}{L_C} + 1.0$

For $0.2 < x/L_C \le 0.4, C_{WD} = \left(2.6 - 1.8C_{yB}\right)\frac{x}{L_C} - 0.04 + 0.12C_{yB}$

For $0.4 < x/L_C \le 0.5, C_{WD} = 1.0 - 0.6C_{yB}$

For $0.5 < x/L_C \le 0.7, C_{WD} = \left(-1.9 + 1.1C_{yB}\right)\frac{x}{L_C} + 1.95 - 1.15C_{yB}$

For $0.7 < x/L_C, C_{WD} = \left(1.27 + 1.26C_{yB}\right)\frac{x}{L_C} - 0.27 - 1.26C_{yB}$

C_{yB}: Ratio of the *Y* coordinate of the load calculation point or acceleration calculation point to B_{x1}, as given by the following formula but not more than 1.0. Where $B_{x1} = 0$, to be taken as $C_{yB} = 0$.

$$C_{yB} = \frac{|2y|}{B_{x1}}$$

B_{x1}: Breadth of ship (m) at the waterline of draught in the transverse section of the hull under consideration. Where the waterline does not intersect the transverse section, to be taken as $B_{x1} = 0$.

In *RP*,

For $x/L_C \le 0.\cancel{3}\underline{2}, C_{WD} = \left(2.15 - 1.4\frac{z}{T_{SC}} - 0.25C_{yB}\right)\frac{x}{L_C} + 0.32 + 0.13\frac{z}{T_{SC}} + 0.15C_{yB}$

For $0.\cancel{3}\underline{2} < x/L_C \le 0.7, C_{WD} = 0.75 - 0.15\frac{z}{T_{SC}} + 0.1C_{yB}$

For $0.7 < x/L_C, C_{WD} = \left(-1.57 + 0.5\frac{z}{T_{SC}} + 0.17C_{yB}\right)\frac{x}{L_C} + 1.85 - 0.5\frac{z}{T_{SC}} - 0.02C_{yB}$

P_d: As given by the following formulae:

For $x/L_C \le 0.3, P_d = 7.292T_{SC} + 1.109B + 69.68 + (0.7315L_C + 146.2)\left(\frac{x}{L_C} - 0.3\right)$

Remarks:

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Corrects the case division of C_{WD} in RP

Amended	Original	Remarks
For $0.3 < x/L_C \leq 0.7, P_d = 7.292T_{SC} + 1.109B + 69.68$ For $0.7 < x/L_C, P_d = 7.292T_{SC} + 1.109B + 69.68 + (-1223C_W + 1271)\left(\frac{x}{L_C} - 0.7\right)$ P_c: As given by the following formulae: For $x/L_C \leq 0.3, P_c = 2.857T_{SC} - 0.5231B + 14.87 + (-0.1572L_c - 152.8)\left(\frac{x}{L_C} - 0.3\right)$ For $0.3 < x/L_C \leq 0.7, P_c = 2.857T_{SC} - 0.5231B + 14.87$ For $0.7 < x/L_C, P_c = 2.857T_{SC} - 0.5231B + 14.87 + (-2447C_W + 2622)\left(\frac{x}{L_C} - 0.7\right)$ P_{WL}: Hydrodynamic pressure (kN/m^2) at the waterline, to be taken as: For $y \geq 0$, the value of P_{exw} at $y = B_{x1}/2$ and $z = T_{SC}$ For $y < 0$, the value of P_{exw} at $y = -B_{x1}/2$ and $z = T_{SC}$ h_W: Water head (m) equivalent to the pressure at the waterline, to be taken as: $h_W = \frac{P_{WL}}{\rho g}$ (1) In the range of $x/L_C < 0.0$, $x/L_C = 0.0$ (2) In the range of $x/L_C > 1.0$, $x/L_C = 1.0$		
4.4.2.7 Internal Pressure due to Cargoes, Stores or Other Equipment Loaded on Deck **1** Static pressure P_{dks} (kN/m^2) due to cargoes, stores or other equipment loaded on deck is to be in accordance with the following **(1)** to **(3)**: ((1) to (3) are omitted.) **2** Dynamic pressure P_{dkd} (kN/m^2) due to cargoes, stores or other equipment loaded on deck is to be in accordance with the following formula: $P_{dkd} = C_{WDz}P_{dks}\frac{a_{Ze}}{g}$ C_{WDz}: As specified in **Table 4.4.2-8** a_{Ze}: Envelope acceleration (m/s^2) in the vertical direction specified in **4.2.4.1**. In obtaining the dynamic pressure acting on the cargo hold, the	**4.4.2.7 Internal Pressure due to Unspecified Cargoes and Stores on General Cargo Ships, etc.** **1** Static pressure P_{dks} (kN/m^2) due to unspecified cargoes and stores on general cargo ships, etc. is to be in accordance with the following **(1)** to **(3)**: ((1) to (3) are omitted.) **2** Dynamic pressure P_{dkd} (kN/m^2) due to unspecified cargoes and stores on general cargo ships, etc. is to be in accordance with the following formula: $P_{dkd} = C_{WDz}P_{dks}\frac{a_{Ze}}{g}$ C_{WDz}: As specified in **Table 4.4.2-8** a_{Ze}: Envelope acceleration (m/s^2) in the vertical direction specified in **4.2.4.1**. In obtaining the dynamic pressure acting on the cargo hold, the	Amendment (9) Clarifies some definitions and corrects typographical errors: Clarifies the note of deck load Amendment (9) Clarifies some definitions and corrects

Amended	Original	Remarks
average value between the value of acceleration at the forward and aft ends, whichever is greater, of the cargo hold at the centreline and the value at the mid-length of the cargo hold may be taken. <u>In this case, $T_{LC} = T_{SC}$ and $\theta = a_4 = 0$.</u>	average value between the value of acceleration at the forward and aft ends, whichever is greater, of the cargo hold at the centreline and the value at the mid-length of the cargo hold may be taken. I<u>n obtaining the dynamic pressure, the values of K_{xx}, GM, etc. may be calculated by the following formulae:</u> $\underline{K_{xx} = 0.35B}$ $\underline{GM = \frac{T_{SC}}{2} + \frac{B^2}{T_{SC}C_B}\frac{3C_W - 1}{24} - z_G}$ $\underline{T_{LC} = T_{SC}}$ $\underline{z_G = 0.25\frac{B}{C_B}}$	typographical errors: Clarifies that parameters related to rolling motion are not used in calculation because it is simplified that acceleration is calculated at the centre line.
4.6 Loads to be Considered in Strength Assessment by Cargo Hold Analysis **4.6.2 Maximum Load Condition** **4.6.2.4 External Pressure due to Seawater** **1** Hydrostatic pressure P_{exs} corresponding to the draught T_{LC} (m) in the loading condition under consideration is to be considered (*See* **Table 4.6.2-5**).	**4.6 Loads to be Considered in Strength Assessment by Cargo Hold Analysis** **4.6.2 Maximum Load Condition** **4.6.2.4 External Pressure due to Seawater** **1** Hydrostatic pressure P_{exs} corresponding to the draught T_{LC} (m) in the loading condition under consideration is to be considered (*See* **Table 4.6.2-5**).	Amendment (7) Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy. See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks

Table 4.6.2-6 Hydrodynamic Pressure P_{exw} in Equivalent Design Wave *HM*

	Hydrodynamic pressure P_{exw} (*kN/m*^{2})		
	$z \le T_{LC}$	$T_{LC} < z \le T_{LC} + h_W$	$z > T_{LC} + h_W$
HM-1	$P_{exw} = \max(-P_{HM}, \rho g(z - T_{LC}))$	$P_{WL} - \rho g(z - T_{LC})$	0
HM-2	$P_{exw} = \max(P_{HM}, \rho g(z - T_{LC}))$		

Notes:

P_{HM}: As given by the following formula:

$$P_{HM} = 0.5C_{R\_HM}C_{NL\_HM}C_M C_{HM1}H_{S\_HM}(P_{HM1} + P_{HM2} + P_{HM3} + P_{HM4})$$

(Omitted)

P_{HM3}: As given by the following formula:

$$P_{HM3} = -\rho g\left|R_{5\_HM}\right|(x - x_G)(-0.002\lambda_{HM} + 1.0)$$

R_{5_HM}: As given by the following formula:

$$R_{5\_HM} = 2.08\pi\left(\frac{1}{L_C}\right)^{1.15}$$

x_G: *X* coordinate (*m*) at the centre of gravity of the ship, to be taken as $x_G = \cancel{0.45}\underline{(0.36 + 0.2C_{B\_LC})}L_C$. The value calculated based on the weight distribution corresponding to the loading condition under consideration may be used.

(Omitted)

4.6.2.5 Internal Pressure due to Liquid Loaded

1 Static pressure P_{ls} (*kN/m*^{2}) acting on tanks and ballast holds loaded with liquids is to be in accordance with **Table 4.6.2-11**.

2 Dynamic pressure P_{ld} (*kN/m*^{2}) acting on tanks and ballast holds loaded with liquids is to be as given in **Table 4.6.2-13**.

4.6.2.5 Internal Pressure due to Liquid Loaded

1 Static pressure P_{ls} (*kN/m*^{2}) acting on tanks and ballast holds loaded with liquids is to be in accordance with **Table 4.6.2-11**.

2 Dynamic pressure P_{ld} (*kN/m*^{2}) acting on tanks and ballast holds loaded with liquids is to be as given in **Table 4.6.2-13**.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table 4.6.2-14 Acceleration a_X, a_Y and a_Z at Any Position

Equivalent design wave		Longitudinal acceleration a_X (m/s^2)	Transverse acceleration a_Y (m/s^2)	Vertical acceleration a_Z (m/s^2)
HM	*HM*-1	$-0.6g \cdot \sin\phi$ $+(-0.2f_T + 0.3)a_1$ $-0.7a_5(z - z_G)$	0	$(-0.15 + 0.5f_T)a_3$ $+0.7a_5(x - x_G)$
	HM-2	$0.6g \cdot \sin\phi$ $+(0.2f_T - 0.3)a_1$ $+0.7a_5(z - z_G)$	0	$(0.15 - 0.5f_T)a_3$ $-0.7a_5(x - x_G)$
FM	*FM*-1	$0.1g \cdot \sin\phi$ $+(-0.4f_T + 0.2)a_1$ $+(0.02T_{LC} - 0.14)a_5(z - z_G)$	0	$0.075a_3$ $-(0.02T_{LC} - 0.14)a_5(x - x_G)$
	FM-2	$-0.1g \cdot \sin\phi$ $+(0.4f_T - 0.2)a_1$ $+(-0.02T_{LC} + 0.14)a_5(z - z_G)$	0	$-0.075a_3$ $-(-0.02T_{LC} + 0.14)a_5(x - x_G)$
BR	*BR*-1*P*	0	$-g \cdot \sin\theta$ $+(-0.2f_T + 0.2)a_2$ $-a_4(z - z_G)$	$g(\cos\theta - 1)$ $+(0.7 - 0.4f_T)a_3 + a_4 y$
	BR-2*P*	0	$g \cdot \sin\theta$ $+(0.2f_T - 0.2)a_2$ $+a_4(z - z_G)$	$g(\cos\theta - 1)$ $+(-0.7 + 0.4f_T)a_3 - a_4 y$
	BR-1*S*	0	$g \cdot \sin\theta$ $+(0.2f_T - 0.2)a_2$ $+a_4(z - z_G)$	$g(\cos\theta - 1)$ $+(0.7 - 0.4f_T)a_3 - a_4 y$
	BR-2*S*	0	$-g \cdot \sin\theta$ $+(-0.2f_T + 0.2)a_2$ $-a_4(z - z_G)$	$g(\cos\theta - 1)$ $+(-0.7 + 0.4f_T)a_3 + a_4 y$
BP	*BP*-1*P*	0	$-0.002\lambda_{BP} g \cdot \sin\theta$ $-0.3a_2 - 0.3a_4(z - z_G)$	$[1 - 1.6\exp(-0.012\lambda_{BP})]a_3$ $+0.3a_4 y$
	BP-2*P*	0	$0.002\lambda_{BP} g \cdot \sin\theta$ $+0.3a_2 + 0.3a_4(z - z_G)$	$[-1 + 1.6\exp(-0.012\lambda_{BP})]a_3$ $-0.3a_4 y$
	BP-1*S*	0	$0.002\lambda_{BP} g \cdot \sin\theta$ $+0.3a_2 + 0.3a_4(z - z_G)$	$[1 - 1.6\exp(-0.012\lambda_{BP})]a_3$ $-0.3a_4 y$
	BP-2*S*	0	$-0.002\lambda_{BP} g \cdot \sin\theta$ $-0.3a_2 - 0.3a_4(z - z_G)$	$[-1 + 1.6\exp(-0.012\lambda_{BP})]a_3$ $+0.3a_4 y$

Remarks:

Amendment (7)
Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.

See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Notes:
a_1, a_2, a_3, a_4, a_5: As specified in **4.2.3**
θ, ϕ: As specified in **4.2.2**
x_G: X coordinate (m) at the centre of gravity of the ship to be taken as $x_G = \cancel{0.45}\underline{(0.36 + 0.2C_{B\_LC})}L_C$. However, the value calculated based on the weight distribution corresponding to the considered loading condition may be used.
z_G: Z coordinate (m) at the centre of gravity of the ship in the loading condition under consideration
λ_{BP}: As specified in **Table 4.6.2-9**

Amended

4.7 Loads to be Considered in Fatigue

4.7.2 Cyclic Load Condition

4.7.2.5 Internal Pressure due to Liquid Cargoes

1 Static pressure P_{ls} (kN/m^2) acting on tanks and ballast holds loaded with liquids is to be in accordance with **Table 4.7.2-7**.

2 Dynamic pressure P_{ld} (kN/m^2) acting on tanks and ballast holds loaded with liquids is to be as given in **Table 4.7.2-8**.

Original

4.7 Loads to be Considered in Fatigue

4.7.2 Cyclic Load Condition

4.7.2.5 Internal Pressure due to Liquid Cargoes

1 Static pressure P_{ls} (kN/m^2) acting on tanks and ballast holds loaded with liquids is to be in accordance with **Table 4.7.2-7**.

2 Dynamic pressure P_{ld} (kN/m^2) acting on tanks and ballast holds loaded with liquids is to be as given in **Table 4.7.2-8**.

Table 4.7.2-9 Accelerations a_X, a_Y and a_Z at Any Position

Equivalent design wave		Longitudinal acceleration a_X (m/s^2)	Transverse acceleration a_Y (m/s^2)	Vertical acceleration a_Z (m/s^2)
HM	HM-1	$-0.6g \cdot \sin\phi$ $+(-0.2f_T + 0.3)a_1$ $-0.7a_5(z - z_G)$	0	$(-0.15 + 0.5f_T)a_3$ $+0.7a_5(x - x_G)$
	HM-2	$0.6g \cdot \sin\phi$ $+(0.2f_T - 0.3)a_1$ $+0.7a_5(z - z_G)$	0	$(0.15 - 0.5f_T)a_3$ $-0.7a_5(x - x_G)$
FM	FM-1	$0.1g \cdot \sin\phi$ $+(-0.4f_T + 0.2)a_1$ $+(0.02T_{LC} - 0.14)a_5(z - z_G)$	0	$0.075a_3$ $-(0.02T_{LC} - 0.14)a_5(x - x_G)$

Remarks

Amendment (7)
Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.

See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks

	FM-2	$-0.1g\cdot\sin\phi$ $+(0.4f_T-0.2)a_1$ $+(-0.02T_{LC}+0.14)a_5(z-z_G)$	0	$-0.075a_3$ $-(-0.02T_{LC}+0.14)a_5(x-x_G)$
BR	*BR*-1*P*	0	$-g\cdot\sin\theta$ $+(-0.2f_T+0.2)a_2$ $-a_4(z-z_G)$	$g(\cos\theta-1)$ $+(0.7-0.4f_T)a_3+a_4y$
	BR-2*P*	0	$g\cdot\sin\theta$ $+(0.2f_T-0.2)a_2$ $+a_4(z-z_G)$	$g(\cos\theta-1)$ $+(-0.7+0.4f_T)a_3-a_4y$
	BR-1*S*	0	$g\cdot\sin\theta$ $+(0.2f_T-0.2)a_2$ $+a_4(z-z_G)$	$g(\cos\theta-1)$ $+(0.7-0.4f_T)a_3-a_4y$
	BR-2*S*	0	$-g\cdot\sin\theta$ $+(-0.2f_T+0.2)a_2$ $-a_4(z-z_G)$	$g(\cos\theta-1)$ $+(-0.7+0.4f_T)a_3+a_4y$
BP	*BP*-1*P*	0	$-0.002\lambda_{BP}g\cdot\sin\theta$ $-0.3a_2-0.3a_4(z-z_G)$	$[1-1.6\exp(-0.012\lambda_{BP})]a_3$ $+0.3a_4y$
	BP-2*P*	0	$0.002\lambda_{BP}g\cdot\sin\theta$ $+0.3a_2+0.3a_4(z-z_G)$	$[-1+1.6\exp(-0.012\lambda_{BP})]a_3$ $-0.3a_4y$
	BP-1*S*	0	$0.002\lambda_{BP}g\cdot\sin\theta$ $+0.3a_2+0.3a_4(z-z_G)$	$[1-1.6\exp(-0.012\lambda_{BP})]a_3$ $-0.3a_4y$
	BP-2*S*	0	$-0.002\lambda_{BP}g\cdot\sin\theta$ $-0.3a_2-0.3a_4(z-z_G)$	$[-1+1.6\exp(-0.012\lambda_{BP})]a_3$ $+0.3a_4y$

Notes:
a_1, a_2, a_3, a_4, a_5: As specified in **4.2.3**
θ, ϕ: As specified in **4.2.2**
x_G: *X* coordinate (*m*) at the centre of gravity of the ship, to be taken as $x_G=\cancel{0.45}\underline{(0.36+0.2C_{B\_LC})}L_C$. The value calculated based on the weight distribution corresponding to the considered loading condition may be used.
z_G: *Z* coordinate (*m*) at the centre of gravity of the ship in the loading condition under consideration
λ_{BP}: As specified in **Table 4.6.2-9**

Amended	Original	Remarks
4.8 Loads to be Considered in Additional Structural Requirements **4.8.2 Maximum Load Condition** **4.8.2.2 Bottom Slamming** **1** In ships <u>with $T_{BAL-F}(m)$</u> less than $0.037L_{C230}$, the bottom slamming load specified in the following **(1)** to **(3)** is to be considered. Here, "ballast condition" means the ordinary condition where only ballast tanks such as clean ballast tanks, segregated ballast tanks and ballast holds are ballasted. When multiple ballast conditions are planned, it is permissible to consider only the ballast condition specified for heavy weather conditions, limited to the case where the loading manual specifies a ballast condition for heavy weather. This ballast condition, however, excludes exceptional cases where cargo tanks are ballasted in heavy weather conditions to ensure the safety of the ship. (1) In ships <u>with $T_{BAL-F}(m)$</u> equal to or less than $0.025L_{C230}$, the bottom slamming load P_{SL1} (kN/m^2) specified in **Table 4.8.2-1** is to be considered. In ships <u>with $T_{BAL-F}(m)$</u> greater than $0.025L_{C230}$ but less than $0.037L_{C230}$, the requirements specified in **10.6.2.3-2** are to be satisfied. (2) Notwithstanding **(1)** above, in ships of which L_C is equal to or less than 150 m, where $V/\sqrt{L_C}$ is not less than 1.4 and C_B is not more than 0.7, the bottom slamming load P_{SL2A} (kN/m^2) and P_{SL2B} (kN/m^2) are to be as specified in **Table 4.8.2-2**. However, **(1)** above may be applied for ships that can be expected	**4.8 Loads to be Considered in Additional Structural Requirements** **4.8.2 Maximum Load Condition** **4.8.2.2 Bottom Slamming** **1** In ships <u>having a bow draught</u> less than $0.037L_{C230}$ <u>in the ballast condition</u>, the bottom slamming load specified in the following **(1)** to **(3)** is to be considered. Here, "ballast condition" means the ordinary condition where only ballast tanks such as clean ballast tanks, segregated ballast tanks and ballast holds are ballasted. When multiple ballast conditions are planned, it is permissible to consider only the ballast condition specified for heavy weather conditions, limited to the case where the loading manual specifies a ballast condition for heavy weather. This ballast condition, however, excludes exceptional cases where cargo tanks are ballasted in heavy weather conditions to ensure the safety of the ship. (1) In ships <u>having a bow draught</u> equal to or less than $0.025L_{C230}$ <u>in the ballast condition</u>, the bottom slamming load P_{SL1} (kN/m^2) specified in **Table 4.8.2-1** is to be considered. In ships <u>having a bow draught</u> greater than $0.025L_{C230}$ but less than $0.037L_{C230}$ <u>in the ballast condition</u>, the requirements specified in **10.6.2.3-2** are to be satisfied. (2) Notwithstanding **(1)** above, in ships of which L_C is equal to or less than 150 m, where $V/\sqrt{L_C}$ is not less than 1.4 and C_B is not more than 0.7, the bottom slamming load P_{SL2A} (kN/m^2) and P_{SL2B} (kN/m^2) are to be as specified in **Table 4.8.2-2**. However, **(1)** above may be applied for ships that can be expected	Amendment (9) Clarifies some definitions and corrects typographical errors: Unifies the notes of the bow draught in the ballast condition newly specified in 1.4.2.4

Amended	Original	Remarks
to carry a certain amount of cargo regularly such as container carriers. (3) Notwithstanding **(1)** above, in ships of which L_C is equal to and greater than 150 *m* and C_B is not less than 0.7, the bottom slamming load P_{SL3} (kN/m^2) specified in **Table 4.8.2-3** is to be considered. **2** Notwithstanding the requirements of **(1)** to **(3)** in **-1** above, where the strengthened bottom forward is of structural arrangement other than that specified in **10.6.2.2(1)** and **10.6.3.2**, the bottom slamming loads P_{SL4A} (kN/m^2), P_{SL4B} (kN/m^2) and P_{SL4C} (kN/m^2) specified in **Table 4.8.2-4** are to be considered.	to carry a certain amount of cargo regularly such as container carriers. (3) Notwithstanding **(1)** above, in ships of which L_C is equal to and greater than 150 *m* and C_B is not less than 0.7, the bottom slamming load P_{SL3} (kN/m^2) specified in **Table 4.8.2-3** is to be considered. **2** Notwithstanding the requirements of **(1)** to **(3)** in **-1** above, where the strengthened bottom forward is of structural arrangement other than that specified in **10.6.2.2(1)** and **10.6.3.2**, the bottom slamming loads P_{SL4A} (kN/m^2), P_{SL4B} (kN/m^2) and P_{SL4C} (kN/m^2) specified in **Table 4.8.2-4** are to be considered.	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table 4.8.2-1 Bottom Slamming Impact Pressure P_{SL1}

Structural member under consideration	Bottom slamming impact pressure P_{SL1} (kN/m^2)
Stiffeners attached to outer shell and bottom longitudinals(1)	$P_{SL1} = 2.48\dfrac{L_C C_{SL1A} C_{SL2}}{\beta_1}$

Notes:

C_{SL1A}: Coefficient, as specified in **Table 4.8.2-5**

C_{SL2}: Coefficient, as given by the following formula:

For $\dfrac{V}{\sqrt{L_C}} \leq 1.0$, 0.4

For $1.0 < \dfrac{V}{\sqrt{L_C}} < 1.3$, $0.667\dfrac{V}{\sqrt{L_C}} - 0.267$

For $\dfrac{V}{\sqrt{L_C}} \geq 1.3$, $1.5\dfrac{V}{\sqrt{L_C}} - 1.35$

β_1: Coefficient, as given by the following formula: (2)

$$\beta_1 = \frac{0.0025L_C}{b_1}$$

b_1: Distance (m) from the centreline to the intersection of the outer shell and the horizontal line where the height from the top of the keel equals $0.0025L_C$, measured at the transverse section of the hull $0.2L_C$ aft from the fore end (*See* **Fig. 4.8.2-1**)

(1) Formula for ships where ~~the bow draught~~$\underline{T_{BAL-F}(m)}$ is not more than $0.025L_{C230}$ ~~in the ballast condition~~. For ships where ~~the bow draught~~$\underline{T_{BAL-F}(m)}$ is more than $0.025L_{C230}$ but less than $0.037L_{C230}$ ~~in the said ballast condition~~, the scantlings of members are to be determined in accordance with the requirements in **10.6.2.3-2**.

(2) Where the value of C_{SL2}/β_1 is 11.43 or more, C_{SL2}/β_1 is to be taken as 11.43.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table 4.8.2-2 Bottom Slamming Impact Pressures P_{SL2A} and P_{SL2B}

Structural member under consideration	Bottom slamming impact pressures P_{SL2A} and P_{SL2B} (kN/m^2)
Stiffeners attached to outer shell and bottom longitudinals [(1)]	$P_{SL2A} = 2.48\dfrac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_1}$
Floor[(2)]	$P_{SL2B} = 2.48\dfrac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_2}$

Notes:

C_{SL2}, β_1: As specified in **Table 4.8.2-1**[(3)]

C_{SL1B}: Coefficient, as specified in **Table 4.8.2-5**

C_{SL3}: Coefficient, as given by the following formula:

$$C_{SL3} = 1.9 - 0.9\frac{\cancel{T_{BALemp}}T_{BAL-F}}{0.025L_C}$$

~~T_{BALemp}: Minimum bow draught (m) in the ballast condition~~

β_2 : Coefficient, as given by the following formula[(3)]:

(a) In cases where $T_{BAL-F} \le 0.025L_C$

$\beta_2 = 0.0025L_C/b_1$

b_1: ~~Distance (m) from the centreline to the intersection of the outer shell to the horizontal line where the height from the top of the keel equals $0.0025L_C$, at the transverse section of the hull $0.2L_C$ aft from the fore end. Where the bow draught is greater than $0.025L_C$ but less than $0.037L_C$ in ballast condition, the bow draught in the actual condition is to be used to calculate the horizontal line~~ As specified in **Table 4.8.2-1** (*See* **Fig. 4.8.2-1**).

(b) In cases where $0.025L_C < T_{BAL-F} < 0.037L_C$

$\beta_2 = 0.1T_{BAL-F}/b_2$

b_2: Distance (m) from the centreline to the intersection of the outer shell to the horizontal line where the height from the top of the keel equals $0.1T_{BAL-F}$, at the transverse section of the hull $0.2L_C$ aft from the fore end (*See* **Fig. 4.8.2-1**).

(1) Formula for ships where ~~the bow draught~~ T_{BAL-F} is not more than $0.025L_C$ ~~in the ballast condition~~. For ships where ~~the bow draught~~ T_{BAL-F} is more than $0.025L_C$ but less than $0.037L_C$ ~~in the ballast condition~~, the scantlings of members are to be determined in accordance with the requirements in **10.6.3.3-2**.

(2) Formula for ships where ~~the bow draught~~ T_{BAL-F} is less than $0.037L_C$ ~~in the ballast condition~~.

(3) Where the values of C_{SL2}/β_1 and C_{SL2}/β_2 are 11.43 or more, to be taken as 11.43.

Remarks:

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Clarifies the case of $0.025L_C < T_{BAL-F} < 0.037L_C$ in calculating bottom slamming impact pressure

Amended	Original	Remarks
Table 4.8.2-3 Bottom Slamming Impact Pressure P_{SL3} (see table below)		

Table 4.8.2-3 Bottom Slamming Impact Pressure P_{SL3}

Structural member under consideration	Bottom slamming impact pressure P_{SL3} (kN/m^2)
Stiffeners attached to outer shell and bottom longitudinals(1)(2)	$P_{SL3} = 1.14 \dfrac{{V_{SL}}^2}{\beta_3}$

Notes:
(Omitted)

(1) Formula for ships where ~~the bow draught~~ T_{BAL-F} is not more than $0.025L_{C230}$ ~~in the ballast condition~~. For ships where ~~the bow draught~~ T_{BAL-F} is more than $0.025L_{C230}$ but less than $0.037L_{C230}$ ~~in the ballast condition~~, the scantlings of members are to be determined in accordance with the requirements in **10.6.2.3-2**.

(2) For the examination of positions within ballast tanks which are fully loaded with sea water in the ballast condition, the bottom slamming load may be reduced by ΔP_{SL} (kPa), as given by the following formula. In this case, it is to be stated in the loading manual that the said ballast tank is to be filled up in the heavy weather condition.

$$\Delta P_{SL} = 5h_b$$

h_b: Ballast tank depth (m)

Amended	Original	Remarks

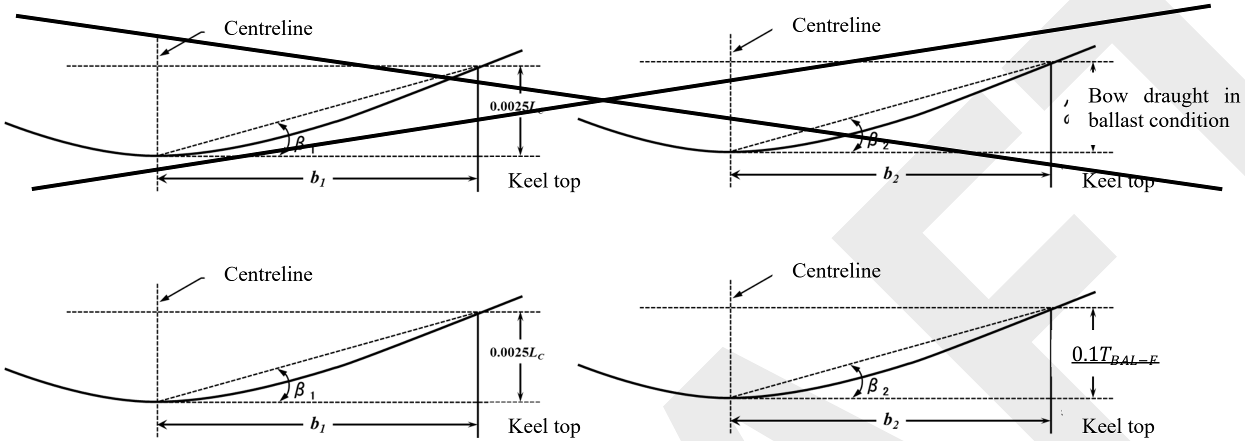
Table 4.8.2-4 Bottom Slamming Impact Pressures P_{SL4A}, P_{SL4B} and P_{SL4C} for Special Types of Construction

Ship and structural member		Bottom slamming impact pressure (kN/m^2)
Ships where L_C is not greater than 150 m, $V/\sqrt{L_C}$ is not less than 1.4 and C_B is not greater than 0.7	Floor of longitudinal framing system	$P_{SL4A} = C_{SL7}P_{SL2B}$
	Girder of transverse framing system	$P_{SL4A} = P_{SL2B}$
General	Floors and girders(1)	$P_{SL4B} = \max(C_{SL8}P_{SL1}, P_{\min})$
Ships where L_C is not greater than 150 m, $V/\sqrt{L_C}$ is not less than 1.4 and C_B is not greater than 0.7		$P_{SL4B} = \max(C_{SL8}P_{SL2B}, P_{\min})$
Ships where L_C is not less than 150 m and C_B is not less than 0.7		$P_{SL4B} = \max(C_{SL8}P_{SL3}, P_{\min})$
General	Stiffeners attached to outer shell or bottom longitudinals(2)	$P_{SL4C} = \max(C_{SL7}P_{SL1}, P_{\min})$
Ships where L_C is not greater than 150 m, $V/\sqrt{L_C}$ is not less than 1.4 and C_B is not greater than 0.7		$P_{SL4C} = \max(C_{SL7}P_{SL2A}, P_{\min})$
Ships where L_C is not less than 150 m and C_B is not less than 0.7		$P_{SL4C} = \max(C_{SL7}P_{SL3}, P_{\min})$

Notes:
(Omitted)

(1) For ships ~~having bow draught of~~ with T_{BAL-F} more than $0.025L_{C230}$ but less than $0.037L_{C230}$ ~~in the ballast condition~~, to be obtained by linear interpolation assuming the bottom slamming impact pressure is $P_{\min}$ when the bow draught is $0.037L_{C230}$.

(2) Formula for ships ~~having bow draught of~~ with T_{BAL-F} not more than $0.025L_{C230}$ ~~in the ballast condition~~. Where ~~the bow draught~~ T_{BAL-F} is more than $0.025L_{C230}$ but less than $0.037L_{C230}$ ~~in the ballast condition~~, the scantlings of members are to be determined in accordance with the requirements in **10.6.2.3-2** and **10.6.3.3-2**.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">Fig. 4.8.2-1. Measuring Method of b_1 and b_2

</td><td rowspan="2">Amendment (9)
Clarifies some definitions and corrects typographical errors:

Clarifies the case of $0.025L_C < T_{BAL-F} < 0.037L_C$ in calculating bottom slamming impact pressure</td></tr>
<tr><td>4.8.2.4 Sloshing Loads
(Omitted)
4 Sloshing loads to be considered for plate panels are to be in accordance with the following (1) and (2).
(1) Equivalent pressures P_{slh-p} (kN/m^2) obtained in accordance with Table 4.8.2-13 are to be considered as sloshing loads due to pitch.
(2) Equivalent pressures P_{slh-r} (kN/m^2) obtained in accordance with Table 4.8.2-14 are to be considered as sloshing loads due to roll.
(Omitted)</td><td>4.8.2.4 Sloshing Loads
(Omitted)
4 Sloshing loads to be considered for plate panels are to be in accordance with the following (1) and (2).
(1) Equivalent pressures P_{slh-p} (kN/m^2) obtained in accordance with Table 4.8.2-13 are to be considered as sloshing loads due to pitch.
(2) Equivalent pressures P_{slh-r} (kN/m^2) obtained in accordance with Table 4.8.2-14 are to be considered as sloshing loads due to roll.
(Omitted)</td></tr>
</table>

Amended	Original	Remarks

Table 4.8.2-13 Equivalent Pressure for Plate Panels and Sloshing Loads Due to Pitch

Relevant ship motion	Equivalent pressure (kN/m^2)
Pitch	$P_{slh-p} = \dfrac{F_{slh-p}}{C_{slh1} \cdot \min(1000, C_{slh2})} \cdot 10^6$

Notes:

C_{slh1}, C_{slh2}: Coefficients related to member and panel length depending on the type of stiffened system, to be taken as:

$C_{slh1} = b$, $C_{slh2} = a$ for plate panels of stiffened system A

$C_{slh1} = a$, $C_{slh2} = b$ for plate panels of stiffened system B

$C_{slh1} = b_f$ or b_w, $C_{slh2} = l$ for vertically corrugated bulkheads

Stiffened system A [(1)]: Transverse bulkheads, transverse wash bulkheads, front and aft walls of tanks with vertically stiffened systems; vertical girders of vertically stiffened systems attached to longitudinal bulkheads or tank side walls; tank top plates of longitudinally stiffened systems; horizontal girders stiffened in parallel to depth direction of webs which are attached to transverse bulkheads or transverse wash bulkheads or front and aft walls of tanks

Stiffened system B[(2)]: Transverse bulkheads, transverse wash bulkheads, front and aft walls of tanks with horizontally stiffened systems; vertical girders of horizontally stiffened systems attached to longitudinal bulkheads or tank side walls; tank top plates of transverse stiffened systems; horizontal girders in perpendicular to depth direction of webs which are attached to transverse bulkheads or transverse wash bulkheads or front and aft walls of tanks; cross-ties in transverse direction

a: Length (mm) of the longer side of the plate panel

b: Length (mm) of the shorter side of the plate panel

b_f, b_w: Width (mm) of the flange and web of corrugated bulkheads respectively, as specified in **10.9.2.1**

~~θ: Angle (rad) of corrugated bulkheads, as specified in **10.9.2.1**~~

l: Height (mm) of corrugated bulkheads, as specified in **7.2.7.3**

F_{slh-p}: Equivalent impact force (kN), to be taken as:

$F_{slh-p} = \rho_L \cdot C_{slh1} \cdot \ell_{tk}^{1.5} \cdot C_d \cdot C_{SS} \cdot a_{5\_slh} \cdot C_{slh3} \cdot 10^{-3}$

ρ_L: Maximum design cargo density (t/m^3) in considered h_{lc}. **Table 4.4.2-6** may be applied correspondingly.

ℓ_{tk}: Maximum tank length (m)

C_d: Coefficient depending on aspect ratio of the tank, as given by the following formula:

$$C_d = 0.65 + 0.35 \tanh\left(4 - \frac{1.5\ell_{tk}}{h_{tk}}\right)$$

h_{tk}: Maximum tank height (m)

C_{SS}: Coefficient, as given by the following formula:

$$C_{SS} = \min\left(0.3 + \frac{L_C}{325}, 1.0\right)$$

a_{5_slh}: Pitch angular acceleration (rad/s^2), as specified in **Table 4.8.2-11**. The parameters for the ballast condition are to be used.

Remarks:

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Deletes angle (rad) of corrugated bulkheads θ because it is not used in formula of sloshing loads due to pitch

Amendment (7)
Revises the simplified

Amended	Original	Remarks
C_{slh3}: Coefficient related to members under consideration and the distance from the centre of gravity of the ship to the tank, to be taken as: $C_{slh3} = C_{h1}(0.0104\|x_{TG} - x_G\| + 1.0)$ C_{h1} : Parameter depending on h_{lc}, as specified in **Table 4.8.2-15**. x_{TG} : X coordinate (m) at the volumetric centre of gravity of the tank under consideration x_G : X coordinate (m) at the centre of gravity of the ship, to be taken as $x_G = \cancel{0.45}\underline{(0.36 + 0.2C_{B\_LC})}L_C$ Where deemed appropriate by the Society, the value may be defined by the designer. (1) *See* **Fig. 10.9.3-1** (2) *See* **Fig. 10.9.3-2**		formula for the ship's hull centre of gravity to enhance accuracy. See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks
Table 4.8.2-14 Equivalent Pressure for Plate Panels, Sloshing Load Due to Roll (see below)		Amendment (9) Clarifies some definitions and corrects typographical errors: Deletes angle (rad) of corrugated bulkheads θ

Table 4.8.2-14 Equivalent Pressure for Plate Panels, Sloshing Load Due to Roll

Relevant ship motion	Equivalent pressure (kN/m^2)
Roll	$P_{slh-r} = \dfrac{F_{slh-r}}{C_{slh1} \cdot \min(1000, C_{slh2})} \cdot 10^6$

Notes:

C_{slh1}, C_{slh2}: Coefficients related to member and panel length depending on the type of stiffened system, to be taken as:

$C_{slh1} = b$, $C_{slh2} = a$ for plate panels of stiffened system A

$C_{slh1} = a$, $C_{slh2} = b$ for plate panels of stiffened system B

$C_{slh1} = b_f$ or b_w, $C_{slh2} = l$ for vertically corrugated bulkheads

Stiffened system A [(1)]: Longitudinal bulkheads, longitudinal wash bulkheads, tank side walls with vertically stiffened systems; vertical girders of vertically stiffened systems attached to transverse bulkheads or front and aft walls of tanks; tank top plates of transverse stiffened systems; horizontal girders stiffened in parallel to depth direction of webs which are attached to longitudinal bulkheads or longitudinal wash bulkheads or front and aft walls of tanks

Stiffened system B[(2)]: Longitudinal bulkheads, longitudinal wash bulkheads, front and aft walls of tanks with longitudinally stiffened systems; vertical girders of horizontally stiffened systems attached to transverse bulkheads or front and aft walls of tanks; tank top plates of longitudinally stiffened systems; horizontal girders stiffened in perpendicular to depth direction of webs attached to longitudinal bulkheads or longitudinal wash bulkheads or tank side walls; cross-ties in longitudinal direction

a, b, b_f, b_w, $\cancel{\theta,}$ l: As specified in **Table 4.8.2-13**

F_{slh-r}: Equivalent impact force (kN), to be taken as:

$F_{slh-r} = \rho_L \cdot C_{slh1} \cdot {b_{tk}}^{1.5} \cdot a_4 \cdot C_{slh3} \cdot 10^{-3}$

ρ_L: As specified in **Table 4.8.2-13**

b_{tk}: Maximum tank breadth (m)

a_4: Roll angular acceleration (rad/s^2), as specified in **4.2.3.4**. The parameters for the ballast condition are to be used.

C_{slh3}: Coefficient related to members under consideration, to be taken as:

$C_{slh3} = C_{h1}$

C_{h1} : Parameter depending on h_{lc}, as specified in **Table 4.8.2-15**

(1) *See* **Fig.10.9.3-1**

(2) *See* **Fig.10.9.3-2**

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>

Annex 5.1 EXTENT OF HIGH TENSILE STEEL

An1 Extent of High Tensile Steel Use

An1.2 Vertical Extent

An1.2.1

1 The vertical extent (m) of high tensile steel $z_{hts,i}$ use in the deck zone or bottom zone, respectively, from the deck or the baseline, is not to be taken less than the value obtained from the following formula. (*See* **Fig. An1**)

$$z_{hts,i} = z_1\left(1 - \frac{\sigma_{perm,i}}{\sigma_L}\right)$$

z_1: Distance (m) from the horizontal neutral axis to the deck or the baseline.

$\sigma_{perm,i}$: Permissible vertical bending stress (N/mm^2) of the steel under consideration as given in **Table 5.2.1-2** and **Fig. An1**.

σ_L: Vertical bending stress σ_{dk} (N/mm^2) at the deck or σ_{bl} (N/mm^2) at the baseline as given in **Table An1**

2 The requirement in **-1** above is to be applied for ships to which **Part 2-1** applies. In this case, the requirement is to be modified as necessary, e.g. by using net scantlings and by using the value specified in **5.2.1.1-1, Part 2-1** as $\sigma_{perm,i}$.

</td><td>

Annex 5.1 EXTENT OF HIGH TENSILE STEEL

An1 Extent of High Tensile Steel Use

An1.2 Vertical Extent

An1.2.1

The vertical extent (m) of high tensile steel $z_{hts,i}$ use in the deck zone or bottom zone, respectively, from the deck or the baseline, is not to be taken less than the value obtained from the following formula. (*See* **Fig. An1**)

$$z_{hts,i} = z_1\left(1 - \frac{\sigma_{perm,i}}{\sigma_L}\right)$$

z_1: Distance (m) from the horizontal neutral axis to the deck or the baseline.

$\sigma_{perm,i}$: Permissible vertical bending stress (N/mm^2) of the steel under consideration as given in **Table 5.2.1-2** and **Fig. An1**.

σ_L: Vertical bending stress σ_{dk} (N/mm^2) at the deck or σ_{bl} (N/mm^2) at the baseline as given in **Table An1**

</td><td>

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Clarifies the usage of gross/net scantlings in the extent of high tensile steel

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

Amended	Original	Remarks

Table An1 Stresses at Baseline and Deck

Condition	Baseline	Deck
Seagoing	$\sigma_{bl}=\frac{\lvert M_{SW}+M_{WV}\rvert}{\underline{I_{gr}}\cancel{I_{y-n50}}}z_n\times\cancel{10^{-3}}\underline{10^5}$	$\sigma_{dk}=\frac{\lvert M_{SW}+M_{WV}\rvert}{\underline{I_{gr}}\cancel{I_{y-n50}}}V_D\times\cancel{10^{-3}}\underline{10^5}$
Operation in harbor/sheltered water	$\sigma_{bl}=\frac{\lvert M_{SW-p}\rvert}{\underline{I_{gr}}\cancel{I_{y-n50}}}z_n\times\cancel{10^{-3}}\underline{10^5}$	$\sigma_{dk}=\frac{\lvert M_{SW-p}\rvert}{\underline{I_{gr}}\cancel{I_{y-n50}}}V_D\times\cancel{10^{-3}}\underline{10^5}$
V_D: Refer to **5.2.1.2**		

Amended	Original	Remarks
Chapter 6 LOCAL STRENGTH	**Chapter 6 LOCAL STRENGTH**	
6.2 Design Load Scenarios and Loads of the Ship to Be Assessed	**6.2 Design Load Scenarios and Loads of the Ship to Be Assessed**	
6.2.2 Assessment Design Load Scenarios and Loads for Members to be Assessed	**6.2.2 Assessment Design Load Scenarios and Loads for Members to Be Assessed**	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">
Table 6.2.2-1 Assessment Design <u>L</u>oad <u>S</u>cenarios and Loads for Members/Compartments to <u>be</u> Assessed
<table>
<tr><th rowspan="3">Compartments or members to be assessed</th><th rowspan="3">Design load scenario</th><th colspan="5">Load</th></tr>
<tr><th rowspan="2">Lateral load</th><th rowspan="2">Load type</th><th rowspan="2">Load component</th><th colspan="2">Refer to the following:</th></tr>
<tr><th>Lateral load (P)</th><th>Hull girder load (M_{V-HG}, M_{H-HG})</th></tr>
<tr><td>Outer shell (including stiffeners)</td><td rowspan="7">Maximum load condition</td><td>External pressure</td><td>Seawater</td><td>Static + dynamic loads</td><td>4.4.2.2-1</td><td rowspan="7">4.4.2.9</td></tr>
<tr><td>Cargo tanks, ballast tanks, ballast holds and other tanks</td><td rowspan="3">Internal pressure</td><td>Liquid loaded</td><td>Static + dynamic loads</td><td rowspan="3">4.4.2.2-2</td></tr>
<tr><td>Cargo holds(1)</td><td>Dry bulk cargoes</td><td>Static + dynamic loads</td></tr>
<tr><td>Cargo holds(2)</td><td>Others</td><td>Static + dynamic loads</td></tr>
<tr><td>Weather decks (including stiffeners)</td><td rowspan="2">Others</td><td>Green sea, <s>unspecified loads</s> <u>cargoes on the deck, etc.</u></td><td>Green sea load, static + dynamic loads</td><td>Greater of the pressures specified in 4.4.2.2-3 and -4</td></tr>
<tr><td>Internal decks(2) (including stiffeners)</td><td>Cargoes</td><td>Static + dynamic loads</td><td>4.4.2.2-3</td></tr>
<tr><td colspan="7">(Omitted)</td></tr>
<tr><td colspan="7">(Notes)
(Omitted)</td></tr>
</table>
</td><td>Amendment (9)
Clarifies some definitions and corrects typographical errors:

Clarifies the notes of deck load</td></tr>
</table>

Amended	Original	Remarks
6.3 Plates **6.3.2 Plates** **6.3.2.1 Bending Strength** The plate thickness is to be not less than the largest of the values obtained by the following formula under all applicable design load scenarios specified in **Table 6.2.2-1**. Application of gross or net scantlings in the values obtained from the following is specified in **Table 6.3.2-1**: $t = C_{Safety} C_{Aspect} \sqrt{\frac{4}{1.15 C_a \sigma_Y}} \sqrt{\frac{\|P\|b^2}{f_P}} \times 10^{-3} (mm)$ σ_Y: Specified minimum yield stress (N/mm^2) b: Length (mm) of the shorter side of the plate panel a: Length (mm) of the longer side of the plate panel α: Aspect ratio to be taken as a/b. f_P: Strength coefficient as given in **Table 6.3.2-1**. P: Lateral pressure (kN/m^2) corresponding to each Design load scenario specified in **Table 6.3.2-1**, to be calculated at the load calculation point specified in **3.7**. C_a: Coefficient of axial force effect as specified in **Table 6.3.2-2**. C_{Aspect}: Correction coefficient for the aspect ratio of the plate panel as given in **Table 6.3.2-1**. C_{Safety}: Safety factor taken as 1.0. σ_{BM}: Axial stress (N/mm^2) due to hull girder bending as specified in **6.2.3.1**.	**6.3 Plates** **6.3.2 Plates** **6.3.2.1 Bending Strength** The plate thickness is to be not less than the largest of the values obtained by the following formula under all applicable design load scenarios specified in **Table 6.2.2-1**. Application of gross or net scantlings in the values obtained from the following is specified in **Table 6.3.2-1**: $t = C_{Safety} C_{Aspect} \sqrt{\frac{4}{1.15 C_a \sigma_Y}} \sqrt{\frac{\|P\|b^2}{f_P}} \times 10^{-3} (mm)$ σ_Y: Specified minimum yield stress (N/mm^2) b: Length (mm) of the shorter side of the plate panel a: Length (mm) of the longer side of the plate panel α: Aspect ratio to be taken as a/b. f_P: Strength coefficient as given in **Table 6.3.2-1**. P: Lateral pressure (kN/m^2) corresponding to each Design load scenario specified in **Table 6.3.2-1**, to be calculated at the load calculation point specified in **3.7**. C_a: Coefficient of axial force effect as specified in **Table 6.3.2-2** when $\alpha \geq 2$ or **Table 6.3.2-3** when $\alpha < 2$. C_{Aspect}: Correction coefficient for the aspect ratio of the plate panel as given in **Table 6.3.2-1**. C_{Safety}: Safety factor taken as 1.0. σ_{BM}: Axial stress (N/mm^2) due to hull girder bending as specified in **6.2.3.1**.	Amendment (5) Revises the scope of application for correction coefficient for the aspect ratio in the local strength calculation formula of plate members. Correct the references because the tables are merged.

Amended	Original	Remarks

Table 6.3.2-1 Application of Gross or Net Scantlings and Each Parameter in the Evaluation for Each Design Load Scenario

Design load scenario		Application of gross or net scantlings	Lateral load P (kN/m^2)	~~Member~~	C_{Aspect}	f_P
Maximum load condition		Net scantling	P_{ex}, P_{in}, P_{dk} and P_{GW} To be in accordance with **4.4.2.2-1** to **-4** corresponding to compartments/members to be assessed in **Table 6.2.2-1**	~~Longitudinal hull girder structural members~~	~~1.0~~	12
				~~Other members~~	$\cancel{1.07-0.28\left(\frac{b}{a}\right)^2}$ $1.07-0.28\left(\frac{1}{\alpha}\right)^2$ but 1.0 for $\alpha > 2$	
Testing condition	Case 1	Gross scantling	P_{ST-in1} To be in accordance with **4.4.3.2**	~~Longitudinal hull girder structural members~~	~~1.0~~	12
				~~Other members~~	$\cancel{1.07-0.28\left(\frac{b}{a}\right)^2}$ $1.07-0.28\left(\frac{1}{\alpha}\right)^2$ but 1.0 for $\alpha > 2$	
	Case 2	Net scantling	P_{ST-in2} To be in accordance with **4.4.3.2**	~~Longitudinal hull girder structural members~~	~~1.0~~	16
				~~Other members~~	$\cancel{\sqrt{\frac{1}{1+\left(\frac{b}{a}\right)^2}}}$ $\sqrt{\frac{1}{1+\left(\frac{1}{\alpha}\right)^2}}$	
Flooded condition		Net scantling	P_{FD-in} To be in accordance with **4.4.4.1**	~~Longitudinal hull girder structural members~~	~~1.0~~	16

Amendment (5)
Revises the scope of application for correction coefficient for the aspect ratio in the local strength calculation formula of plate members.

The parameter C_{Aspect}, which expresses the increase in strength due to aspect ratio, will be changed to apply to longitudinal strength members as well.
In addition, the expression b/a is changed to $1/\alpha$.

Amended	Original	Remarks
	(continued table) ~~Other members~~: $\cancel{\sqrt{\frac{1}{1+\left(\frac{b}{a}\right)^2}}}$ $\sqrt{\frac{1}{1+\left(\frac{1}{\alpha}\right)^2}}$	
(Deleted)	Table 6.3.2-2 Definition of C_a (for $\alpha \geq 2$) (see table below)	

Table 6.3.2-2 Definition of C_a (for $\alpha \geq 2$)

Member		C_a
Longitudinal hull girder structural members	Longitudinal framing system	$\sqrt{1-\left(\frac{\sigma_{BM}}{\sigma_Y}\right)^2}$
	Transverse framing system	$1.0-\frac{\lvert\sigma_{BM}\rvert}{\sigma_Y}$
Other members		1.0

Amended	Original	Remarks

Table 6.3.2-~~3~~2 Definition of C_a ~~(for $\alpha < 2$)~~

Member		α	C_a	ζ	η
Longitudinal hull girder structural members	Longitudinal framing system	$2 \le \alpha$	$\left[1-\left(\frac{\lvert\sigma_{BM}\rvert}{\sigma_Y}\right)^{\zeta}\right]^{\eta}$	2	$\frac{1}{2}$
		$\alpha < 2$		2	$\cancel{\frac{b}{a}}$ $\frac{1}{\alpha}$
	Transverse framing system	$\alpha < 2$		$\cancel{2\frac{b}{a}}$ $2\frac{1}{\alpha}$	1
		$2 \le \alpha$		1	1
Other members			1.0		

Amendment (5)
Revises the scope of application for correction coefficient for the aspect ratio in the local strength calculation formula of plate members.

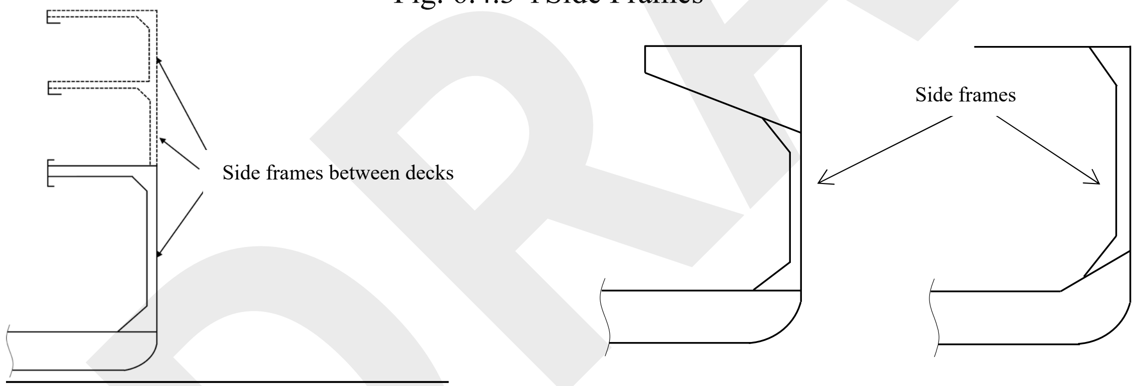
Table 6.3.2-2. and Table 6.3.2-3. are combined into one table.
In addition, the expression b/a is changed to $1/\alpha$.

Amended	Original	Remarks
6.4 Stiffeners **6.4.1 General** **6.4.1.1 Application** **1** Stiffeners subject to lateral loads are to be in accordance with the requirements in **6.4.2**. **2** Side frames within the cargo region are to be in accordance with the following **(1)** to **(3)** (*See* **Table 6.4.1-1**). (1) The scantlings of side frames in single-deck ships are to be in accordance with **6.4.3.2** instead of **-1** above. However, for side frames abaft of collision bulkheads, the scantlings are also to be in accordance with **6.4.3.4**.	**6.4 Stiffeners** **6.4.1 General** **6.4.1.1 Application** **1** Stiffeners subject to lateral loads are to be in accordance with the requirements in **6.4.2**. **2** Notwithstanding **-1** above, the side frames within the cargo region are to be in accordance with **6.4.3**.	Amendment (2) Clarifies the requirements regarding side frames: Reviews the composition so that the case divisions of application which was in 6.4.3 is newly specified in 6.4.1.1.

Amended	Original	Remarks
(2) The scantlings of side frames supporting deck transverses (except cantilever beams) for longitudinal framing systems are to be in accordance with **6.4.3.3** in addition to **-1** above. (3) The scantlings of side frames supporting cantilever beams are to be in accordance with **7.2.3** to **7.2.6** in addition to **-1** above. The bending moments and shear forces to be considered in applying **7.2.3** to **7.2.5** are to be in accordance with **7.2.2.1**.		
Table 6.4.1-1 Side Frames		(Newly Added)
6.4.1.2 Grouping of Stiffeners The scantlings of stiffeners may be decided based on the concept of grouping stiffeners of equal scantlings and specified minimum yield stresses sequentially arranged between primary supporting members. The scantling of the group of stiffeners is to be taken as the greater of the values obtained from the following **(1)** and **(2)**: (1) The average of the required scantlings of all stiffeners within a group (2) 90% of the maximum scantling required for any one stiffener within the group	**6.4.1.2 Grouping of Stiffeners** The scantlings of stiffeners may be decided based on the concept of grouping stiffeners of equal scantlings sequentially arranged between primary supporting members. The scantling of the group of stiffeners is to be taken as the greater of the values obtained from the following **(1)** and **(2)**: (1) The average of the required scantlings of all stiffeners within a group (2) 90% of the maximum scantling required for any one stiffener within the group	Amendment (9) Clarifies some definitions and corrects typographical errors: Clarifies that stiffeners with different specified minimum yield stress cannot be included in the same group.

Table 6.4.1-1 Side Frames

	Single-deck ships	Multiple-deck ships
Side Frames	**6.4.3.2** and **6.4.3.4**	**6.4.2**
Side frames supporting deck transverses	**6.4.3.2** and **6.4.3.3**	**6.4.2** and **6.4.3.3**
Side frames supporting cantilever beams	**6.4.3.2** and **7.2.2.1**	**6.4.2** and **7.2.2.1**

Amended	Original	Remarks
6.4.3 Side Frames **6.4.3.1 General** **1** Side frames are frames that fall under the following **(1)** and **(2)**: (1) Frames supporting the side shell plating installed between the decks or side stringers in ships with multiple decks (2) Frames supporting the side shell plating in single deck ships	**6.4.3 Side Frames** **6.4.3.1 General** **1** Side frames are frames that fall under the following **(1)** and **(2)**: (1) Frames supporting the side shell plating installed between the decks or side stringers in ships with multiple decks (2) Frames supporting the side shell plating in single deck ships	Amendment (2) Clarifies the requirements regarding side frames:
Fig. 6.4.3-1 Side Frames  (a) Ship with multiple decks (b) Single deck ship		Amendment (2) Clarifies the requirements regarding side frames: Replaces the figure because the lowest tier side frames of multi-deck ships are excluded from the application of 6.4.3 due to this amendment
(Deleted)	**2** The scantlings of side frames in ships with multiple decks are to be in accordance with the following **(1)** to **(4)**: (1) The scantlings of side frames between decks, except	Amendment (2) Clarifies the requirements regarding

Amended	Original	Remarks
	the lowest tier side frames, are to be in accordance with **6.4.2**, and are also to be determined in relation to such factors as the strength of the lowest tier side frames and the arrangement and transverse stiffness of bulkheads. (2) The scantlings of the lowest tier side frames are to be in accordance with **6.4.3.2**. (3) The scantlings of side frames supporting deck transverses (except cantilever beams) for the longitudinal framing system are to be in accordance with **6.4.3.3**.	side frames: Transferred to 6.4.1.1 due to composition review
(Deleted)	**3** The scantlings of side frames in single deck ships are to be in accordance with the following **(1)** and **(2)**: (1) The scantlings are to comply with the requirements in **6.4.3.2** and **6.4.3.4**. (2) In addition to **(1)** above, the requirements in **6.4.3.3** and **7.2.8.3** are to apply to deck transverses (except cantilever beams) for the longitudinal framing system and side frames supporting cantilever beams, respectively.	Amendment (2) Clarifies the requirements regarding side frames: Transferred to 6.4.1.1 due to composition review
6.4.3.2 Side Frames in Single-Deck Ships The scantlings of the side frames in single deck ships are to be in accordance with the following **(1)** and **(2)**: (1) Bending strength The section modulus is to be not less than the value obtained from the following formula: $Z = C_{Safety}\dfrac{M_1 + M_2}{\sigma_Y} \times 10^3 (cm^3)$	**6.4.3.2 Side Frames in Single Deck Ships and Lowest Tier Side Frames in Ships with Multiple Decks** The scantlings of the side frames in single deck ships and the lowest tier side frames in ships with multiple decks are to be in accordance with the following **(1)** and **(2)**: (1) Bending strength The section modulus is to be not less than the value obtained from the following formula: $Z = C_{Safety}\dfrac{M_1 + M_2}{\sigma_Y} \times 10^3 (cm^3)$	Amendment (2) Clarifies the requirements regarding side frames: the lowest tier side frames of multi-deck ships are excluded from the application of 6.4.3.2 and newly in accordance with 6.4.2

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>
(Omitted)

6.4.3.3 Side Frames Supporting Deck Transverses
The scantlings of side frames supporting deck transverses for the longitudinal framing system are to be in accordance with the following (1) and (2).
(Omitted)
(1) Bending strength
The section modulus is to be not less than the value obtained from the following formula:
$Z = C_{Safety}\frac{M_B}{\sigma_Y} \times 10^3 (cm^3)$
C_{safety}: Safety factor taken as 1.0.
M_B: Bending moment (kN-m) at the upper end of the frame according to the following formula:
$M_B = \frac{k_t \ell_{1bdg}{}^2 s_1 (P_{lower} + 1.5P_{upper}) + 5P_{Deck} s_2 \ell_2{}^2}{30k_t + 40} \times 10^{-3}$
However, $k_t = 0.4s_2/s_1$
ℓ_{1bdg}: Effective bending span (m) of the side frame. Where a bracket is provided, the end of the effective bending span is to be taken to the position where the depth of the side frame and the bracket is equal to $2h_w$, where h_w is the web depth of side frame.
s_1: Spacing (mm) of side frames
ℓ_2: Full length (m) of the deck transverse
s_2: Spacing (mm) of deck transverses
P_{upper}: Lateral pressure (kN/m^2) due to the external pressure under the maximum load condition specified in 4.4.2, to be
</td><td>
(Omitted)

6.4.3.3 Side Frames Supporting Deck Transverses
The scantlings of side frames supporting deck transverses for the longitudinal framing system are to be in accordance with the following (1) and (2)<u> in addition to the requirements in 6.4.2 or 6.4.3.2:</u>
(1) Bending strength
The section modulus is to be not less than the value obtained from the following formula:
$Z = C_{Safety}\frac{M_B}{\sigma_Y} \times 10^3 (cm^3)$
C_{safety}: Safety factor taken as 1.0.
M_B: Bending moment (kN-m) at the upper end of the frame according to the following formula:
$M_B = \frac{k_t \ell_{1bdg}{}^2 s_1 (P_{lower} + 1.5P_{upper}) + 5P_{Deck} s_2 \ell_2{}^2}{30k_t + 40} \times 10^{-3}$
However, $k_t = 0.4s_2/s_1$
ℓ_{1bdg}: Effective bending span (m) of the side frame. Where a bracket is provided, the end of the effective bending span is to be taken to the position where the depth of the side frame and the bracket is equal to $2h_w$, where h_w is the web depth of side frame.
s_1: Spacing (mm) of side frames
ℓ_2: Full length (m) of the deck transverse
s_2: Spacing (mm) of deck transverses
P_{upper}: Lateral pressure (kN/m^2) due to the external pressure under the maximum load condition specified in 4.4.2, to be
</td><td>
Amendment (2)
Clarifies the requirements regarding side frames:
</td></tr>
</table>

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>calculated at the upper end of the full length ℓ_1 of the side frame.
P_{lower}: Lateral pressure (kN/m^2) due to the external pressure under the maximum load condition specified in 4.4.2, to be calculated at the lower end of the full length ℓ_1 of the side frame.
P_{deck}: Average value of the lateral pressure (kN/m^2) on the deck, to be taken as the greater of the cargo load or green sea load under the maximum load condition specified in 4.4.2.2. <u>When calculating green sea deck pressure as specified in 4.4.2.8, the value of coefficient a and the minimum value of P_{GW} are to be in accordance with Table 4.5.2-1.</u> This <u>P_{deck}</u> is to be calculated at the midpoint of the full span of the deck transverse.
(2) Shear strength
(Omitted)

Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES

Symbols
For symbols not defined in this Chapter, refer to 1.4.
D_{DB}: When considering bending stiffness, depth (m) of double bottom is to be taken as the value at $x_{DH} = 0$ and $y_{DH} = 0$
D_{DS}: When considering bending stiffness, breadth (m) of</td><td>calculated at the upper end of the full length ℓ_1 of the side frame.
P_{lower}: Lateral pressure (kN/m^2) due to the external pressure under the maximum load condition specified in 4.4.2, to be calculated at the lower end of the full length ℓ_1 of the side frame.
P_{deck}: Average value of the lateral pressure (kN/m^2) on the deck, to be taken as the greater of the cargo load or green sea load under the maximum load condition specified in 4.4.2.2. This <u>load</u> is to be calculated at the midpoint of the full span of the deck transverse.
(2) Shear strength
(Omitted)

Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES

Symbols
For symbols not defined in this Chapter, refer to 1.4.
D_{DB}: When considering bending stiffness, depth (m) of double bottom is to be taken as the value at $x_{DH} = 0$ and $y_{DH} = 0$
D_{DS}: When considering bending stiffness, breadth (m) of</td><td>Amendment (9)
Clarifies some definitions and corrects typographical errors:

Specifies the reference of the value of coefficient a and the minimum value of P_{GW} in calculating green sea deck pressure P_{GW}

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Clarifies the definition of breadth of double</td></tr>
</table>

Amended	Original	Remarks
double side is to be taken as the value at $x_{DH} = 0$ and $z_{DH} = 0$ D_{DH}: Depth or breadth (m) of double hull, given as D_{DB} or D_{DS}, depending on whether assessing a double bottom or a double side x_{DB}: X coordinate with the $\frac{\ell_{DH}}{2}$ point in the double bottom under assessment being $x_{DB} = 0$ x_{DS}: X coordinate with the $\frac{\ell_{DH}}{2}$ point in the double side under assessment being $x_{DS} = 0$ x_{DH}: X coordinate, given as x_{DB} or x_{DS}, depending on whether assessing a double bottom or a double side y_{DH}: Y *coordinate* with the $\frac{B_{DB}}{2}$ point in the double bottom of the cargo hold under assessment being $y_{DH} = 0$ z_{DH}: Z coordinate with the $B_{DS}/2$ point in the double side of the cargo hold under assessment being $z_{DH} = 0$	double side D_{DH}: Depth or breadth (m) of double hull, given as D_{DB} or D_{DS}, depending on whether assessing a double bottom or a double side x_{DB}: X coordinate with the $\frac{\ell_{DH}}{2}$ point in the double bottom under assessment being $x_{DB} = 0$ x_{DS}: X coordinate with the $\frac{\ell_{DH}}{2}$ point in the double side under assessment being $x_{DS} = 0$ x_{DH}: X coordinate, given as x_{DB} or x_{DS}, depending on whether assessing a double bottom or a double side y_{DH}: Y coordinate with the $\frac{B_{DB}}{2}$ point in the double bottom of the cargo hold under assessment being $y_{DH} = 0$ z_{DH}: Z coordinate with the $B_{DS}/2$ point in the double side of the cargo hold under assessment being $z_{DH} = 0$	side
7.2 Simple Girders	**7.2 Simple Girders**	
7.2.1 General	**7.2.1 General**	
7.2.1.1 Assessment Conditions and Loads **1** For the members listed in **Table 7.2.1-1** and the primary supporting structural strength members constituting the boundaries of compartments, the strength assessments specified in this Chapter are to be carried out considering the lateral loads and hull girder loads specified in the table. For girders corresponding to multiple conditions, the strength assessments are to be carried out under all applicable conditions. **2** Simple girders are to be assessed for strength in each	**7.2.1.1 Assessment Models** **1** Girders are to be assessed by applying one of the assessment models shown in **Table 7.2.1-1** as appropriate for the form of load distribution and the surrounding structural arrangement. For cases not corresponding to any of the assessment models shown in **Table 7.2.1-1**, girders are to be deemed appropriate by the Society. **2** Notwithstanding **-1** above, the specific assessment models for the ship types specified in **Part 2** are to be referred to **Chapter 7, Part 2**. For members not specifically specified	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. The requirements remain unchanged. ・Transferred to 7.2.1.2

Amended	Original	Remarks
of the assessment conditions of the maximum load condition, testing condition and flooded condition. **3** For longitudinal hull girder structural members, hull girder loads due to the ship's longitudinal bending are to be considered in addition to lateral loads on girder members. **4** Lateral loads are, in general, assumed to act from one side of the girder members. However, where any loads are constantly acting from the other side, such loads may be taken into account.	in **Chapter 7, Part 2**, applied models are to be deemed appropriate by the Society. **3** Where multiple loads act simultaneously, as in cases with distributed and concentrated loads acting simultaneously, assessments are to be carried out by applying the corresponding multiple assessment models.	

Table 7.2.~~2~~1-1 Assessment Conditions and Loads for Members/Compartments to be Assessed

Compartments/members to be assessed	Typical members	Assessment condition	Loads: Lateral load	Loads: Load type	Loads: Load components	Refer to: Load (P)	Refer to: Hull girder load (M_{V-HG}, M_{H-HG})
Girders on shell plating	Web frames (including multiple-deck ships), side stringers (single side skin structure)	Maximum load condition	External pressure	Seawater	Static + dynamic loads	**4.4.2.2-1**	**4.4.2.9**
	Web frames supporting cantilever beams		Others	Green sea (weather decks only), ~~Unspecified~~ cargoes on the deck, etc.	Green sea load, static + dynamic loads	Greater of the pressures specified in **4.4.2.2-3 and -4**	
Cargo oil tanks, ballast tanks, ballast holds and other tanks	Stiffening girders, corrugated bulkheads		Internal pressure	Liquid loaded	Static + dynamic loads	**4.4.2.2-2**	

Remarks:

Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.

・Add "Web frames supporting cantilever beams" as typical members.
・Transferred from Table 7.2.2-1

Amended	Original	Remarks

Cargo holds[1]	Stiffening girders, corrugated bulkheads			Dry bulk cargoes and others	Static + dynamic loads		
Single-bottomed cargo holds	Girders, floors			~~Unspecified~~ Cargoes on the deck	Static + dynamic loads		
Girders on deck	Deck girders, deck transverses		Others	Green sea (weather decks only), ~~unspecified~~ Cargoes on the deck	Green sea load, static + dynamic loads	Greater of the pressures specified in **4.4.2.2-3** and **-4**	
Internal decks[2]	Deck girders, deck transverses			~~Unspecified~~ Cargoes on the deck	Static + dynamic loads	**4.4.2.2-3**	
Members constituting compartments subject to hydraulic testing	Stiffening girders, corrugated bulkheads	Testing condition	Internal pressure	Seawater	Static loads	P_{ST-in1} as specified in **4.4.3.2**	**4.4.4.3**
Compartments not carrying liquids[3]	Stiffening girders, corrugated bulkheads	Flooded condition	Internal pressure	Seawater	-	**4.4.4.1**	**4.4.4.2**

Notes:
(1) For ships of a single side skin structure for carrying cargoes other than liquids, girders on the shell plating may be excluded from the assessment.
(2) For ships carrying cargoes other than bulk and liquid cargoes with the cargoes properly fastened or otherwise held in position so that the cargo loads can be deemed as acting only on the inner bottom plating and internal deck, the assessment may be performed only for the inner bottom plating and the internal deck.
(3) Not required for girders on shell plating and weather deck.

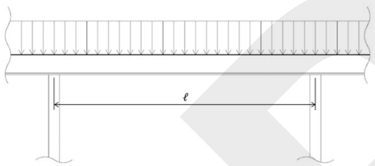
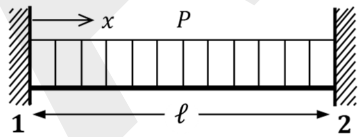
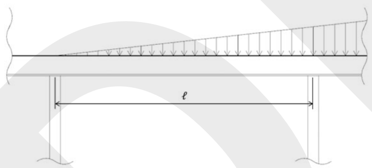
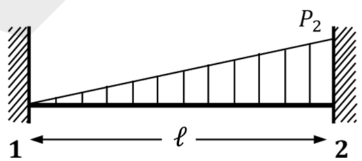
7.2.1.2 Assessment Models

1 Girders are to be assessed by applying one of the assessment models shown in **Table 7.2.1-2** as appropriate for

Remarks: Amendment (3)
For clarification of the rules, reviews the composition of the

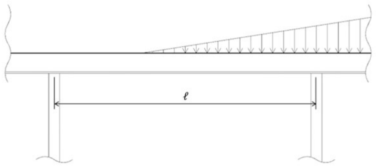
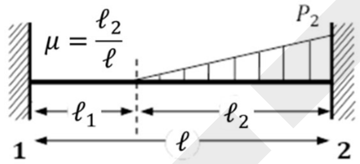
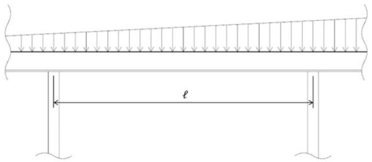
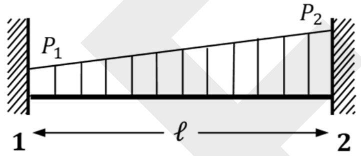
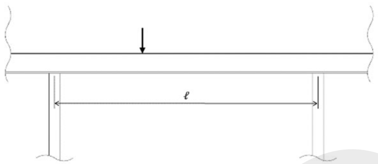
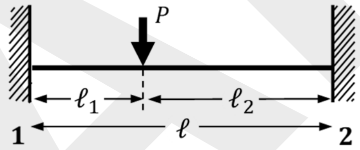
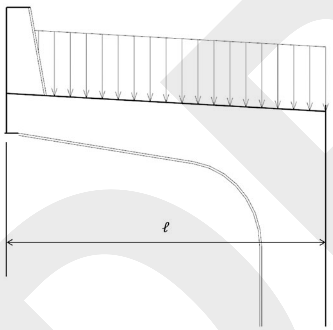
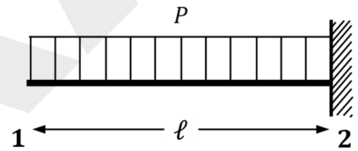
Amended	Original	Remarks
the form of load distribution and the surrounding structural arrangement. For cases not corresponding to any of the assessment models shown in **Table 7.2.1-2**, girders are to be deemed appropriate by the Society. **2** Notwithstanding **-1** above, reference is to be made to **Chapter 7, Part 2** with respect to the specific assessment models for the ship types specified in **Part 2**. For members not specifically specified in **Chapter 7, Part 2**, applied models are to be as deemed appropriate by the Society. **3** Where multiple loads act simultaneously, as in cases with distributed and concentrated loads acting simultaneously, assessments are to be carried out by applying the corresponding multiple assessment models.		requirements related to simple girders. ・Transferred from 7.2.1.1

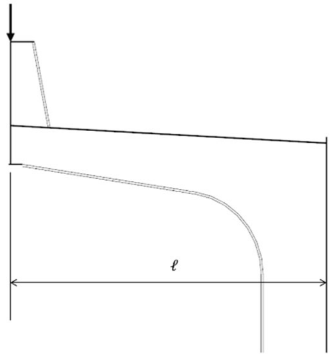
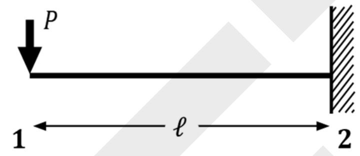
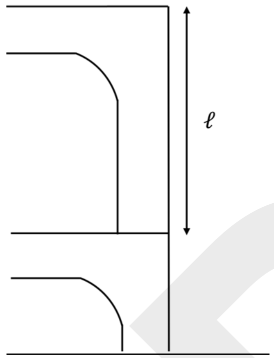
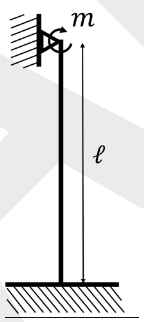
Table 7.2.1-~~1~~2 Examples of Structures and Assessment Models

	Examples of structures	Assessment models
1		
2		

Remarks: Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred from Table 7.2.1-1
・Add the assessment model 8

Amended	Original	Remarks

3		
4		
5		
6		

7		
<u>8</u>		

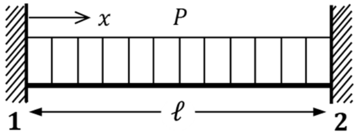
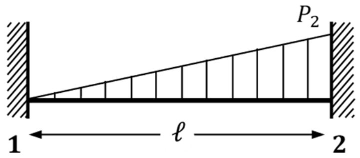
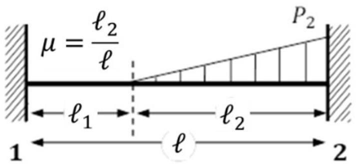
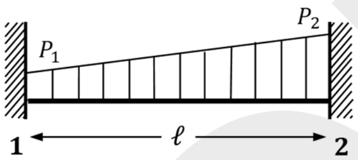
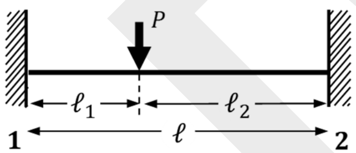
Amended	Original	Remarks
<u>**7.2.2 Strength Assessment**</u> <u>**7.2.2.1 General***</u> <u>**1** Girders are to be assessed in accordance with **7.2.3** to **7.2.5** using the moments and shear forces given in the following **(1)** to **(3)**, depending on the applicable assessment models.</u> <u>(1) Assessment model 1 to 7 shown in **Table 7.2.1-2**: Moments and shear forces are to be in accordance</u>	<u>**7.2.2 Assessment Conditions and Loads**</u> <u>**7.2.2.1 General**</u> <u>**1** Simple girders are to be assessed for strength in each of the assessment conditions of the maximum load condition, testing condition and flooded condition.</u> <u>**2** For longitudinal hull girder structural members, hull girder loads due to the ship's longitudinal bending are to be considered in addition to lateral loads on girder members.</u>	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Transferred to 7.2.1.1 ・Specifies the strength

Amended	Original	Remarks
with **Table 7.2.2-1**. (2) Assessment model 8 shown in **Table 7.2.1-2**: Moments and shear forces are to be in accordance with **7.2.2.2**. (3) For cases not corresponding to **(1)** and **(2)** above, applied models are to be deemed appropriate by the Society. **2** Corrugated bulkheads are to be assessed in accordance with 7.2.7.	**3** Lateral loads are, in general, assumed to act from one side of the girder members. However, where any loads are constantly acting from the other side, such loads may be taken into account. **4** Girder members constituting watertight boundaries of compartments not intended to carry liquids, excluding girders on the shell plating and weather deck, are to be subjected to lateral loads in the flooded condition.	assessment method

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

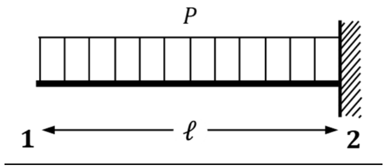
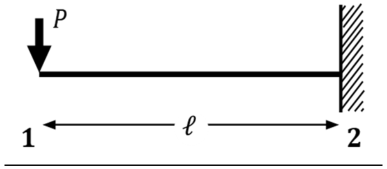
Amended	Original	Remarks

Table 7.2.~~3~~2-1 Moments and Shear Forces

	Assessment model	M	F
1		$M_1 = M_2 = \dfrac{SP{\ell_{bdg}}^2}{12}$	$F_1 = F_2 = \dfrac{SP\ell_{shr}}{2}$
2		$M_1 = \dfrac{SP_2{\ell_{bdg}}^2}{30}$ $M_2 = \dfrac{SP_2{\ell_{bdg}}^2}{20}$	$F_1 = \dfrac{3SP_2\ell_{shr}}{20}$ $F_2 = \dfrac{7SP_2\ell_{shr}}{20}$
3		$M_1 = -\dfrac{SP_2{\ell_{bdg}}^2}{60}(3\mu^4 - 5\mu^3)$ $M_2 = \dfrac{SP_2{\ell_{bdg}}^2}{60}(3\mu^4 - 10\mu^3 + 10\mu^2)$	$F_1 = -\dfrac{SP_2\ell_{shr}}{20}(2\mu^4 - 5\mu^3)$ $F_2 = \dfrac{SP_2\ell_{shr}}{20}(2\mu^4 - 5\mu^3 + 10\mu)$
4		$M_1 = \dfrac{S{\ell_{bdg}}^2}{60}(3P_1 + 2P_2)$ $M_2 = \dfrac{S{\ell_{bdg}}^2}{60}(2P_1 + 3P_2)$	$F_1 = \dfrac{S\ell_{shr}}{20}(7P_1 + 3P_2)$ $F_2 = \dfrac{S\ell_{shr}}{20}(3P_1 + 7P_2)$
5		$M_1 = P\mu_1{\mu_2}^2\ell_{bdg}$ $M_2 = P{\mu_1}^2\mu_2\ell_{bdg}$	$F_1 = P{\mu_2}^2(3\mu_1 + \mu_2)$ $F_2 = P{\mu_1}^2(3\mu_2 + \mu_1)$

Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred from Table 7.2.3-1
・Add Table 7.2.9-1 to assessment model 6 and 7 and note
・Modifies the references due to composition review

Amended	Original	Remarks

6		$M_2 = \dfrac{SP\ell_{bdg}{}^2}{2}$	$F_2 = SP\ell_{shr}$
7		$M_2 = P\ell_{bdg}$	$F_2 = P$

S: Breadth (m) of the area supported by the girder
ℓ: Full length (m) of the girder
ℓ_{bdg}: Effective bending span (m) of the girder as given in **3.6.1.4**
ℓ_{shr}: Effective shear span (m) of the girder as given in **3.6.1.5**
P: Load corresponding to each assessment condition specified in **Table 7.2.~~2~~1-1** to be taken as follows depending on the assessment model:
Assessment Model 1: Uniform load (kN/m^2) acting on the girder
Assessment Model 5: Concentrated load (kN) acting on the girder
Assessment Model 6: Average lateral load (kN/m^2) acting on the deck to be taken as the greater of the cargo load or green sea load in the maximum load condition specified in **4.4.2.2**. These loads are to be calculated at the midpoint of the span ℓ.
Assessment Model 7: Load (kN) due to the cargo loaded on the hatch cover to be taken as follows:
$P_B = SBP_h$
B: A half of the breadth (m) of the hatch in the deck supported by deck transverses
P_h: Load (kN/m^2) acting on the hatch cover as specified in **4.4.2.7** or **4.10.2.1**
P_1 and P_2: Loads corresponding to each assessment condition specified in **Table 7.2.~~2~~1-1** to be taken as follows depending on the assessment model:
Assessment Models 2, 3 and 4: Loads (kN/m^2) acting on the ends of the girder to be calculated at both ends of the full length ℓ of the girder.

7.2.2.2 Web Frames Supporting Cantilever Beams

For web frames supporting cantilever beams, the bending moments and shear forces are to be in accordance with the following **(1)** or **(2)**.

(1) Web frames in double-deck ships with the first layers being double side and the second layers being single

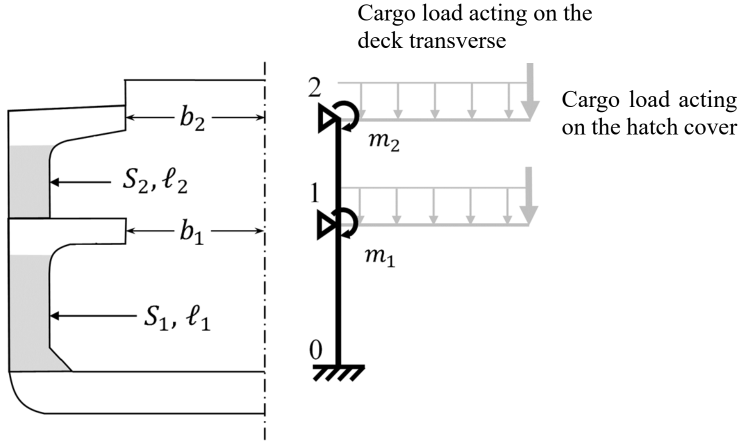
7.2.2.2 Assessment Conditions and Loads for Members to Be Assessed

For the members listed in **Table 7.2.2-1** and the primary supporting structural strength members constituting the boundaries of compartments, the strength assessments specified in this Chapter are to be carried out considering the

Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.

Amended	Original	Remarks
side, single-deck ships, multi-deck ships with three or more decks: i) Moment $\lvert m\rvert$ ii) Shear force $\frac{3\lvert m\rvert}{2\ell}$ m: Moment acting on the upper ends of web frames to be assessed, as follows: $m = M_d + M_h$ M_d: Moment (*kN-m*) due to the cargo loaded on the deck or wave loads to be obtained from Assessment Model 6 shown in **Table 7.2.2-1**. However, ℓ is to be used for calculation instead of ℓ_{bdg}. M_h: Moment (*kN-m*) due to the cargo loaded on the hatch cover or wave loads to be obtained from Assessment Model 7 shown in **Table 7.2.2-1**. However, ℓ is to be used for calculation instead of ℓ_{bdg}. ℓ: Span (*m*) of the web frame to be assessed (2) Web frames in double-deck ships with the first layers and the second layers being single side (a) Web frame in the first tier from the inner bottom plating: i) Moment $0.6\lvert m_1\rvert$ ii) Shear force	lateral loads and hull girder loads specified in the table. For girders corresponding to multiple conditions, the strength assessments are to be carried out under all applicable conditions.	・Transferred to 7.2.1.1 ・Transferred from 7.2.8.3 ・changes the usage of variable i

Amended	Original	Remarks
$0.9\left\|\frac{m_1}{\ell_1}\right\|$ (b) Web frame in the second tier: i) Moment $\max(\|0.25m_2+0.5m_1\|, \|m_2\|)$ ii) Shear force $\left\|\frac{0.5m_1+1.25m_2}{\ell_2}\right\|$ m_1, m_2: Moment acting on the upper ends of web frames in the first and second tier from the inner bottom plating, in accordance with **(1)** above (See Fig. 7.2.2-1) ℓ_1, ℓ_2: Span (m) of the web frame in the first and the second tier from the inner bottom plating		

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>Fig. 7.2.2-1 Web Frames in a Double-deck Ships with the First Layers and the Second Layers being Single Side

</td><td></td><td>Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred to 7.2.1.1
・Transferred from 7.2.8.3</td></tr>
<tr><td>(Deleted)</td><td>7.2.2.3 Stress Due to Hull Girder Loads
The stress σ_{BM} (N/mm²) due to the hull girder load at the girder to be assessed is to be obtained from the following formula. However, in case of load condition RP in the maximum load condition, σ_{BM} is not to be less than when $M_{V-HG}=0$ or $M_{H-HG}=M_{WH}$.
$$\sigma_{BM}=\left[\left|\frac{M_{V-HG}}{I_{y-n50}}(z-z_n)\right|+\left|\frac{M_{H-HG}}{I_{z-n50}}y\right|\right]\times 10^5$$
(Omitted)</td><td>Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred to 7.2.3.1</td></tr>
</table>

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>

7.2.3 Bending Strength

7.2.3.1 Section Modulus

In each assessment condition, the section modulus of simple girders is to be not less than that obtained from the following formula:

$$Z_{n50} = C_{Safety}\frac{|M|}{\sigma_{all}-\sigma_{BM}}\times 10^3\ (cm^3)$$

C_{Safety}: Safety factor, to be taken as 1.1

M: Maximum moment (kN-m) of the assessment model as specified in **7.2.2.1**

σ_{all}: Permissible bending stress (N/mm^2) to be taken as follows:

$$\sigma_{all} = \frac{235}{K}$$

K: Material factor as specified in **3.2.1.2**

σ_{BM}: Stress (N/mm^2) due to the hull girder load at the girder to be assessed as follows. However, in case of load condition RP in the maximum load condition, σ_{BM} is not to be less than when $M_{V-HG}=0$ or $M_{H-HG}=M_{WH}$. In addition, for members other than longitudinal hull girder structural members, σ_{BM} is to be taken as 0.

$$\sigma_{BM} = \left[\left|\frac{M_{V-HG}}{I_{y-n50}}(z-z_n)\right| + \left|\frac{M_{H-HG}}{I_{z-n50}}y\right|\right]\times 10^5$$

M_{V-HG}: Hull girder load (vertical bending moment) corresponding to each assessment condition specified in **Table 7.2.1-1**

M_{H-HG}: Hull girder load (horizontal bending moment) considered in maximum load

</td><td>

7.2.3 Bending Strength

7.2.3.1 Section Modulus

In each assessment condition, the section modulus of simple girders is to be not less than that obtained from the following formula:

$$Z_{n50} = C_{Safety}\frac{|M|}{\sigma_{all}-\sigma_{BM}}\times 10^3\ (cm^3)$$

C_{Safety}: Safety factor, to be taken as 1.1

M: Maximum moment (kN-m) of the assessment model as specified in **7.2.3.2**

σ_{all}: Permissible bending stress (N/mm^2) to be taken as follows:

$$\sigma_{all} = \frac{235}{K}$$

K: Material factor as specified in **3.2.1.2**

σ_{BM}: Stress (N/mm^2) due to the hull girder load at the girder to be assessed as specified in **7.2.2.3**. However, for members other than longitudinal hull girder structural members, σ_{BM} is to be taken as 0.

</td><td>

Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Modifies the reference

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

Amended	Original	Remarks
condition, as specified in **4.4.2.9-2.** $M_{H-HG} = 0$ in load conditions other than maximum load condition. M_{WH}: Horizontal wave bending moment (*kN-m*) specified in **4.4.2.9-2** I_{y-n50}: Moment of inertia (cm^4) of the hull transverse section under consideration about its horizontal neutral axis. Corrosion additions considered in the calculation are as specified in **3.3.4.** I_{z-n50}: Moment of inertia (cm^4) of the hull transverse section under consideration about its vertical neutral axis. Corrosion additions considered in the calculation are as specified in **3.3.4.** z: Z coordinate (*m*) of the load calculation point for the member under consideration z_n Vertical distance (*m*) from the top of the keel in the transverse section under consideration to its horizontal neutral axis y: Y coordinate (*m*) of the load calculation point for the member under consideration The coordinate system and the load calculation points are as given in **1.4.3.6** and **3.7.3**, respectively.		
(Deleted)	**7.2.3.2 Moments** **1** Members of interest are to be assessed based on the moment in an appropriate assessment model selected from **Table 7.2.3-1** according to their boundary condition and load distribution. For cases not corresponding to any of the assessment models shown in **Table 7.2.3-1**, moments are to be deemed appropriate by the Society.	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Deleted due to composition review

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td></td><td><u>2 Where multiple loads act simultaneously, as in cases where distributed and concentrated loads act simultaneously, the assessment is to be carried out by the summation of the moments in the respective assessment models.</u></td><td></td></tr>
<tr><td>7.2.4 Shear Strength</td><td>7.2.4 Shear Strength</td><td></td></tr>
<tr><td>7.2.4.1 Web Thickness
In each assessment condition, the web thickness of simple girders is to be not less than that obtained from the following formula:
$t_{n50} = C_{Safety} \frac{|F|}{D_{sh-n50} \tau_{all}}$ (mm)
C_{Safety}: Safety factor to be taken as 1.2
F: Maximum shear force (kN) of the assessment model as specified in <u>7.2.2.1</u>
D_{sh-n50}:Shear depth (m) as given in 3.6.4.5
τ_{all}: Permissible shear stress (N/mm^2) to be taken as follows:
$\tau_{all} = \frac{235}{K\sqrt{3}}$
K: Material factor as specified in 3.2.1.2</td><td>7.2.4.1 Web Thickness
In each assessment condition, the web thickness of simple girders is to be not less than that obtained from the following formula:
$t_{n50} = C_{Safety} \frac{|F|}{D_{sh-n50} \tau_{all}}$ (mm)
C_{Safety}: Safety factor to be taken as 1.2
F: Maximum shear force (kN) of the assessment model as specified in <u>7.2.4.2</u>
D_{sh-n50}:Shear depth (m) as given in 3.6.4.5
τ_{all}: Permissible shear stress (N/mm^2) to be taken as follows:
$\tau_{all} = \frac{235}{K\sqrt{3}}$
K:Material factor as specified in 3.2.1.2</td><td>Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Modifies the reference due to composition review</td></tr>
<tr><td>(Deleted)</td><td><u>7.2.4.2 Shear Forces</u>
<u>1 Members of interest are to be assessed based on the shear force in an appropriate assessment model selected from Table 7.2.3-1 according to their boundary condition and load distribution. For cases not corresponding to any of the assessment models shown in Table 7.2.3-1, Shear forces are to be deemed appropriate by the Society.</u>
<u>2 Where multiple loads act simultaneously, as in cases</u></td><td>Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Deleted due to composition review</td></tr>
</table>

Amended	Original	Remarks
	where distributed and concentrated loads are applied simultaneously, the assessment is to be carried out by the summation of the shear forces in the respective assessment models.	
7.2.5 Shear Buckling Strength **7.2.5.1 Web Thickness** The web thickness of simple girders is to be not less than that obtained from the formulae shown in the following **(1)** to **(3)** for each assessment condition: (1) For girder webs with no opening $t=\sqrt[3]{C_{Safety}\frac{\lvert F\rvert b^2}{D_w}\frac{12(1-\nu^2)}{K_\tau \pi^2 E}}$ (*mm*) C_{Safety}: Safety factor to be taken as 1.2 F: Maximum shear force (*kN*) of the assessment model as specified in **7.2.2.1** D_W: Web depth (*m*) of the primary supporting members (*See* **Fig. 7.2.5-1**) K_τ: Shear buckling factor to be taken as follows: $K_\tau = 5.34 + \frac{4.0}{\alpha^2}$ α: Panel aspect ratio to be taken as follows: $\alpha = \frac{a}{b}$ a: Length (*mm*) of the longer side of the plate panel (*See* **Fig. 7.2.5-1**) b: Length (*mm*) of the shorter side of the plate panel. Where the plate panel is divided in the girder depth direction, this	**7.2.5 Shear Buckling Strength** **7.2.5.1 Web Thickness** The web thickness of simple girders is to be not less than that obtained from the formulae shown in the following **(1)** to **(3)** for each assessment condition: (1) For girder webs with no opening $t=\sqrt[3]{C_{Safety}\frac{\lvert F\rvert b^2}{D_w}\frac{12(1-\nu^2)}{K_\tau \pi^2 E}}$ (*mm*) C_{Safety}: Safety factor to be taken as 1.2 F: Maximum shear force (*kN*) of the assessment model as specified in **7.2.4.2** D_W: Web depth (*m*) of the primary supporting members (*See* **Fig. 7.2.5-1**) K_τ: Shear buckling factor to be taken as follows: $K_\tau = 5.34 + \frac{4.0}{\alpha^2}$ α: Panel aspect ratio to be taken as follows: $\alpha = \frac{a}{b}$ a: Length (*mm*) of the longer side of the plate panel (*See* **Fig. 7.2.5-1**) b: Length (*mm*) of the shorter side of the plate panel. Where the plate panel is divided in the girder depth direction, this	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Modifies the reference due to composition review

Amended	Original	Remarks
length is to be the greatest of the lengths of the resulting shorter sides. (*See* **Fig. 7.2.5-1**) ν: Poisson's ratio to be taken as 0.3 E: Young's modulus to be taken as 206,000 (N/mm^2) (2) For girder webs provided with an opening reinforced by stiffeners in the girder span direction $t = \sqrt[3]{C_{Safety}\frac{\|F\|b^2}{D_w - D_0}\frac{12(1-\nu^2)}{K_\tau \pi^2 E}}$ (mm) C_{Safety}: Safety factor to be taken as 1.2 F: Maximum shear force (kN) of the assessment model as specified in <u>**7.2.2.1**</u> D_W: Web depth (m) of the primary supporting members (*See* **Fig. 7.2.5-2**) K_τ: Shear buckling factor to be taken as follows: $K_\tau = 5.34 + \frac{4.0}{\alpha^2}$ D_0: Size (m) of manholes and other openings in the girder depth direction (*See* **Fig. 7.2.5-2**) α: Panel aspect ratio to be taken as follows: $\alpha = \frac{a}{b}$ a: Length (mm) of the longer side of the plate panel (*See* **Fig. 7.2.5-2**) b: Length (mm) of the shorter side of the plate panel, which is to be the greatest of the lengths of the resulting shorter sides (*See* **Fig. 7.2.5-2**) ν: Poisson's ratio to be taken as 0.3 E: Young's modulus to be taken as 206,000 (N/mm^2) (3) For girder webs provided with an opening (an	length is to be the greatest of the lengths of the resulting shorter sides. (*See* **Fig. 7.2.5-1**) ν: Poisson's ratio to be taken as 0.3 E: Young's modulus to be taken as 206,000 (N/mm^2) (2) For girder webs provided with an opening reinforced by stiffeners in the girder span direction $t = \sqrt[3]{C_{Safety}\frac{\|F\|b^2}{D_w - D_0}\frac{12(1-\nu^2)}{K_\tau \pi^2 E}}$ (mm) C_{Safety}: Safety factor to be taken as 1.2 F: Maximum shear force (kN) of the assessment model as specified in <u>**7.2.4.2**</u> D_W: Web depth (m) of the primary supporting members (*See* **Fig. 7.2.5-2**) K_τ: Shear buckling factor to be taken as follows: $K_\tau = 5.34 + \frac{4.0}{\alpha^2}$ D_0: Size (m) of manholes and other openings in the girder depth direction (*See* **Fig. 7.2.5-2**) α: Panel aspect ratio to be taken as follows: $\alpha = \frac{a}{b}$ a: Length (mm) of the longer side of the plate panel (*See* **Fig. 7.2.5-2**) b: Length (mm) of the shorter side of the plate panel, which is to be the greatest of the lengths of the resulting shorter sides (*See* **Fig. 7.2.5-2**) ν: Poisson's ratio to be taken as 0.3 E: Young's modulus to be taken as 206,000 (N/mm^2) (3) For girder webs provided with an opening (an	

Amended	Original	Remarks
unreinforced opening) $t = \sqrt[3]{C_{Safety}\frac{\lvert F\rvert b^2}{D_w}\frac{12(1-\nu^2)}{\gamma_{a_0}K_\tau\pi^2 E}}$ (*mm*) C_{Safety}: Safety factor to be taken as 1.2 F: Maximum shear force (*kN*) of the assessment model as specified in **7.2.2.1** D_W: Web depth (*m*) of the primary supporting members (*See* **Fig. 7.2.5-3**) K_τ: Shear buckling factor to be taken as follows: $K_\tau = 5.34 + \frac{4.0}{\alpha^2}$ γ_{a_0}: Coefficient of the effect of an opening, such as a manhole, on shear buckling to be taken as follows: $\gamma_{a_0} = \left(1 + \frac{D_0}{2a} \times 10^3\right)^{-2}$ D_0: Size (*m*) of manholes and other openings in the girder depth direction (*See* **Fig. 7.2.5-3**) α: Panel aspect ratio to be taken as follows: $\alpha = \frac{a}{b}$ a: Length (*mm*) of the longer side of the plate panel (*See* **Fig. 7.2.5-3**) b: Length (*mm*) of the shorter side of the plate panel (*See* **Fig. 7.2.5-3**) ν: Poisson's ratio to be taken as 0.3 E: Young's modulus to be taken as 206,000 (N/mm^2)	unreinforced opening) $t = \sqrt[3]{C_{Safety}\frac{\lvert F\rvert b^2}{D_w}\frac{12(1-\nu^2)}{\gamma_{a_0}K_\tau\pi^2 E}}$ (*mm*) C_{Safety}: Safety factor to be taken as 1.2 F: Maximum shear force (*kN*) of the assessment model as specified in **7.2.4.2** D_W: Web depth (*m*) of the primary supporting members (*See* **Fig. 7.2.5-3**) K_τ: Shear buckling factor to be taken as follows: $K_\tau = 5.34 + \frac{4.0}{\alpha^2}$ γ_{a_0}: Coefficient of the effect of an opening, such as a manhole, on shear buckling to be taken as follows: $\gamma_{a_0} = \left(1 + \frac{D_0}{2a} \times 10^3\right)^{-2}$ D_0: Size (*m*) of manholes and other openings in the girder depth direction (*See* **Fig. 7.2.5-3**) α: Panel aspect ratio to be taken as follows: $\alpha = \frac{a}{b}$ a: Length (*mm*) of the longer side of the plate panel (*See* **Fig. 7.2.5-3**) b: Length (*mm*) of the shorter side of the plate panel (*See* **Fig. 7.2.5-3**) ν: Poisson's ratio to be taken as 0.3 E: Young's modulus to be taken as 206,000 (N/mm^2)	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
7.2.6 Bending Stiffness **7.2.6.1 Depth of Girders** **1** For the members specified in **Table 7.2.6-1**, depth is not to be less than that specified in the table. However, the depth may be reduced provided that the member has equivalent moment of inertia or deflection to the required members. **2** Cantilever beams are to comply with the following **(1)** and **(2)**: (1) The depths of the cantilever beams may be gradually tapered down towards their inboard ends from the toes of the end brackets and may be reduced to about $1/2$ of the depth at the toe of the end bracket. (2) The sectional areas of face plates may be gradually tapered down from the toes of the end brackets toward the inboard end of the cantilever beams and may be reduced to 0.60 *times* that at the toe of the end bracket.	**7.2.6 Bending Stiffness** **7.2.6.1 Depth of Girders** For the members specified in **Table 7.2.6-1**, depth is not to be less than that specified in the table. However, the depth may be reduced provided that the member has equivalent moment of inertia or deflection to the required members.	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Transferred from 7.2.9 due to composition review

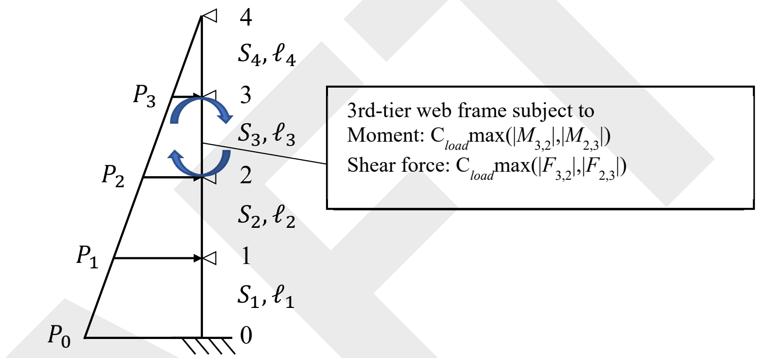
Table 7.2.6-1 Depths of Girders

Member	Depths of Girders (m)
Web frame	$0.1\ell_{bdg}$
Web frame supporting cantilever	$0.125\ell_{bdg}$
Web frame supporting side stringer	$0.125\ell_{bdg}$
Side stringer	$0.125\ell_{bdg}$
Side stringer forward of collision bulkhead	$0.2\ell_{bdg}$
Web frame forward of collision bulkhead	$0.2\ell_{bdg}$
Cantilever beam	$0.2\ell_{bdg}$

Note:
ℓ_{bdg}: Effective bending span (m) of the girder as given in **3.6.1.4**

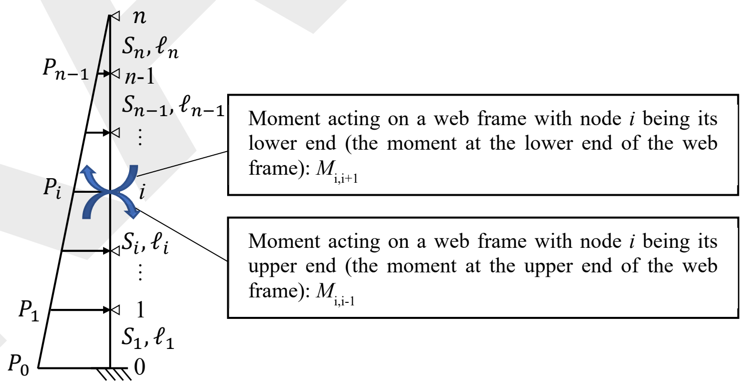
Remarks: ・Transferred from 7.2.9 due to composition review

Amended	Original	Remarks
(Deleted) **(Deleted)**	**7.2.8 Web Frames** **7.2.8.1 Application** **1** 7.2.8 applies to web frames in multi-deck ships with two or more decks as defined in the following (1) and (2): (1) Web frames extending continuously from the inner bottom plating to the freeboard deck. The "web frames" meant here include the adjacent side frames above and below the web frame (in cases of ships with both longitudinal and transverse framing systems). Web frames in single-deck ships are to be in accordance with the requirements in 7.2.3 to 7.2.5. (2) Web frames supporting cantilever beams **2** The web frames specified in **-1(1)** and **(2)** above are to be in accordance with the requirements in **7.2.8.2** and **7.2.8.3**, respectively. **3** Notwithstanding **-2** above, web frames may be assessed based on the moments and shear forces obtained by direct strength calculations such as beam analysis.	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Deleted due to composition review

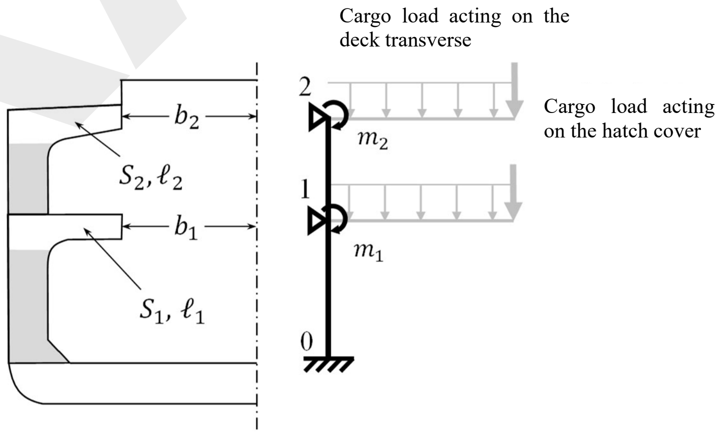
<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>(Deleted)</td><td>Fig. 7.2.8-1 Example of Application
</td><td>Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred to Part 2-6 due to composition review</td></tr>
<tr><td>(Deleted)</td><td>7.2.8.2 Multi-Deck Ship Web Frames Subject to External Pressure
The scantlings of web frames are to be in accordance with the requirements in 7.2.3 to 7.2.5. The bending moments and shear forces to be considered in applying 7.2.3 to 7.2.5 are to be 1.1 times the greater of their respective absolute values at the upper and lower ends of web frames (See Fig. 7.2.8-1). Nodal bending moments and shear forces are to be in accordance with the following (1) and (2), respectively:
(1) Moments acting on web frames at each node are to be in accordance with the following (a) and (b):
(a) The moment $M_{i,i-1}$ (kN-m) acting on a web frame with node i being its upper end (the moment at the upper end of the web frame) is to be taken as follows (See Fig. 7.2.8-2):
i) For $i = n$
$M_{n,n-1} = 0$</td><td>Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred to Part 2-6 due to composition review</td></tr>
</table>

Amended	Original	Remarks
	ii) For $1 \le i \le n-1$ $M_{i,i-1} = \frac{1}{2}(C_{i,i-1} - C_{i,i+1} + \emptyset_{i-1} - \emptyset_{i+1})$ (b) The moment $M_{i,i+1}$ (*kN-m*) acting on a web frame with node i being its lower end (the moment at the lower end of the web frame) is to be taken as follows (*See* **Fig. 7.2.8-2**): i) For $1 \le i \le n-1$ $M_{i,i+1} = -\frac{1}{2}(C_{i,i-1} - C_{i,i+1} + \emptyset_{i-1} - \emptyset_{i+1})$ ii) For $i = 0$ $M_{0,1} = -\frac{1}{4}(C_{1,2} + C_{1,0} - \emptyset_0 + \emptyset_2) - C_{0,1}$ $C_{i,i-1}$: Coefficient to be taken as follows: $C_{i,i-1} = \frac{S_i \ell_i^{\,2}}{60}(3P_i + 2P_{i-1}) \quad (0 \le i \le n-1)$ $C_{i,i+1}$: Coefficient to be taken as follows: i) For $0 \le i \le n-2$ $C_{i,i+1} = -\frac{S_{i+1} \ell_{i+1}^{\,2}}{60}(2P_{i+1} + 3P_i)$ ii) For $i = n-1$ $C_{n-1,n} = -\frac{S_n \ell_n^{\,2}}{120}(7P_n + 8P_{n-1})$ $\emptyset_i$: Coefficient to be taken as follows: i) For $i = 0$ $\phi_0 = 0$ ii) For $1 \le i \le n-1$	

Amended	Original	Remarks
	$\phi_i = -\frac{1}{4}\left(C_{i,i-1} + C_{i,i+1}\right)$ iii) For $i = n$ $\phi_n = -\frac{1}{2}\phi_{n-1}$ S_i: Spacing (*m*) of the web frame in the i-th tier from the inner bottom plating ℓ_i: Span (*m*) of the web frame in the i-th tier from the inner bottom plating P_i: Load (kN/m^2) due to the external load at node i in the maximum load condition as specified in **4.4.2.1-1** (2) Nodal shear forces acting on web frames are to be in accordance with the following **(a)** and **(b)**: (a) The shear force $F_{i,i-1}$ (*kN*) acting on a web frame with node i being its upper end (the shear force at the upper end of the web frame) is to be taken as follows: $F_{i,i-1} = -\frac{1}{\ell_i}\left(M_{i,i-1} + M_{i-1,i}\right) - \frac{\ell_i}{6}\left(2S_iP_i + S_{i-1}P_{i-1}\right) \quad (1 \leq i \leq n)$ (b) The shear force $F_{i,i+1}$ (*kN*) acting on a web frame with node i being its lower end (the shear force at the lower end of the web frame) is to be taken as follows: i) For $0 \leq i \leq n-1$	

Amended	Original	Remarks
	$F_{i,i+1} = -\frac{1}{\ell_{i+1}}\left(M_{i+1,i} + M_{i,i+1}\right)$ $+\frac{\ell_{i+1}}{6}\left(S_{i+1}P_{i+1} + 2S_iP_i\right)$ ii) For $i = 0$ $F_{0,1} = -\frac{1}{\ell_1}\left(M_{1,0} + M_{0,1}\right)$ $+\frac{\ell_1}{6}\left(S_1P_1 + 2S_1P_0\right)$ $M_{1,0}$, $M_{0,1}$, $M_{i+1,i}$, $M_{i,i+1}$, ℓ_i, S_i and P_i: As specified in **(1)** above	
(Deleted)	Fig. 7.2.8-2Moment Acting on a Web Frame at Node *i* 	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Transferred to Part 2-6 due to composition review
(Deleted)	**7.2.8.3 Web Frames Supporting Cantilever Beams** The scantlings of web frames are to be in accordance	Amendment (3) For clarification of the rules, reviews the

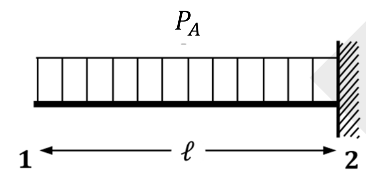
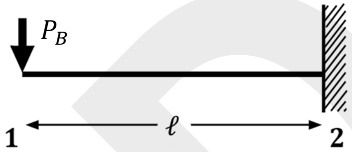
Amended	Original	Remarks
	with the requirements in **7.2.3** to **7.2.5**. The bending moments and shear forces to be considered in applying **7.2.3** to **7.2.5** are to be in accordance with the following **(1)** or **(2)** as applicable depending on the number of decks: (1) Web frames in double-deck ships (*See* **Fig. 7.2.8-3**) (a) Web frame in the first tier from the inner bottom plating: i) Moment $0.6\|m_1\|$ ii) Shear force $0.3\left\|\frac{m_1}{\ell_1}\right\|$ (b) Web frame in the second tier: i) Moment $\max(\|0.25m_2+0.5m_1\|,\|m_2\|)$ ii) Shear force $\left\|\frac{0.5m_1-0.75m_2}{\ell_2}\right\|$ (2) Web frames in multi-deck ships with three or more decks: i) Moment $\|m_i\|$ ii) Shear force $\frac{3\|m_i\|}{2\ell_i}$ m_i: Moment due to the deck load acting on the web frames at the *i*-th tier deck to be taken as follows: $m_i = M_{di} + M_{hi}$ M_{di}: Moment (*kN-m*) due to the cargo loaded on the *i*-th tier deck or wave loads to be obtained from	composition of the requirements related to simple girders. ・Transferred to 7.2.2.2 due to composition review

Amended	Original	Remarks
(Deleted)	Assessment Model A shown in **Table 7.2.9-1**. However, ℓ is to be used for calculation instead of ~~ℓ_{bdg}.~~ M_{hi}: Moment (kN-m) due to the cargo loaded on the i-th tier hatch cover or wave loads to be obtained from Assessment Model B shown in **Table 7.2.9-1**. However, ℓ is to be used for calculation instead of ~~ℓ_{bdg}.~~ ℓ_i: Horizontal distance (m) from the inboard end of the supported deck transverse to the inner surface of the web frame Fig. 7.2.8-3 Web Frames in a Double-Deck Ship  	

Amended	Original	Remarks
(Deleted) **(Deleted)**	**7.2.9 Cantilever Beam Systems** **7.2.9.1 Cantilever Beams** Cantilever beams are to comply with the requirements in the following **(1)** to **(5)**: (1) The depth of the cantilever beams measured at the toe of the end brackets is to be not less than $1/5$ of the horizontal distance from the inboard end of the cantilever beam to the toe of the end bracket. (2) The depth of the cantilever beams may be gradually tapered down towards their inboard end from the toe of the end brackets where it may be reduced to about $1/2$ of the depth at the toe of the end bracket. (3) The section modulus at the end of the cantilever beams is to be in accordance with the requirements in **7.2.3**. The bending moment to be considered in applying **7.2.3** is to be not less than that obtained from the following formula: $M = M_d + M_h$ M_d: Moment (*kN-m*) due to deck cargo or wave loads to be obtained from Assessment Model A shown in **Table 7.2.9-1**. M_h: Moment (*kN-m*) due to the cargo loaded on the hatch cover or wave loads to be obtained from Assessment Model B shown in **Table 7.2.9-1**. (4) The sectional area of face plates may be gradually tapered down from the toe of the end brackets toward the inboard end of the cantilever beams where it may be reduced to 0.60 times that at the toe of the end	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Transferred to 7.2.6.1 and Table7.2.2-1 due to composition review

Amended	Original	Remarks
	bracket. (5) The web thickness of the cantilever beams at any point is to be in accordance with the requirements in **7.2.4**. The shear force to be considered in applying **7.2.4** is to be not less than that obtained from the following formula: $F = F_d + F_h$ F_d: Shear force (kN) due to deck cargo or wave loads to be obtained from Assessment Model A shown in **Table 7.2.9-1**. F_h: Moment (kN) due to the cargo loaded on the hatch cover or wave loads to be obtained from Assessment Model B shown in **Table 7.2.9-1**.	

~~Table 7.2.9-1 Moments and Shear Forces~~

	~~Assessment model~~	~~M~~	~~F~~
~~A~~		$\cancel{M_2 = \frac{SP_A \ell_{bdg}{}^2}{2}}$	$\cancel{F_2 = SP_A \ell_{shr}}$
~~B~~		$\cancel{M_2 = P_B \ell_{bdg}}$	$\cancel{F_2 = P_B}$

~~S: Spacing of cantilever beam (m)~~
~~ℓ: Full length (m) of the cantilever beam~~
~~ℓ_{bdg}: Effective bending span (m) of the cantilever beam as given in **3.6.1.4**~~
~~ℓ_{shr}: Effective shear span (m) of the cantilever beam as given in **3.6.1.5**~~
~~P_A: Average lateral load (kN/m^2) acting on the deck to be taken as the greater of the cargo load or green sea load in the maximum~~

Remarks:
Amendment (3)
For clarification of the rules, reviews the composition of the requirements related to simple girders.
・Transferred to Table7.2.1-2 and Table7.2.2-1 due to composition review

Amended	Original	Remarks

~~load condition specified in 4.4.2.2. These loads are to be calculated at the midpoint of the span ℓ.~~

~~P_B: Load (kN) due to the cargo loaded on the hatch cover to be taken as follows:~~

~~$P_B = SBP_h$~~

~~B: A half of the breadth (m) of the hatch in the deck supported by deck transverses~~

~~P_h: Load (kN/m^2) acting on the hatch cover as specified in 4.4.2.7 or 4.10.2.1~~

Amended:

7.3 Double Hull Structures

7.3.1.2 Double Hull Models

Double hull strength assessments are to be carried out using an appropriate double hull model selected from **Table 7.3.1-2** according to the presence or absence of double side skin structures and hopper tanks, the breadth of hatchways and the presence or absence of longitudinal bulkheads on the centreline.

Original:

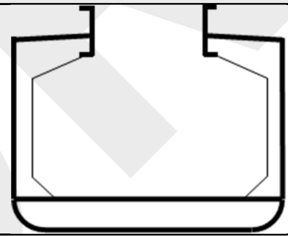
7.3 Double Hull Structures

7.3.1.2 Double Hull Models

Double hull strength assessments are to be carried out using an appropriate double hull model selected from **Table 7.3.1-2** according to the presence or absence of double side skin structures and hopper tanks, the size of hatchways and the presence or absence of longitudinal bulkheads on the centreline.

Remarks: Amendment (9) Clarifies some definitions and corrects typographical errors:

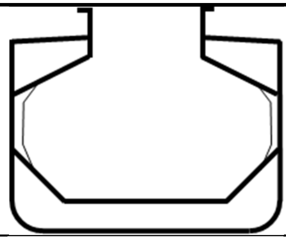
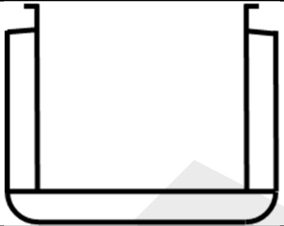
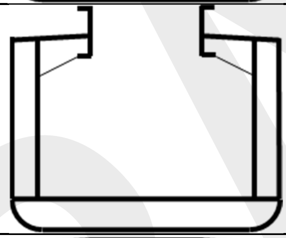
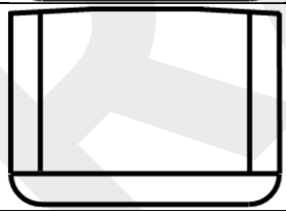
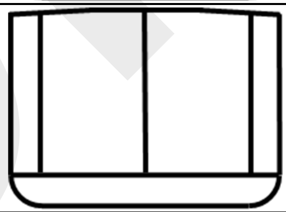
Table 7.3.1-2 Classification of Double Hull Models

Type of structure	Side structure	Other features	Typical transverse sectional view	Boundary condition at the left and right of the double bottom	Boundary condition at the upper end of the double side
S1	Single side skin structure	No bilge hopper tanks provided		Supported	

Remarks: Amendment (9) Clarifies some definitions and corrects typographical errors:

When selecting the D1/D2 types, clarify how to measure the breadth of the hatchway where the ship's side structure changes from a double to a single in the middle of its height.

Amended	Original	Remarks
	(see table below)	

S2	Single side skin structure	Bilge hopper tanks provided		Rotational spring support	
D1	Double side skin structure	Hatchway greater than $0.7B$ in breadth[(1)]		Rotational spring support	Upper end: Free
D2	Double side skin structure	Hatchway $0.7B$ and under in breadth[(1)]		Rotational spring support	Upper end: Supported
D3	Double side skin structure	No hatchway provided		Rotational spring support	Upper end: Fixed
D4	Double side skin structure	No hatchway provided C.L. BHD provided		Left and right ends: Rotational spring support C.L.: Supported or fixed	Upper end: Fixed

Notes:
(1) When selecting the D1/D2 types, breadth of hatchways is to be taken as the distance up to the upper end of the double side.

Amended	Original	Remarks
7.3.1.5 Idealisation of Loads **1** The pressures at the load calculation points (*LCP*) shown in **Table 7.3.1-1** are to be used according to the type of members.	**7.3.1.5 Idealisation of Loads** **1** The pressures at the load calculation points (*LCP*) shown in **Table 7.3.1-1** are to be used according to the type of members.	

Table 7.3.1-1 Load Calculation Points

LCP coordinate	Bottom shell	Inner bottom plating	Side shell	Longitudinal bulkhead
x coordinate	$x_{DH} = 0$	$x_{DH} = 0$	$x_{DH} = 0$	$x_{DH} = 0$
y coordinate	$y_{DH} = 0$	$y_{DH} = 0$	~~Portside: $y_{DH} = 0.5B_{DB} + D_{DS}$~~ ~~Starboard side: $y_{DH} = -0.5B_{DB} - D_{DS}$~~ $y = y_{SS}$	~~Portside: $y = 0.5B_{DB}$~~ ~~Starboard side: $y = -0.5B_{DB}$~~ $y = y_{LB}$
z coordinate	$z = 0$	$z = D_{DB}$	$z_{DH} = -0.5B_{DS}$	$z_{DH} = -0.5B_{DS}$
(Notes) y_{SS}: y-coordinate of the side shell corresponding to the z-coordinate at the $z_{DH} = 0$ point. y_{LB}: y-coordinate of the longitudinal bulkhead corresponding to the z-coordinate at the $z_{DH} = 0$ point.				
Either of the load calculation point of port or starboard side of the longitudinal bulkhead may be used for the assessment of double bottom.				

Remarks:

Amendment (9)
Clarifies some definitions and corrects typographical errors:

The definition of the y-coordinate for the load calculation points on the side shell and the longitudinal bulkhead will be amended to accommodate ships with bilge hoppers or steps with double-hull structuers.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr>
<td>

7.3.2 Requirements for Scantlings

7.3.2.1 Bending Strength

In each assessment condition, the thickness of plating of double hull is to be in accordance with the following requirements **(1)** and **(2)**. The thickness of plating according to these requirements is to be uniform at any point in the double hull under assessment.

(1) The thickness of bottom shell plating and inner bottom plating constituting a double bottom and that of side shell plating and side longitudinal bulkheads constituting a double side are to be not less than that obtained from the following formula:

$$t_{n50} = \frac{C_{Safety}}{C_{cnd}}\frac{(1-\nu^2)}{D_{DH}} \times max\left(\frac{|M_X|}{\gamma_{stf-x}C_{bi-x}(\sigma_{all}-\sigma_{BM})},\frac{|M_Y|}{\gamma_{stf-y}C_{bi-y}\sigma_{all}}\right) \text{(mm)}$$

C_{Safety}: Safety factor to be taken as 1.<u>1</u>

(Omitted)

(2) Notwithstanding **(1)** above, where any of the requirements specified in **2.4.1.2-6(1)** and **2.4.1.3-1(1)** for the spacing of girders and floors in double bottom is not satisfied, the thickness of the bottom shell plating and inner bottom plating constituting a double bottom is to be not less than that obtained from the following formula. Similarly, if any of the requirements specified in **2.4.2.1(1)** and **2.4.2.2(1)** for the spacing of side transverses and side stringers is not satisfied, the thickness of the side shell plating and longitudinal bulkheads constituting a double side is to be not less than that obtained from the following

</td>
<td>

7.3.2 Requirements for Scantlings

7.3.2.1 Bending Strength

In each assessment condition, the thickness of plating of double hull is to be in accordance with the following requirements **(1)** and **(2)**. The thickness of plating according to these requirements is to be uniform at any point in the double hull under assessment.

(1) The thickness of bottom shell plating and inner bottom plating constituting a double bottom and that of side shell plating and side longitudinal bulkheads constituting a double side are to be not less than that obtained from the following formula:

$$t_{n50} = \frac{C_{Safety}}{C_{cnd}}\frac{(1-\nu^2)}{D_{DH}} \times max\left(\frac{|M_X|}{\gamma_{stf-x}C_{bi-x}(\sigma_{all}-\sigma_{BM})},\frac{|M_Y|}{\gamma_{stf-y}C_{bi-y}\sigma_{all}}\right) \text{(mm)}$$

C_{Safety}: Safety factor to be taken as 1.<u>2</u>

(Omitted)

(2) Notwithstanding **(1)** above, where any of the requirements specified in **2.4.1.2-6(1)** and **2.4.1.3-1(1)** for the spacing of girders and floors in double bottom is not satisfied, the thickness of the bottom shell plating and inner bottom plating constituting a double bottom is to be not less than that obtained from the following formula. Similarly, if any of the requirements specified in **2.4.2.1(1)** and **2.4.2.2(1)** for the spacing of side transverses and side stringers is not satisfied, the thickness of the side shell plating and longitudinal bulkheads constituting a double side is to be not less than that obtained from the following

</td>
<td>

Amendment (8)
Assessments for double hull Structures

The safety factor is amended based on the feedback from trial calculation results, balancing it with the safety factor from the old Part C, the evaluation model which are considered to be more in line with reality in Part C of the Rules and Guidance for the Survey and Construction of Steel Ships.

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

Amended	Original	Remarks
formula. However, $C_{EX} = 1.0$ where no longitudinal girders are provided, while $C_{EY} = 1.0$ where no transverse girders are provided. $t_{n50} = \frac{C_{Safety}}{C_{cnd}} \frac{(1-\nu^2)}{D_{DH}} \times \max\left(\frac{1}{\min(C_{bi-x}, C_{EX})} \cdot \frac{\lvert M_X \rvert}{\gamma_{stf-x}(\sigma_{all} - \sigma_{BM})}, \frac{1}{\min(C_{bi-y}, C_{EY})} \cdot \frac{\lvert M_Y \rvert}{\gamma_{stf-y}\sigma_{all}}\right)$ (mm) C_{Safety}: Safety factor to be taken as 1.<u>1</u> γ_{stf-x}, γ_{stf-y}, C_{bi-x}, C_{bi-y}, M_X, M_Y and σ_{BM}: As specified in **(1)** above **7.3.2.2 Shear Strength** In each assessment condition, the web thickness of girder members in double hull is to be not less than that obtained from the following formula: $t_{n50} = \frac{C_{Safety}}{C_{cnd}} \frac{\lvert F \rvert}{D_{sh}\tau_{all}}$ (mm) C_{Safety}: Safety factor to be taken as 1.<u>1</u> F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2**	formula. However, $C_{EX} = 1.0$ where no longitudinal girders are provided, while $C_{EY} = 1.0$ where no transverse girders are provided. $t_{n50} = \frac{C_{Safety}}{C_{cnd}} \frac{(1-\nu^2)}{D_{DH}} \times \max\left(\frac{1}{\min(C_{bi-x}, C_{EX})} \cdot \frac{\lvert M_X \rvert}{\gamma_{stf-x}(\sigma_{all} - \sigma_{BM})}, \frac{1}{\min(C_{bi-y}, C_{EY})} \cdot \frac{\lvert M_Y \rvert}{\gamma_{stf-y}\sigma_{all}}\right)$ (mm) C_{Safety}: Safety factor to be taken as 1.<u>2</u> γ_{stf-x}, γ_{stf-y}, C_{bi-x}, C_{bi-y}, M_X, M_Y and σ_{BM}: As specified in **(1)** above **7.3.2.2 Shear Strength** In each assessment condition, the web thickness of girder members in double hull is to be not less than that obtained from the following formula: $t_{n50} = \frac{C_{Safety}}{C_{cnd}} \frac{\lvert F \rvert}{D_{sh}\tau_{all}}$ (mm) C_{Safety}: Safety factor to be taken as 1.<u>2</u> F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2**	Amendment (8) Assessments for double hull Structures The safety factor is amended based on the feedback from trial calculation results, balancing it with the safety factor from the old Part C, the evaluation model which are considered to be more in line with reality in Part C of the Rules and Guidance for the Survey and Construction of Steel Ships.

Amended	Original	Remarks
7.3.2.3 Shear Buckling Strength In each assessment condition, the web thickness of girder members in double hull is to be not less than that obtained from the following formulae **(1)** to **(3)**: (1) For girder webs with no opening $t=\sqrt[3]{C_{safety}\dfrac{\lvert F\rvert b^2}{C_{cnd}D_w}\dfrac{12(1-\nu^2)}{K_\tau \pi^2 E}}\ (mm)$ C_{Safety}: Safety factor to be taken as 1.1 F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2** (2) For girder webs with an opening reinforced by stiffeners in the girder span direction $t=\sqrt[3]{C_{safety}\dfrac{\lvert F\rvert b^2}{C_{cnd}(D_w-D_0)}\dfrac{12(1-\nu^2)}{K_\tau \pi^2 E}}\ (mm)$ F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2** (3) For girder webs with an opening (an unreinforced opening) $t=\sqrt[3]{C_{safety}\dfrac{\lvert F\rvert b^2}{C_{cnd}D_w}\dfrac{12(1-\nu^2)}{\gamma_{a_0} K_\tau \pi^2 E}}\ (mm)$ C_{Safety}: Safety factor to be taken as 1.1 F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2** γ_{a_0}: Coefficient of the effect of an opening, such as a manhole, on shear buckling to be taken as follows:	**7.3.2.3 Shear Buckling Strength** In each assessment condition, the web thickness of girder members in double hull is to be not less than that obtained from the following formulae **(1)** to **(3)**: (1) For girder webs with no opening $t=\sqrt[3]{C_{safety}\dfrac{\lvert F\rvert b^2}{C_{cnd}D_w}\dfrac{12(1-\nu^2)}{K_\tau \pi^2 E}}\ (mm)$ C_{Safety}: Safety factor to be taken as 1.2 F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2** (2) For girder webs with an opening reinforced by stiffeners in the girder span direction $t=\sqrt[3]{C_{safety}\dfrac{\lvert F\rvert b^2}{C_{cnd}(D_w-D_0)}\dfrac{12(1-\nu^2)}{K_\tau \pi^2 E}}\ (mm)$ F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2** (3) For girder webs with an opening (an unreinforced opening) $t=\sqrt[3]{C_{safety}\dfrac{\lvert F\rvert b^2}{C_{cnd}D_w}\dfrac{12(1-\nu^2)}{\gamma_{a_0} K_\tau \pi^2 E}}\ (mm)$ C_{Safety}: Safety factor to be taken as 1.2 F: Shear force (kN) of the girder in double hull under assessment as given in **7.3.3.2** γ_{a_0}: Coefficient of the effect of an opening, such as a manhole, on shear buckling to be taken as follows:	Amendment (8) Assessments for double hull Structures The safety factor is amended based on the feedback from trial calculation results, balancing it with the safety factor from the old Part C, the evaluation model which are considered to be more in line with reality in Part C of the Rules and Guidance for the Survey and Construction of Steel Ships.

Amended	Original	Remarks
$$\gamma_{a_0} = \left(1 + \frac{D_0}{2a} \times 10^3\right)^{-2}$$ **Chapter 10 ADDITIONAL STRUCTURAL REQUIREMENTS** **10.4 Deck Structure** **10.4.1 Camber of Weather Deck*** **10.4.1.1** In general, appropriate camber is to be provided in the weather deck.	$$\gamma_{a_0} = \left(1 + \frac{D_0}{2a} \times 10^3\right)^{-2}$$ **Chapter 10 ADDITIONAL STRUCTURAL REQUIREMENTS** **10.4 Deck Structure** **10.4.1 Camber of Weather Deck*** **10.4.1.1** Appropriate camber is to be provided in the weather deck.	Amendment (9) Although the installation of camber on weather decks is generally recommended, "In general" is added because camber may not be installed in some cases.

Amended	Original	Remarks
10.6 Strengthened Bottom Forward **10.6.2 General Ships (Ship other than those with L_C of not more than 150 m, $V/\sqrt{L_C}$ of not less than 1.4 and C_B of not more than 0.7)** **10.6.2.2 Structural Arrangement** The structural arrangement is to be in accordance with the following **(1)** and **(2)**. (1) (Omitted) (2) Where the structural arrangement of the strengthened bottom forward is different from the structural arrangement specified in **(1)** above, the following **(a)** to **(c)** are to be applied: (a) (Omitted) (b) (Omitted) (c) (Deleted)	**10.6 Strengthened Bottom Forward** **10.6.2 General Ships (Ship other than those with L_C of not more than 150 m, $V/\sqrt{L_C}$ of not less than 1.4 and C_B of not more than 0.7)** **10.6.2.2 Structural Arrangement** The structural arrangement is to be in accordance with the following **(1)** and **(2)**. (1) (Omitted) (2) Where the structural arrangement of the strengthened bottom forward is different from the structural arrangement specified in **(1)** above, the following **(a)** to **(c)** are to be applied: (a) (Omitted) (b) (Omitted) (c) The calculation of the section modulus of bottom longitudinals and longitudinal shell stiffeners is to be as specified in **10.6.2.3-1**. The slamming impact pressure P are to be P_{SL4C} specified in **4.8.2.2-2.**	Amendment (9) Clarifies some definitions and corrects typographical errors Clarifies the application of bottom slamming impact pressure The requirements remain unchanged.
10.6.2.3 Shell Longitudinals **1** In ships having a bow draught in the ballast condition of not more than $0.025L_{C230}$, the section modulus of the side longitudinal and bottom longitudinal in way of the strengthened bottom forward is to be not less than that given by the following formula. $Z = 0.44KP\lambda\ell^2$ (cm^3) K: Material factor ℓ: Spacing (m) of floors	**10.6.2.3 Shell Longitudinals** **1** In ships having a bow draught in the ballast condition of not more than $0.025L_{C230}$, the section modulus of the side longitudinal and bottom longitudinal in way of the strengthened bottom forward is to be not less than that given by the following formula. $Z = 0.44KP\lambda\ell^2$ (cm^3) K: Material factor ℓ: Spacing (m) of floors	In 10.6.2.3-2 and 10.6.2.4, 10.6.2.3-1 is referred to as the loads to be used in strength assessment, so the application of the loads is collectively specified in 10.6.2.3-1. In 4.8.2.2, loads from P_{SL1} to P_{SL4} are

Amended	Original	Remarks
λ: 0.774ℓ. However, where the spacing of the longitudinals is not more than 0.774ℓ, the spacing (*m*) of that is to be used. P: Slamming impact pressure (*kN/m*^{2}) as specified in **4.8.2.2.** **2** (Omitted)	λ: 0.774ℓ. However, where the spacing of the longitudinals is not more than 0.774ℓ, the spacing (m) of that is to be used. P: Slamming impact pressure (*kN/m*^{2}) as per the following: Ships other than noted below: Bottom slamming pressure P_{SL1} (*kN/m*^{2}), as specified in **4.8.2.2.** Ships having L_C of not less than 150 *m* and C_B of not less than 0.7: Bottom slamming pressure P_{SL3} (*kN/m*^{2}), as specified in **4.8.2.2.** **2** (Omitted)	specified.
10.9 Tank Structures for Sloshing	**10.9 Tank Structures for Sloshing**	
10.9.2 Plates **10.9.2.1** The thickness of plates on which sloshing loads act is to be not less than the value obtained from the following formula. $$t = \frac{b}{2}\sqrt{\frac{P_{slh} \times 10^{-3}}{1.15 C_a \sigma_Y}}\ (mm)$$ σ_Y: Specified minimum yield stress (*N/mm*^{2}) b: Length (*mm*) of the shorter side of the plate panel. However, it is to be taken as breadth of flange b_f (*mm*) or breadth of web b_w(*mm*) in the case of corrugated bulkheads (*See* **Fig. 10.9.2-1**) P_{slh}: Equivalent pressure (*kN/m*^{2}) for the plate panels,	**10.9.2 Plates** **10.9.2.1** The thickness of plates on which sloshing loads act is to be not less than the value obtained from the following formula. $$t = \frac{b}{2}\sqrt{\frac{P_{slh} \times 10^{-3}}{1.15 C_a \sigma_Y}}\ (mm)$$ σ_Y: Specified minimum yield stress (*N/mm*^{2}) b: Length (*mm*) of the shorter side of the plate panel. However, it is to be taken as breadth of flange b_f (*mm*) or breadth of web b_w(*mm*) in the case of corrugated bulkheads (*See* **Fig. 10.9.2-1**) a: Length (*mm*) of the longer side of the plate panel.	Amendment (5) Revises the scope of application for correction coefficient for the aspect ratio in the local strength calculation formula of plate members. Delete the definition of a and α since they are

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
as specified in **Table 10.9.2-1** C_a: Coefficient of axial force effect as specified in **Table 6.3.2-2**. However, it is taken as 1.0 for corrugated bulkheads. σ_{BM}: Stress (N/mm^2) due to hull girder bending, as specified in **10.9.1.4**	$\underline{\alpha\text{:}}$ <u>Aspect ratio, to be taken as</u> $\underline{a/b}$<u>.</u> P_{slh}: Equivalent pressure (kN/m^2) for the plate panels, as specified in **Table 10.9.2-1** C_a: Coefficient of axial force effect as specified in **Table 6.3.2-2**<u> when </u>$\underline{\alpha \geq 2}$<u> or **Table 6.3.2-3** when </u>$\underline{\alpha < 2}$. However, it is taken as 1.0 for corrugated bulkheads. σ_{BM}: Stress (N/mm^2) due to hull girder bending, as specified in **10.9.1.4**	no longer used in this formula. Correct the references because the tables are merged.

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part C HULL CONSTRUCTION AND EQUIPMENT** **Part 1 GENERAL HULL REQUIREMENTS** **C7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES** **C7.2 Simple Girders** **C7.2.2 Strength Assessment** **C7.2.2.1 General** In applying **7.2.2.1-1, Part 1, Part C of the Rules** to web frames, moments and shear forces are to be in accordance with **Table C7.2.2-1**.	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part C HULL CONSTRUCTION AND EQUIPMENT** **Part 1 GENERAL HULL REQUIREMENTS** **C7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES** **C7.2 Simple Girders** **(Newly Added)**	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. ・Newly adds the list of applications of web frames

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table C7.2.2-1 Moments and Shear Forces to be Considered in the Assessment of Web Frames

	Single-deck ships	Double-deck ships	Multi-deck ships with three or more decks
Web frames subject to external pressure	**7.2.2.1, Part 1, Part C of the Rules**	**7.2.2.1, Part 1, Part C of the Rules**	**7.2.2.1, Part 1, Part C of the Rules or 7.2.2.1, Part 2-6, Part C of the Rules**
Web frames supporting cantilever beams	**7.2.2.2(1), Part 1, Part C of the Rules**	Double-deck ships with the first layers being double side and the second layers being single side: **7.2.2.2(1), Part 1, Part C of the Rules** Double-deck ships with the first and second layers being single side: **7.2.2.2(2), Part 1, Part C of the Rules**	**7.2.2.2(1), Part 1, Part C of the Rules**

Remarks:
・Newly adds the list of applications of web frames

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>Appendix C1 REFERENCE DATA FOR DESIGN

<u>1.4 Simplified Method for Deriving Stress due to Hull Girder Loads</u>

<u>1.4.1 General</u>
<u>1 This 1.4 is specified for the purpose of deriving the stresses due to the hull girder loads required for the local strength assessment specified in Chapter 6 and the primary supporting structure strength assessment specified in Chapter 7 using a simplified method in the initial study of shipbuilding design and to determine the initial scantlings.</u>
<u>2 The stress due to the hull girder load derived in this 1.4 corresponds to the maximum load condition.</u>
<u>3 The stress due to the hull girder load derived in accordance with 6.2.3.1, 7.2.3.1 and 7.3.2.1 is to be used for deciding the final scantlings.</u>

<u>1.4.2 Stress due to Hull Girder Loads</u>
<u>A simplified method for deriving the stress due to the hull girder load is given in Table 1.</u></td><td>Appendix C1 REFERENCE DATA FOR DESIGN

(Newly added)</td><td>Amendment (6)
Simplified method for deriving stress due to hull girder loads

For the purpose of reducing the number of work hours, specifies a simplified method for deriving stress due to hull girder loads as a reference in the early consideration of ship design.</td></tr>
</table>

Amended	Original	Remarks

Table 1 Simplified Method for Deriving Stress due to Hull Girder Loads

Design load scenario	Load Condition	Stress due to hull girder loads	β	Wave and still water vertical bending moments to be considered M_W and M_S
Maximum load condition	HF[(1)] or HM[(2)]	$\sigma_{BM} = \sigma_{BM-HF}$ where $\sigma_{BM-HF} = \begin{cases} \dfrac{190}{K} f_D \dfrac{z - z_n}{z_D - z_n} & for\ z \geq z_n \\ \left\lvert \dfrac{190}{K} f_B \dfrac{z - z_n}{z_B - z_n} \right\rvert & for\ z < z_n \end{cases}$	—	—
	RP[(1)] or BP[(2)]	$\sigma_{BM} = \max(\beta\sigma_{BM-HF} + \lvert 0.35 C_{MH} y \rvert, \lvert C_{MH} y \rvert)$ where $C_{MH} = \min\left(\dfrac{118}{B_{x2}}, 5.9\right)$	$\dfrac{0.35M_W + M_S}{M_W + M_S}$	Wave and still water vertical bending moments for hogging and sagging load cases

(Notes)
f_D and f_B: Strength margins relative to the allowable yield strength of vertical bending strength at deck and bottom positions, as assumed by the designer; for example, a margin of 10 % is expressed as 0.9.
z_n: Vertical distance from the top of the keel to the horizontal neutral axis, as assumed by the designer

(Remarks)
(1) Load condition used for the local strength assessment specified in **Chapter 6** and the assessment of simple girders specified in **Chapter 7**.
(2) Equivalent design wave used for the assessment of double hull structures specified in **Chapter 7**.

Amendment (6)
Simplified method for deriving stress due to hull girder loads

Amended	Original	Remarks
Part 2-1 CONTAINER CARRIERS	**Part 2-1 CONTAINER CARRIERS**	
Chapter 4 LOADS	**Chapter 4 LOADS**	
4.4 Loads to be Considered in Strength of Primary Supporting Structures	**4.4 Loads to be Considered in Strength of Primary Supporting Structures**	
4.4.2 Maximum Load Condition	**4.4.2 Maximum Load Condition**	
4.4.2.2 External Pressure For the requirements of double hull structures, the hydrostatic pressure at the draught and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.4.2-2** are to be considered.	**4.4.2.2 External Pressure** For the requirements of double hull structures, the hydrostatic pressure at the draught and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.4.2-2** are to be considered.	

Table 4.4.2-2 External and Internal Pressure to be Considered

Structures to be assessed		$P_{DB}(kN/m^2)$ (1) (2)	$P_{DS}(kN/m^2)$ (1) (2)
Double bottom	$S1$(3)	$P_{exs}+P_{exw}-P_{in\_s1}$	$P_{exs}+P_{exw}$
Double side	$S2$	$P_{exs}+P_{exw}-P_{in\_s1}$	$P_{exs}+P_{exw}$
	$S3$	$P_{exs}+P_{exw}-P_{in\_s3}$	$P_{exs}+P_{exw}$

Notes:

P_{exs}, P_{exw} : Hydrostatic and Hydrodynamic pressures (kN/m^2) acting on bottom shell in the case of P_{DB}, and the values acting on side shell in the case of P_{DS}. Each value is to be calculated in accordance with **4.6.2.4, Part 1**.

P_{in_s1}, P_{in_s3} : In general, ~~T~~the values considering the effect of container cargo (kN/m^2)~~, as given by the following formula:~~ is to be taken as 0: ~~however, said values are to be taken as 0 when the number of bays in the cargo hold is only one.~~ however, when there are no partial bulkheads and there are two or more bays between watertight bulkheads in the cargo hold under assessment, or when there are partial bulkheads and there are two or more bays within the range from the watertight bulkhead to

Amendment (9)
Clarifies some definitions and corrects typographical errors

Clarifies the cases where container cargo loads can be taken into account.

Amended	Original	Remarks
the partial bulkhead in the cargo hold under assessment, such values are to be given by the following formula. $P_{in\_s1} = 0.15\rho g T_{SC}$ $P_{in\_s3} = 0.3\rho g T_{SC}$ (1) Load calculation points are to be in accordance with **7.3.1.5, Part 1** for all loading conditions. (2) When calculating loads, $T_{LC} = T_{SC}$. (3) P_{exw} is to be not less than the value of P_{exw} for HM-2 at x_G, which is the X coordinate (m) at the centre of gravity of the ship.		Amendment (8) Assessments for double hull Structures Specifies equivalent design wave HM-2 value of P_{exw} at the ship's centre of gravity position x_G as the minimum value to calculate the equivalent design wave HM value of P_{exw} as a safer side evaluation load in the condition where external pressure becomes dominant.

Amended	Original	Remarks
Chapter 5 LONGITUDINAL STRENGTH **5.1 General** **5.1.4 Hull Girder Stress** **5.1.4.1 Vertical Bending Moment** **1** Vertical bending moment σ_{HG} (N/mm^2) is to be obtained from the following formula: $$\sigma_{HG}=\frac{\gamma_S M_S+\gamma_W M_W}{I_y}(z-z_n)\times 10^5$$ γ_S, γ_W: Partial safety factors, to be taken as 1.0 M_S, M_W: <u>Vertical still water bending moment and vertical wave bending moment (*kN-m*) under consideration, as specified in **Table 5.1.4-1**</u> I_y: Moment of inertia (cm^4) for the cross section under consideration z: Vertical coordinate of the location under consideration (m) z_n: Distance from the baseline to the horizontal neutral axis (m) **2** Vertical shear stress τ_{HG} (N/mm^2) is to be obtained from the following formula: $$\tau_{HG}=\frac{(\gamma_S Q_S+\gamma_W Q_W)q_v}{t}\times 10^3$$ γ_S, γ_W: As specified in **1** above. Q_S, Q_W: <u>Vertical still water shear force and vertical wave shear force (*kN-m*) under consideration, as specified in **Table 5.1.4-2**</u>	**Chapter 5 LONGITUDINAL STRENGTH** **5.1 General** **5.1.4 Hull Girder Stress** **5.1.4.1 Vertical Bending Moment** **1** Vertical bending moment σ_{HG} (N/mm^2) is to be obtained from the following formula: $$\sigma_{HG}=\frac{\gamma_S M_S+\gamma_W M_W}{I_y}(z-z_n)\times 10^5$$ γ_S, γ_W: Partial safety factors, to be taken as 1.0 M_S, M_W: <u>Vertical still water bending moment and vertical wave bending moment (*kN-m*) for the load cases "hogging" and "sagging" as specified in **4.2.2.5**</u> I_y: Moment of inertia (cm^4) for the cross section under consideration z: Vertical coordinate of the location under consideration (m) z_n: Distance from the baseline to the horizontal neutral axis (m) **2** Vertical shear stress τ_{HG} (N/mm^2) is to be obtained from the following formula: $$\tau_{HG}=\frac{(\gamma_S Q_S+\gamma_W Q_W)q_v}{t}\times 10^3$$ γ_S, γ_W: As specified in **1** above. Q_S, Q_W: <u>Vertical still water shear force and vertical wave shear force (*kN*) for the load cases "hogging" and "sagging" as specified in</u>	Amendment (4) Adds harbour condition to longitudinal strength assessment of container carriers. Modifies the definitions of vertical bending moment and shear force as in Part 1.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
q_v: Shear flow (*N/mm*) at any location when shear force acts along the cross section under consideration, to be determined according to the calculation method which are specified in **Annex 5.2, Part 1 "Calculation of Shear Flow"**. t: Thickness of plate considered (*mm*)	4.2.2.5 q_v: Shear flow (*N/mm*) at any location when shear force acts along the cross section under consideration, to be determined according to the calculation method which are specified in **Annex 5.2, Part 1 "CALCULATION OF SHEAR FLOW"**. t: Thickness of plate considered (*mm*)	

Table 5.1.4-1 Still Water and Wave Vertical Bending Moments to be Considered

Condition	M_S	M_W
Maximum load condition	Still water and wave vertical bending moment for the hogging and sagging load cases shown in **4.2.2.5**	
Harbour condition	M_{PT_max} or M_{PT_min}	0

Amendment (4)
Newly added as in Part 1

Table 5.1.4-2 Still Water and Wave Vertical Shear Forces to be Considered

Condition	Q_S	Q_W
Maximum load condition	Still water and wave vertical shear force for the hogging and sagging load cases shown in **4.2.2.5**	
Harbour condition	Q_{PT_max} or Q_{PT_min}	0

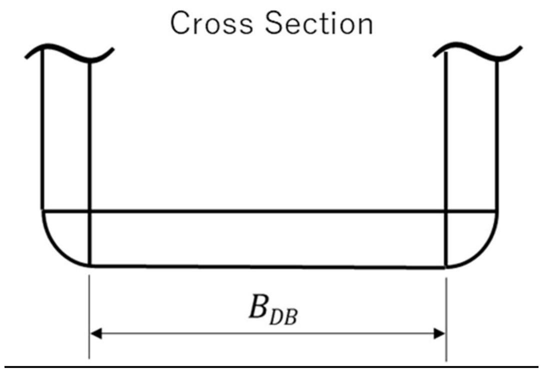
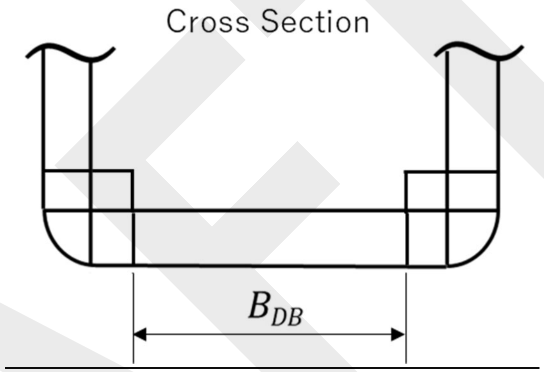
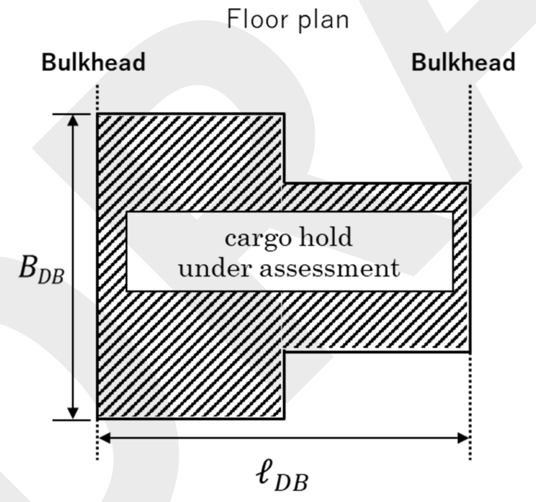
Amendment (4)
Newly added as in Part 1

Amended	Original	Remarks
5.2 Yield Strength Assessment	**5.2 Yield Strength Assessment**	
5.2.1 Bending Strength and Shear Strength	**5.2.1 Bending Strength and Shear Strength**	
5.2.1.1 Evaluation Area **1** For each of the load cases "hogging" and "sagging",	**5.2.1.1 Evaluation Area** **1** For each of the load cases "hogging" and "sagging" as	Amendment (4) Modifies the reference.

Amended	Original	Remarks
the equivalent hull girder stress σ_{eq} (N/mm^2) is to be in accordance with the following formula: $\sigma_{eq} < \sigma_{perm}$ $\sigma_{eq} = \sqrt{\sigma_x{}^2 + 3\tau^2}$ Where σ_x and τ are combination of hull girder stresses, to be taken as the following formulae according to the bending strength assessment and shear strength assessment, and where σ_{HG} and τ_{HG} are to be in accordance with **5.1.4.1**. $\sigma_x = \sigma_{HG}$ and $\tau = 0$, for bending strength assessment $\sigma_x = 0$ and $\tau = \tau_{HG}$, for shear strength assessment σ_{perm}: Permissible stress (N/mm^2), to be taken as $\sigma_{perm} = \dfrac{\sigma_Y}{\gamma_1\gamma_2}$ σ_Y: Specified minimum yield stress of the material (N/mm^2) γ_1: Partial safety factor for material, to be taken as $\gamma_1 = K\dfrac{\sigma_Y}{235}$ γ_2: Partial safety factor for load combinations and permissible stress, to be taken as follows: $\gamma_2 = 1.24$, for bending strength assessment in the maximum load condition $\gamma_2 = 1.46$, for bending strength assessment in the harbour condition $\gamma_2 = 1.13$, for shear strength assessment in the maximum load condition $\gamma_2 = 1.22$, for shear strength assessment in	defined in 4.2.2.5, the equivalent hull girder stress σ_{eq} (N/mm^2) is to be in accordance with the following formula: $\sigma_{eq} < \sigma_{perm}$ $\sigma_{eq} = \sqrt{\sigma_x{}^2 + 3\tau^2}$ Where σ_x and τ are combination of hull girder stresses, to be taken as the following formulae according to the bending strength assessment and shear strength assessment, and where σ_{HG} and τ_{HG} are to be in accordance with **5.1.4.1**. $\sigma_x = \sigma_{HG}$, $\tau = 0$, for bending strength assessment $\sigma_x = 0$, $\tau = \tau_{HG}$, for shear strength assessment σ_{perm}: Permissible stress (N/mm^2), to be taken as $\sigma_{perm} = \dfrac{\sigma_Y}{\gamma_1\gamma_2}$ σ_Y: Specified minimum yield stress of the material (N/mm^2) γ_1: Partial safety factor for material, to be taken as $\gamma_1 = K\dfrac{\sigma_Y}{235}$ γ_2: Partial safety factor for load combinations and permissible stress, to be taken as follows: $\gamma_2 = 1.24$, for bending strength assessment $\gamma_2 = 1.13$, for shear strength assessment	Adds the permissible stresses for yield strength in harbour condition as in Part 1

Amended	Original	Remarks
the harbour condition **2** (Omitted)	**2** (Omitted)	
Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES	**Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES**	
7.2 Double Hull Structure	**7.2 Double Hull Structure**	
7.2.1 General	**7.2.1 General**	
7.2.1.1 Application In applying **7.3, Part 1**, when there are partial bulkheads in the middle of the hold, the range in the cargo hold under assessment is to be from the partial bulkhead to the watertight bulkhead.	**7.2.1.1 Handling of Partial Bulkheads in the Hold** In applying **7.3, Part 1**, the length between the watertight bulkheads is to be assessed as the length of the cargo hold regardless of whether there are partial bulkheads in the middle of the hold. When assessing in consideration of the influence of the partial bulkheads in the middle of the hold, the strength is to be assessed by the cargo hold analysis specified in **Chapter 8**. Girders near partial bulkheads are to ensure sufficient strength to account for shear force effects.	Amendment (8) Assessments for double hull Structures Amended the evaluation range to extend from the partial bulkheads to the watertight bulkheads, as with the old Part C to evaluate the shear force effects in girders near partial bulkheads.
7.2.1.2 Idealisation of Structures -1. ℓ_{DB} is to be taken as the length of the double bottom in the cargo hold under assessment. -2. B_{DB} is to be taken as the breadth of the double bottom in the cargo hold under assessment as either the following **(1)** or **(2)**; however, if the breadth of the double bottom changes, B_{DB} is to be taken as the maximum breadth of double bottom	**(Newly added)**	Amendment (8) Assessments for double hull Structures Specified the definition for the length and breadth of the double

Amended	Original	Remarks
in the cargo hold under assessment. (See **Fig. 7.2.1-1**) (1) Where the cargo hold is not provided with steps, B_{DB} is to be taken as the distance between the connections of the inner bottom plating and longitudinal bulkheads. (2) Where the cargo hold is provided with steps, B_{DB} is to be taken as the distance between the steps.		bottom. Previously, B_{DB} (the breadth of the double bottom) was measured at the center of the cargo hold under evaluation: however, considering cases where B_{DB} varies within the cargo hold under evaluation, the method for measuring B_{DB} has been amended.

Amended	Original	Remarks
Fig. 7.2.1-1 Double Bottom Breadth <u>a) Without steps</u>  <u>b) With steps</u>  <u>c) When there are changes in the breadth of the double bottom of the cargo hold under assessment.</u> 		Add Figure to clarify the method for measuring the breadth of the double bottom B_{DB}.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr>
<td>
Chapter 8 STRENGTH ASSESSMENT BY CARGO HOLD ANALYSIS

8.5 Boundary Conditions and Loads Conditions

8.5.2 Load Conditions

8.5.2.2 Method of Applying Moments to the Structural Model
1 In applying 8.5.2.2-5, Part 1, the vertical bending moment and horizontal bending moment act on the target hold are to be adjusted, based on the boundary conditions specified in 8.5.1 and the value of the moment for each analysis case, in accordance with the following (1) to (3).
(1) (Omitted)
(2) The adjustment vertical bending moment M_{V-end}, and adjustment horizontal bending moment M_{H-end} (kN-m) are given by the following formulae.
$M_{V-end} = M_{V-targ} - M_{V-min}$ for $M_{V-targ} \geq 0$
$M_{V-end} = M_{V-targ} - M_{V-max}$ for $M_{V-targ} < 0$
$\underline{M_{H-end}} = M_{H-targ} - M_{H-min}$ for $M_{H-targ} \geq$
$\underline{M_{H-end}} = M_{H-targ} - M_{H-max}\ for\ M_{H-targ} < 0$
M_{V-targ}, M_{H-targ}: The maximum or minimum value in the target hold for the vertical bending moment and horizontal bending moment (kN-m) specified in Table 8.5.2-1
(3) (Omitted)
</td>
<td>
Chapter 8 STRENGTH ASSESSMENT BY CARGO HOLD ANALYSIS

8.5 Boundary Conditions and Loads Conditions

8.5.2 Load Conditions

8.5.2.2 Method of Applying Moments to the Structural Model
1 In applying 8.5.2.2-5, Part 1, the vertical bending moment and horizontal bending moment act on the target hold are to be adjusted, based on the boundary conditions specified in 8.5.1 and the value of the moment for each analysis case, in accordance with the following (1) to (3).
(1) (Omitted)
(2) The adjustment vertical bending moment M_{V-end}, and adjustment horizontal bending moment M_{H-end} (kN-m) are given by the following formulae.
$M_{V-end} = M_{V-targ} - M_{V-min}$ for $M_{V-targ} \geq 0$
$M_{V-end} = M_{V-targ} - M_{V-max}$ for $M_{V-targ} < 0$
$\underline{M_{V-end}} = M_{H-targ} - M_{H-min}$ for $M_{H-targ} \geq$
$\underline{M_{V-end}} = M_{H-targ} - M_{H-max}\ for\ M_{H-targ} < 0$
M_{V-targ}, M_{H-targ}: The maximum or minimum value in the target hold for the vertical bending moment and horizontal bending moment (kN-m) specified in Table 8.5.2-1
(3) (Omitted)
</td>
<td>
Amendment (9)
Clarifies some definitions and corrects typographical errors:

Corrects the typographical errors in adjustment moment
</td>
</tr>
</table>

Amended	Original	Remarks
Part 2-2 BOX-SHAPED BULK CARRIERS **Chapter 4 LOADS** **4.4 Loads to be Considered in Strength of Primary Supporting Structures** **4.4.2 Maximum Load Condition** **4.4.2.2 External Pressure** For the requirements of double hull, the hydrostatic pressure at the draught and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.4.2-2** are to be considered.	**Part 2-2 BOX-SHAPED BULK CARRIERS** **Chapter 4 LOADS** **4.4 Loads to be Considered in Strength of Primary Supporting Structures** **4.4.2 Maximum Load Condition** **4.4.2.2 External Pressure** For the requirements of double hull, the hydrostatic pressure at the draught and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.4.2-2** are to be considered.	

Table 4.4.2-2 External Pressure and Internal Pressure to be Considered

Structures to be assessed		P_{DB} (kN/m^2) (1)(2)	P_{DS} (kN/m^2) (1)(2)
Double bottom	$S1$(3)	$P_{exs}+P_{exw}$	$P_{exs}+P_{exw}$
	$S2$	$P_{exs}+P_{exw}-(P_{bs}+P_{bd})$	$P_{exs}+P_{exw}-(P_{bs}+P_{bd})$
	$S3$	$P_{exs}+P_{exw}-(P_{bs}+P_{bd})$	$P_{exs}+P_{exw}-(P_{bs}+P_{bd})$
	$S4$(3)	$P_{exs}+P_{exw}$	$P_{exs}+P_{exw}$
	$S5$(3)	$P_{exs}+P_{exw}$	$P_{exs}+P_{exw}$
	$S6$	$P_{exs}+P_{exw}-(P_{ls1}+P_{ld1})-(P_{ls2}+P_{ld2})$	$P_{exs}+P_{exw}-(P_{ls1}+P_{ld1})-(P_{ls2}+P_{ld2})$

Remarks: Amendment (8) Assessments for double hull Structures

See the remark of amended-original requirements comparison table in Table 4.4.2-2, Chapter 4 , Part2-1.

Amended	Original	Remarks

Double side	*S7*	$P_{exs} + P_{exw} - (P_{bs} + P_{bd})$	$P_{exs} + P_{exw}$
	S8	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$

Notes:

P_{exs}, P_{exw} : Hydrostatic and Hydrodynamic pressure (kN/m^2) act on bottom shell in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.4, Part 1**.

P_{bs}, P_{bd} : Static and dynamic pressure due to dry bulk cargo (kN/m^2) act on inner bottom plating in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.6, Part 1**.

P_{ls1}, P_{ld1} : Static and dynamic pressure due to liquid cargo loaded in ballast hold (kN/m^2) act on inner bottom plating in case of P_{DB}. Those values act on longitudinal bulkheads in case of P_{DS}. Each value is calculated in accordance with the following formulae.

$P_{ls1} = P_{ls}$

$P_{ld1} = P_{ld}$

P_{ls}, P_{ld}: As specified in **4.6.2.5, Part 1**

P_{ls2}, P_{ld2} : Difference of the pressure in upward and downward direction due to liquid cargo loaded in ballast tanks in double bottom construction (kN/m^2) in case of P_{DB}. Those values act on longitudinal bulkheads in case of P_{DS}. Each value is calculated in accordance with the following formulae.

$P_{ls\_2} = P_{ls\_2a} - P_{ls\_2b}$

$P_{ld\_2} = P_{ld\_2a} - P_{ld\_2b}$

P_{ls_2a}, P_{ld_2a} : Static pressure P_{ls} and dynamic pressure P_{ld} act on bottom shell in case of P_{DB}. Those values act on side shell in case of P_{DS}.

P_{ls_2b}, P_{ld_2b} : Static pressure P_{ls} and dynamic pressure P_{ld} act on inner bottom plating in case of P_{DB}. Those values act on side shell in case of P_{DS}.

(1) The parameters (GM, z_G, K_{XX}) required to calculate loads is given by the follows.

*S*1, *S*2, *S*7, *S*8 : As given by the formulae in full load condition in **Table 4.3.2-1**.

*S*3 : As given by the formulae in ballast condition in **Table 4.3.2-1**. However, the value calculated based on the weight distribution according to the loading condition to be considered can be used

*S*4 : As given by the formulae in full load condition in **Table 4.3.2-1**. However, the value calculated based on the weight distribution according to the loading condition to be considered can be used

*S*5 : As given by the formulae in ballast condition in **Table 4.3.2-1**.

*S*6 : As given by the formulae in heavy ballast condition in **Table 4.3.2-1**.

(2) Load calculation points is in accordance with **7.3.1.5, Part 1** for all loading conditions. Where pipe ducts are arranged in the

Amended	Original	Remarks
ballast tanks in double bottom construction, in the case of $S6$, the value of y_{DH} in calculation points is taken as the location of the boundary between the pipe duct and ballast tank, and the pressure due to ballast water in the said tank is to be calculated. <u>(3) P_{exw} is to be not less than the value of P_{exw} for HM-2 at x_G, which is the X coordinate (m) at the centre of gravity of the ship.</u>		
Chapter 8 STRENGTH ASSESSMENT BY CARGO HOLD ANALYSIS **8.4 Boundary Conditions and Loads Conditions** **8.4.2 Load Conditions** **8.4.2.2 Method of Applying Moments to the Structural Model** In applying **8.5.2, Part 1**, the vertical bending moment and horizontal bending moment act on the target hold are to be adjusted in accordance with the following **(1)** to **(3)** based upon the boundary conditions specified in **8.4.1** and the value of the moment for each analysis case. (1) (Omitted) (2) The adjustment vertical bending moment M_{V-end}, and adjustment horizontal bending moment M_{H-end} (kN-m) are obtained by the following formulae. $M_{V-end} = M_{V-targ} - M_{V-max}$, for $M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-min}$, for $M_{V-targ} < 0$ $\underline{M_{H-end}} = M_{H-targ} - M_{H-max}$, for $M_{H-targ} \geq 0$ $\underline{M_{H-end}} = M_{H-targ} - M_{H-min}$, for $M_{H-targ} < 0$ M_{V-targ}, M_{H-targ} : The maximum or minimum value in the target hold of the vertical bending moment and horizontal bending moment (kN-m) specified in **Table 8.4.2-1**	**Chapter 8 STRENGTH ASSESSMENT BY CARGO HOLD ANALYSIS** **8.4 Boundary Conditions and Loads Conditions** **8.4.2 Load Conditions** **8.4.2.2 Method of Applying Moments to the Structural Model** In applying **8.5.2, Part 1**, the vertical bending moment and horizontal bending moment act on the target hold are to be adjusted in accordance with the following **(1)** to **(3)** based upon the boundary conditions specified in **8.4.1** and the value of the moment for each analysis case. (1) (Omitted) (2) The adjustment vertical bending moment M_{V-end}, and adjustment horizontal bending moment M_{H-end} (kN-m) are obtained by the following formulae. $M_{V-end} = M_{V-targ} - M_{V-max}$, for $M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-min}$, for $M_{V-targ} < 0$ $\underline{M_{V-end}} = M_{H-targ} - M_{H-max}$, for $M_{H-targ} \geq 0$ $\underline{M_{V-end}} = M_{H-targ} - M_{H-min}$, for $M_{H-targ} < 0$ M_{V-targ}, M_{H-targ} : The maximum or minimum value in the target hold of the vertical bending moment and horizontal bending moment (kN-m) specified in **Table 8.4.2-1**	Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the typographical errors in adjustment moment

Amended	Original	Remarks
(3) (Omitted)	(3) (Omitted)	
Part 2-5 GENERAL CARGO SHIPS AND REFRIGERATED CARGO SHIPS	**Part 2-5 GENERAL CARGO SHIPS AND REFRIGERATED CARGO SHIPS**	
Chapter 4 LOADS	**Chapter 4 LOADS**	
4.2 Loads to be Considered in Local Strength	**4.2 Loads to be Considered in Local Strength**	
4.2.2 Maximum Load Condition	**4.2.2 Maximum Load Condition**	
4.2.2.1 Lateral Loads **1** Cargo mass and cargo density are to comply with **Table 4.2.2-1** instead of **4.4.2.5 Part 1**; however, for ships in which the loading condition of high-density bulk cargo is included as a standard loading condition in the loading manual, **4.4.2.5 Part 1** is to be applied, and cargo mass and cargo density are to be appropriately considered . ~~**1**~~2 In applying **4.4.2, Part 1**, the parameters (GM, z_G, etc.) required to calculate dynamic pressure due to cargo are to be the values for the appropriate loading condition among all full load conditions in consideration of cargo mass and cargo density. However, the values in **Table 4.2.2-1** may be used if the parameters are not available. ~~**2**~~3 In applying **4.4.2, Part 1**, the parameters (GM, z_G, etc.) required to calculate dynamic pressure due to ballast water are to be the values for the ballast condition. The same parameters are to be applied where the dynamic pressure due	**4.2.2.1 Lateral Loads** **1** In applying **4.4.2, Part 1**, the parameters (GM, z_G, etc.) required to calculate dynamic pressure due to cargo are to be the values for the appropriate loading condition among all full load conditions in consideration of cargo mass and cargo density. However, the values in **Table 4.2.2-1** may be used if the parameters are not available. **2** In applying **4.4.2, Part 1**, the parameters (GM, z_G, etc.) required to calculate dynamic pressure due to ballast water are to be the values for the ballast condition. The same The same parameters are to be applied where the dynamic pressure due to liquid other than ballast water, such as the	Amendment (9) Clarifies some definitions and corrects typographical errors: Excludes the loading conditions which are generally not included in general cargoes: however, cargo, it is specified that 4.4.2.5 Part 1 is to be applied for vessels that plan to carry heavy.

Amended	Original	Remarks
to liquid other than ballast water, such as the pressure due to fuel oil tank, is considered. However, the values in **Table 4.2.2-1** may be used if the parameters are not available.	pressure due to fuel oil tank, is considered. However, the values in **Table 4.2.2-1** may be used if the parameters are not available.	

Table 4.2.2-1 Cargo Mass and Cargo Density

Dry bulk cargo mass M (t)	M_D
Cargo density ρ_C (t/m^3)	$\frac{M_D}{V_{Full}}$

Notes
M_D: Maximum permissible cargo mass (t) in the cargo hold under consideration
V_{Full}: Volume (m^3) of the hold (including its hatch coaming).

(Newly added)
Amendment (9)
Clarifies some definitions and corrects typographical errors:

Table 4.2.2-~~1~~2 Simplified Formulae for Parameters

Loading condition	Draught T_{LC} (m) amidships	Z coordinate z_G (m) of the centre of gravity of the ship	Metacentric height GM (m)	Radius of Gyration K_{xx} (m)
Full load condition	T_{SC}	$0.25\frac{B}{C_B}$	$\frac{T_{SC}}{2}+\frac{B^2}{T_{SC}C_B}\frac{3C_W-1}{24}-z_G$	$0.35B$
Ballast condition	T_{BAL}	$0.20\frac{B}{C_{B\_LC}}$	$\frac{T_{LC}}{2}+\frac{B^2}{T_{LC}C_{B\_LC}}\frac{3C_{W\_LC}-1}{24}-z_G$	$0.40B$

Amendment (9)
Clarifies some definitions and corrects typographical errors:

Modifies the table number

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
4.3 Loads to be Considered in Strength of Primary Supporting Structures **4.3.1 General** **4.3.1.1 General** **1** The loads to be considered in the requirements of strength of primary supporting structures specified in **Chapter 7** and **Chapter 7, Part 1** are also to be in accordance with **4.3**; however, **4.4, Chapter4, Part 2-2** is to be applied where the cargo density ρ_C is more than 0.9 for double hull structure ships, or to holds with double hull structure ships that are empty in the fully loaded condition. The definition of ρ_C is as specified in **Table 4.2.2-1**. **2** Additional requirements for loads in the maximum load condition are to be in accordance with **4.3.2**. **4.3.2 Maximum Load Condition** **4.3.2.1 General** **1** Loads for simple girders are also to be in accordance with the relevant requirements of **4.2**. **2** The loads specified in **Table 4.3.2-1** are to be considered when applying the requirements for double hull. However, where deemed necessary by the Society, additional loading patterns taken the loading conditions into account specified in the loading manual may be required.	**4.3 Loads to be Considered in Strength of Primary Supporting Structures** **4.3.1 General** **4.3.1.1 General** **1** The loads to be considered in the requirements of strength of primary supporting structures specified in **Chapter 7** and **Chapter 7, Part 1** are also to be in accordance with **4.3**. **2** Additional requirements for loads in the maximum load condition are to be in accordance with **4.3.2**. **4.3.2 Maximum Load Condition** **4.3.2.1 General** **1** Loads for simple girders are also to be in accordance with the relevant requirements of **4.2**. **2** The loads specified in **Table 4.3.2-1** are to be considered when applying the requirements for double hull. However, where deemed necessary by the Society, additional loading patterns taken the loading conditions into account specified in the loading manual may be required.	Amendment (8) Assessments for double hull Structures Clarify the application of loads to be considered for the strength of primary supporting structures on vessels carrying high-density cargo.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table 4.3.2-1 Loads to be Considered in Maximum Load Condition

Structures to be assessed		Loading patterns			Equivalent design wave	Difference between external and internal pressure to be considered (kN/m^2)
		Draught(m)	Vertical still water bending moment (kN-m)	Loaded to be considered		
Double bottom	$S1$	$\cancel{0.7}\underline{0.6}T_{SC}$	$M_{SV\ max}$	None	HM-1 / HM-2	Double bottom: P_{DB} Double side: P_{DS}
Double side	$S2$	T_{SC}	$M_{SV\ min}$	Cargo	BP-1P / BP-1S	
	$S3$	T_{SC}	$M_{SV\ min}$	Cargo		

Amendment (8)
Assessments for double hull Structures

The load for assessing longitudinal and transverse girders of double bottom assumes an evaluation loading draught in a ballast condition. The evaluation loading draught will be amended based on the draft in the ballast condition of actual vessels.

4.3.2.2 External Pressure

For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2** are to be considered.

4.3.2.2 External Pressure

For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2** are to be considered.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table 4.3.2-2 External and Internal Pressure to be Considered

Structures to be assessed		$P_{DB}(kN/m^2)$ (1)(2)	$P_{DS}(kN/m^2)$ (1)(2)
Double bottom	$S1$ <u>(3)</u>	$P_{exs}+P_{exw}$	$P_{exs}+P_{exw}$
Double side	$S2$	$P_{exs}+P_{exw}-P_{in\_s2}$	$P_{exs}+P_{exw}$
	$S3$	$P_{exs}+P_{exw}-P_{in\_s3}$	$P_{exs}+P_{exw}$

Notes:

P_{exs}, P_{exw} : Hydrostatic and Hydrodynamic pressure (kN/m^2) act on bottom shell in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.4, Part 1**.

P_{in_s2}, P_{in_s3} : Loads considering the effect of cargo (kN/m^2), as given by the formulae:

$$P_{in\_s2} = 0.5\rho g T_{SC}$$
$$P_{in\_s3} = \rho g T_{SC}$$

(1) Load calculation points are to be in accordance with **7.3.1.5, Part 1** for all loading conditions.

(2) When calculating loads, $T_{LC} = \cancel{0.7}\underline{0.6}T_{SC}$ for $S1$ and $T_{LC} = T_{SC}$ for $S2$ and $S3$.

<u>(3) P_{exw} is to be not less than the value of P_{exw} for HM-2 at x_G, which is the X coordinate (m) at the centre of gravity of the ship.</u>

Remarks:

Amendment (8)
Assessments for double hull Structures

The load for assessing longitudinal and transverse girders of double bottom assumes an evaluation loading draught in a ballast condition. The evaluation loading draught will be amended based on the draft in the ballast condition of actual vessels.

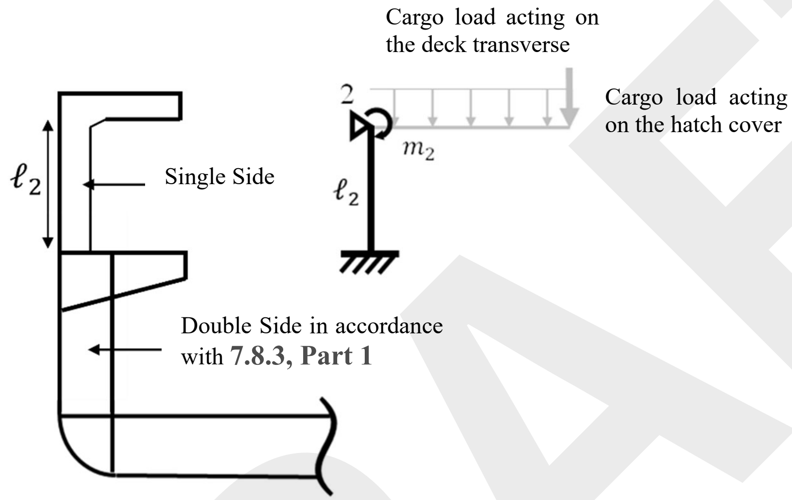
Amendment (8)
Assessments for double hull Structures

See the remark of amended-original requirements comparison table in Table 4.4.2-2, Chapter 4 , Part2-1.

Amended	Original	Remarks
7.2 <u>Simple Girders</u>	**7.2 <u>Hatch Side Girders</u>**	
7.2.1 <u>Hatch Side Girders</u>	**7.2.1 Hatch Side Girders Supported by Pillars, etc.**	
7.2.1.1 <u>Hatch Side Girders Supported by Pillars, etc.</u> Where hatch side girders are supported by support members such as pillars, the following requirements **(1)** and **(2)** are to be complied. (1) The required cross-sectional property is to be the value calculated by the method specified in **7.2.3.1, Part 1** multiplied by the value of C_{BC} shown in **Fig. 7.2.1-1** according to the positional relationship between the pillar and the hatch side coaming. (2) If **(a)** to **(c)** in **Fig. 7.2.1-1** are applicable, hatch side coamings may be considered in cross-sectional property calculations.	**7.2.1.1** Where hatch side girders are supported by support members such as pillars, the following requirements **(1)** and **(2)** are to be complied. (1) The required cross-sectional property is to be the value calculated by the method specified in **7.2.3.1, Part 1** multiplied by the value of C_{BC} shown in **Fig. 7.2.1-1** according to the positional relationship between the pillar and the hatch side coaming. (2) If **(a)** to **(c)** in **Fig. 7.2.1-1** are applicable, hatch side coamings may be considered in cross-sectional property calculations.	Amendment (9) Clarifies some definitions and corrects typographical errors: Modifies the numbering as in Chapter 7, Part 1.
<u>7.2.2 Web Frames</u>	**(Newly Added)**	
<u>7.2.2.1 Web Frames Supporting Cantilever Beams</u> <u>In applying **7.2.2.2, Part 1** to double-deck ships with the first layers being double side and the second layers being single side, moments and shear forces are to be in accordance with **7.2.2.2(1), Part 1**. However, ℓ_2 and m_2 shown in **Fig. 7.2.2-1** are to be used.</u>	**(Newly Added)**	Amendment (3) Reviews the composition of the requirements related to simple girders: Clarifies the assessment method in web frames supporting cantilever beams in typical general cargoes.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">

<u>Fig. 7.2.2-1 Web Frames of Double-deck Ships with the First Layers being Double Side and the Second Layers being Single Side</u>



</td><td>(Newly Added)</td></tr>
<tr><td>

<u>7.3 Double Hull Structures</u>

<u>7.3.1 General</u>

<u>7.3.1.1 Idealisation of Structures of Double-deck Ships with the First Layers being Double Side and the Second Layers being Single Side</u>

<u>**1** Hatchway breadth is to be taken as the breadth of the hatchway of the first tier. (See **Fig. 7.3.1-1**)</u>

<u>**2** B_{DS} is to be taken as the distance up to the upper end of the double side. (See **Fig. 7.3.1-1**)</u>

</td><td>

(Newly Added)

(Newly Added)

(Newly Added)

</td><td>

Amendment (9)
Clarifies some definitions and corrects typographical errors:

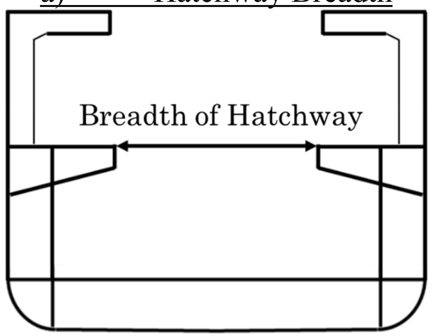
Clarify the definitions of the breadth of the hatchways and the

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

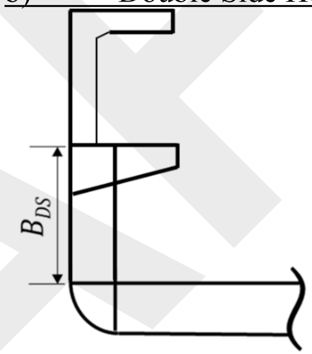
Amended	Original	Remarks
		height of the double hull side for double-deck ships with the first layers being double side and the second layers being single

Fig. 7.3.1-1 Hatchway Breadth and Double Side Height

a) Hatchway Breadth



b) Double Side Height



Amended	Original	Remarks
7.4 Special Cargo	**7.3 Special Cargo**	
7.4.1 Ships Loaded with Steel Coils	**7.3.1 Ships Loaded with Steel Coils**	
7.4.1.1 Girder members subjected to the loads of steel coil are to be in accordance with **10.1.6**.	**7.3.1.1** Girder members subjected to the loads of steel coil are to be in accordance with **10.1.6**.	Modifies the numbers according to the addition of 7.3

Amended	Original	Remarks
Part 2-6 VEHICLES CARRIERS AND ROLL-ON/ROLL-OFF SHIPS **Chapter 4 LOADS** **4.3 Loads to be Considered in Strength of Primary Supporting Structures** **4.3.2 Maximum Load Condition** **4.3.2.2 External Pressure** For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2** are to be considered.	**Part 2-6 VEHICLES CARRIERS AND ROLL-ON/ROLL-OFF SHIPS** **Chapter 4 LOADS** **4.3 Loads to be Considered in Strength of Primary Supporting Structures** **4.3.2 Maximum Load Condition** **4.3.2.2 External Pressure** For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2** are to be considered.	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks

Table 4.3.2-2 External and Internal Pressure to be Considered

Structures to be assessed		$P_{DB}(kN/m^2)$ (1) (2)	$P_{DS}(kN/m^2)$ (1) (2)
Double bottom	$S1$(3)	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$
Double side	$S2$	$P_{exs} + P_{exw} - P_{in\_s2}$	$P_{exs} + P_{exw}$
	$S3$	$P_{exs} + P_{exw} - P_{in\_s3}$	$P_{exs} + P_{exw}$

Notes:
P_{exs}, P_{exw} : Hydrostatic and Hydrodynamic pressure (kN/m^2) act on bottom shell in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.4, Part 1**.
P_{in_s2}, P_{in_s3} : The values considering the effect due to cargo (kN/m^2), as given by the following formulae:

$$P_{in\_s2} = 0.5\rho g T_{SC}$$
$$P_{in\_s3} = \rho g T_{SC}$$

(1) Load calculation points are to be in accordance with **7.3.1.5, Part 1** for all loading conditions.
(2) When calculating loads, $T_{LC} = 0.7T_{SC}$ for $S1$ and $T_{LC} = T_{SC}$ for $S2$ and $S3$.
(3) P_{exw} is to be not less than the value of P_{exw} for HM-2 at x_G, which is the X coordinate (m) at the centre of gravity of the ship.

Remarks: Amendment (8) Assessments for double hull Structures

See the remark of amended-original requirements comparison table in Table 4.4.2-2, Chapter 4 , Part2-1.

Amended:

4.7 Loads to be Considered in Additional Structural Requirements

4.7.2 Maximum Load Condition

4.7.2.1 Load Acting on the Car Deck and Movable Car Deck

1 The concentrated loads due to the wheels of the vehicle are to be considered as loads for car decks on the stiffeners attached to the car decks, in accordance with the following formula.

$$P_{CDK} = P_{Wh-max} \cdot (1 + C_{CDK})$$

Original:

4.7 Loads to be Considered in Additional Structural Requirements

4.7.2 Maximum Load Condition

4.7.2.1 Load Acting on the Car Deck and Movable Car Deck

1 The concentrated loads due to the wheels of the vehicle are to be considered as loads for car decks on the stiffeners attached to the car decks, in accordance with the following formula.

$$P_{CDK} = P_{Wh-max} \cdot (1 + C_{CDK})$$

Remarks: Amendment (9) Clarifies some definitions and corrects typographical errors:

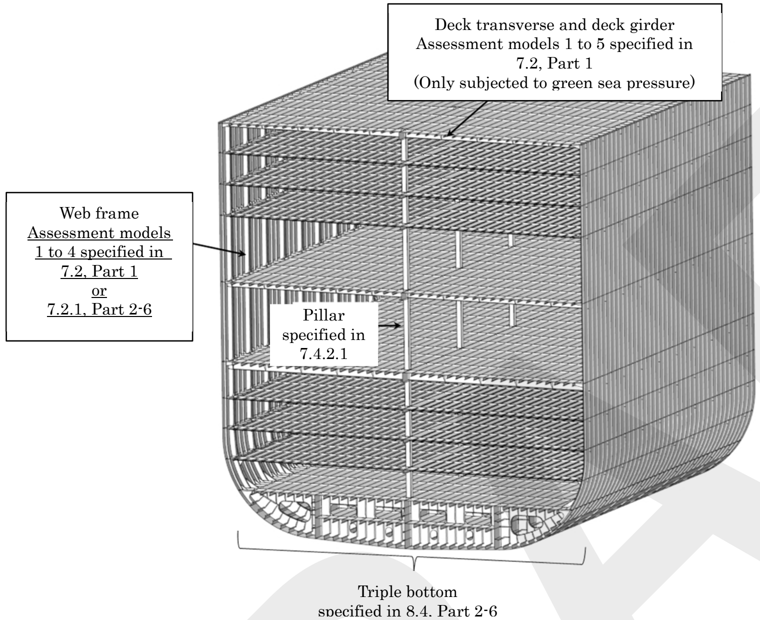
Amended	Original	Remarks
P_{Wh-max}: Designed maximum wheel load (kN). When the wheel load is given in units of t, multiply this value by 9.81. C_{CDK}: As given by the following formula: $C_{CDK} = C_{WDz} \frac{a_{Ze-CDK}}{g}$ C_{WDz}: Coefficient related to load condition, as specified in **Table 4.4.2-8, Part 1**. a_{Ze-CDK}: Envelope acceleration (m/s^2) in the vertical direction at the centre line of the car deck under consideration, obtained from the formula specified in **4.2.4.1, Part 1**. <u>In this case, $T_{LC} = T_{SC}$ and $\theta = a_4 = 0$.</u> Further, the centre of gravity in the longitudinal direction of the car deck under consideration is taken as the centre of the distance between support points for stiffeners on the car deck accounted for. **2** The load to be considered in the primary supporting members attached to the movable car deck P_{LCDK} (kN/m^2) is to be in accordance with the following formula: $P_{LCDK} = \left(P_{LCDK\_d} + w_{LCDK}\right) \cdot (1 + C_{CDK})$ P_{LCDK_d}: Design deck load (kN/m^2) w_{LCDK}: Deck dead weight (kN/m^2) per unit area C_{CDK}: As specified in **-1** above.	P_{Wh-max}: Designed maximum wheel load (kN). When the wheel load is given in units of t, multiply this value by 9.81. C_{CDK}: As given by the following formula: $C_{CDK} = C_{WDz} \frac{a_{Ze-CDK}}{g}$ C_{WDz}: Coefficient related to load condition, as specified in **Table 4.4.2-8, Part 1**. a_{Ze-CDK}: Envelope acceleration (m/s^2) in the vertical direction at the centre line of the car deck under consideration, obtained from the formula specified in **4.2.4.1, Part 1**. Further, the centre of gravity in the longitudinal direction of the car deck under consideration is taken as the centre of the distance between support points for stiffeners on the car deck accounted for. **2** The load to be considered in the primary supporting members attached to the movable car deck P_{LCDK} (kN/m^2) is to be in accordance with the following formula: $P_{LCDK} = \left(P_{LCDK\_d} + w_{LCDK}\right) \cdot (1 + C_{CDK})$ P_{LCDK_d}: Design deck load (kN/m^2) w_{LCDK}: Deck dead weight (kN/m^2) per unit area C_{CDK}: As specified in **-1** above.	Clarifies that parameters related to rolling motion are not used in calculation because it is simplified that acceleration is calculated at the centre line.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES **7.1 General** **7.1.1 Application** **7.1.1.2 Application Example of Assessment Model** **1** An application example of assessment model applying **7.2** and **7.3, Part 1** is shown in **Fig. 7.1.1-1**. **2** For girder members deemed to be simple girders with structures different from that shown in **Fig. 7.1.1-1**, the boundary conditions and acting loads are to be considered, and the assessment model from **Table 7.2.1-2, Part 1** is to be appropriately selected.	**Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES** **7.1 General** **7.1.1 Application** **7.1.1.2 Application Example of Assessment Model** **1** An application example of assessment model applying **7.2** and **7.3, Part 1** is shown in **Fig. 7.1.1-1**. **2** For girder members deemed to be simple girders with structures different from that shown in **Fig. 7.1.1-1**, the boundary conditions and acting loads are to be considered, and the assessment model from **Table 7.2.1-1, Part 1** is to be appropriately selected.	

Amended	Original	Remarks

Fig. 7.1.1-1 Application Example of Car Carriers

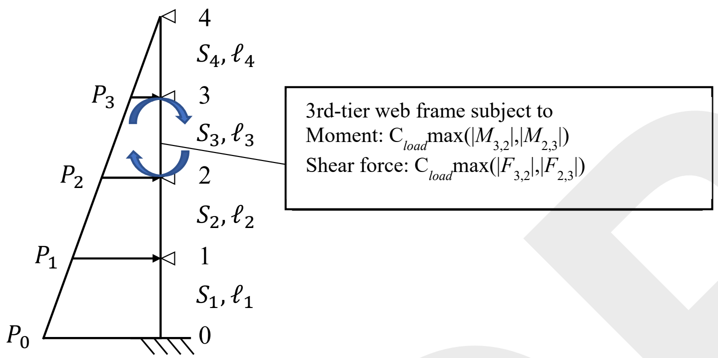


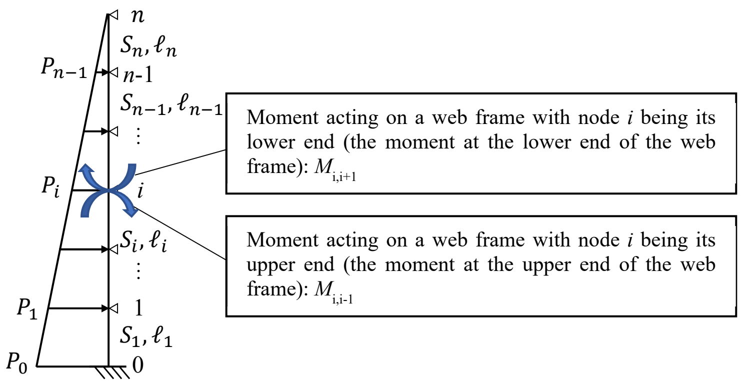
Remarks: Amendment (3)
According to the review of the composition of the requirements related to simple girders, modifies the references of web frames.

Amended	Original	Remarks
7.2 Simple Girders	**(Newly Added)**	
7.2.1 Web Frames	**(Newly Added)**	
7.2.2.1 Multi-Deck Ship Web Frames subject to External Pressure In applying **7.2.3** to **7.2.5, Part 1**, the bending moments and shear forces to be considered may be in accordance with the following **(1)** and **(2)**, respectively. However, the values are to be 1.1 *times* the greater of their respective absolute values at the upper and lower ends of web		Amendment (3) According to the review of the composition of the requirements related to simple girders, Transferred from 7.2.8.2. The requirements

Amended	Original	Remarks
frames (*See* **Fig. 7.2.1-1**). (1) Moments acting on web frames at each node are to be in accordance with the following **(a)** and **(b)**: (a) The moment $M_{i,i-1}$ (*kN-m*) acting on a web frame with node i being its upper end (the moment at the upper end of the web frame) is to be taken as follows (*See* **Fig. 7.2.1-2**): i) For $i=n$ $M_{n,n-1}=0$ ii) For $1\le i\le n-1$ $M_{i,i-1}=\frac{1}{2}(C_{i,i-1}-C_{i,i+1}+\emptyset_{i-1}-\emptyset_{i+1})$ (b) The moment $M_{i,i+1}$ (*kN-m*) acting on a web frame with node i being its lower end (the moment at the lower end of the web frame) is to be taken as follows (*See* **Fig. 7.2.1-2**): i) For $1\le i\le n-1$ $M_{i,i+1}=-\frac{1}{2}(C_{i,i-1}-C_{i,i+1}+\emptyset_{i-1}-\emptyset_{i+1})$ ii) For $i=0$ $M_{0,1}=-\frac{1}{4}(C_{1,2}+C_{1,0}-\emptyset_0+\emptyset_2)-C_{0,1}$ $C_{i,i-1}$: Coefficient to be taken as follows: $C_{i,i-1}=\frac{S_i{\ell_i}^2}{60}(3P_i+2P_{i-1})$ $(0<i\le n-1)$ $C_{i,i+1}$: Coefficient to be taken as follows: i) For $0\le i\le n-2$ $C_{i,i+1}=-\frac{S_{i+1}{\ell_{i+1}}^2}{60}(2P_{i+1}+3P_i)$ ii) For $i=n-1$ $C_{n-1,n}=-\frac{S_n{\ell_n}^2}{120}(7P_n+8P_{n-1})$		remain unchanged.

Amended	Original	Remarks
$\emptyset_i$: Coefficient to be taken as follows: i) For $i = 0$ $$\phi_0 = 0$$ ii) For $1 \leq i \leq n-1$ $$\phi_i = -\frac{1}{4}\left(C_{i,i-1} + C_{i,i+1}\right)$$ iii) For $i = n$ $$\phi_n = -\frac{1}{2}\phi_{n-1}$$ S_i: Spacing (m) of the web frame in the i-th tier from the inner bottom plating ℓ_i: Span (m) of the web frame in the i-th tier from the inner bottom plating P_i: Load (kN/m^2) due to the external load at node i in the maximum load condition as specified in **4.4.2.1-1, Part 1** (2) Nodal shear forces acting on web frames are to be in accordance with the following **(a)** and **(b)**: (a) The shear force $F_{i,i-1}$ (kN) acting on a web frame with node i being its upper end (the shear force at the upper end of the web frame) is to be taken as follows: $$F_{i,i-1} = -\frac{1}{\ell_i}\left(M_{i,i-1} + M_{i-1,i}\right) - \frac{\ell_i}{6}\left(2S_iP_i + S_{i-1}P_{i-1}\right) \qquad (1 \leq i \leq n)$$ (b) The shear force $F_{i,i+1}$ (kN) acting on a web frame with node i being its lower end (the shear force at the lower end of the web frame) is to be taken as follows:		

Amended	Original	Remarks
i) For $0 \le i \le n-1$ $F_{i,i+1} = -\frac{1}{\ell_{i+1}}\left(M_{i+1,i} + M_{i,i+1}\right) + \frac{\ell_{i+1}}{6}\left(S_{i+1}P_{i+1} + 2S_iP_i\right)$ ii) For $i = 0$ $F_{0,1} = -\frac{1}{\ell_1}\left(M_{1,0} + M_{0,1}\right) + \frac{\ell_1}{6}\left(S_1P_1 + 2S_1P_0\right)$ $M_{1,0}$, $M_{0,1}$, $M_{i+1,i}$, $M_{i,i+1}$, ℓ_i, S_i and P_i: As specified in (1) above Fig. 7.2.1-1 Example of Application  	(Newly Added)	

Amended	Original	Remarks
<u>Fig. 7.2.1-2 Moment Acting on a Web Frame at Node *i*</u> 	(Newly Added)	
Chapter 9 FATIGUE	**Chapter 9 FATIGUE**	
9.5 Screening Assessment	**9.5 Screening Assessment**	
9.5.6 Fatigue Strength Assessment	**9.5.6 Fatigue Strength Assessment**	
9.5.6.2 Reference Stress for Fatigue Strength Assessment Hot spot stress ranges used in screening assessments, $\Delta\sigma_{FS,(j)}$, are $\Delta\sigma_{FS\_ort,(j)}$ and $\Delta\sigma_{FS\_par,(j)}$, and fatigue damage is to be calculated for each stress range. where, $\Delta\sigma_{FS\_ort,(j)} = \max_i(\Delta\sigma_{FS\_ort,i(j)})$ $\Delta\sigma_{FS\_par,(j)} = \max_i(\Delta\sigma_{FS\_par,i(j)})$ $\Delta\sigma_{FS\_ort,i(j)}$: Hot spot stress range (N/mm^2) for screening assessment according to the hot	**9.5.6.2 Reference Stress for Fatigue Strength Assessment** Hot spot stress ranges used in screening assessments, $\Delta\sigma_{FS,(j)}$, are $\Delta\sigma_{FS\_ort,(j)}$ and $\Delta\sigma_{FS\_par,(j)}$, and fatigue damage is to be calculated for each stress range. where, $\Delta\sigma_{FS\_ort,(j)} = \max_i(\Delta\sigma_{FS\_ort,i(j)})$ $\Delta\sigma_{FS\_par,(j)} = \max_i(\Delta\sigma_{FS\_par,i(j)})$ $\Delta\sigma_{FS\_ort,i(j)}$: Hot spot stress range (N/mm^2) for screening assessment according to the hot	Amendment (9) Clarifies some definitions and corrects typographical errors: Specifies the correction factor corresponding to the wave environment in screening assessment

Amended	Original	Remarks
spot stress in the direction orthogonal to the weld line, as obtained from the following formula: $\Delta\sigma_{FS\_ort,i(j)} = f_{mean\_ort,i(j)} \cdot \Delta\sigma_{HS\_ort,i(j)}$ $\Delta\sigma_{FS\_par,i(j)}$: Hot spot stress range (N/mm^2) for screening assessment according to the hot spot stress in the direction parallel to the weld line, as obtained from the following formula: $\Delta\sigma_{FS_{par},i(j)} = 0.72 \cdot f_{mean_{par},i(j)} \cdot \Delta\sigma_{HS_{par},i(j)}$ f_R: Correction factor corresponding to the wave environment in accordance with **9.5.2.1, Part 1** $f_{mean\_ort,i(j)}$, $f_{mean\_par,i(j)}$: Correction factor for mean stress effect, as obtained by the following formulas for each combination of $\Delta\sigma_{HS\_ort,i(j)}$, $\sigma_{mean\_ort,i(j)}$ and $\Delta\sigma_{HS\_par,i(j)}$, $\sigma_{mean\_par,i(j)}$ respectively. $\begin{cases} f_{mean,i(j)} = \min\left[1.0, 0.8 + 0.2\dfrac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}}\right] & : \sigma_{mCor,i(j)} \geq 0 \\ f_{mean,i(j)} = \max\left[0.6, 0.8 + 0.2\dfrac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}}\right] & : \sigma_{mCor,i(j)} < 0 \end{cases}$ Where, $\sigma_{mCor,i(j)}$ is to be obtained as follows:	spot stress in the direction orthogonal to the weld line, as obtained from the following formula: $\Delta\sigma_{FS\_ort,i(j)} = f_{mean\_ort,i(j)} \cdot \Delta\sigma_{HS\_ort,i(j)}$ $\Delta\sigma_{FS\_par,i(j)}$: Hot spot stress range (N/mm^2) for screening assessment according to the hot spot stress in the direction parallel to the weld line, as obtained from the following formula: $\Delta\sigma_{FS\_par,i(j)} = 0.72 \cdot f_{mean\_par,i(j)} \cdot \Delta\sigma_{HS\_par,i(j)}$ $f_{mean\_ort,i(j)}$, $f_{mean\_par,i(j)}$: Correction factor for mean stress effect, as obtained by the following formulas for each combination of $\Delta\sigma_{HS\_ort,i(j)}$, $\sigma_{mean\_ort,i(j)}$ and $\Delta\sigma_{HS\_par,i(j)}$, $\sigma_{mean\_par,i(j)}$ respectively. $\begin{cases} f_{mean,i(j)} = \min\left[1.0, 0.8 + 0.2\dfrac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}}\right] & : \sigma_{mCor,i(j)} \geq 0 \\ f_{mean,i(j)} = \max\left[0.6, 0.8 + 0.2\dfrac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}}\right] & : \sigma_{mCor,i(j)} < 0 \end{cases}$ Where, $\sigma_{mCor,i(j)}$ is to be obtained as follows:	

Amended	Original	Remarks
$\begin{cases} \sigma_{mCor,i(j)} = \sigma_{mean,i(j)} & : \sigma_{max} \leq \sigma_{YEq} \\ \sigma_{mCor,i(j)} = \sigma_{YEq} - \sigma_{max} + \sigma_{mean,i(j)} & : \sigma_{max} > \sigma_{YEq} \end{cases}$ $\sigma_{max} = \max_{i(j)}(\Delta\sigma_{HS.i(j)} + \sigma_{mean,i(j)})$ $\sigma_{YEq} = \max(315, \sigma_Y)$ $\Delta\sigma_{HS\_ort,i(j)}$, $\Delta\sigma_{HS\_par,i(j)}$: As given in **9.5.5.1-2**. $\boldsymbol{\sigma_{mean\_ort,i(j)}}$, $\boldsymbol{\sigma_{mean\_par,i(j)}}$: As given in 9.5.5.1-2.	$\begin{cases} \sigma_{mCor,i(j)} = \sigma_{mean,i(j)} & : \sigma_{max} \leq \sigma_{YEq} \\ \sigma_{mCor,i(j)} = \sigma_{YEq} - \sigma_{max} + \sigma_{mean,i(j)} & : \sigma_{max} > \sigma_{YEq} \end{cases}$ $\sigma_{max} = \max_{i(j)}(\Delta\sigma_{HS.i(j)} + \sigma_{mean,i(j)})$ $\sigma_{YEq} = \max(315, \sigma_Y)$ $\Delta\sigma_{HS\_ort,i(j)}$, $\Delta\sigma_{HS\_par,i(j)}$: As given in **9.5.5.1-2**. $\boldsymbol{\sigma_{mean\_ort,i(j)}}$, $\boldsymbol{\sigma_{mean\_par,i(j)}}$: As given in 9.5.5.1-2.	

Part 2-7 TANKERS

Chapter 4 LOADS

4.3 Loads to be Considered in Strength of Primary Supporting Structures

4.3.2 Maximum Load Condition

4.3.2.2 External Pressure

For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2** are to be considered.

Amended	Original	Remarks
Table 4.3.2-2 External and Internal Pressure to be Considered (see below)		Amendment (8) Assessments for double hull Structures See the remark of amended-original requirements comparison table in Table 4.4.2-2, Chapter 4 , Part2-1.

Table 4.3.2-2 External and Internal Pressure to be Considered

Structures to be assessed		$P_{DB}(kN/m^2)$ (1)(2)	$P_{DS}(kN/m^2)$ (1) (2)
Double bottom	$S1$(3)	$P_{exs}+P_{exw}$	$P_{exs}+P_{exw}$
	$S2$	$P_{exs}+P_{exw}-(P_{ls}+P_{ld})$	$P_{exs}+P_{exw}-(P_{ls}+P_{ld})$
Double side	$S3$	$P_{exs}+P_{exw}$	$P_{exs}+P_{exw}$
	$S4$	$P_{exs}+P_{exw}-(P_{ls}+P_{ld})$	$P_{exs}+P_{exw}-(P_{ls}+P_{ld})$

Notes:

P_{exs}, P_{exw} : Hydrostatic and Hydrodynamic pressure (kN/m^2) act on bottom shell in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.4, Part 1**.

P_{ls}, P_{ld} : Static and dynamic pressure due to liquid cargo (kN/m^2) act on inner bottom plating in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.5, Part 1**.

(1) The parameters (GM, z_G, K_{XX}) required to calculate loads is given by the follows.
$S1$, $S3$: As given by the formula for full load condition specified in **Table 4.2.2-1**
$S2$, $S4$: As given by the formula for ballast condition specified in **Table 4.2.2-1**

(2) Load calculation points is in accordance with **7.3.1.5, Part 1** for all loading conditions.

(3) P_{exw} is to be not less than the value of P_{exw} for HM-2 at x_G, which is the X coordinate (m) at the centre of gravity of the ship.

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>
Part 2-8 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT SPHERICAL TANKS OF TYPE B)

Chapter 8 STRENGTH ASSESSMENT BY CARGO HOLD ANALYSIS

8.4 Boundary Conditions and Loads Conditions

8.4.2 Loads Condition

8.4.2.2 Method of Applying Loads to the Structural Model
1 In applying 8.5.2, Part 1, the vertical bending moment and horizontal bending moment act on the target hold are to be adjusted in accordance with the following (1) to (3) based upon the boundary conditions specified in 8.4.1.1 and the value of the moment for each analysis case.
(1) (Omitted)
(2) The adjustment vertical bending moment M_{V-end} and adjustment horizontal bending moment M_{H-end} (kN-m) are obtained by the following formulae:
$M_{V-end} = M_{V-targ} - M_{V-max}$, for $M_{V-targ} \geq 0$
$M_{V-end} = M_{V-targ} - M_{V-min}$, for $M_{V-targ} < 0$
$\underline{M_{H-end}} = M_{H-targ} - M_{H-max}$, for $M_{H-targ} \geq 0$
$\underline{M_{H-end}} = M_{H-targ} - M_{H-min}$, for $M_{H-targ} < 0$
M_{V-targ}, M_{H-targ}: The maximum or
</td><td>
Part 2-8 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT SPHERICAL TANKS OF TYPE B)

Chapter 8 STRENGTH ASSESSMENT BY CARGO HOLD ANALYSIS

8.4 Boundary Conditions and Loads Conditions

8.4.2 Loads Condition

8.4.2.2 Method of Applying Loads to the Structural Model
1 In applying 8.5.2, Part 1, the vertical bending moment and horizontal bending moment act on the target hold are to be adjusted in accordance with the following (1) to (3) based upon the boundary conditions specified in 8.4.1.1 and the value of the moment for each analysis case.
(1) (Omitted)
(2) The adjustment vertical bending moment M_{V-end} and adjustment horizontal bending moment M_{H-end} (kN-m) are obtained by the following formulae:
$M_{V-end} = M_{V-targ} - M_{V-max}$, for $M_{V-targ} \geq 0$
$M_{V-end} = M_{V-targ} - M_{V-min}$, for $M_{V-targ} < 0$
$\underline{M_{V-end}} = M_{H-targ} - M_{H-max}$, for $M_{H-targ} \geq 0$
$\underline{M_{V-end}} = M_{H-targ} - M_{H-min}$, for $M_{H-targ} < 0$
M_{V-targ}, M_{H-targ}: The maximum or
</td><td>
Amendment (9)
Clarifies some definitions and corrects typographical errors:

Corrects the typographical errors in adjustment moment
</td></tr>
</table>

Amended	Original	Remarks
minimum value in the target hold of the vertical bending moment and horizontal bending moment (*kN-m*) specified in **Table 8.4.2-1** (3) (Omitted) **Part 2-9 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT PRISMATIC TANKS TYPE A/B)** **Chapter 4 LOADS** **4.3 Loads to be Considered in Strength Assessment by Cargo Hold Analysis** **4.3.2 Maximum Load Condition** **4.3.2.4 External Pressure due to Seawater** In applying **4.6.2.4, Part 1**, hydrodynamic pressure P_{exw} specified in **(1)** to **(2)** is to be additionally considered. (1) Hydrodynamic pressure in the equivalent design wave *AV* is in accordance with **Table 4.3.2-5** and **Fig. 4.3.2-1**. (2) Hydrodynamic pressure in the equivalent design wave *PCL* is in accordance with **Table 4.3.2-6** and **Fig. 4.3.2-2**.	minimum value in the target hold of the vertical bending moment and horizontal bending moment (*kN-m*) specified in **Table 8.4.2-1** (3) (Omitted) **Part 2-9 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT PRISMATIC TANKS TYPE A/B)** **Chapter 4 LOADS** **4.3 Loads to be Considered in Strength Assessment by Cargo Hold Analysis** **4.3.2 Maximum Load Condition** **4.3.2.4 External Pressure due to Seawater** In applying **4.6.2.4, Part 1**, hydrodynamic pressure P_{exw} specified in **(1)** to **(2)** is to be additionally considered. (1) Hydrodynamic pressure in the equivalent design wave *AV* is in accordance with **Table 4.3.2-5** and **Fig. 4.3.2-1**. (2) Hydrodynamic pressure in the equivalent design wave *PCL* is in accordance with **Table 4.3.2-6** and **Fig. 4.3.2-2**.	

Amended	Original	Remarks

Table 4.3.2-5 Hydrodynamic Pressure P_{exw} in Equivalent Design Wave *AV*

	Hydrodynamic pressure P_{exw} (kN/m^2)		
	$z \le T_{LC}$	$T_{LC} < z \le T_{LC} + h_W$	$z > T_{LC} + h_W$
AV-1*P*	$P_{exw} = \max(P_{AV}, \rho g(z - T_{LC}))$	$P_{WL} - \rho g(z - T_{LC})$	0
AV-2*P*	$P_{exw} = \max(-P_{AV}, \rho g(z - T_{LC}))$		
AV-1*S*	$P_{exw} = \max(P_{AV}, \rho g(z - T_{LC}))$		
AV-2*S*	$P_{exw} = \max(-P_{AV}, \rho g(z - T_{LC}))$		

Notes:

P_{AV}: As given by the following formula:

$$P_{AV} = 0.5 C_{R_{AV}} C_{NL_{AV}} C_M C_{AV1} H_{S_{AV}} (P_{AV1} + P_{AV2} + P_{AV3} + P_{AV4} + P_{AV5})$$

(Omitted)

P_{AV2}: As given by the following formulae:

For equivalent design waves *AV*-1*P* and *AV*-2*P*:

$$For\ y > 0.0,\quad P_{AV2} = \rho g \left\{ 0.6 \sin\left(\frac{2(x - x_G)}{L_C}\pi\right) - [-2.0 \cdot 10^{-5} \cdot (x - x_G) + 2.0 \cdot 10^{-3}](y^2 + z^2) \right\}$$

$$For\ y \le 0.0,\quad P_{AV2} = \rho g \left\{ 0.6 \sin\left(\frac{2(x - x_G)}{L_C}\pi\right) - 1.0 \cdot 10^{-3} \cdot (y^2 + z^2) \right\}$$

For equivalent design waves *AV*-1*S* and *AV*-2*S*:

$$For\ y > 0.0,\quad P_{AV2} = \rho g \left\{ 0.6 \sin\left(\frac{2(x - x_G)}{L_C}\pi\right) - 1.0 \cdot 10^{-3} \cdot (y^2 + z^2) \right\}$$

$$For\ y \le 0.0,\quad P_{AV2} = \rho g \left\{ 0.6 \sin\left(\frac{2(x - x_G)}{L_C}\pi\right) - [-2.0 \cdot 10^{-5} \cdot (x - x_G) + 2.0 \cdot 10^{-3}](y^2 + z^2) \right\}$$

<u>x_G: *X* coordinate (*m*) at the centre of gravity of the ship, to be taken as $x_G = (0.36 + 0.2 C_{B\_LC}) L_C$. The value calculated based on the weight distribution corresponding to the loading condition under consideration may be used.</u>

(Omitted)

P_{AV5}: As given by the following formula:

$$P_{AV5} = -\rho g |R_{5\_AV}| \left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right) \cdot (-0.95)$$

R_{5_AV}: As given by the following formula:

$$R_{5\_AV} = \frac{-0.54(0.33 C_{W\_LC} - 0.12)\exp\left(-\frac{2\pi}{\lambda_{AV}} T_{LC} C_{VP\_LC}\right)}{0.26\left(\frac{2\pi}{K_{AV} L_C} + 1.0\right) K_{AV} B \cdot \exp(-2 K_{AV} T_{LC} C_{VP\_LC}{}^4) \cdot \frac{C_{W\_LC}{}^{3.65}}{12} L_C}$$

Remarks:

Amendment (7)
Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.

See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks

(Omitted)

Table 4.3.2-6 Hydrodynamic Pressure P_{exw} in Equivalent Design Wave *PCL*

	Hydrodynamic pressure P_{exw} (kN/m^2)		
	$z \leq T_{LC}$	$T_{LC} < z \leq T_{LC} + h_W$	$z > T_{LC} + h_W$
PCL-1	$P_{exw} = \max(-P_{PCL}, \rho g(z - T_{LC}))$	$P_{WL} - \rho g(z - T_{LC})$	0
PCL-2	$P_{exw} = \max(P_{PCL}, \rho g(z - T_{LC}))$		

Notes:

P_{WL}, h_W: As specified in **Table 4.3.2-5**.

P_{PCL}: As given by the following formula:

$$P_{PCL} = 0.5 C_{R_{PCL}} C_{NL_{PCL}} C_M C_{PCL1} H_{S_{PCL}} (P_{PCL1} + P_{PCL2} + P_{PCL3})$$

(Omitted)

P_{PCL3}: As given by the following formula:

$$P_{PCL3} = -\rho g |R_{5\_PCL}| \left(x - \cancel{\frac{L_C}{2}} \underline{x_G}\right) \cos\left(\left(0.05\sqrt{\lambda_{PCL}} - 1.28\right)\pi - \varepsilon_{PCL2}\right)$$

R_{5_PCL}: As given by the following formula:

$$R_{5\_PCL} = \frac{3\pi(1 - C_{W\_LC})}{2B} \left(\frac{\lambda_{PCL}}{L_C}\right)^4$$

<u>x_G: As specified in **Table 4.3.2-5**.</u>

Remarks:

Amendment (7)
Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.

See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks

Table 4.3.2-7 Phase of Incident Wave in the Equivalent Design Wave

	$C_{RE} > 0$	$C_{RE} < 0$	$C_{RE} = 0$ and $C_{IM} \geq 0$	$C_{RE} = 0$ and $C_{IM} < 0$
C_{AV2}, C_{PCL2}	1	-1	1	-1
ε_{AV1}, ε_{PCL1}	$\arctan\left(\frac{C_{IM}}{C_{RE}}\right)$		$\frac{\pi}{2}$	

Notes:

C_{RE}: As given by the following formula:

For equivalent design waves *AV*-1*P* and *AV*-2*P*, $C_{RE} = \cos\left(\pi + \frac{2\pi}{\lambda_{AV}}\left[\frac{\left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right)}{2} + \frac{\sqrt{3}}{2}y\right]\right)$

For equivalent design waves *AV*-1*S* and *AV*-2*S*, $C_{RE} = \cos\left(\pi + \frac{2\pi}{\lambda_{AV}}\left[\frac{\left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right)}{2} - \frac{\sqrt{3}}{2}y\right]\right)$

For equivalent design wave *PCL*, $C_{RE} = \cos\left(\pi + \frac{2\pi}{\lambda_{PCL}}\left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right)\right)$

λ_{AV}: As specified in **Table 4.3.2-5**.
λ_{PCL}: As specified in **Table 4.3.2-6**.
$\underline{x_G}$: <u>As specified in **Table 4.3.2-5**.</u>

C_{IM}: As given by the following formula:

For equivalent design waves *AV*-1*P* and *AV*-2*P*, $C_{IM} = \sin\left(\frac{2\pi}{\lambda_{AV}}\left[-\frac{\left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right)}{2} - \frac{\sqrt{3}}{2}y\right]\right)$

For equivalent design waves *AV*-1*S* and *AV*-2*S*, $C_{IM} = \sin\left(\frac{2\pi}{\lambda_{AV}}\left[-\frac{\left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right)}{2} + \frac{\sqrt{3}}{2}y\right]\right)$

For equivalent design wave *PCL*, $C_{IM} = \sin\left(-\frac{2\pi}{\lambda_{PCL}}\left(x - \cancel{\frac{L_C}{2}}\underline{x_G}\right)\right)$

Remarks:

Amendment (7)
Revises the simplified formula for the ship’s hull centre of gravity to enhance accuracy.

See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks
4.3.2.5 Internal Pressure due to Loaded Liquid **1** In applying **4.6.2.5, Part 1**, where the cargo tank is equipped with swash bulkhead, it is to be assumed that there is no swash bulkhead when calculating dynamic pressure due to cargo. **2** In applying **4.6.2.5, Part 1**, the acceleration at any position with respect to the equivalent design wave *AV* and *PCL* is to be in accordance with **Table 4.3.2-8**.	**4.3.2.5 Internal Pressure due to Loaded Liquid** **1** In applying **4.6.2.5, Part 1**, where the cargo tank is equipped with swash bulkhead, it is to be assumed that there is no swash bulkhead when calculating dynamic pressure due to cargo. **2** In applying **4.6.2.5, Part 1**, the acceleration at any position with respect to the equivalent design wave *AV* and *PCL* is to be in accordance with **Table 4.3.2-8**.	

Table 4.3.2-8 Acceleration at Any Position, a_X, a_Y, a_Z

Equivalent design wave		Longitudinal acceleration a_X (m/s^2)	Transverse acceleration a_Y (m/s^2)	Vertical acceleration a_Z (m/s^2)
AV	*AV*-1*P*	$-0.5g \cdot \sin\phi$ $+0.1a_1 - 0.95a_5(z - z_G)$	$0.1g \cdot \sin\theta$ $+0.01GMa_2 + 0.1a_4(z - z_G)$ $+[-0.9a_6(x - x_G)]$	$\left(1.7\frac{\lambda_{AV}}{L_C} - 0.6\right)a_3 - 0.1a_4 y$ $+0.95a_5(x - x_G)$
	AV-2*P*	$0.5g \cdot \sin\phi$ $-0.1a_1 + 0.95a_5(z - z_G)$	$-0.1g \cdot \sin\theta$ $-0.01GMa_2 - 0.1a_4(z - z_G)$ $+[0.9a_6(x - x_G)]$	$\left(-1.7\frac{\lambda_{AV}}{L_C} + 0.6\right)a_3 + 0.1a_4 y$ $-0.95a_5(x - x_G)$
	AV-1*S*	$-0.5g \cdot \sin\phi$ $+0.1a_1 - 0.95a_5(z - z_G)$	$-0.1g \cdot \sin\theta$ $-0.01GMa_2 - 0.1a_4(z - z_G)$ $+[0.9a_6(x - x_G)]$	$\left(1.7\frac{\lambda_{AV}}{L_C} - 0.6\right)a_3 + 0.1a_4 y$ $+0.95a_5(x - x_G)$
	AV-2*S*	$0.5g \cdot \sin\phi$ $-0.1a_1 + 0.95a_5(z - z_G)$	$0.1g \cdot \sin\theta$ $+0.01GMa_2 + 0.1a_4(z - z_G)$ $+[-0.9a_6(x - x_G)]$	$\left(-1.7\frac{\lambda_{AV}}{L_C} + 0.6\right)a_3 - 0.1a_4 y$ $-0.95a_5(x - x_G)$
PCL	*PCL*-1	$-0.15\frac{T_{LC}}{D}\sin\phi - 0.3\frac{T_{LC}}{D}a_1$ $+\left(-40\frac{f_T}{L_C} - 0.2\right)a_5(z - z_G)$	0	$15\frac{f_T}{L_C}a_3$ $-\left(-40\frac{f_T}{L_C} - 0.2\right)a_5(x - x_G)$
	PCL-2	$0.15\frac{T_{LC}}{D}\sin\phi + 0.3\frac{T_{LC}}{D}a_1$ $+\left(40\frac{f_T}{L_C} + 0.2\right)a_5(z - z_G)$	0	$-15\frac{f_T}{L_C}a_3$ $-\left(40\frac{f_T}{L_C} + 0.2\right)a_5(x - x_G)$

Remarks:
Amendment (7)
Revises the simplified formula for the ship's hull centre of gravity to enhance accuracy.

See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Amended	Original	Remarks
Notes: $a_1, a_2, a_3, a_4, a_5, a_6$: As specified in **4.2.3, Part 1**. θ, ϕ: As specified in **4.2.2, Part 1**. x_G: *X* coordinate (*m*) at the centre of gravity of the ship, taken as $x_G = \cancel{0.45}\underline{(0.36+0.2C_{B\_LC})}L_C$. However, the value calculated based on the weight distribution according to the loading condition to be considered may be used. z_G: *Z* coordinate (*m*) at the centre of gravity of the ship in the loading condition to be considered GM: Metacentric height (*m*), the value specified in the loading condition to be considered is to be used. λ_{AV}: As specified **Table 4.3.2-5**.		
4.4 Loads to be Considered in Fatigue **4.4.2 Cyclic Load Condition** **4.4.2.5 Internal Pressure due to Loaded Liquid** In applying **4.7.2.5, Part 1**, the acceleration at any position with respect to the equivalent design wave *AV* and *PCL* is to be in accordance with **Table 4.4.2-5**.	**4.4 Loads to be Considered in Fatigue** **4.4.2 Cyclic Load Condition** **4.4.2.5 Internal Pressure due to Loaded Liquid** In applying **4.7.2.5, Part 1**, the acceleration at any position with respect to the equivalent design wave *AV* and *PCL* is to be in accordance with **Table 4.4.2-5**.	

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
(see Table 4.4.2-5 below)		Amendment (7) Revises the simplified formula for the ship’s hull centre of gravity to enhance accuracy. See the remark of amended-original requirements comparison table in Table 4.2.4-1.

Table 4.4.2-5 Acceleration at Any Position a_X, a_Y, a_Z

Equivalent design wave		Longitudinal acceleration a_X (m/s^2)	Transverse acceleration a_Y (m/s^2)	Vertical acceleration a_Z (m/s^2)
AV	*AV*-1*P*	$-0.5g\cdot\sin\phi$ $+0.1a_1-0.95a_5(z-z_G)$	$0.1g\cdot\sin\theta$ $+0.01GMa_2+0.1a_4(z-z_G)$ $+[-0.9a_6(x-x_G)]$	$\left(1.7\frac{\lambda_{AV}}{L_C}-0.6\right)a_3-0.1a_4y$ $+0.95a_5(x-x_G)$
	AV-2*P*	$0.5g\cdot\sin\phi$ $-0.1a_1+0.95a_5(z-z_G)$	$-0.1g\cdot\sin\theta$ $-0.01GMa_2-0.1a_4(z-z_G)$ $+[0.9a_6(x-x_G)]$	$\left(-1.7\frac{\lambda_{AV}}{L_C}+0.6\right)a_3+0.1a_4y$ $-0.95a_5(x-x_G)$
	AV-1*S*	$-0.5g\cdot\sin\phi$ $+0.1a_1-0.95a_5(z-z_G)$	$-0.1g\cdot\sin\theta$ $-0.01GMa_2-0.1a_4(z-z_G)$ $+[0.9a_6(x-x_G)]$	$\left(1.7\frac{\lambda_{AV}}{L_C}-0.6\right)a_3+0.1a_4y$ $+0.95a_5(x-x_G)$
	AV-2*S*	$0.5g\cdot\sin\phi$ $-0.1a_1+0.95a_5(z-z_G)$	$0.1g\cdot\sin\theta$ $+0.01GMa_2+0.1a_4(z-z_G)$ $+[-0.9a_6(x-x_G)]$	$\left(-1.7\frac{\lambda_{AV}}{L_C}+0.6\right)a_3-0.1a_4y$ $-0.95a_5(x-x_G)$
PCL	*PCL*-1	$-0.15\frac{T_{LC}}{D}\sin\phi-0.3\frac{T_{LC}}{D}a_1$ $+\left(-40\frac{f_T}{L_C}-0.2\right)a_5(z-z_G)$	0	$15\frac{f_T}{L_C}a_3$ $-\left(-40\frac{f_T}{L_C}-0.2\right)a_5(x-x_G)$
	PCL-2	$0.15\frac{T_{LC}}{D}\sin\phi+0.3\frac{T_{LC}}{D}a_1$ $+\left(40\frac{f_T}{L_C}+0.2\right)a_5(z-z_G)$	0	$-15\frac{f_T}{L_C}a_3$ $-\left(40\frac{f_T}{L_C}+0.2\right)a_5(x-x_G)$

Notes:

a_1, a_2, a_3, a_4, a_5, a_6: As specified in **4.2.3, Part 1**.

θ, ϕ: As specified in **4.2.2, Part 1**.

x_G: *X* coordinate (*m*) at the centre of gravity of the ship, taken as $x_G=\cancel{0.45}\underline{(0.36+0.2C_{B\_LC})}L_C$. However, the value calculated based on the weight distribution according to the loading condition to be considered may be used.

z_G: *Z* coordinate (*m*) at the centre of gravity of the ship in the loading condition under consideration

GM: Metacentric height (*m*), the value specified in the loading condition under consideration is to be used.

λ_{AV}: As specified in **Table 4.3.2-5**.

Amended	Original	Remarks
Part 2-10 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT TANKS OF TYPE C) **Chapter 4 LOADS** **4.3 Loads to be Considered in Strength of Primary Supporting Structures** **4.3.2 Maximum Load Condition** **4.3.2.2 External Pressure** For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2.** are to be considered.	**Part 2-10 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT TANKS OF TYPE C)** **Chapter 4 LOADS** **4.3 Loads to be Considered in Strength of Primary Supporting Structures** **4.3.2 Maximum Load Condition** **4.3.2.2 External Pressure** For the requirements of double hull, the hydrostatic pressure and the hydrodynamic pressure at the equivalent design wave specified in **Table 4.3.2-2.** are to be considered.	

Table 4.3.2-2 External and Internal Pressure to be Considered

		$P_{DB}(kN/m^2)^{(1)(2)}$	$P_{DS}(kN/m^2)^{(1)(2)}$
Double bottom	$S1^{(3)}$	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$
	$S2$	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$

Notes:
P_{exs}, P_{exw}: Hydrostatic and Hydrodynamic pressure (kN/m^2) act on bottom shell in case of P_{DB}. Those values act on side shell in case of P_{DS}. Each value is calculated in accordance with **4.6.2.4, Part 1**.

(1) Load calculation points for calculating each component of loads such as P_{exs} are to be in accordance with **7.3.1.5, Part 1** for all loading conditions.
(2) When calculating loads, $T_{LC} = T_{SC}$.
(3) P_{exw} is to be not less than the value of P_{exw} for HM-2 at x_G, which is the X coordinate (m) at the centre of gravity of the ship.

Remarks: Amendment (8) Assessments for double hull Structures

See the remark of amended-original requirements comparison table in Table 4.4.2-2, Chapter 4 , Part2-1.

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
EFFECTIVE DATE AND APPLICATION **1.** Effective date of this amendment is [the date 6 months from the date of establishment]. **2.** Notwithstanding the amendments to the Amendments, the current requirements apply to ships for which the date of contract for construction is before the effective date. **3.** Notwithstanding the provision of preceding **2.**, the amendments to the Amendments may apply to ships for which the date of contract for construction is before the effective date upon requests.		