

Amendment on 20 June 2025

Resolved by Technical Committee on 29 January 2025

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 amendment applies to ships for which the date of contract for construction is on or after 20 December 2025.
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 <u>unrestricted service</u>. 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.

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
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 <i>m</i>. When Old Part C is applied, “<i>Advanced Structural Rules</i>” (abbreviated to <i>ASR</i>) 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.	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 <i>m</i>. When Old Part C is applied, “<i>Advanced Structural Rules</i>” (abbreviated to <i>ASR</i>) 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.	

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 1.4.2-2 Ship's Main Data			Table 1.4.2-2 Ship's Main Data			Amendment (9) Clarifies some definitions and corrects typographical errors: Adds the definition of bow draught in the ballast condition
Symbol	Meaning	Unit	Symbol	Meaning	Unit	
(Omitted)			(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 <i>Regulation 18 of Annex I to the MARPOL Convention</i> .	m	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 <i>Regulation 18 of Annex I to the MARPOL Convention</i> .	m	
T_{BAL-F}	<u>Bow draught in the ballast condition</u>	$\underline{m}$				
T_{LC}	Midship draught in the loading condition to be considered	m	T_{LC}	Midship draught in the loading condition to be considered	m	
(Omitted)			(Omitted)			
Table 1.4.2-4 Loads			Table 1.4.2-4 Loads			Amendment (9) Clarifies some definitions and corrects typographical errors: Clarifies the definition of deck load
Symbol	Meaning	Unit	Symbol	Meaning	Unit	
(Omitted)			(Omitted)			
P_{dk}	<u>Design uniform load due to cargoes, stores or other equipment loaded on deck.</u>	kN/m^2	P_{dk}	<u>Deck load due to unspecified cargoes or stores loaded on general cargo ships and the like</u>	kN/m^2	
(Omitted)			(Omitted)			
1.4.2.5 Scantlings			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 .			Unless otherwise specified, the symbols regarding scantlings and their units used in Part C are those defined in Table 1.4.2-5 .			

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												
Table 1.4.2-5 Scantlings <table border="1"> <thead> <tr> <th>Symbol</th><th>Meaning</th><th>Unit</th></tr> </thead> <tbody> <tr> <td colspan="3">(Omitted)</td></tr> <tr> <td>d_e</td><td>Distance from the upper edge of the web to the top of the flange for L3 profiles</td><td>mm</td></tr> <tr> <td colspan="3">(Omitted)</td></tr> </tbody> </table>		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
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)														
Annex 1.1 SPECIAL REQUIREMENTS FOR RESTRICTED SERVICE 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 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	Annex 1.1 SPECIAL REQUIREMENTS FOR RESTRICTED SERVICE An1 General 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 L_f of 80 m or more that do not satisfy the requirements regarding damage stability as stipulated in the SOLAS have been transferred from Chapter 2. In accordance with												

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
the hull. (a) <u>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.</u> (b) <u>Ships having conveyor systems for handling cargoes may omit all hold bulkheads, if necessary.</u> (c) <u>Ships other than those specified above are, as a rule, not regarded as special type ships.</u>		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 Part CS, so there is no change. Transferred from Ch.2.

Table An4 Total Number of Watertight Bulkheads

<u>L_C (m)</u>		<u>Total number of watertight bulkheads</u>
<u>not less than</u>	<u>less than</u>	
<u>90</u>	<u>102</u>	<u>5</u>
<u>102</u>	<u>123</u>	<u>6</u>
<u>123</u>	<u>143</u>	<u>7</u>
<u>143</u>	<u>165</u>	<u>8</u>
<u>165</u>	<u>186</u>	<u>9</u>
<u>186</u>	<u>200</u>	The number of bulkheads arranged in accordance with Notes (1)
<u>200</u>		The number of bulkheads arranged in accordance with Note (1) and (2)
<u>Notes</u>		
(1) <u>The ship has sufficient transverse strength of the hull.</u>		
(2) <u>The number of bulkheads are to be deemed appropriate by the Society.</u>		

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 2 GENERAL ARRANGEMENT DESIGN 2.2 Subdivision Arrangement 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. (Deleted) (Deleted)	Chapter 2 GENERAL ARRANGEMENT DESIGN 2.2 Subdivision Arrangement 2.2.1 Arrangement of Watertight Bulkheads 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) <u>Ships complying with the requirements in 2.3 (including ships specified in 2.3.1.1(1) to (3))</u> (2) <u>Tankers in compliance with the requirements of 3.2.2, Part 3 of the Rules for Marine Pollution Prevention Systems</u> (3) <u>Ships carrying liquefied gases in bulk or ships carrying dangerous chemicals in bulk</u> (4) <u>Ships in compliance with the requirements in An2.1, Annex 1.1, Part 2-2 “Additional Requirements for Bulk Carriers under SOLAS Chapter XII”</u> 2 <u>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.</u> 3 Where it is impracticable to adhere to -2 above due to	Clarifies that ships which applies to Part C are required to have watertight bulkheads to satisfy the requirements regarding damage stability. Transferred to Annex 1.1, An1.3.1.

Amended-Original Requirements Comparison Table
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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.	

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Amended	Original	Remarks																										
(Deleted)	<table><tr><th colspan="2">Table 2.2.1-1 Number of Watertight Bulkheads</th></tr><tr><th><u>L_C (m)</u></th><th><u>Total number of watertight bulkheads</u></th></tr><tr><td><u>not less than</u></td><td></td></tr><tr><td><u>90</u> <u>102</u></td><td><u>5</u></td></tr><tr><td><u>102</u> <u>123</u></td><td><u>6</u></td></tr><tr><td><u>123</u> <u>143</u></td><td><u>7</u></td></tr><tr><td><u>143</u> <u>165</u></td><td><u>8</u></td></tr><tr><td><u>165</u> <u>186</u></td><td><u>9</u></td></tr><tr><td><u>186</u> <u>200</u></td><td><u>The number of bulkheads arranged in accordance with Notes (1) and (2)</u></td></tr><tr><td><u>200</u></td><td><u>The number of bulkheads arranged in accordance with Note (2)</u></td></tr><tr><td colspan="2"><u>(Notes)</u></td></tr><tr><td colspan="2"><u>(1) The ship has sufficient transverse strength of the hull.</u></td></tr><tr><td colspan="2"><u>(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.</u></td></tr></table>	Table 2.2.1-1 Number of Watertight Bulkheads		<u>L_C (m)</u>	<u>Total number of watertight bulkheads</u>	<u>not less than</u>		<u>90</u> <u>102</u>	<u>5</u>	<u>102</u> <u>123</u>	<u>6</u>	<u>123</u> <u>143</u>	<u>7</u>	<u>143</u> <u>165</u>	<u>8</u>	<u>165</u> <u>186</u>	<u>9</u>	<u>186</u> <u>200</u>	<u>The number of bulkheads arranged in accordance with Notes (1) and (2)</u>	<u>200</u>	<u>The number of bulkheads arranged in accordance with Note (2)</u>	<u>(Notes)</u>		<u>(1) The ship has sufficient transverse strength of the hull.</u>		<u>(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.</u>		Transferred to Annex 1.1, Table An4.
Table 2.2.1-1 Number of Watertight Bulkheads																												
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<u>(1) The ship has sufficient transverse strength of the hull.</u>																												
<u>(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.</u>																												

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												
(Deleted)	Table 2.2.1-2 Permeability of Cargo Holds <table><thead><tr><th>Cargo hold condition</th><th>Permeability</th></tr></thead><tbody><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></tbody></table> (Notes) V_c: Volume (m^3) occupied by cars and/or containers V_0: Moulded volume (m^3) of the compartment	Cargo hold condition	Permeability	Empty	0.95	Loaded with general cargo	0.60	Loaded with timber	0.55	Loaded with ore	0.50	Loaded with cars or containers	$0.95 - 0.35 \times \frac{V_c}{V_0}$	
Cargo hold condition	Permeability													
Empty	0.95													
Loaded with general cargo	0.60													
Loaded with timber	0.55													
Loaded with ore	0.50													
Loaded with cars or containers	$0.95 - 0.35 \times \frac{V_c}{V_0}$													
(Deleted)	Table 2.2.1-3 Permeability of Deep Tanks <table><thead><tr><th>Tank condition</th><th>Permeability</th></tr></thead><tbody><tr><td>Empty</td><td>0.95</td></tr><tr><td>Filled</td><td>0</td></tr></tbody></table> (Note) For spaces loaded with special kinds of cargo, a suitable permeability is used depending on the kind of cargo.	Tank condition	Permeability	Empty	0.95	Filled	0							
Tank condition	Permeability													
Empty	0.95													
Filled	0													
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) t_c: Corrosion addition (mm)	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) t_c: Corrosion addition (mm)													

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
t_{gr}: Gross thickness (<i>mm</i>) h_{stf}: Height (<i>mm</i>) of stiffener or primary supporting member h_w: Web height (<i>mm</i>) of stiffener or primary supporting member t_w: Web thickness (<i>mm</i>) of stiffener or primary supporting member b_f: Face plate width (<i>mm</i>) of stiffener or primary supporting member t_f: Face plate thickness (<i>mm</i>) of stiffener or primary supporting member t_p: Thickness (<i>mm</i>) of the plating attached to a stiffener or to a primary supporting member (hereinafter referred to as “attached plating”) (Deleted) d_f: Distance (<i>mm</i>) for the shorter extension of flange for L2 profiles (See Fig. 3.3.3-1) (Omitted) 3.5 Minimum 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 and the radius gunwale	t_{gr}: Gross thickness (<i>mm</i>) h_{stf}: Height (<i>mm</i>) of stiffener or primary supporting member h_w: Web height (<i>mm</i>) of stiffener or primary supporting member t_w: Web thickness (<i>mm</i>) of stiffener or primary supporting member b_f: Face plate width (<i>mm</i>) of stiffener or primary supporting member t_f: Face plate thickness (<i>mm</i>) of stiffener or primary supporting member t_p: Thickness (<i>mm</i>) of the plating attached to a stiffener or to a primary supporting member (hereinafter referred to as “attached plating”) <u>d_e: Distance (<i>mm</i>) from the upper edge of the web to the top of the flange for L3 profiles (See Fig. 3.3.3-1)</u> d_f: Distance (<i>mm</i>) for the shorter extension of flange for L2 profiles (See Fig. 3.3.3-1) (Omitted) 3.5 Minimum 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 and the radius gunwale	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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
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. 4 <u>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>	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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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 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 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))

Amended	Original	Remarks														
<table><tr><th colspan="2">Table 4.2.4-1 Envelope Accelerations a_{xe}, a_{ye} and a_{ze} at Any Position</th></tr><tr><th>Direction</th><th>Envelope acceleration a_{xe}, a_{ye} and a_{ze} (m/s^2)</th></tr><tr><td>Longitudinal direction</td><td>$a_{xe} = 0.35\sqrt{a_1^2 + [g \cdot \sin \phi + a_5(z - z_G)]^2}$</td></tr><tr><td>Transverse direction</td><td>$a_{ye} = \sqrt{a_2^2 + [g \cdot \sin \theta + a_4(z - z_G)]^2}$</td></tr><tr><td>Vertical direction</td><td>$a_{ze} = \sqrt{a_3^2 + \{\max(0, C_{SS}[-g(1 - \cos \phi) + a_5 x - x_G])\}^2 + [\max(0, -g(1 - \cos \theta) + a_4 y)]^2}$</td></tr><tr><td colspan="2">Notes: x_G: X coordinate (m) at the centre of gravity of the ship to be taken as $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. 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: $C_{SS} = \min\left(0.3 + \frac{L_C}{325}, 1.0\right)$</td></tr><tr><td colspan="2">(1) The relevant requirements in Part 2 may be applied where the value is not available.</td></tr></table>		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	$a_{ze} = \sqrt{a_3^2 + \{\max(0, C_{SS}[-g(1 - \cos \phi) + a_5 x - x_G])\}^2 + [\max(0, -g(1 - \cos \theta) + a_4 y)]^2}$	Notes: x_G : X coordinate (m) at the centre of gravity of the ship to be taken as $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. 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.		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
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	$a_{ze} = \sqrt{a_3^2 + \{\max(0, C_{SS}[-g(1 - \cos \phi) + a_5 x - x_G])\}^2 + [\max(0, -g(1 - \cos \theta) + a_4 y)]^2}$															
Notes: x_G : X coordinate (m) at the centre of gravity of the ship to be taken as $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. 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.																
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	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 general cargo ships, etc.</u>, is to be obtained from the following formula, but not to	Amendment (9) Clarifies some definitions and corrects typographical errors:														

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																												
be less than 0. $P_{dk} = P_{dks} + P_{dkd}$ P_{dks}: Static pressure (kN/m^2) due to <u>cargoes, stores or other equipment loaded on deck</u>, as specified in Table 4.4.2-2 P_{dkd}: Dynamic pressure (kN/m^2) due to <u>cargoes, stores or other equipment loaded on deck</u>, as specified in Table 4.4.2-2 Table 4.4.2-2 Lateral Loads <table><tr><th rowspan="2">External pressure P_{ex}</th><th>Internal pressure P_{in}</th><th colspan="2">Deck loads P_{dk} and P_{GW}</th></tr><tr><th>(Omitted)</th><th><u>Design uniform load due to cargoes, stores or other equipment loaded on deck</u></th><th>Green sea pressure</th></tr><tr><td>P_{exs} (4.4.2.3-1)</td><td>(Omitted)</td><td>P_{dks} (4.4.2.7-1)</td><td rowspan="2">P_{GW} (4.4.2.8)</td></tr><tr><td>P_{exw} (4.4.2.3-2)</td><td>(Omitted)</td><td>P_{dkd} (4.4.2.7-2)</td></tr></table> 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.	External pressure P_{ex}	Internal pressure P_{in}	Deck loads P_{dk} and P_{GW}		(Omitted)	<u>Design uniform load due to cargoes, stores or other equipment loaded on deck</u>	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)	be less than 0. $P_{dk} = P_{dks} + P_{dkd}$ P_{dks}: Static pressure (kN/m^2) due to <u>unspecified cargoes and stores in general cargo ships</u>, as specified in Table 4.4.2-2 P_{dkd}: Dynamic pressure (kN/m^2) due to <u>unspecified cargoes and stores in general cargo ships</u>, as specified in Table 4.4.2-2 Table 4.4.2-2 Lateral Loads <table><tr><th rowspan="2">External pressure P_{ex}</th><th>Internal pressure P_{in}</th><th colspan="2">Deck loads P_{dk} and P_{GW}</th></tr><tr><th>(Omitted)</th><th><u>Unspecified cargoes and stores in general cargo ships, etc.</u></th><th>Green sea pressure</th></tr><tr><td>P_{exs} (4.4.2.3-1)</td><td>(Omitted)</td><td>P_{dks} (4.4.2.7-1)</td><td rowspan="2">P_{GW} (4.4.2.8)</td></tr><tr><td>P_{exw} (4.4.2.3-2)</td><td>(Omitted)</td><td>P_{dkd} (4.4.2.7-2)</td></tr></table> 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.	External pressure P_{ex}	Internal pressure P_{in}	Deck loads P_{dk} and P_{GW}		(Omitted)	<u>Unspecified cargoes and stores in general cargo ships, etc.</u>	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)	Clarifies the definition of deck load
External pressure P_{ex}		Internal pressure P_{in}	Deck loads P_{dk} and P_{GW}																											
	(Omitted)	<u>Design uniform load due to cargoes, stores or other equipment loaded on deck</u>	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)																												
External pressure P_{ex}	Internal pressure P_{in}	Deck loads P_{dk} and P_{GW}																												
	(Omitted)	<u>Unspecified cargoes and stores in general cargo ships, etc.</u>	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)																												

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 4.4.2-4 Hydrodynamic Pressure P_{exw} <table><tr><th>Position under consideration</th><th>Hydrodynamic pressure P_{exw} (kN/m²)</th></tr><tr><td>$z \leq T_{SC}$</td><td>$P_{exw} = 0.5C_R C_{NL} C_{WD} \left[(P_d - P_c) \cos \left(\left(2 - \frac{z}{T_{SC}} - C_{yB} \right) \frac{\pi}{2} \right) + (P_d + P_c) \right]$</td></tr><tr><td>$T_{SC} < z \leq T_{SC} + h_W$</td><td>$P_{WL} - \rho g(z - T_{SC})$</td></tr><tr><td>$z > T_{SC} + h_W$</td><td>0</td></tr></table> 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 <i>HF</i>, For $x/L_C \leq 0.2$, $C_{WD} = (-2.6 - 1.2C_{yB}) \frac{x}{L_C} + 1.0$ For $0.2 < x/L_C \leq 0.4$, $C_{WD} = (2.6 - 1.8C_{yB}) \frac{x}{L_C} - 0.04 + 0.12C_{yB}$ For $0.4 < x/L_C \leq 0.5$, $C_{WD} = 1.0 - 0.6C_{yB}$ For $0.5 < x/L_C \leq 0.7$, $C_{WD} = (-1.9 + 1.1C_{yB}) \frac{x}{L_C} + 1.95 - 1.15C_{yB}$ For $0.7 < x/L_C$, $C_{WD} = (1.27 + 1.26C_{yB}) \frac{x}{L_C} - 0.27 - 1.26C_{yB}$ C_{yB}: Ratio of the <i>Y</i> 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 (<i>m</i>) 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 <i>RP</i>, For $x/L_C \leq 0.32$, $C_{WD} = \left(2.15 - 1.4 \frac{z}{T_{SC}} - 0.25C_{yB} \right) \frac{x}{L_C} + 0.32 + 0.13 \frac{z}{T_{SC}} + 0.15C_{yB}$ For $0.32 < x/L_C \leq 0.7$, $C_{WD} = 0.75 - 0.15 \frac{z}{T_{SC}} + 0.1C_{yB}$ 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 $x/L_C \leq 0.3$, $P_d = 7.292T_{SC} + 1.109B + 69.68 + (0.7315L_C + 146.2) \left(\frac{x}{L_C} - 0.3 \right)$ <td> Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the case division of C_{WD} in RP </td>		Position under consideration	Hydrodynamic pressure P_{exw} (kN/m ²)	$z \leq T_{SC}$	$P_{exw} = 0.5C_R C_{NL} C_{WD} \left[(P_d - P_c) \cos \left(\left(2 - \frac{z}{T_{SC}} - C_{yB} \right) \frac{\pi}{2} \right) + (P_d + P_c) \right]$	$T_{SC} < z \leq T_{SC} + h_W$	$P_{WL} - \rho g(z - T_{SC})$	$z > T_{SC} + h_W$	0	Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the case division of C_{WD} in RP
Position under consideration	Hydrodynamic pressure P_{exw} (kN/m ²)									
$z \leq T_{SC}$	$P_{exw} = 0.5C_R C_{NL} C_{WD} \left[(P_d - P_c) \cos \left(\left(2 - \frac{z}{T_{SC}} - C_{yB} \right) \frac{\pi}{2} \right) + (P_d + P_c) \right]$									
$T_{SC} < z \leq T_{SC} + h_W$	$P_{WL} - \rho g(z - T_{SC})$									
$z > T_{SC} + h_W$	0									

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
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 <u>cargoes, stores or other equipment loaded on deck</u> 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 <u>cargoes, stores or other equipment loaded on deck</u> 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 <u>Unspecified Cargoes and Stores on General Cargo Ships, etc.</u> 1 Static pressure P_{dks} (kN/m^2) due to <u>unspecified cargoes and stores on general cargo ships, etc.</u> 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 <u>unspecified cargoes and stores on general cargo ships, etc.</u> 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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> 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). 2 Hydrodynamic pressure P_{exw} specified in the following (1) to (4) is to be considered. (1) Hydrodynamic pressure in equivalent design wave HM is to be in accordance with Table 4.6.2-6 (See Fig. 4.6.2-1). (2) Hydrodynamic pressure in equivalent design wave FM is to be in accordance with Table 4.6.2-7 (See Fig.	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 obtaining the dynamic pressure, the values of K_{xx}, GM, etc. may be calculated by the following formulae:</u> $K_{xx} = 0.35B$ $GM = \frac{T_{SC}}{2} + \frac{B^2}{T_{SC}C_B} \frac{3C_W - 1}{24} - z_G$ $T_{LC} = T_{SC}$ $z_G = 0.25 \frac{B}{C_B}$ 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). 2 Hydrodynamic pressure P_{exw} specified in the following (1) to (4) is to be considered. (1) Hydrodynamic pressure in equivalent design wave HM is to be in accordance with Table 4.6.2-6 (See Fig. 4.6.2-1). (2) Hydrodynamic pressure in equivalent design wave FM is to be in accordance with Table 4.6.2-7 (See Fig.	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. 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													
4.6.2-2). (3) Hydrodynamic pressure in equivalent design wave <i>BR</i> is to be in accordance with Table 4.6.2-8 (See Figs. 4.6.2-3 and 4.6.2-4). (4) Hydrodynamic pressure in equivalent design wave <i>BP</i> is to be in accordance with Table 4.6.2-9 (See Figs. 4.6.2-5 and 4.6.2-6).	4.6.2-2). (3) Hydrodynamic pressure in equivalent design wave <i>BR</i> is to be in accordance with Table 4.6.2-8 (See Figs. 4.6.2-3 and 4.6.2-4). (4) Hydrodynamic pressure in equivalent design wave <i>BP</i> is to be in accordance with Table 4.6.2-9 (See Figs. 4.6.2-5 and 4.6.2-6).														
Table 4.6.2-6 Hydrodynamic Pressure P_{exw} in Equivalent Design Wave <i>HM</i> <table><tr><th rowspan="2"></th><th colspan="3">Hydrodynamic pressure P_{exw} (kN/m^2)</th></tr><tr><th>$z \leq T_{LC}$</th><th>$T_{LC} < z \leq T_{LC} + h_W$</th><th>$z > T_{LC} + h_W$</th></tr><tr><td><i>HM-1</i></td><td>$P_{exw} = \max(-P_{HM}, \rho g(z - T_{LC}))$</td><td rowspan="2">$P_{WL} - \rho g(z - T_{LC})$</td><td rowspan="2">0</td></tr><tr><td><i>HM-2</i></td><td>$P_{exw} = \max(P_{HM}, \rho g(z - T_{LC}))$</td></tr></table> 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: $P_{HM3} = -\rho g R_{5_HM} (x - x_G)(-0.002\lambda_{HM} + 1.0)$ 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: <i>X</i> coordinate (<i>m</i>) at the centre of gravity of the ship, to be taken as $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. The value calculated based on the weight distribution corresponding to the loading condition under consideration may be used. (Omitted)				Hydrodynamic pressure P_{exw} (kN/m^2)			$z \leq T_{LC}$	$T_{LC} < z \leq T_{LC} + h_W$	$z > T_{LC} + h_W$	<i>HM-1</i>	$P_{exw} = \max(-P_{HM}, \rho g(z - T_{LC}))$	$P_{WL} - \rho g(z - T_{LC})$	0	<i>HM-2</i>	$P_{exw} = \max(P_{HM}, \rho g(z - T_{LC}))$
	Hydrodynamic pressure P_{exw} (kN/m^2)														
	$z \leq T_{LC}$	$T_{LC} < z \leq T_{LC} + h_W$	$z > T_{LC} + h_W$												
<i>HM-1</i>	$P_{exw} = \max(-P_{HM}, \rho g(z - T_{LC}))$	$P_{WL} - \rho g(z - T_{LC})$	0												
<i>HM-2</i>	$P_{exw} = \max(P_{HM}, \rho g(z - T_{LC}))$														
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	4.6.2.5 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														

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
4.6.2-11. 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.		4.6.2-11. 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.		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 4.6.2-14 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-1P	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-2P	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-1S	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-2S	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-1P	0	$-0.002\lambda_{BP}g \cdot \sin \theta$ $-0.3a_2 - 0.3a_4(z - z_G)$	$[1 - 1.6\exp(-0.012\lambda_{BP})]a_3$ $+0.3a_4y$

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
	<i>BP-2P</i>	0	$0.002\lambda_{BP}g \cdot \sin \theta + 0.3a_2 + 0.3a_4(z - z_G)$	$[-1 + 1.6\exp(-0.012\lambda_{BP})]a_3 - 0.3a_4y$		
	<i>BP-1S</i>	0	$0.002\lambda_{BP}g \cdot \sin \theta + 0.3a_2 + 0.3a_4(z - z_G)$	$[1 - 1.6\exp(-0.012\lambda_{BP})]a_3 - 0.3a_4y$		
	<i>BP-2S</i>	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 $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. 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						
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.				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.		

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 4.7.2-9 Accelerations a_x, a_y and a_z at Any Position					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.
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-1P	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-2P	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-1S	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-2S	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-1P	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-2P	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-1S	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-2S	0	$-0.002\lambda_{BP}g \cdot \sin \theta$ $-0.3a_2 - 0.3a_4(z - z_G)$	$[-1 + 1.6\exp(-0.012\lambda_{BP})]a_3$ $+0.3a_4y$	

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 $x_G = 0.45(0.36 + 0.2C_{BLC})L_C$. 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		
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 with $T_{BAL-F}(m)$ 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 with $T_{BAL-F}(m)$ 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 with $T_{BAL-F}(m)$ greater than $0.025L_{C230}$ but less than $0.037L_{C230}$, the requirements specified in	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 having a bow draught less than $0.037L_{C230}$ in the ballast condition, 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 having a bow draught equal to or less than $0.025L_{C230}$ in the ballast condition, the bottom slamming load P_{SL1} (kN/m^2) specified in Table 4.8.2-1 is to be considered. In ships having a bow draught greater than $0.025L_{C230}$ but less than	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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
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/m²) and P_{SL2B} (kN/m²) are to be as specified in Table 4.8.2-2. However, (1) above may be applied for ships that can be expected 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/m²) 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/m²), P_{SL4B} (kN/m²) and P_{SL4C} (kN/m²) specified in Table 4.8.2-4 are to be considered.	$0.037L_{C230}$ <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/m²) and P_{SL2B} (kN/m²) are to be as specified in Table 4.8.2-2. However, (1) above may be applied for ships that can be expected 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/m²) 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/m²), P_{SL4B} (kN/m²) and P_{SL4C} (kN/m²) 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⁾	$P_{SL1} = 2.48 \frac{L_C C_{SL1A} C_{SL2}}{\beta_1}$	
Notes: C_{SL1A} : Coefficient, as specified in Table 4.8.2-5 C_{SL2} : Coefficient, as given by the following formula: For $\frac{V}{\sqrt{L_C}} \leq 1.0$, 0.4 For $1.0 < \frac{V}{\sqrt{L_C}} < 1.3$, $0.667 \frac{V}{\sqrt{L_C}} - 0.267$ For $\frac{V}{\sqrt{L_C}} \geq 1.3$, $1.5 \frac{V}{\sqrt{L_C}} - 1.35$ 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 $T_{BAL-F}(m)$ is not more than $0.025L_{C230}$ in the ballast condition. For ships where the bow draught $T_{BAL-F}(m)$ 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} <table><tr><th>Structural member under consideration</th><th>Bottom slamming impact pressures P_{SL2A} and P_{SL2B} (kN/m²)</th></tr><tr><td>Stiffeners attached to outer shell and bottom longitudinals⁽¹⁾</td><td>$P_{SL2A} = 2.48 \frac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_1}$</td></tr><tr><td>Floor⁽²⁾</td><td>$P_{SL2B} = 2.48 \frac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_2}$</td></tr></table> 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{T_{BAL-F} T_{BAL-F}}{0.025 L_C}$$T_{BAL-F}$: Minimum bow draught (m) in the ballast condition β_2: Coefficient, as given by the following formula⁽³⁾: <u>(a) In cases where $T_{BAL-F} \leq 0.025 L_C$</u> $\beta_2 = 0.0025 L_C / b_1$<u>$b_1$: 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 $0.0025 L_C$, at the transverse section of the hull $0.2 L_C$ aft from the fore end. Where the bow draught is greater than $0.025 L_C$ but less than $0.037 L_C$ in ballast condition, the bow draught in the actual condition is to be used to calculate the horizontal line</u> <u>As specified in Table 4.8.2-1 (See Fig. 4.8.2-1).</u> <u>(b) In cases where $0.025 L_C < T_{BAL-F} < 0.037 L_C$</u> $\beta_2 = 0.1 T_{BAL-F} / b_2$<u>$b_2$: 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 $0.1 T_{BAL-F}$, at the transverse section of the hull $0.2 L_C$ aft from the fore end (See Fig. 4.8.2-1).</u> (1) Formula for ships where the bow draught T_{BAL-F} is not more than $0.025 L_C$ in the ballast condition. For ships where the bow draught T_{BAL-F} is more than $0.025 L_C$ but less than $0.037 L_C$ 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 $0.037 L_C$ 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.		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⁾	$P_{SL2A} = 2.48 \frac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_1}$	Floor ⁽²⁾	$P_{SL2B} = 2.48 \frac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_2}$	Amendment (9) Clarifies some definitions and corrects typographical errors: Clarifies the case of $0.025 L_C < T_{BAL-F} < 0.037 L_C$ in calculating bottom slamming impact pressure
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⁾	$P_{SL2A} = 2.48 \frac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_1}$							
Floor ⁽²⁾	$P_{SL2B} = 2.48 \frac{L_C C_{SL1B} C_{SL2} C_{SL3}}{\beta_2}$							

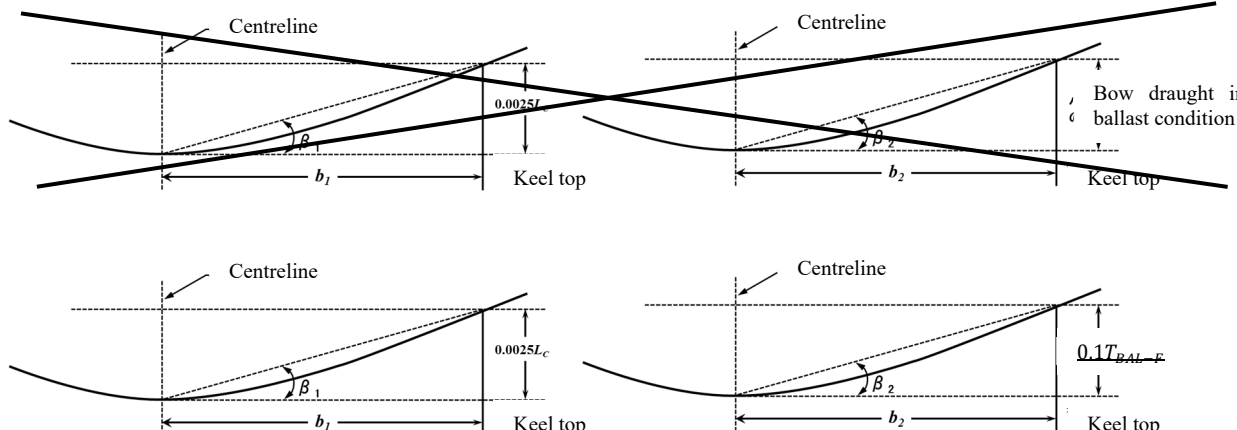
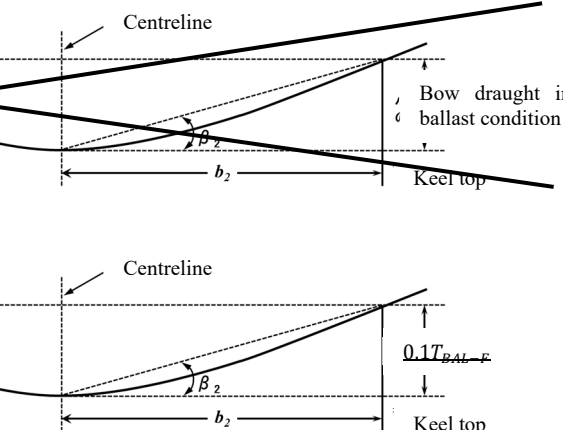
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks											
Table 4.8.2-3 Bottom Slamming Impact Pressure P_{SL3} <table><tr><th>Structural member under consideration</th><th>Bottom slamming impact pressure P_{SL3} (kN/m^2)</th></tr><tr><td>Stiffeners attached to outer shell and bottom longitudinals⁽¹⁾⁽²⁾</td><td>$P_{SL3} = 1.14 \frac{V_{SL}^2}{\beta_3}$</td></tr><tr><td colspan="2">Notes: (Omitted)</td></tr><tr><td colspan="2">(1) Formula for ships where the bow draught T_{BAL-E} is not more than $0.025L_{C230}$ in the ballast condition. For ships where the bow draught T_{BAL-E} 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.</td></tr><tr><td colspan="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$)</td></tr></table>			Structural member under consideration	Bottom slamming impact pressure P_{SL3} (kN/m^2)	Stiffeners attached to outer shell and bottom longitudinals ⁽¹⁾⁽²⁾	$P_{SL3} = 1.14 \frac{V_{SL}^2}{\beta_3}$	Notes: (Omitted)		(1) Formula for ships where the bow draught T_{BAL-E} is not more than $0.025L_{C230}$ in the ballast condition. For ships where the bow draught T_{BAL-E} 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)		
Structural member under consideration	Bottom slamming impact pressure P_{SL3} (kN/m^2)												
Stiffeners attached to outer shell and bottom longitudinals ⁽¹⁾⁽²⁾	$P_{SL3} = 1.14 \frac{V_{SL}^2}{\beta_3}$												
Notes: (Omitted)													
(1) Formula for ships where the bow draught T_{BAL-E} is not more than $0.025L_{C230}$ in the ballast condition. For ships where the bow draught T_{BAL-E} 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 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 4.8.2-4 Bottom Slamming Impact Pressures P_{SL4A} , P_{SL4B} and P_{SL4C} for Special Types of Construction																																	
<table><tr><th colspan="2">Ship and structural member</th><th>Bottom slamming impact pressure (kN/m^2)</th></tr><tr><td rowspan="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</td><td>Floor of longitudinal framing system</td><td>$P_{SL4A} = C_{SL7}P_{SL2B}$</td></tr><tr><td>Girder of transverse framing system</td><td>$P_{SL4A} = P_{SL2B}$</td></tr><tr><td>General</td><td rowspan="3">Floors and girders⁽¹⁾</td><td>$P_{SL4B} = \max (C_{SL8}P_{SL1}, P_{\min})$</td></tr><tr><td>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</td><td>$P_{SL4B} = \max (C_{SL8}P_{SL2B}, P_{\min})$</td></tr><tr><td>Ships where L_C is not less than 150 m and C_B is not less than 0.7</td><td>$P_{SL4B} = \max (C_{SL8}P_{SL3}, P_{\min})$</td></tr><tr><td>General</td><td rowspan="3">Stiffeners attached to outer shell or bottom longitudinals⁽²⁾</td><td>$P_{SL4C} = \max (C_{SL7}P_{SL1}, P_{\min})$</td></tr><tr><td>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</td><td>$P_{SL4C} = \max (C_{SL7}P_{SL2A}, P_{\min})$</td></tr><tr><td>Ships where L_C is not less than 150 m and C_B is not less than 0.7</td><td>$P_{SL4C} = \max (C_{SL7}P_{SL3}, P_{\min})$</td></tr><tr><td colspan="3">Notes: (Omitted)</td><td></td></tr><tr><td colspan="3"> (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. </td><td></td></tr></table>				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.			
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.																																	

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
Fig. 4.8.2-1. Measuring Method of b_1 and b_2  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)	Fig. 4.8.2-1. Measuring Method of b_1 and b_2  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)	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 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 4.8.2-13 Equivalent Pressure for Plate Panels and Sloshing Loads Due to Pitch		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
Relevant ship motion	Equivalent pressure (kN/m^2)	
Pitch	$P_{slh-p} = \frac{F_{slh-p}}{C_{slh1} \cdot \min(1000, C_{slh2})} \cdot 10^6$	
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.		
		Amendment (7) Revises the simplified

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
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 $x_G = 0.45(0.36 + 0.2C_{B_{LC}})L_C$ 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 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 4.8.2-14 Equivalent Pressure for Plate Panels, Sloshing Load Due to Roll <table><tr><th>Relevant ship motion</th><th>Equivalent pressure (kN/m^2)</th></tr><tr><td>Roll</td><td>$P_{slh-r} = \frac{F_{slh-r}}{C_{slh1} \cdot \min(1000, C_{slh2})} \cdot 10^6$</td></tr></table> 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, θ, 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		Relevant ship motion	Equivalent pressure (kN/m^2)	Roll	$P_{slh-r} = \frac{F_{slh-r}}{C_{slh1} \cdot \min(1000, C_{slh2})} \cdot 10^6$	Amendment (9) Clarifies some definitions and corrects typographical errors: Deletes angle (rad) of corrugated bulkheads θ
Relevant ship motion	Equivalent pressure (kN/m^2)					
Roll	$P_{slh-r} = \frac{F_{slh-r}}{C_{slh1} \cdot \min(1000, C_{slh2})} \cdot 10^6$					

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
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 <u>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 $\sigma_{perm,i}$.</u>	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	Amendment (9) Clarifies some definitions and corrects typographical errors: Clarifies the usage of gross/net scantlings in the extent of high tensile steel

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 An1 Stresses at Baseline and Deck <table border="1"> <thead> <tr> <th>Condition</th><th>Baseline</th><th>Deck</th></tr> </thead> <tbody> <tr> <td>Seagoing</td><td>$\sigma_{bl} = \frac{ M_{SW} + M_{WV} }{I_{gr} I_{y-nso}} z_n \times 10^{-3} 10^5$</td><td>$\sigma_{dk} = \frac{ M_{SW} + M_{WV} }{I_{gr} I_{y-nso}} V_D \times 10^{-3} 10^5$</td></tr> <tr> <td>Operation in harbor/sheltered water</td><td>$\sigma_{bl} = \frac{ M_{SW-p} }{I_{gr} I_{y-nso}} z_n \times 10^{-3} 10^5$</td><td>$\sigma_{dk} = \frac{ M_{SW-p} }{I_{gr} I_{y-nso}} V_D \times 10^{-3} 10^5$</td></tr> <tr> <td colspan="3">V_D: Refer to 5.2.1.2</td></tr> </tbody> </table>			Condition	Baseline	Deck	Seagoing	$\sigma_{bl} = \frac{ M_{SW} + M_{WV} }{I_{gr} I_{y-nso}} z_n \times 10^{-3} 10^5$	$\sigma_{dk} = \frac{ M_{SW} + M_{WV} }{I_{gr} I_{y-nso}} V_D \times 10^{-3} 10^5$	Operation in harbor/sheltered water	$\sigma_{bl} = \frac{ M_{SW-p} }{I_{gr} I_{y-nso}} z_n \times 10^{-3} 10^5$	$\sigma_{dk} = \frac{ M_{SW-p} }{I_{gr} I_{y-nso}} V_D \times 10^{-3} 10^5$	V_D : Refer to 5.2.1.2		
Condition	Baseline	Deck												
Seagoing	$\sigma_{bl} = \frac{ M_{SW} + M_{WV} }{I_{gr} I_{y-nso}} z_n \times 10^{-3} 10^5$	$\sigma_{dk} = \frac{ M_{SW} + M_{WV} }{I_{gr} I_{y-nso}} V_D \times 10^{-3} 10^5$												
Operation in harbor/sheltered water	$\sigma_{bl} = \frac{ M_{SW-p} }{I_{gr} I_{y-nso}} z_n \times 10^{-3} 10^5$	$\sigma_{dk} = \frac{ M_{SW-p} }{I_{gr} I_{y-nso}} V_D \times 10^{-3} 10^5$												
V_D : Refer to 5.2.1.2														
Chapter 6 LOCAL STRENGTH 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 <u>be</u> Assessed	Chapter 6 LOCAL STRENGTH 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 <u>Be</u> Assessed													

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

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
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 <u>when $\alpha \geq 2$ or Table 6.3.2-3 when $\alpha < 2$</u>. 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 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 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	$1.07 - 0.28 \left(\frac{b}{a}\right)^2$ $1.07 - 0.28 \left(\frac{1}{\alpha}\right)^2$ 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	$1.07 - 0.28 \left(\frac{b}{a}\right)^2$ $1.07 - 0.28 \left(\frac{1}{\alpha}\right)^2$ 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	$\sqrt{\frac{1}{1 + \left(\frac{b}{a}\right)^2}}$ $\sqrt{\frac{1}{1 + \left(\frac{1}{\alpha}\right)^2}}$	
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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended				Original		Remarks
			Other members	$\frac{1}{\sqrt{1 + \left(\frac{b}{a}\right)^2}}$ $\frac{1}{\sqrt{1 + \left(\frac{1}{a}\right)^2}}$		

(Deleted)

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

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

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 6.3.2-32 Definition of C_a (for $\alpha \leq 2$)					
Member		α	C_a	ζ	η
Longitudinal hull girder structural members	Longitudinal framing system	$2 \leq \alpha$	$\left[1 - \left(\frac{ \sigma_{BM} }{\sigma_Y} \right)^\zeta \right]^\eta$	2	$\frac{1}{2}$
		$\alpha < 2$		2	$\frac{b}{a} \frac{1}{\alpha}$
	Transverse framing system	$\alpha < 2$		$\frac{2}{2} \frac{b}{a} \frac{1}{\alpha}$	1
		$2 \leq \alpha$		1	1
Other members			1.0		

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

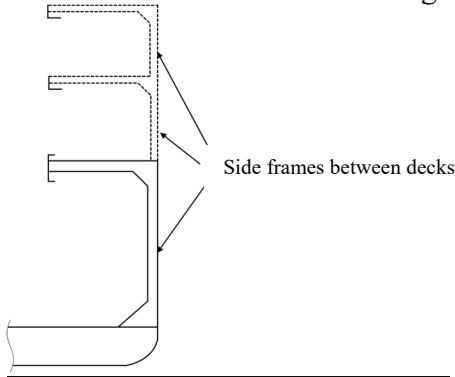
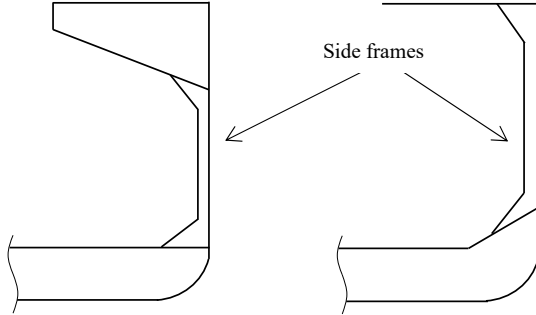
Table 6.3.2-2. and Table 6.3.2-3. are combined into one table.
In addition, the expression b/a is changed to $1/\alpha$.

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

Amended	Original	Remarks												
(2) <u>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.</u> (3) <u>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.</u>														
<u>Table 6.4.1-1 Side Frames</u> <table border="1"> <thead> <tr> <th></th><th><u>Single-deck ships</u></th><th><u>Multiple-deck ships</u></th></tr> </thead> <tbody> <tr> <td><u>Side Frames</u></td><td><u>6.4.3.2 and 6.4.3.4</u></td><td><u>6.4.2</u></td></tr> <tr> <td><u>Side frames supporting deck transverses</u></td><td><u>6.4.3.2 and 6.4.3.3</u></td><td><u>6.4.2 and 6.4.3.3</u></td></tr> <tr> <td><u>Side frames supporting cantilever beams</u></td><td><u>6.4.3.2 and 7.2.2.1</u></td><td><u>6.4.2 and 7.2.2.1</u></td></tr> </tbody> </table>			<u>Single-deck ships</u>	<u>Multiple-deck ships</u>	<u>Side Frames</u>	<u>6.4.3.2 and 6.4.3.4</u>	<u>6.4.2</u>	<u>Side frames supporting deck transverses</u>	<u>6.4.3.2 and 6.4.3.3</u>	<u>6.4.2 and 6.4.3.3</u>	<u>Side frames supporting cantilever beams</u>	<u>6.4.3.2 and 7.2.2.1</u>	<u>6.4.2 and 7.2.2.1</u>	(Newly Added)
	<u>Single-deck ships</u>	<u>Multiple-deck ships</u>												
<u>Side Frames</u>	<u>6.4.3.2 and 6.4.3.4</u>	<u>6.4.2</u>												
<u>Side frames supporting deck transverses</u>	<u>6.4.3.2 and 6.4.3.3</u>	<u>6.4.2 and 6.4.3.3</u>												
<u>Side frames supporting cantilever beams</u>	<u>6.4.3.2 and 7.2.2.1</u>	<u>6.4.2 and 7.2.2.1</u>												
6.4.1.2 Grouping of Stiffeners The scantlings of stiffeners may be decided based on the concept of grouping stiffeners of equal scantlings <u>and specified minimum yield stresses</u> 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.												

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
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  (a) Ship with multiple decks	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  (b) Single deck ship	Amendment (2) Clarifies the requirements regarding side frames: 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 <u>The scantlings of side frames in ships with multiple decks are to be in accordance with the following (1) to (4):</u> <u>(1) The scantlings of side frames between decks, except 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</u>	Amendment (2) Clarifies the requirements regarding side frames: Transferred to 6.4.1.1 due to composition

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
(Deleted)	<u>frames and the arrangement and transverse stiffness of bulkheads.</u> (2) <u>The scantlings of the lowest tier side frames are to be in accordance with 6.4.3.2.</u> (3) <u>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.</u> 3 <u>The scantlings of side frames in single deck ships are to be in accordance with the following (1) and (2):</u> (1) <u>The scantlings are to comply with the requirements in 6.4.3.2 and 6.4.3.4.</u> (2) <u>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.</u>	review 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: $Z = C_{Safety} \frac{M_1 + M_2}{\sigma_Y} \times 10^3 (cm^3)$ (Omitted)	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 <u>and the lowest tier side frames in ships with multiple decks</u> 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: $Z = C_{Safety} \frac{M_1 + M_2}{\sigma_Y} \times 10^3 (cm^3)$ (Omitted)	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

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
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 calculated at the upper end of the full length ℓ_1 of the side frame.	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 calculated at the upper end of the full length ℓ_1 of the side frame.	Amendment (2) Clarifies the requirements regarding side 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
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 P_{deck} 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	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	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 side

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
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 $z_{DH} = 0$ 7.2 Simple Girders 7.2.1 General <u>7.2.1.1 Assessment Conditions and Loads</u> <u>1</u> 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. <u>2</u> Simple girders are to be assessed for strength in each	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 $z_{DH} = 0$ 7.2 Simple Girders 7.2.1 General <u>7.2.1.1 Assessment Models</u> <u>1</u> 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. <u>2</u> 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended			Original				Remarks
<u>of the assessment conditions of the maximum load condition, testing condition and flooded condition.</u>			<u>in Chapter 7, Part 2, applied models are to be deemed appropriate by the Society.</u>				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
<u>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.</u>			<u>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.</u>				
<u>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.</u>							
Table 7.2.21-1 Assessment Conditions and Loads for Members/Compartments to be Assessed							
Compartments/members to be assessed	Typical members	Assessment condition	Loads				
			Lateral load	Load type	Load components	Refer to:	
						Load (P)	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	

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

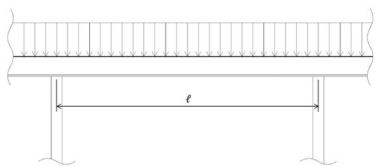
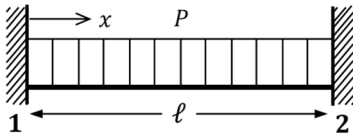
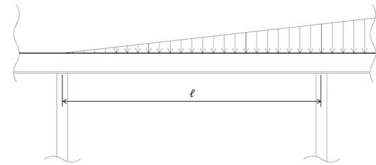
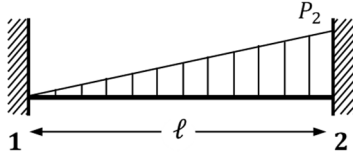
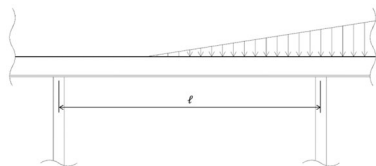
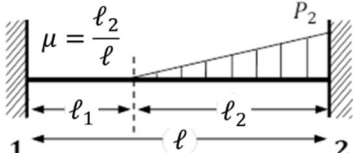
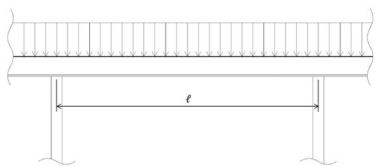
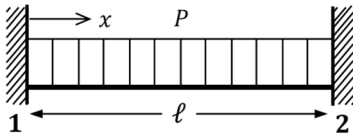
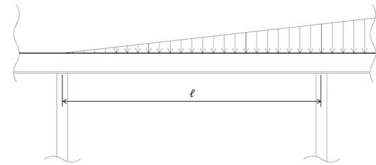
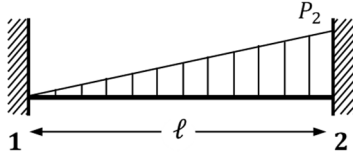
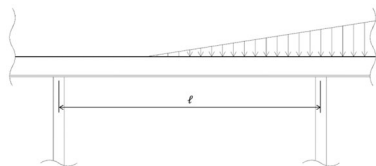
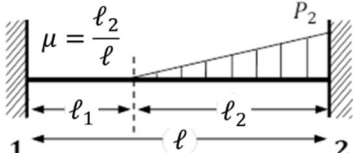
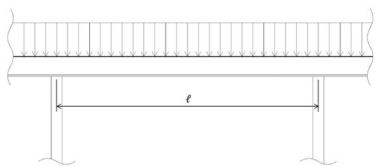
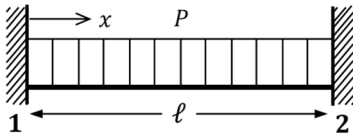
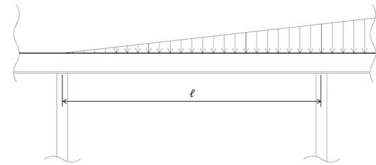
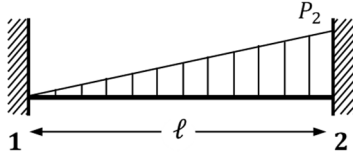
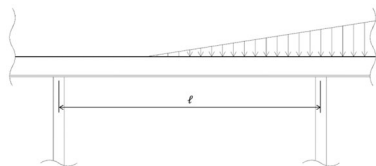
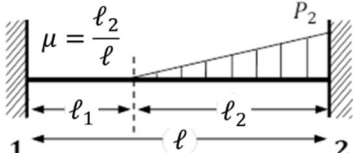
Amended				Original				Remarks
Cargo holds ⁽¹⁾	Stiffening girders, corrugated bulkheads			Dry bulk cargoes and others	Static + dynamic loads			
Single-bottomed cargo holds	Girders, floors			Unspecified Cargoes on the deck	Static + dynamic loads			
Girders on deck	Deck girders, deck transverses			Green 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	4.4.3.3	
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

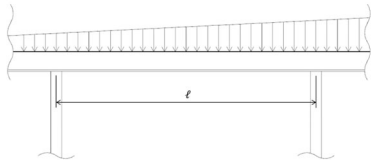
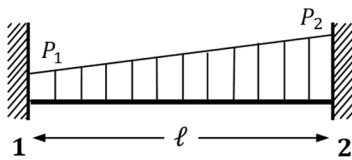
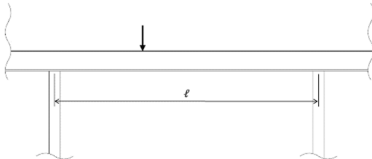
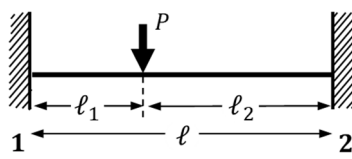
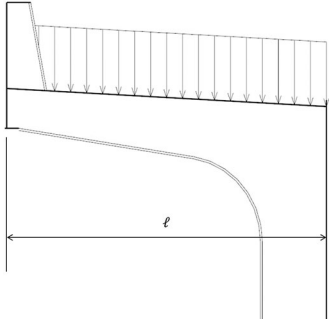
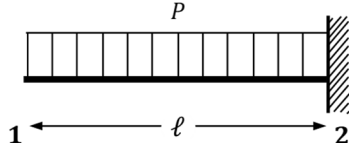
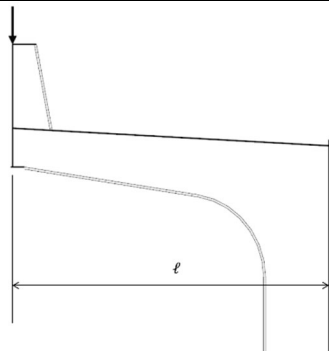
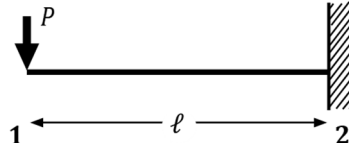
1 Girders are to be assessed by applying one of the assessment models shown in Table 7.2.1-2 as appropriate for the form of load distribution and the surrounding structural

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

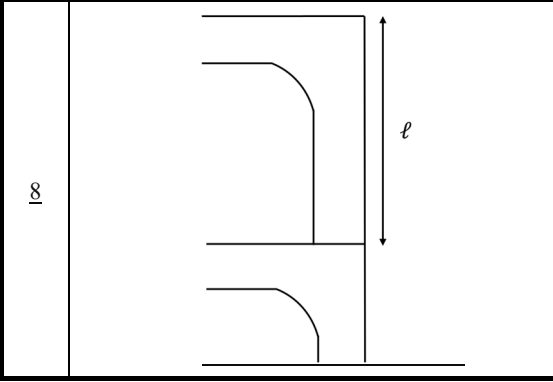
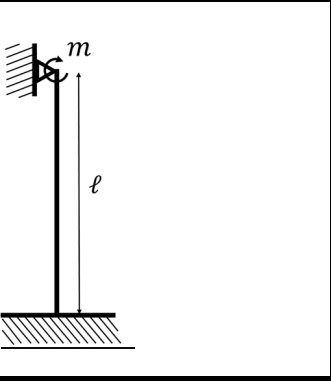
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks												
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.		simple girders. • Transferred from 7.2.1.1												
Table 7.2.1-1 Examples of Structures and Assessment Models <table> <tr> <th></th><th>Examples of structures</th><th>Assessment models</th></tr> <tr> <td>1</td><td></td><td></td></tr> <tr> <td>2</td><td></td><td></td></tr> <tr> <td>3</td><td></td><td></td></tr> </table>				Examples of structures	Assessment models	1			2			3		
	Examples of structures	Assessment models												
1														
2														
3														
		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												

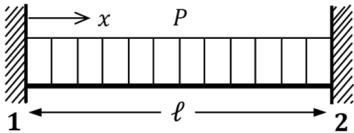
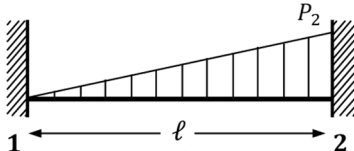
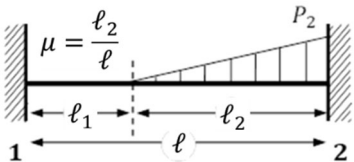
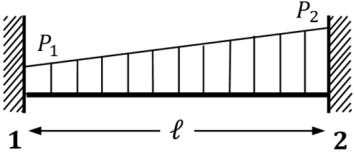
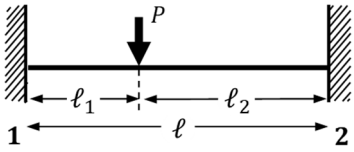
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended		Original		Remarks
	4			
	5			
	6			
	7			

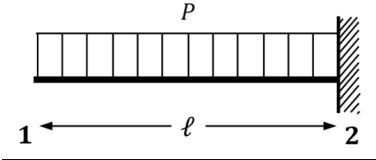
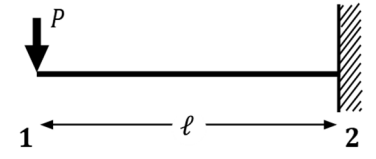
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
 <u>7.2.2 Strength Assessment</u> <u>7.2.2.1 General*</u> <u>1</u> Girders are to be assessed in accordance with <u>7.2.3 to 7.2.5</u> using the moments and shear forces given in the following (1) to (3), depending on the applicable assessment models. (1) Assessment model 1 to 7 shown in Table 7.2.1-2: Moments and shear forces are to be in accordance 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. <u>2</u> Corrugated bulkheads are to be assessed in accordance with 7.2.7.	 <u>7.2.2 Assessment Conditions and Loads</u> <u>7.2.2.1 General</u> <u>1</u> 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>2</u> 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>3</u> 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. <u>4</u> 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.	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 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 7.2.32-1 Moments and Shear Forces				
	Assessment model	M	F	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
1		$M_1 = M_2 = \frac{SP\ell_{bdg}^2}{12}$	$F_1 = F_2 = \frac{SP\ell_{shr}}{2}$	
2		$M_1 = \frac{SP_2\ell_{bdg}^2}{30}$ $M_2 = \frac{SP_2\ell_{bdg}^2}{20}$	$F_1 = \frac{3SP_2\ell_{shr}}{20}$ $F_2 = \frac{7SP_2\ell_{shr}}{20}$	
3		$M_1 = -\frac{SP_2\ell_{bdg}^2}{60}(3\mu^4 - 5\mu^3)$ $M_2 = \frac{SP_2\ell_{bdg}^2}{60}(3\mu^4 - 10\mu^3 + 10\mu^2)$	$F_1 = -\frac{SP_2\ell_{shr}}{20}(2\mu^4 - 5\mu^3)$ $F_2 = \frac{SP_2\ell_{shr}}{20}(2\mu^4 - 5\mu^3 + 10\mu)$	
4		$M_1 = \frac{S\ell_{bdg}^2}{60}(3P_1 + 2P_2)$ $M_2 = \frac{S\ell_{bdg}^2}{60}(2P_1 + 3P_2)$	$F_1 = \frac{S\ell_{shr}}{20}(7P_1 + 3P_2)$ $F_2 = \frac{S\ell_{shr}}{20}(3P_1 + 7P_2)$	
5		$M_1 = P\mu_1\mu_2^2\ell_{bdg}$ $M_2 = P\mu_1^2\mu_2\ell_{bdg}$	$F_1 = P\mu_2^2(3\mu_1 + \mu_2)$ $F_2 = P\mu_1^2(3\mu_2 + \mu_1)$	

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
6		$M_2 = \frac{SP\ell_{bdg}^2}{2}$	$F_2 = SP\ell_{shr}$	
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 7.2.21-1 to be taken as follows depending on the assessment model: Assessment Model 1: Uniform load (kN/m²) acting on the girder Assessment Model 5: Concentrated load (kN) acting on the girder <u>Assessment Model 6: Average lateral load (kN/m²) 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.</u> <u>Assessment Model 7: Load (kN) due to the cargo loaded on the hatch cover to be taken as follows:</u> $P_B = SBP_h$ B: A half of the breadth (m) of the hatch in the deck supported by deck transverses P_h: Load (kN/m²) 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 7.2.21-1 to be taken as follows depending on the assessment model: Assessment Models 2, 3 and 4: Loads (kN/m²) 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.

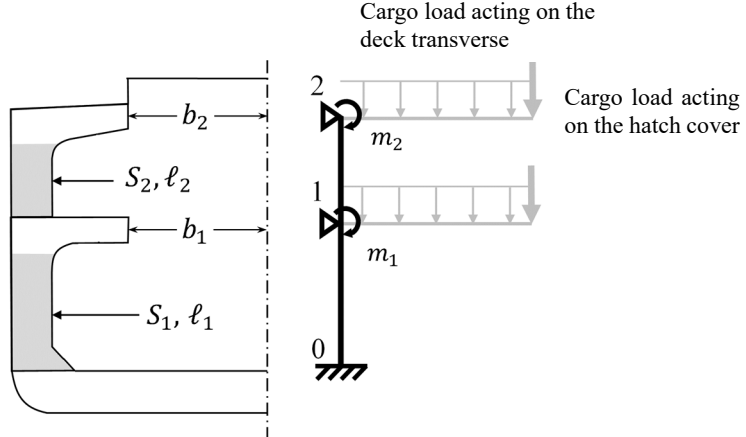
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
<u>side, single-deck ships, multi-deck ships with three or more decks:</u> i) <u>Moment</u> <u>m</u> ii) <u>Shear force</u> <u>$\frac{3 m }{2\ell}$</u> <u>m: Moment acting on the upper ends of web frames to be assessed, as follows:</u> <u>$m = M_d + M_h$</u> <u>M_d: Moment ($kN\cdot m$) 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}.</u> <u>M_h: Moment ($kN\cdot m$) 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}.</u> <u>ℓ: Span (m) of the web frame to be assessed</u> (2) <u>Web frames in double-deck ships with the first layers and the second layers being single side</u> (a) <u>Web frame in the first tier from the inner bottom plating:</u> i) <u>Moment</u> <u>$0.6 m_1$</u> ii) <u>Shear force</u>	<u>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.</u>	• Transferred to 7.2.1.1 • Transferred from 7.2.8.3 • changes the usage of variable i

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
$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		

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
Fig. 7.2.2-1 Web Frames in a Double-deck Ships <u>with the First Layers and the Second Layers being Single Side</u> 	7.2.2.3 Stress Due to Hull Girder Loads The stress σ_{BM} (N/mm^2) 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 <i>RP</i> 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)	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 Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Transferred to 7.2.3.1
(Deleted)		

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
7.2.3 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 <u>7.2.2.1</u> 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}: <u>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.</u> $\sigma_{BM} = \left[\left \frac{M_{V-HG}}{I_{y-n50}} (z - z_n) \right + \left \frac{M_{H-HG}}{I_{z-n50}} y \right \right] \times 10^5$ M_{V-HG}: <u>Hull girder load (vertical bending moment) corresponding to each assessment condition specified in Table 7.2.1-1</u> M_{H-HG}: <u>Hull girder load (horizontal bending moment) considered in maximum load</u>	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 <u>7.2.3.2</u> 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}: <u>Stress (N/mm^2) due to the hull girder load at the girder to be assessed as specified in <u>7.2.2.3</u>. However, for members other than longitudinal hull girder structural members, σ_{BM} is to be taken as 0.</u>	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Modifies the reference

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
condition, as specified in <u>4.4.2.9-2</u>. $M_{H-HG} = 0$ in load conditions other than maximum load condition. M_{WH}: Horizontal wave bending moment ($kN-m$) specified in <u>4.4.2.9-2</u> 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 <u>3.3.4</u>. 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 <u>3.3.4</u>. 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 <u>The coordinate system and the load calculation points are as given in 1.4.3.6 and 3.7.3, respectively.</u> (Deleted)	<u>7.2.3.2 Moments</u> <u>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.</u>	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Deleted due to composition review

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
7.2.4 Shear Strength 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: $t_{n50} = C_{safety} \frac{ F }{D_{sh-n50} \tau_{all}} \text{ (mm)}$ 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 <u>3.6.4.5</u> τ_{all}: Permissible shear stress (N/mm²) to be taken as follows: $\tau_{all} = \frac{235}{K\sqrt{3}}$ K: Material factor as specified in <u>3.2.1.2</u> (Deleted)	<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> 7.2.4 Shear Strength 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: $t_{n50} = C_{safety} \frac{ F }{D_{sh-n50} \tau_{all}} \text{ (mm)}$ 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 <u>3.6.4.5</u> τ_{all}: Permissible shear stress (N/mm²) to be taken as follows: $\tau_{all} = \frac{235}{K\sqrt{3}}$ K: Material factor as specified in <u>3.2.1.2</u> 7.2.4.2 Shear Forces <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>	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Modifies the reference due to composition review Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Deleted due to composition review

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
7.2.5 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 $t = \sqrt[3]{C_{Safety} \frac{ F b^2}{D_w} \frac{12(1-\nu^2)}{K_\tau \pi^2 E}} \text{ (mm)}$ 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. 7.2.5-1) 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	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 $t = \sqrt[3]{C_{Safety} \frac{ F b^2}{D_w} \frac{12(1-\nu^2)}{K_\tau \pi^2 E}} \text{ (mm)}$ 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. 7.2.5-1) 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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/mm²) (2) For girder webs provided with an opening reinforced by stiffeners in the girder span direction $t = \sqrt[3]{C_{Safety} \frac{ F b^2}{D_w - D_0} \frac{12(1 - \nu^2)}{K_\tau \pi^2 E}} \text{ (mm)}$ 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/mm²) (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/mm²) (2) For girder webs provided with an opening reinforced by stiffeners in the girder span direction $t = \sqrt[3]{C_{Safety} \frac{ F b^2}{D_w - D_0} \frac{12(1 - \nu^2)}{K_\tau \pi^2 E}} \text{ (mm)}$ 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/mm²) (3) For girder webs provided with an opening (an	

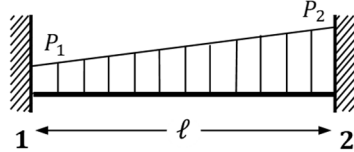
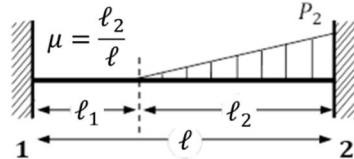
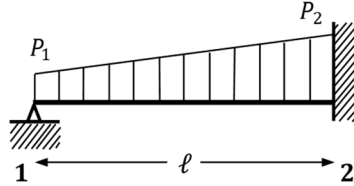
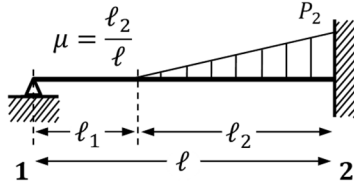
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
unreinforced opening) $t = \sqrt[3]{C_{Safety} \frac{ F b^2}{D_w} \frac{12(1-\nu^2)}{\gamma_{a_0} K_\tau \pi^2 E}} \text{ (mm)}$ 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) $t = \sqrt[3]{C_{Safety} \frac{ F b^2}{D_w} \frac{12(1-\nu^2)}{\gamma_{a_0} K_\tau \pi^2 E}} \text{ (mm)}$ 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)	

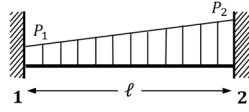
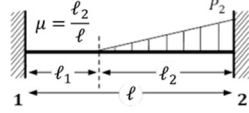
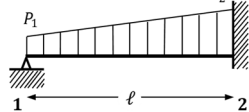
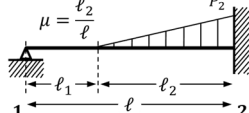
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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 <u>Cantilever beams are to comply with the following (1) and (2):</u> (1) <u>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.</u> (2) <u>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 <i>times</i> that at the toe of the end bracket.</u>	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 <table><tr><th>Member</th><th>Depths of Girders (<i>m</i>)</th></tr><tr><td>Web frame</td><td>$0.1\ell_{bdg}$</td></tr><tr><td>Web frame supporting cantilever</td><td>$0.125\ell_{bdg}$</td></tr><tr><td>Web frame supporting side stringer</td><td>$0.125\ell_{bdg}$</td></tr><tr><td>Side stringer</td><td>$0.125\ell_{bdg}$</td></tr><tr><td>Side stringer forward of collision bulkhead</td><td>$0.2\ell_{bdg}$</td></tr><tr><td>Web frame forward of collision bulkhead</td><td>$0.2\ell_{bdg}$</td></tr><tr><td><u>Cantilever beam</u></td><td><u>$0.2\ell_{bdg}$</u></td></tr></table> Note: ℓ_{bdg}: Effective bending span (<i>m</i>) of the girder as given in 3.6.1.4			Member	Depths of Girders (<i>m</i>)	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	$0.2\ell_{bdg}$	<u>Cantilever beam</u>	<u>$0.2\ell_{bdg}$</u>
Member	Depths of Girders (<i>m</i>)																	
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	$0.2\ell_{bdg}$																	
<u>Cantilever beam</u>	<u>$0.2\ell_{bdg}$</u>																	
		• Transferred from 7.2.9 due to composition review																

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 7.2.7-1 Moments and Shear Forces (with $d_H \geq 2.5d_0$)					
Upper end of bulkhead	Lower end of bulkhead	Load distribution	Assessment model	Lower part of corrugated bulkhead (Point 2 in assessment model)	
				Moment	Shear force F
Supported by girder Connected to stool	Supported by girder Connected to double bottom Connected to stool	Pressure P_1 at the upper end of $\ell \geq 0$		$M_2 = \frac{S\ell^2}{60}(2P_1 + 3P_2)$	$F_2 = \frac{S\ell}{20}(3P_1 + 7P_2)$
		Midspan pressure = 0		$M_2 = \frac{SP_2\ell^2}{60}(3\mu^4 - 10\mu^3 + 10\mu^2)$	$F_2 = \frac{SP_2\ell}{20}(2\mu^4 - 5\mu^3 + 10\mu)$
Connected to deck	Supported by girder Connected to double bottom Connected to stool	Pressure P_1 at the upper end of $\ell \geq 0$		$M_2 = \frac{S\ell^2}{120}(7P_1 + 8P_2)$	$F_2 = \frac{S\ell}{40}(9P_1 + 16P_2)$
		Midspan pressure = 0		$M_2 = \frac{SP_2\ell^2}{120}(3\mu^4 - 15\mu^3 + 20\mu^2)$	$F_2 = \frac{SP_2\ell}{40}(\mu^4 - 5\mu^3 + 20\mu)$
ℓ: Length (m) between the supporting points as specified in Fig. 7.2.7-2 and -3 ℓ_1: Length (m) from one end of ℓ to the zero pressure point to be taken as $\ell_1 = \ell - \ell_2$ ℓ_2: Length (m) from the other end of ℓ to the zero pressure point P_1 and P_2: Loads (kN/m^2) corresponding to each assessment condition specified in Table 7.2.12-1 to be calculated at the upper and lower ends of ℓ of the girder, respectively. However, where an upper stool is provided, P_1 is to be calculated at the deck level. S: Breadth of 1/2 pitch (m) of the corrugation					

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 7.2.7-2 Moments and Shear Forces (with $d_H < 2.5d_0$)						
Upper end of bulkhead	Lower end of bulkhead	Load distribution	Assessment model	Lower part of corrugated bulkhead		Lower stool at inner bottom plating
				Moment M	Shear force F	Moment M
Supported by girder Connected to stool	Supported by girder Connected to deck or double bottom Connected to stool	Pressure P_1 at the upper end of $\ell \geq 0$		$M = \max(M_1 , M_a)$ $M_1 = \frac{S\ell^2}{60} (3P_1 + 2P_2)$ $M_a = \frac{S\ell^2}{60} \left[\frac{10(P_2 - P_1)\alpha^3 + 30P_1\alpha^2}{-3(7P_1 + 3P_2)\alpha + 3P_1 + 2P_2} \right]$	$F = \max(F_1 , F_a)$ $F_1 = -\frac{S\ell}{20} (7P_1 + 3P_2)$ $F_a = \frac{S\ell}{20} \left[\frac{10(P_2 - P_1)\alpha^2 + 20P_1\alpha}{-7P_1 - 3P_2} \right]$	$M_2 = \frac{S\ell^2}{60} (2P_1 + 3P_2)$
		Midspan pressure = 0		$M = \max(M_1 , M_a)$ $M_1 = -\frac{SP_2\ell_2^2}{60} (3\mu^2 - 5\mu)$ $M_a = \frac{SP_2\ell_2^2}{60} [(6\mu^2 - 15\mu + 10)\alpha - 3\mu^2 + 5\mu]$ $-\frac{SP_2\ell_2^2}{6}\alpha + \left[\frac{SP_2}{6\ell_2} (\alpha\ell - \ell_1)^3 \right]$	$F = \max(F_1 , F_a)$ $F_1 = \frac{SP_2\ell_2}{20} (2\mu^3 - 5\mu^2)$ $F_a = \frac{SP_2\ell_2}{20} (2\mu^3 - 5\mu^2) + \left[\frac{SP_2}{2\ell_2} (\alpha\ell - \ell_1)^2 \right]$	$M_2 = \frac{SP_2\ell_2^2}{60} (3\mu^2 - 10\mu + 10)$
Connected to deck	Supported by girder Connected to deck or double bottom Connected to stool	Pressure P_1 at the upper end of $\ell \geq 0$		$M = \max(M_a , 0.6M_2)$ $M_a = \frac{S\ell^2\alpha}{120} \left[\frac{20(P_2 - P_1)\alpha^2 + 60P_1\alpha}{-33P_1 - 12P_2} \right]$	$F = \max(F_1 , F_a)$ $F_1 = -\frac{S\ell}{40} (11P_1 + 4P_2)$ $F_a = \frac{S\ell}{40} \left[\frac{20(P_2 - P_1)\alpha^2}{+40P_1\alpha - 11P_1 - 4P_2} \right]$	$M_2 = \frac{S\ell^2}{120} (7P_1 + 8P_2)$
		Midspan pressure = 0		$M = \max(M_a , 0.6M_2)$ $M_a = \frac{SP_2\ell_2\ell\alpha}{40} (\mu^3 - 5\mu^2) + \left[\frac{SP_2}{6\ell_2} (\alpha\ell - \ell_1)^3 \right]$	$F = \max(F_1 , F_a)$ $F_1 = \frac{SP_2\ell_2}{40} (\mu^3 - 5\mu^2)$ $F_a = \frac{SP_2\ell_2}{40} (\mu^3 - 5\mu^2) + \left[\frac{SP_2}{2\ell_2} (\alpha\ell - \ell_1)^2 \right]$	$M_2 = \frac{SP_2\ell_2^2}{120} (3\mu^2 - 15\mu + 20)$
ℓ, ℓ_1 and ℓ_2 : As given in Table 7.2.7-1						
P_1 and P_2 : Loads (kN/m^2) corresponding to each assessment condition specified in Table 7.2.12-1 to be calculated at the web centre of the upper and lower ends of ℓ of the girder, respectively. However, where an upper stool is provided, P_1 is to be calculated at the deck level.						
S : Breadth of 1/2 pitch (m) of the corrugation						
$\alpha = \frac{\ell - h_S}{\ell}$						
h_S : Height (m) of the lower stool						

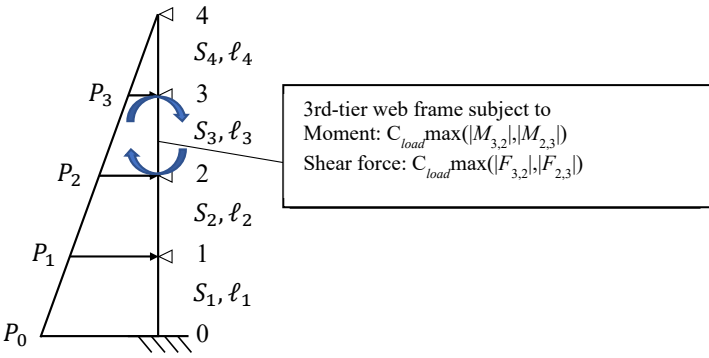
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended		Original		Remarks
Table 7.2.7-3 Plastic Moments				
Lower end		Upper end		
		Connected to stool Supported by girder	Connected to deck	
(1)	Supported by girder Connected to deck or double bottom	$\frac{P_b S \ell^2}{4(2 + \frac{z_1'}{z_0} + \frac{z_2'}{z_0})}$	$\frac{P_b S \ell^2}{4(2 + \frac{z_2'}{z_0})}$	
(2)	Connected to stool	$\frac{P_S S (\ell + h_S)^2}{4(2 + \frac{z_1'}{z_0} + \frac{d_H}{d_0})}$	$\frac{P_S S (\ell + h_S)^2}{4(2 + \frac{d_H}{d_0})}$	
		Not to be less than the value in (1).		
P_b: Load (kN/m^2) acting on the bulkhead to be taken as follows: $P_b = \frac{P_1 + P_2}{2}$ P_S: Load (kN/m^2) acting on the bulkhead and lower stool to be taken as follows: $P_b = \frac{P_1 + P_3}{2}$ P_1 and P_2: Loads (kN/m^2) in the flooded condition specified in Table 7.2.12-1 to be calculated at the upper and lower ends of ℓ, respectively. However, where an upper stool is provided, P_1 is to be calculated at the deck level. P_3: Load (kN/m^2) in the flooded condition specified in Table 7.2.12-1 to be calculated at the lower end of the lower stool S: 1/2 pitch (m) of the corrugation ℓ: Length (m) between the supporting points as specified in Fig. 7.2.7-2 d_0: Corrugation depth (mm) d_H: Breadth (mm) of the stool on the top of the inner bottom plating Z_i': Plastic section modulus considering the effect of buckling to be taken as follows: $Z_i' = \frac{2C_{xi}}{C_{xi} + 1} f Z_i \quad (i = 0, 1, 2)$ Where: $C_{xi} = \frac{2.25}{\beta_i} - \frac{1.25}{\beta_i^2} \quad (i = 0, 1, 2)$ $\beta_i = \frac{b_f}{t_{fi-n50}} \sqrt{\frac{\sigma_Y}{E}} \quad (i = 0, 1, 2)$ Z_0 and t_{f0-n50}: Minimum section modulus (cm^3) per 1/2 pitch and minimum thickness (mm) of the flange of midpart for 0.6ℓ of the corrugated bulkhead, respectively Z_1 and t_{f1-n50}: Minimum section modulus (cm^3) per 1/2 pitch and the minimum thickness (mm)				

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
of the flange at the upper end of the bulkhead, respectively Z_2 and t_{f2-n50}: Minimum section modulus (cm^3) per 1/2 pitch and the minimum thickness (mm) of the flange at the lower end of the bulkhead, respectively σ_Y: Specified minimum yield stress (N/mm^2) E: Young's modulus to be taken as 206,000 (N/mm^2) f: Shape coefficient to be taken as 1.1		
(Deleted) (Deleted)	<u>7.2.8 Web Frames</u> <u>7.2.8.1 Application</u> <u>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):</u> <u>(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.</u> <u>(2) Web frames supporting cantilever beams</u> <u>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.</u> <u>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.</u>	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Deleted due to composition review

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
(Deleted)	<u>Fig. 7.2.8-1 Example of Application</u>  <u>7.2.8.2 Multi-Deck Ship Web Frames Subject to External Pressure</u> <u>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:</u> <u>(1) Moments acting on web frames at each node are to be in accordance with the following (a) and (b):</u> <u>(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):</u> <u>i) For $i = n$</u> <u>$M_{n,n-1} = 0$</u>	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 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

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
	ii) For $1 \leq i \leq n - 1$ $M_{i,i-1} = \frac{1}{2}(C_{i,i-1} - C_{i,i+1} + \phi_{i-1} - \phi_{i+1})$ (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 $1 \leq i \leq n - 1$ $M_{i,i+1} = -\frac{1}{2}(C_{i,i-1} - C_{i,i+1} + \phi_{i-1} - \phi_{i+1})$ ii) For $i = 0$ $M_{0,1} = -\frac{1}{4}(C_{1,2} + C_{1,0} - \phi_0 + \phi_2) - C_{0,1}$ $C_{i,i-1}$: Coefficient to be taken as follows: $C_{i,i-1} = \frac{S_i \ell_i^2}{60} (3P_i + 2P_{i-1}) \quad (0 \leq i \leq n - 1)$ $C_{i,i+1}$: Coefficient to be taken as follows: i) For $0 \leq i \leq n - 2$ $C_{i,i+1} = -\frac{S_{i+1} \ell_{i+1}^2}{60} (2P_{i+1} + 3P_i)$ ii) For $i = n - 1$ $C_{n-1,n} = -\frac{S_n \ell_n^2}{120} (7P_n + 8P_{n-1})$ ϕ_i: Coefficient to be taken as follows: i) For $i = 0$ $\phi_0 = 0$ ii) For $1 \leq i \leq n - 1$	

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
	$\phi_i = -\frac{1}{4}(C_{i,i-1} + C_{i,i+1})$ 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: $F_{i,i-1} = -\frac{1}{\ell_i}(M_{i,i-1} + M_{i-1,i}) - \frac{\ell_i}{6}(2S_i P_i + S_{i-1} P_{i-1}) \quad (1 \leq i \leq n)$ (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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
(Deleted)	$E_{i,i+1} = -\frac{1}{\ell_{i+1}}(M_{i+1,i} + M_{i,i+1})$ $+ \frac{\ell_{i+1}}{6}(S_{i+1}P_{i+1} + 2S_iP_i)$ ii) For $i = 0$ $E_{0,1} = -\frac{1}{\ell_1}(M_{1,0} + M_{0,1})$ $+ \frac{\ell_1}{6}(S_1P_1 + 2S_0P_0)$ $M_{1,0}$, $M_{0,1}$, $M_{i+1,i}$, $M_{i,i+1}$, ℓ_i, S_i and P_i: <u>As specified in (1) above</u> <u>Fig. 7.2.8-2 Moment Acting on a Web Frame at Node i</u> <u>7.2.8.3 Web Frames Supporting Cantilever Beams</u> <u>The scantlings of web frames are to be in accordance</u>	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 Amendment (3) For clarification of the rules, reviews the

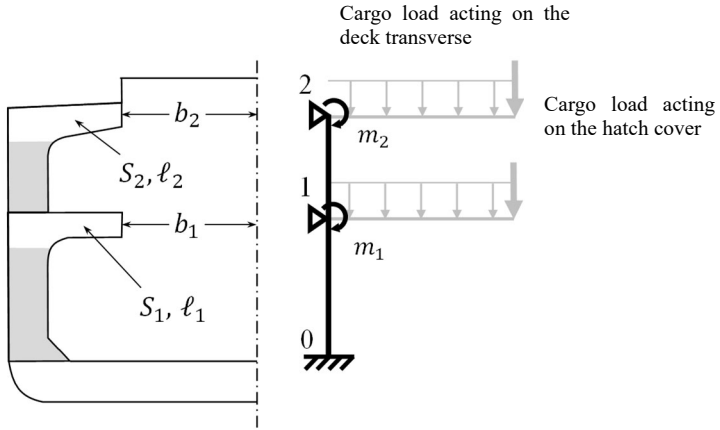
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
	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) <u>Web frames in double-deck ships (See Fig. 7.2.8-3)</u> (a) <u>Web frame in the first tier from the inner bottom plating:</u> i) <u>Moment</u> $\frac{0.6 m_1 }{\ell_1}$ ii) <u>Shear force</u> $0.3 \left \frac{m_1}{\ell_1} \right$ (b) <u>Web frame in the second tier:</u> i) <u>Moment</u> $\max(0.25m_2 + 0.5m_1 , m_2)$ ii) <u>Shear force</u> $\frac{ 0.5m_1 - 0.75m_2 }{\ell_2}$ (2) <u>Web frames in multi-deck ships with three or more decks:</u> i) <u>Moment</u> m_i ii) <u>Shear force</u> $\frac{3 m_i }{2\ell_i}$ m_i: <u>Moment due to the deck load acting on the web frames at the i-th tier deck to be taken as follows:</u> $m_i = M_{ai} + M_{hi}$ M_{ai}: <u>Moment ($kN\cdot m$) due to the cargo loaded on the i-th tier deck or</u>	composition of the requirements related to simple girders. • Transferred to 7.2.2.2 due to composition review

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
	<u>wave loads to be obtained from Assessment Model A shown in Table 7.2.9-1. However, ℓ is to be used for calculation instead of ℓ_{bdg}.</u> <u>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}.</u> <u>ℓ_i: Horizontal distance (m) from the inboard end of the supported deck transverse to the inner surface of the web frame</u>	

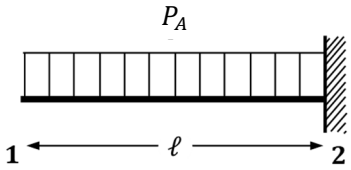
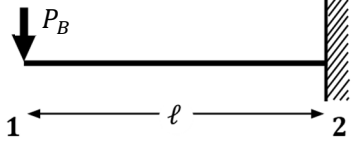
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
(Deleted)	<u>Fig. 7.2.8-3 Web Frames in a Double-Deck Ship</u> 	
(Deleted)	<u>7.2.9 Cantilever Beam Systems</u> <u>7.2.9.1 Cantilever Beams</u> Cantilever beams are to comply with the requirements in the following (1) to (5): (1) <u>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.</u> (2) <u>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.</u> (3) <u>The section modulus at the end of the cantilever beams is to be in accordance with the requirements in</u>	Amendment (3) For clarification of the rules, reviews the composition of the requirements related to simple girders. • Transferred to 7.2.6.1 and Table 7.2.2-1 due to composition review

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
	<u>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:</u> $M = M_d + M_h$ <u>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.</u> <u>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.</u> (4) <u>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 bracket.</u> (5) <u>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:</u> $F = F_d + F_h$ <u>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.</u> <u>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.</u>	

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 7.2.9-1 Moments and Shear Forces			
	Assessment model	M	F
A		$M_x = \frac{SP_A \ell_{bag}^2}{2}$	$F_x = SP_A \ell_{shf}$
B		$M_x = P_B \ell_{bag}$	$F_x = P_B$
S: Spacing of cantilever beam (m) ℓ: Full length (m) of the cantilever beam ℓ_{bag}: Effective bending span (m) of the cantilever beam as given in 3.6.1.4 ℓ_{shf}: Effective shear span (m) of the cantilever beam as given in 3.6.1.5 P_A: Average lateral load (kN/m²) 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. 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/m²) acting on the hatch cover as specified in 4.4.2.7 or 4.10.2.1			

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

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

Amendment (3)

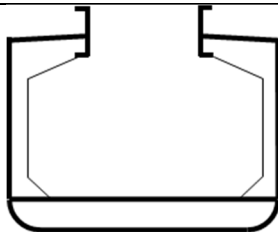
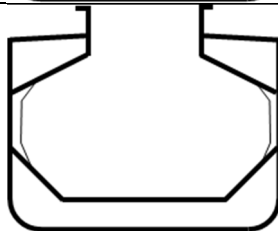
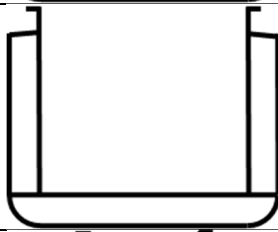
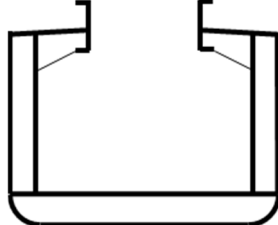
For clarification of the rules, reviews the composition of the requirements related to simple girders.

• Transferred to Table7.2.1-2 and Table7.2.2-1 due to composition review

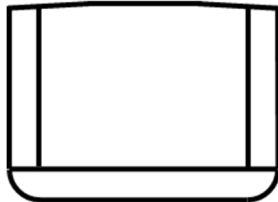
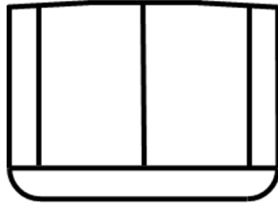
Amendment (9)

Clarifies some definitions and corrects typographical errors:

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
centreline.			centreline.			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.
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		
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	

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	
	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	
	<u>Note:</u> (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.						

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

<i>LCP</i> coordinate	Bottom shell	Inner bottom plating	Side shell	Longitudinal bulkhead
<i>x</i> coordinate	$x_{DH} = 0$	$x_{DH} = 0$	$x_{DH} = 0$	$x_{DH} = 0$
<i>y</i> 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: $y = 0.5B_{DB}$ $y = y_{LB}$
<i>z</i> coordinate	$z = 0$	$z = D_{DB}$	$z_{DH} = -0.5B_{DS}$	$z_{DH} = -0.5B_{DS}$
(Notes)				
y_{SS} : <i>y</i> -coordinate of the side shell corresponding to the <i>z</i> -coordinate at the $z_{DH} = 0$ point.				
y_{LB} : <i>y</i> -coordinate of the longitudinal bulkhead corresponding to the <i>z</i> -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.				

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

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
7.3.2 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: $t_{n50} = \frac{C_{Safety} (1 - \nu^2)}{C_{nd} D_{DH}} \times \max \left(\frac{ M_X }{\gamma_{stf-x} C_{bi-x} (\sigma_{all} - \sigma_{BM})}, \frac{ M_Y }{\gamma_{stf-y} C_{bi-y} \sigma_{all}} \right) \text{ (mm)}$ C_{Safety}: Safety factor to be taken as <u>1.1</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	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: $t_{n50} = \frac{C_{Safety} (1 - \nu^2)}{C_{nd} D_{DH}} \times \max \left(\frac{ M_X }{\gamma_{stf-x} C_{bi-x} (\sigma_{all} - \sigma_{BM})}, \frac{ M_Y }{\gamma_{stf-y} C_{bi-y} \sigma_{all}} \right) \text{ (mm)}$ C_{Safety}: Safety factor to be taken as <u>1.2</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	accommodate ships with bilge hoppers or steps with double-hull structures. 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
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 formula. However, $C_{EX} = 1.0$ where no longitudinal girders are provided, while $C_{EY} = 1.0$ where no transverse girders are provided. $t_{n50} = \frac{C_{Safety} (1 - \nu^2)}{C_{cnd} \frac{D_{DH}}{1}} \times \max \left(\frac{ M_X }{\min(C_{bi-x}, C_{EX}) \gamma_{stf-x} (\sigma_{all} - \sigma_{BM})}, \frac{1}{\min(C_{bi-y}, C_{EY}) \gamma_{stf-y} \sigma_{all}} \cdot \frac{ M_Y }{\gamma_{stf-y} \sigma_{all}} \right) (mm)$ C_{Safety}: Safety factor to be taken as <u>1.1</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: $t_{n50} = \frac{C_{Safety} F }{C_{cnd} D_{sh} \tau_{all}} (mm)$ C_{Safety}: Safety factor to be taken as <u>1.1</u> F: Shear force (kN) of the girder in double hull under assessment as given in 7.3.3.2	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 formula. However, $C_{EX} = 1.0$ where no longitudinal girders are provided, while $C_{EY} = 1.0$ where no transverse girders are provided. $t_{n50} = \frac{C_{Safety} (1 - \nu^2)}{C_{cnd} \frac{D_{DH}}{1}} \times \max \left(\frac{ M_X }{\min(C_{bi-x}, C_{EX}) \gamma_{stf-x} (\sigma_{all} - \sigma_{BM})}, \frac{1}{\min(C_{bi-y}, C_{EY}) \gamma_{stf-y} \sigma_{all}} \cdot \frac{ M_Y }{\gamma_{stf-y} \sigma_{all}} \right) (mm)$ C_{Safety}: Safety factor to be taken as <u>1.2</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: $t_{n50} = \frac{C_{Safety} F }{C_{cnd} D_{sh} \tau_{all}} (mm)$ C_{Safety}: Safety factor to be taken as <u>1.2</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

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
7.3.2.3 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 $t = \sqrt[3]{C_{safety} \frac{ F b^2}{C_{cnd}D_w} \frac{12(1-\nu^2)}{K_\tau\pi^2E}} \text{ (mm)}$ C_{safety}: Safety factor to be taken as <u>1.1</u> 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 $t = \sqrt[3]{C_{safety} \frac{ F b^2}{C_{cnd}(D_w - D_0)} \frac{12(1-\nu^2)}{K_\tau\pi^2E}} \text{ (mm)}$ 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) $t = \sqrt[3]{C_{safety} \frac{ F b^2}{C_{cnd}D_w} \frac{12(1-\nu^2)}{\gamma_{a_0}K_\tau\pi^2E}} \text{ (mm)}$ C_{safety}: Safety factor to be taken as <u>1.1</u> 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 $t = \sqrt[3]{C_{safety} \frac{ F b^2}{C_{cnd}D_w} \frac{12(1-\nu^2)}{K_\tau\pi^2E}} \text{ (mm)}$ C_{safety}: Safety factor to be taken as <u>1.2</u> 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 $t = \sqrt[3]{C_{safety} \frac{ F b^2}{C_{cnd}(D_w - D_0)} \frac{12(1-\nu^2)}{K_\tau\pi^2E}} \text{ (mm)}$ 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) $t = \sqrt[3]{C_{safety} \frac{ F b^2}{C_{cnd}D_w} \frac{12(1-\nu^2)}{\gamma_{a_0}K_\tau\pi^2E}} \text{ (mm)}$ C_{safety}: Safety factor to be taken as <u>1.2</u> 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:	of Steel Ships. 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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 <u>In general</u>, 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 <u>Appropriate</u> 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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) 10.6.2.3 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 \text{ (cm}^3\text{)}$$K:$ Material factor $\ell:$ Spacing (m) of floors	10.6 Strengthened Bottom Forward 10.6.2 General Ships (Ship other than those with L_C of not more than 150 m, $V/\sqrt{L_C}$ of not less than 1.4 and C_B of not more than 0.7) 10.6.2.2 Structural Arrangement The structural arrangement is to be in accordance with the following (1) and (2). (1) (Omitted) (2) Where the structural arrangement of the strengthened bottom forward is different from the structural arrangement specified in (1) above, the following (a) to (c) are to be applied: (a) (Omitted) (b) (Omitted) (c) <u>The calculation of the section modulus of bottom longitudinals and longitudinal shell stiffeners is to be as specified in 10.6.2.3-1. The slamming impact pressure P are to be P_{SL4C} specified in 4.8.2.2-2.</u> 10.6.2.3 Shell Longitudinals 1 In ships having a bow draught in the ballast condition of not more than $0.025L_{C230}$, the section modulus of the side longitudinal and bottom longitudinal in way of the strengthened bottom forward is to be not less than that given by the following formula. $Z = 0.44KP\lambda\ell^2 \text{ (cm}^3\text{)}$$K:$ Material factor $\ell:$ Spacing (m) of floors	Amendment (9) Clarifies some definitions and corrects typographical errors Clarifies the application of bottom slamming impact pressure The requirements remain unchanged. 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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) <u>as specified in 4.8.2.2.</u> 2 (Omitted) 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. $t = \frac{b}{2} \sqrt{\frac{P_{slh} \times 10^{-3}}{1.15C_a\sigma_Y}} \text{ (mm)}$ 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)	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) <u>as per the following:</u> <u>Ships other than noted below: Bottom slamming pressure P_{SL1} (kN/m^2), as specified in 4.8.2.2.</u> <u>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.</u> 2 (Omitted) 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. $t = \frac{b}{2} \sqrt{\frac{P_{slh} \times 10^{-3}}{1.15C_a\sigma_Y}} \text{ (mm)}$ 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) <u>a: Length (mm) of the longer side of the plate panel.</u>	specified. 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
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. 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	α: Aspect ratio, to be taken as a/b. 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 when $\alpha \geq 2$ or Table 6.3.2-3 when $\alpha < 2$. 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
Part 2-1 CONTAINER 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 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.	Part 2-1 CONTAINER 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 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.	

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 4.4.2-2 External and Internal Pressure to be Considered				Amendment (9) Clarifies some definitions and corrects typographical errors
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	$P_{exs} + P_{exw} - P_{in_s1}$	$P_{exs} + P_{exw}$	Clarifies the cases where container cargo loads can be taken into account.
	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} : <u>In general, 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 the partial bulkhead in the cargo hold under assessment, such values are to be given by the following formula.</u> $P_{in_s1} = 0.15\rho gT_{SC}$ $P_{in_s3} = 0.3\rho gT_{SC}$				
(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 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 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 <u>-1</u> 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 <u>1</u> 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)	<u>4.2.2.5</u> 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)										
<u>Table 5.1.4-1 Still Water and Wave Vertical Bending Moments to be Considered</u> <table> <tr> <th>Condition</th><th>M_s</th><th>M_w</th></tr> <tr> <td>Maximum load condition</td><td colspan="2">Still water and wave vertical bending moment for the hogging and sagging load cases shown in <u>4.2.2.5</u></td></tr> <tr> <td>Harbour condition</td><td>$M_{PT\ max}$ or $M_{PT\ min}$</td><td>0</td></tr> </table>		Condition	M_s	M_w	Maximum load condition	Still water and wave vertical bending moment for the hogging and sagging load cases shown in <u>4.2.2.5</u>		Harbour condition	$M_{PT\ max}$ or $M_{PT\ min}$	0	Amendment (4) Newly added as in Part 1
Condition	M_s	M_w									
Maximum load condition	Still water and wave vertical bending moment for the hogging and sagging load cases shown in <u>4.2.2.5</u>										
Harbour condition	$M_{PT\ max}$ or $M_{PT\ min}$	0									
<u>Table 5.1.4-2 Still Water and Wave Vertical Shear Forces to be Considered</u> <table> <tr> <th>Condition</th><th>Q_s</th><th>Q_w</th></tr> <tr> <td>Maximum load condition</td><td colspan="2">Still water and wave vertical shear force for the hogging and sagging load cases shown in <u>4.2.2.5</u></td></tr> <tr> <td>Harbour condition</td><td>$Q_{PT\ max}$ or $Q_{PT\ min}$</td><td>0</td></tr> </table>		Condition	Q_s	Q_w	Maximum load condition	Still water and wave vertical shear force for the hogging and sagging load cases shown in <u>4.2.2.5</u>		Harbour condition	$Q_{PT\ max}$ or $Q_{PT\ min}$	0	Amendment (4) Newly added as in Part 1
Condition	Q_s	Q_w									
Maximum load condition	Still water and wave vertical shear force for the hogging and sagging load cases shown in <u>4.2.2.5</u>										
Harbour condition	$Q_{PT\ max}$ or $Q_{PT\ min}$	0									
5.2 Yield Strength Assessment 5.2.1 Bending Strength and Shear Strength 5.2.1.1 Evaluation Area 1 For each of the load cases “hogging” and “sagging”, the equivalent hull girder stress σ_{eq} (N/mm^2) is to be in	5.2 Yield Strength Assessment 5.2.1 Bending Strength and Shear Strength 5.2.1.1 Evaluation Area 1 For each of the load cases “hogging” and “sagging” <u>as defined in 4.2.2.5</u>, the equivalent hull girder stress σ_{eq}	Amendment (4) Modifies the reference.									

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
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 $\sigma_{perm} = \frac{\sigma_Y}{\gamma_1 \gamma_2}$ σ_Y: Specified minimum yield stress of the material (N/mm^2) γ_1: Partial safety factor for material, to be taken as $\gamma_1 = K \frac{\sigma_Y}{235}$ γ_2: Partial safety factor for load combinations and permissible stress, to be taken as follows: $\gamma_2 = 1.24$, for bending strength assessment <u>in the maximum load condition</u> $\gamma_2 = 1.46$, for bending strength assessment <u>in the harbour condition</u> $\gamma_2 = 1.13$, for shear strength assessment <u>in the maximum load condition</u> $\gamma_2 = 1.22$, for shear strength assessment <u>in the harbour condition</u>	(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 $\sigma_{perm} = \frac{\sigma_Y}{\gamma_1 \gamma_2}$ σ_Y: Specified minimum yield stress of the material (N/mm^2) γ_1: Partial safety factor for material, to be taken as $\gamma_1 = K \frac{\sigma_Y}{235}$ 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

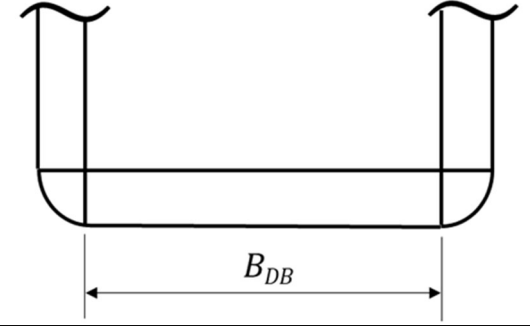
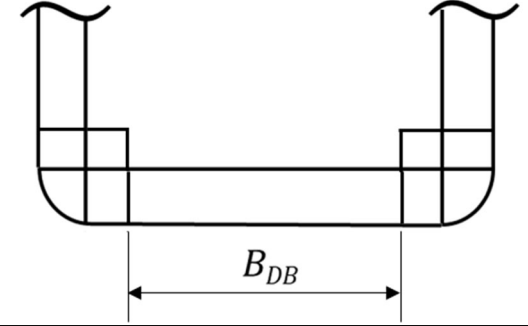
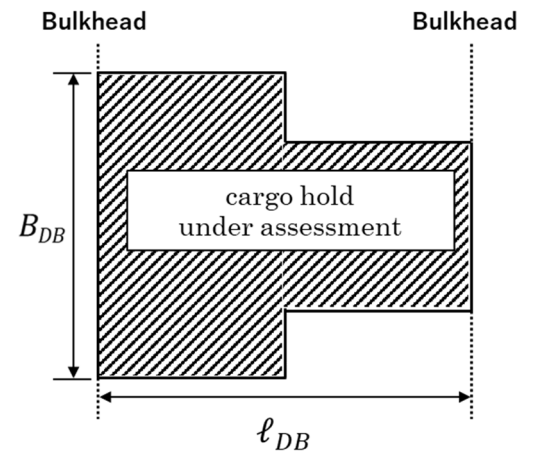
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
2 (Omitted) 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 that have a structure not shown in Fig. 7.1.1-1 and can be regarded as a simple girder, the boundary conditions and acting load are to be considered, and the assessment model from Table 7.2.1-2, Part 1 is to be appropriately selected. 7.2 Double Hull Structure 7.2.1 General 7.2.1.1 Application <u>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.</u>	2 (Omitted) 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 that have a structure not shown in Fig. 7.1.1-1 and can be regarded as a simple girder, the boundary conditions and acting load are to be considered, and the assessment model from Table 7.2.1-1, Part 1 is to be appropriately selected. 7.2 Double Hull Structure 7.2.1 General 7.2.1.1 <u>Handling of Partial Bulkheads in the Hold</u> <u>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</u>	Amendment (8) Assessments for double hull Structures Amended the evaluation range to extend from the partial bulkheads to the watertight bulkheads, as

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
<u>7.2.1.2 Idealisation of Structures</u> <u>1 ℓ_{DB} is to be taken as the length of the double bottom in the cargo hold under assessment.</u> <u>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 in the cargo hold under assessment. (See Fig. 7.2.1-1)</u> <u>(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.</u> <u>(2) Where the cargo hold is provided with steps, B_{DB} is to be taken as the distance between the steps.</u>	<u>specified in Chapter 8. Girders near partial bulkheads are to ensure sufficient strength to account for shear force effects.</u> (Newly added)	with the old Part C to evaluate the shear force effects in girders near partial bulkheads. Amendment (8) Assessments for double hull Structures Specified the definition for the length and breadth of the double bottom. Previously, $\overline{B_{DB}}$ (the breadth of the double bottom) was measured at the center of the cargo hold under evaluation; however, considering cases where $\overline{B_{DB}}$ varies within the cargo hold under evaluation, the method for measuring $\overline{B_{DB}}$ has been amended.

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

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 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. $M_{V-end} = M_{V-targ} - M_{V-min} \text{ for } M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-max} \text{ for } M_{V-targ} < 0$ $M_{H-end} = M_{H-targ} - M_{H-min} \text{ for } M_{H-targ} \geq$ $M_{H-end} = M_{H-targ} - M_{H-max} \text{ for } M_{H-targ} < 0$ 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)	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. $M_{V-end} = M_{V-targ} - M_{V-min} \text{ for } M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-max} \text{ for } M_{V-targ} < 0$ $M_{V-end} = M_{H-targ} - M_{H-min} \text{ for } M_{H-targ} \geq$ $M_{V-end} = M_{H-targ} - M_{H-max} \text{ for } M_{H-targ} < 0$ 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)	Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the typographical errors in adjustment moment

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
Part 2-2	BOX-SHAPED BULK CARRIERS	Part 2-2	BOX-SHAPED BULK 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		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.		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		$P_{DB} \text{ (kN/m}^2\text{)}^{(1)(2)}$	$P_{DS} \text{ (kN/m}^2\text{)}^{(1)(2)}$	
Double bottom	$S1^{(3)}$	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$	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.
	$S2$	$P_{exs} + P_{exw} - (P_{bs} + P_{bd})$	$P_{exs} + P_{exw} - (P_{bs} + P_{bd})$	
	$S3$	$P_{exs} + P_{exw} - (P_{bs} + P_{bd})$	$P_{exs} + P_{exw} - (P_{bs} + P_{bd})$	
	$S4^{(3)}$	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$	
	$S5^{(3)}$	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$	
	$S6$	$P_{exs} + P_{exw} - (P_{ls1} + P_{ld1}) - (P_{ls2} + P_{ld2})$	$P_{exs} + P_{exw} - (P_{ls1} + P_{ld1}) - (P_{ls2} + P_{ld2})$	
Double	$S7$	$P_{exs} + P_{exw} - (P_{bs} + P_{bd})$	$P_{exs} + P_{exw}$	

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
side	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. $P_{ls2} = P_{ls2a} - P_{ls2b}$ $P_{ld2} = P_{ld2a} - P_{ld2b}$ P_{ls2a}, P_{ld2a} : 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_{ls2b}, P_{ld2b} : 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. S1, S2, S7, S8 : As given by the formulae in full load condition in Table 4.3.2-1. S3 : 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 S4 : 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 S5 : As given by the formulae in ballast condition in Table 4.3.2-1. S6 : 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 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.				

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
(3) P_{exw} is to be not less than the value of P_{exw} for <i>HM-2</i> at x_G, which is the X coordinate (m) at the centre of gravity of the ship.			
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 that have a structure not shown in Fig. 7.1.1-1 and can be regarded as a simple girder, the boundary conditions and acting load 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 that have a structure not shown in Fig. 7.1.1-1 and can be regarded as a simple girder, the boundary conditions and acting load are to be considered, and the assessment model from Table 7.2.1-1, Part 1 is to be appropriately selected.	

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 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. $M_{V-end} = M_{V-targ} - M_{V-max}, \text{ for } M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-min}, \text{ for } M_{V-targ} < 0$ $M_{H-end} = M_{H-targ} - M_{H-max}, \text{ for } M_{H-targ} \geq 0$ $M_{H-end} = M_{H-targ} - M_{H-min}, \text{ for } M_{H-targ} < 0$ 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 (3) (Omitted)	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. $M_{V-end} = M_{V-targ} - M_{V-max}, \text{ for } M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-min}, \text{ for } M_{V-targ} < 0$ $M_{V-end} = M_{H-targ} - M_{H-max}, \text{ for } M_{H-targ} \geq 0$ $M_{V-end} = M_{H-targ} - M_{H-min}, \text{ for } M_{H-targ} < 0$ 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 (3) (Omitted)	Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the typographical errors in adjustment moment

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
Part 2-5 GENERAL CARGO SHIPS AND REFRIGERATED CARGO SHIPS Chapter 4 LOADS 4.2 Loads to be Considered in Local Strength 4.2.2 Maximum Load Condition 4.2.2.1 Lateral Loads <u>1</u> 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. <u>2</u> 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 4.2.2-2 may be used if the parameters are not available. <u>3</u> 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 to liquid other than ballast water, such as the pressure due to fuel oil tank, is considered. However, the values in Table 4.2.2-2 may be used if the parameters are not available.	Part 2-5 GENERAL CARGO SHIPS AND REFRIGERATED CARGO SHIPS Chapter 4 LOADS 4.2 Loads to be Considered in Local Strength 4.2.2 Maximum Load Condition 4.2.2.1 Lateral Loads <u>1</u> 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. <u>2</u> 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. <u>The same</u> The same parameters are to be applied where the dynamic pressure due 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.	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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks															
<u>Table 4.2.2-1 Dry Bulk Cargo Mass and Cargo Density</u> <table><tr><td><u>Consideration of dry bulk cargo mass M (t)</u></td><td>M_D</td></tr><tr><td><u>Cargo density ρ_C (t/m³)</u></td><td>$\frac{M_D}{V_{Full}}$</td></tr><tr><td colspan="2"><u>Notes</u> <u>M_D: Maximum permissible cargo mass (t) in the cargo hold under consideration</u> <u>V_{Full}: Volume (m³) of the hold (including its hatch coaming).</u></td></tr></table>		<u>Consideration of dry bulk cargo mass M (t)</u>	M_D	<u>Cargo density ρ_C (t/m³)</u>	$\frac{M_D}{V_{Full}}$	<u>Notes</u> <u>M_D: Maximum permissible cargo mass (t) in the cargo hold under consideration</u> <u>V_{Full}: Volume (m³) of the hold (including its hatch coaming).</u>		(Newly added) Amendment (9) Clarifies some definitions and corrects typographical errors:									
<u>Consideration of dry bulk cargo mass M (t)</u>	M_D																
<u>Cargo density ρ_C (t/m³)</u>	$\frac{M_D}{V_{Full}}$																
<u>Notes</u> <u>M_D: Maximum permissible cargo mass (t) in the cargo hold under consideration</u> <u>V_{Full}: Volume (m³) of the hold (including its hatch coaming).</u>																	
<u>Table 4.2.2-12 Simplified Formulae for Parameters</u> <table><tr><th>Loading condition</th><th>Draught T_{LC} (m) amidships</th><th>Z coordinate z_G (m) of the centre of gravity of the ship</th><th>Metacentric height GM (m)</th><th>Radius of Gyration K_{xx} (m)</th></tr><tr><td>Full load condition</td><td>T_{SC}</td><td>$0.25 \frac{B}{C_B}$</td><td>$\frac{T_{SC}}{2} + \frac{B^2}{T_{SC} C_B} \frac{3C_W - 1}{24} - z_G$</td><td>$0.35B$</td></tr><tr><td>Ballast condition</td><td>T_{BAL}</td><td>$0.20 \frac{B}{C_{B_LC}}$</td><td>$\frac{T_{LC}}{2} + \frac{B^2}{T_{LC} C_{B_LC}} \frac{3C_{W_LC} - 1}{24} - z_G$</td><td>$0.40B$</td></tr></table>		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
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}	$0.20 \frac{B}{C_{B_LC}}$	$\frac{T_{LC}}{2} + \frac{B^2}{T_{LC} C_{B_LC}} \frac{3C_{W_LC} - 1}{24} - z_G$	$0.40B$													

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; <u>however, 4.4, Chapter 4, 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.</u> 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							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.
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	$S1$	0.7 $0.6T_{SC}$	$M_{SV\ max}$	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			
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			Amendment (8) Assessments for double hull Structures
Structures to be assessed		$P_{DB}(kN/m^2)^{(1)(2)}$	
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} : Loads considering the effect of cargo (kN/m^2), as given by the formulae: $P_{in_s2} = 0.5\rho gT_{SC}$ $P_{in_s3} = \rho gT_{SC}$			
(1) Load calculation points are to be in accordance with 7.3.1.5, Part 1 for all loading conditions. (2) When calculating loads, $T_{LC} = 0.70.6T_{SC}$ 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.			
4.4 Loads to be Considered in Additional Structural Requirements		4.4 Loads to be Considered in Additional Structural Requirements	
4.4.2 Maximum Load Condition		4.4.2 Maximum Load Condition	
		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
4.4.2.1 Steel Coils	4.4.2.1 Steel Coils		
Table 4.4.2-3 Dynamic Load F_{SCd}			
Members	Load in waves F_{SCd} (kN)		
Inner bottoms	$\frac{F_{SCs}}{g} C_{WDz} a_{Ze-SC}$		
Bilge hopper plating	Case 1	$\frac{F_{SCs}}{g} C_{WDz} a_{Ze-SC} \cdot \cos \alpha$	
	Case 2	$C_{SC3} W_{SC} \frac{n_1 n_2}{n_3} g \sin \theta \cdot \cos \left(\min \left(\frac{\pi}{2} - \alpha, \frac{\pi}{4} \right) \right)$	
Longitudinal bulkheads	$n_2 \leq 10$ and $n_3 \leq 5$	$C_{SC3} W_{SC} \frac{n_1 n_2}{n_3} g \sin \theta$	
	$n_2 > 10$ or $n_3 > 5$	$C_{SC3} W_{SC} n_1 \frac{\ell}{\ell_{st}} g \sin \theta$	
Side frames	$C_{SC3} W_{SC} \frac{n_1}{n_4} g \sin \theta$		
Notes: C_{WDz} : Coefficient of each load condition, specified in Table 4.4.2-8, Part 1 a_{Ze-SC} : Envelope acceleration in vertical direction (m/s^2) at the centre of gravity of steel coil in the cargo hold to be considered, as calculated in accordance with 4.2.4.1, Part 1 ⁽¹⁾ α , n_1 , n_2 , n_3 , W_{SC} , ℓ , ℓ_{st} : As specified in Table 4.4.2-2 θ : Roll angle (rad), as specified in 4.2.2, Part 1 ⁽²⁾ . C_{SC3} : Coefficient, as follows: $C_{SC3} = 3.2$ for single-tiered stacking or multi-tiered stacking in which the key coil is arranged in the second or third position from the ship side $C_{SC3} = 2.0$ for all other cases n_4 : The number of side frames that support a single steel coil.			
(1) The centre of gravity of steel coil to be considered is in accordance with Table 4.4.2-4. (2) The parameters (GM , z_G , etc.) required to calculate the ship motions and acceleration is in accordance with the values in the full load condition. The values in Table 4.2.2-4 may be used if the parameters is not available.			

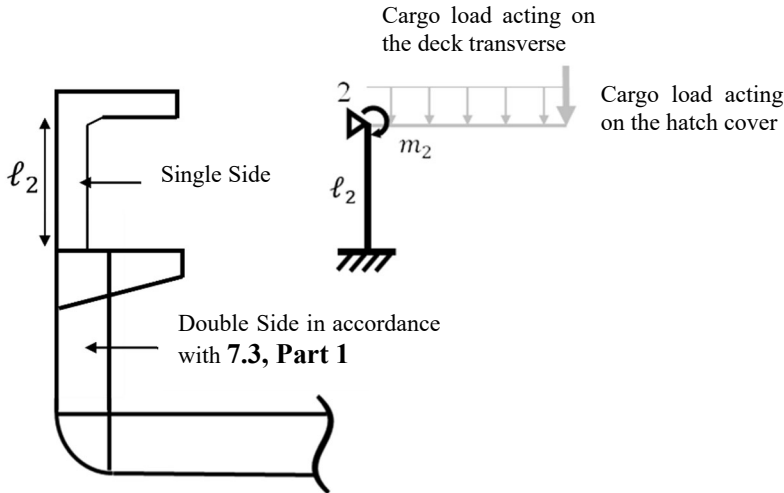
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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 for General Cargo Ship 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. 7.2 Simple Girders 7.2.1 Hatch Side Girders 7.2.1.1 Hatch Side Girders Supported by Pillars, etc. 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	Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES 7.1 General 7.1.1 Application 7.1.1.2 Application Example of Assessment Model for General Cargo Ship 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. 7.2 Hatch Side Girders 7.2.1 Hatch Side Girders Supported by Pillars, etc. 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	Amendment (9) Clarifies some definitions and corrects typographical errors: Modifies the numbering as in Chapter 7, 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
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. <u>7.2.2 Web Frames</u> <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>	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. (Newly Added) (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.

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
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 		(Newly Added)
7.3 Double Hull Structures	(Newly Added)	
7.3.1 General	(Newly Added)	
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	(Newly Added)	Amendment (9) Clarifies some definitions and corrects typographical errors:
1 Hatchway breadth is to be taken as the breadth of the hatchway of the first tier. (See Fig. 7.3.1-1)		
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)		Clarify the definitions of the breadth of the hatchways and the

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
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><tr><th colspan="4">Table 4.3.2-2 External and Internal Pressure to be Considered</th></tr><tr><th>Structures to be assessed</th><th></th><th>$P_{DB}(kN/m^2)^{(1)(2)}$</th><th>$P_{DS}(kN/m^2)^{(1)(2)}$</th></tr><tr><td>Double bottom</td><td>S1⁽³⁾</td><td>$P_{exs} + P_{exw}$</td><td>$P_{exs} + P_{exw}$</td></tr><tr><td rowspan="2">Double side</td><td>S2</td><td>$P_{exs} + P_{exw} - P_{in_s2}$</td><td>$P_{exs} + P_{exw}$</td></tr><tr><td>S3</td><td>$P_{exs} + P_{exw} - P_{in_s3}$</td><td>$P_{exs} + P_{exw}$</td></tr><tr><td colspan="4">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 gT_{SC}$$P_{in_s3} = \rho gT_{SC}$</td></tr><tr><td colspan="4">(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.</td></tr></table>		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: $P_{in_s2} = 0.5\rho gT_{SC}$ $P_{in_s3} = \rho gT_{SC}$				(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.				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⁾	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$																										
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: $P_{in_s2} = 0.5\rho gT_{SC}$ $P_{in_s3} = \rho gT_{SC}$																													
(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.																													
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. $P_{CDK} = P_{Wh-max} \cdot (1 + C_{CDK})$	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. $P_{CDK} = P_{Wh-max} \cdot (1 + C_{CDK})$	Amendment (9) Clarifies some definitions and corrects typographical errors:																											

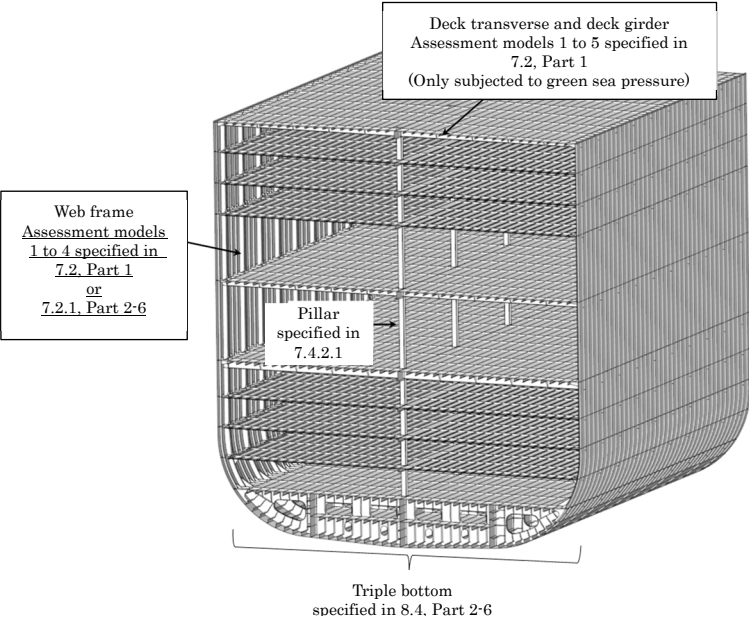
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
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: $P_{LCDK} = (P_{LCDK_d} + w_{LCDK}) \cdot (1 + C_{CDK})$ 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: $P_{LCDK} = (P_{LCDK_d} + w_{LCDK}) \cdot (1 + C_{CDK})$ 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
Fig. 7.1.1-1 Application Example of Car Carriers 		Amendment (3) According to the review of the composition of the requirements related to simple girders, modifies the references of web frames.
<u>7.2 Simple Girders</u> <u>7.2.1 Web Frames</u> <u>7.2.1.1 Multi-Deck Ship Web Frames subject to External Pressure</u> <u>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</u>	(Newly Added) (Newly Added)	Amendment (3) According to the review of the composition of the requirements related to simple girders, Transferred from 7.2.8.2. The requirements

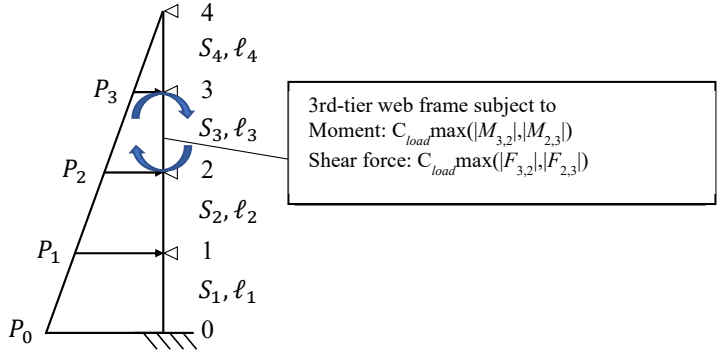
Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks
<u>frames (See Fig. 7.2.1-1).</u> (1) <u>Moments acting on web frames at each node are to be in accordance with the following (a) and (b):</u> (a) <u>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):</u> i) <u>For $i = n$</u> $M_{n,n-1} = 0$ ii) <u>For $1 \leq i \leq n - 1$</u> $M_{i,i-1} = \frac{1}{2}(C_{i,i-1} - C_{i,i+1} + \phi_{i-1} - \phi_{i+1})$ (b) <u>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):</u> i) <u>For $1 \leq i \leq n - 1$</u> $M_{i,i+1} = -\frac{1}{2}(C_{i,i-1} - C_{i,i+1} + \phi_{i-1} - \phi_{i+1})$ ii) <u>For $i = 0$</u> $M_{0,1} = -\frac{1}{4}(C_{1,2} + C_{1,0} - \phi_0 + \phi_2) - C_{0,1}$ <u>$C_{i,i-1}$: Coefficient to be taken as follows:</u> $C_{i,i-1} = \frac{S_i \ell_i^2}{60} (3P_i + 2P_{i-1}) \quad (0 < i \leq n - 1)$ <u>$C_{i,i+1}$: Coefficient to be taken as follows:</u> i) <u>For $0 \leq i \leq n - 2$</u> $C_{i,i+1} = -\frac{S_{i+1} \ell_{i+1}^2}{60} (2P_{i+1} + 3P_i)$ ii) <u>For $i = n - 1$</u> $C_{n-1,n} = -\frac{S_n \ell_n^2}{120} (7P_n + 8P_{n-1})$		remain unchanged.

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
<u>ϕ_i: Coefficient to be taken as follows:</u> i) For $i = 0$ $\phi_0 = 0$ ii) For $1 \leq i \leq n - 1$ $\phi_i = -\frac{1}{4}(C_{i,i-1} + C_{i,i+1})$ iii) For $i = n$ $\phi_n = -\frac{1}{2}\phi_{n-1}$ <u>S_i: Spacing (m) of the web frame in the i-th tier from the inner bottom plating</u> <u>ℓ_i: Span (m) of the web frame in the i-th tier from the inner bottom plating</u> <u>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</u> (2) <u>Nodal shear forces acting on web frames are to be in accordance with the following (a) and (b):</u> (a) <u>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:</u> $F_{i,i-1} = -\frac{1}{\ell_i}(M_{i,i-1} + M_{i-1,i}) - \frac{\ell_i}{6}(2S_i P_i + S_{i-1} P_{i-1}) \quad (1 \leq i \leq n)$ (b) <u>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:</u>		

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
i) For $0 \leq i \leq n - 1$ $F_{i,i+1} = -\frac{1}{\ell_{i+1}}(M_{i+1,i} + M_{i,i+1})$ $+ \frac{\ell_{i+1}}{6}(S_{i+1}P_{i+1} + 2S_iP_i)$ ii) For $i = 0$ $F_{0,1} = -\frac{1}{\ell_1}(M_{1,0} + M_{0,1}) + \frac{\ell_1}{6}(S_1P_1 + 2S_0P_0)$ $M_{1,0}$, $M_{0,1}$, $M_{i+1,i}$, $M_{i,i+1}$, ℓ_i, S_i and P_i: As specified in (1) above <u>Fig. 7.2.1-1 Example of Application</u> 	(Newly Added)	

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
Fig. 7.2.1-2 Moment Acting on a Web Frame at Node i Moment acting on a web frame with node i being its lower end (the moment at the lower end of the web frame): $M_{i,i+1}$ Moment acting on a web frame with node i being its upper end (the moment at the upper end of the web frame): $M_{i,i-1}$	(Newly Added)	
Chapter 9 FATIGUE 9.5 Screening 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	Chapter 9 FATIGUE 9.5 Screening 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	Amendment (9) Clarifies some definitions and corrects typographical errors: Specifies the correction factor corresponding to the wave environment in screening assessment

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
spot stress in the direction orthogonal to the weld line, as obtained from the following formula: $\Delta\sigma_{FS_ort,i(j)} = \underline{f_R} \cdot f_{mean_ort,i(j)} \cdot \Delta\sigma_{HS_ort,i(j)}$ $\Delta\sigma_{FS_par,i(j)}$: 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: $\Delta\sigma_{FS_par,i(j)} = 0.72 \cdot \underline{f_R} \cdot f_{mean_par,i(j)} \cdot \Delta\sigma_{HS_par,i(j)}$ <u>f_R: Correction factor corresponding to the wave environment in accordance with 9.5.2.1, Part 1</u> $f_{mean_ort,i(j)}$, $f_{mean_par,i(j)}$: 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. $\begin{cases} f_{mean,i(j)} = \min \left[1.0, 0.8 + 0.2 \frac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}} \right] : \sigma_{mCor,i(j)} \geq 0 \\ f_{mean,i(j)} = \max \left[0.6, 0.8 + 0.2 \frac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}} \right] : \sigma_{mCor,i(j)} < 0 \end{cases}$ 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. $\begin{cases} f_{mean,i(j)} = \min \left[1.0, 0.8 + 0.2 \frac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}} \right] : \sigma_{mCor,i(j)} \geq 0 \\ f_{mean,i(j)} = \max \left[0.6, 0.8 + 0.2 \frac{\sigma_{mCor,i(j)}}{2\Delta\sigma_{HS,i(j)}} \right] : \sigma_{mCor,i(j)} < 0 \end{cases}$ Where, $\sigma_{mCor,i(j)}$ is to be obtained as follows:	

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

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. $\sigma_{mean_ort,i(j)}, \sigma_{mean_par,i(j)}: \text{ As given in 9.5.5.1-2.}$ 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.	$\begin{cases} \sigma_{mCor,i(j)} = \sigma_{mean,i(j)} & : \sigma_{max} \leq \sigma_{YEq} \\ \sigma_{mCor,i(j)} = \sigma_{YEq} - \sigma_{max} + \sigma_{mean,i(j)} & : \sigma_{max} > \sigma_{YEq} \end{cases}$ $\sigma_{max} = \max_{i(j)}(\Delta\sigma_{HS,i(j)} + \sigma_{mean,i(j)})$ $\sigma_{YEq} = \max(315, \sigma_Y)$ $\Delta\sigma_{HS_ort,i(j)}, \Delta\sigma_{HS_par,i(j)} :$ As given in 9.5.5.1-2. $\sigma_{mean_ort,i(j)}, \sigma_{mean_par,i(j)}: \text{ As given in 9.5.5.1-2.}$ 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 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				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.
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.				

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
Part 2-8 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT SPHERICAL TANKS OF TYPE B) Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES 7.1 General 7.1.1 Application 7.1.1.2 Application Example of Assessment Model for Oil Tanker 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. 7.1.1.3 Application Example of Assessment Model for Chemical Tanker 1 An application example of an assessment model applying 7.2 and 7.3, Part 1 is shown in Fig. 7.1.1-2. 2 For girder members that have a structure not shown in Fig. 7.1.1-2 and can be regarded as a simple girder, the boundary conditions and acting loads are to be considered, and	Part 2-8 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT SPHERICAL TANKS OF TYPE B) Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES 7.1 General 7.1.1 Application 7.1.1.2 Application Example of Assessment Model for Oil Tanker 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. 7.1.1.3 Application Example of Assessment Model for Chemical Tanker 1 An application example of an assessment model applying 7.2 and 7.3, Part 1 is shown in Fig. 7.1.1-2. 2 For girder members that have a structure not shown in Fig. 7.1.1-2 and can be regarded as a simple girder, the boundary conditions and acting loads are to be considered, and	

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
an assessment model from Table 7.2.1-2, Part 1 is to be appropriately selected. 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: $M_{V-end} = M_{V-targ} - M_{V-max}, \text{ for } M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-min}, \text{ for } M_{V-targ} < 0$ $M_{H-end} = M_{H-targ} - M_{H-max}, \text{ for } M_{H-targ} \geq 0$ $M_{H-end} = M_{H-targ} - M_{H-min}, \text{ for } M_{H-targ} < 0$ M_{V-targ}, M_{H-targ}: The maximum or minimum value in the target hold of the vertical bending moment and horizontal bending moment ($kN-m$)	an assessment model from Table 7.2.1-1, Part 1 is to be appropriately selected. 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: $M_{V-end} = M_{V-targ} - M_{V-max}, \text{ for } M_{V-targ} \geq 0$ $M_{V-end} = M_{V-targ} - M_{V-min}, \text{ for } M_{V-targ} < 0$ $M_{V-end} = M_{H-targ} - M_{H-max}, \text{ for } M_{H-targ} \geq 0$ $M_{V-end} = M_{H-targ} - M_{H-min}, \text{ for } M_{H-targ} < 0$ M_{V-targ}, M_{H-targ}: The maximum or minimum value in the target hold of the vertical bending moment and horizontal bending moment ($kN-m$)	Amendment (9) Clarifies some definitions and corrects typographical errors: Corrects the typographical errors in adjustment moment

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
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.	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 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 4.3.2-5 Hydrodynamic Pressure P_{exw} in Equivalent Design Wave AV				Amendment (7) Revises the simplified formula for the ship' s hull centre of gravity to enhance accuracy.
	Hydrodynamic pressure P_{exw} (kN/m^2)			
	$z \leq T_{LC}$	$T_{LC} < z \leq T_{LC} + h_W$	$z > T_{LC} + h_W$	See the remark of amended-original requirements comparison table in Table 4.2.4-1.
AV -1P	$P_{exw} = \max(P_{AV}, \rho g(z - T_{LC}))$	$P_{WL} - \rho g(z - T_{LC})$	0	
AV -2P	$P_{exw} = \max(-P_{AV}, \rho g(z - T_{LC}))$			
AV -1S	$P_{exw} = \max(P_{AV}, \rho g(z - T_{LC}))$			
AV -2S	$P_{exw} = \max(-P_{AV}, \rho g(z - T_{LC}))$			
Notes: P_{AV} : As given by the following formula: $P_{AV} = 0.5C_{RAV}C_{NLA V}C_M C_{AV1}H_{SAV}(P_{AV1} + P_{AV2} + P_{AV3} + P_{AV4} + P_{AV5})$ (Omitted) P_{AV2} : As given by the following formulae: For equivalent design waves AV -1P and AV -2P: $For\ y > 0.0,\ P_{AV2} = \rho g \left\{ 0.6 \sin \left(\frac{2(x - x_G)}{L_C} \pi \right) - [-2.0 \cdot 10^{-5} \cdot (x - x_G) + 2.0 \cdot 10^{-3}](y^2 + z^2) \right\}$ $For\ y \leq 0.0,\ P_{AV2} = \rho g \left\{ 0.6 \sin \left(\frac{2(x - x_G)}{L_C} \pi \right) - 1.0 \cdot 10^{-3} \cdot (y^2 + z^2) \right\}$ For equivalent design waves AV -1S and AV -2S: $For\ y > 0.0,\ P_{AV2} = \rho g \left\{ 0.6 \sin \left(\frac{2(x - x_G)}{L_C} \pi \right) - 1.0 \cdot 10^{-3} \cdot (y^2 + z^2) \right\}$ $For\ y \leq 0.0,\ P_{AV2} = \rho g \left\{ 0.6 \sin \left(\frac{2(x - x_G)}{L_C} \pi \right) - [-2.0 \cdot 10^{-5} \cdot (x - x_G) + 2.0 \cdot 10^{-3}](y^2 + z^2) \right\}$ <u>x_G: X coordinate (m) at the centre of gravity of the ship, to be taken as $x_G = (0.36 + 0.2C_{B-LC})L_C$. 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: $P_{AV5} = -\rho g R_{5_AV} \left(x - \frac{L_C}{2} x_G \right) \cdot (-0.95)$ R_{5_AV} : As given by the following formula: $R_{5_AV} = \frac{-0.54(0.33C_{W_LC} - 0.12)\exp\left(-\frac{2\pi}{\lambda_{AV}}T_{LC}C_{VP_LC}\right)}{0.26\left(\frac{2\pi}{K_{AV}L_C} + 1.0\right)K_{AV}B \cdot \exp(-2K_{AV}T_{LC}C_{VP_LC}^4) \cdot \frac{C_{W_LC}^{3.65}}{12}L_C}$				

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													
(Omitted)															
Table 4.3.2-6 Hydrodynamic Pressure P_{exw} in Equivalent Design Wave PCL <table><tr><th rowspan="2"></th><th colspan="3">Hydrodynamic pressure P_{exw} (kN/m^2)</th></tr><tr><th>$z \leq T_{LC}$</th><th>$T_{LC} < z \leq T_{LC} + h_W$</th><th>$z > T_{LC} + h_W$</th></tr><tr><td>$PCL-1$</td><td>$P_{exw} = \max(-P_{PCL}, \rho g(z - T_{LC}))$</td><td rowspan="2">$P_{WL} - \rho g(z - T_{LC})$</td><td rowspan="2">0</td></tr><tr><td>$PCL-2$</td><td>$P_{exw} = \max(P_{PCL}, \rho g(z - T_{LC}))$</td></tr></table> Notes: P_{WL}, h_W: As specified in Table 4.3.2-5. P_{PCL}: As given by the following formula: $P_{PCL} = 0.5C_{RPCL} C_{NL_{PCL}} C_M C_{PCL1} H_{SPCL} (P_{PCL1} + P_{PCL2} + P_{PCL3})$ (Omitted) P_{PCL3}: As given by the following formula: $P_{PCL3} = -\rho g R_{5_PCL} \left(x - \frac{L_C}{2} x_G \right) \cos \left((0.05\sqrt{\lambda_{PCL}} - 1.28)\pi - \varepsilon_{PCL2} \right)$ R_{5_PCL}: As given by the following formula: $R_{5_PCL} = \frac{3\pi(1 - C_{W_LC})}{2B} \left(\frac{\lambda_{PCL}}{L_C} \right)^4$ x_G: As specified in Table 4.3.2-5.			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	$PCL-2$	$P_{exw} = \max(P_{PCL}, \rho g(z - T_{LC}))$	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.
	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												
$PCL-2$	$P_{exw} = \max(P_{PCL}, \rho g(z - T_{LC}))$														

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 4.3.2-7 Phase of Incident Wave in the Equivalent Design Wave					Amendment (7) Revises the simplified formula for the ship’ s hull centre of gravity to enhance accuracy.
	$C_{RE} > 0$	$C_{RE} < 0$	$C_{RE} = 0$ and $C_{IM} \geq 0$	$C_{RE} = 0$ and $C_{IM} < 0$	
C_{AV2}, C_{PCL2}	1	−1	1	−1	See the remark of amended-original requirements comparison table in Table 4.2.4-1.
$\varepsilon_{AV1}, \varepsilon_{PCL1}$	$\arctan\left(\frac{C_{IM}}{C_{RE}}\right)$		$\frac{\pi}{2}$		
Notes: C_{RE} : As given by the following formula: For equivalent design waves $AV-1P$ and $AV-2P$, $C_{RE} = \cos\left(\pi + \frac{2\pi}{\lambda_{AV}}\left[\frac{\left(x - \frac{L_{\overline{G}}}{2}x_G\right)}{2} + \frac{\sqrt{3}}{2}y\right]\right)$ For equivalent design waves $AV-1S$ and $AV-2S$, $C_{RE} = \cos\left(\pi + \frac{2\pi}{\lambda_{AV}}\left[\frac{\left(x - \frac{L_{\overline{G}}}{2}x_G\right)}{2} - \frac{\sqrt{3}}{2}y\right]\right)$ For equivalent design wave PCL , $C_{RE} = \cos\left(\pi + \frac{2\pi}{\lambda_{PCL}}\left(x - \frac{L_{\overline{G}}}{2}x_G\right)\right)$ λ_{AV} : As specified in Table 4.3.2-5. λ_{PCL} : As specified in Table 4.3.2-6. <u>x_G: As specified in Table 4.3.2-5.</u> C_{IM} : As given by the following formula: For equivalent design waves $AV-1P$ and $AV-2P$, $C_{IM} = \sin\left(\frac{2\pi}{\lambda_{AV}}\left[-\frac{\left(x - \frac{L_{\overline{G}}}{2}x_G\right)}{2} - \frac{\sqrt{3}}{2}y\right]\right)$ For equivalent design waves $AV-1S$ and $AV-2S$, $C_{IM} = \sin\left(\frac{2\pi}{\lambda_{AV}}\left[-\frac{\left(x - \frac{L_{\overline{G}}}{2}x_G\right)}{2} + \frac{\sqrt{3}}{2}y\right]\right)$ For equivalent design wave PCL , $C_{IM} = \sin\left(-\frac{2\pi}{\lambda_{PCL}}\left(x - \frac{L_{\overline{G}}}{2}x_G\right)\right)$					

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
4.3.2.5 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 <i>AV</i> and <i>PCL</i> 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 <i>AV</i> and <i>PCL</i> 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-1P	$-0.5g \cdot \sin \phi$ $+0.1a_1 - 0.95a_5(z - z_G)$	$0.1g \cdot \sin \theta$ $+0.01GMa_2 + 0.1a_4(z - z_G)$ $+[-0.9a_6(x - x_G)]$	$\left(1.7 \frac{\lambda_{AV}}{L_C} - 0.6\right)a_3 - 0.1a_4y$ $+0.95a_5(x - x_G)$
	AV-2P	$0.5g \cdot \sin \phi$ $-0.1a_1 + 0.95a_5(z - z_G)$	$-0.1g \cdot \sin \theta$ $-0.01GMa_2 - 0.1a_4(z - z_G)$ $+ [0.9a_6(x - x_G)]$	$\left(-1.7 \frac{\lambda_{AV}}{L_C} + 0.6\right)a_3 + 0.1a_4y$ $-0.95a_5(x - x_G)$
	AV-1S	$-0.5g \cdot \sin \phi$ $+0.1a_1 - 0.95a_5(z - z_G)$	$-0.1g \cdot \sin \theta$ $-0.01GMa_2 - 0.1a_4(z - z_G)$ $+ [0.9a_6(x - x_G)]$	$\left(1.7 \frac{\lambda_{AV}}{L_C} - 0.6\right)a_3 + 0.1a_4y$ $+0.95a_5(x - x_G)$
	AV-2S	$0.5g \cdot \sin \phi$ $-0.1a_1 + 0.95a_5(z - z_G)$	$0.1g \cdot \sin \theta$ $+0.01GMa_2 + 0.1a_4(z - z_G)$ $+ [-0.9a_6(x - x_G)]$	$\left(-1.7 \frac{\lambda_{AV}}{L_C} + 0.6\right)a_3 - 0.1a_4y$ $-0.95a_5(x - x_G)$
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	$-15 \frac{f_T}{L_C} a_3$ $- \left(40 \frac{f_T}{L_C} + 0.2\right)a_5(x - x_G)$
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: $a_1, a_2, a_3, a_4, a_5, a_6$: 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 $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. 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
Table 4.4.2-5 Acceleration at Any Position a_X, a_Y, a_Z					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.
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-1P	$-0.5g \cdot \sin \phi$ $+0.1a_1 - 0.95a_5(z - z_G)$	$0.1g \cdot \sin \theta$ $+0.01GMa_2 + 0.1a_4(z - z_G)$ $+[-0.9a_6(x - x_G)]$	$\left(1.7\frac{\lambda_{AV}}{L_C} - 0.6\right)a_3 - 0.1a_4y$ $+0.95a_5(x - x_G)$	
	AV-2P	$0.5g \cdot \sin \phi$ $-0.1a_1 + 0.95a_5(z - z_G)$	$-0.1g \cdot \sin \theta$ $-0.01GMa_2 - 0.1a_4(z - z_G)$ $+ [0.9a_6(x - x_G)]$	$\left(-1.7\frac{\lambda_{AV}}{L_C} + 0.6\right)a_3 + 0.1a_4y$ $-0.95a_5(x - x_G)$	
	AV-1S	$-0.5g \cdot \sin \phi$ $+0.1a_1 - 0.95a_5(z - z_G)$	$-0.1g \cdot \sin \theta$ $-0.01GMa_2 - 0.1a_4(z - z_G)$ $+ [0.9a_6(x - x_G)]$	$\left(1.7\frac{\lambda_{AV}}{L_C} - 0.6\right)a_3 + 0.1a_4y$ $+0.95a_5(x - x_G)$	
	AV-2S	$0.5g \cdot \sin \phi$ $-0.1a_1 + 0.95a_5(z - z_G)$	$0.1g \cdot \sin \theta$ $+0.01GMa_2 + 0.1a_4(z - z_G)$ $+ [-0.9a_6(x - x_G)]$	$\left(-1.7\frac{\lambda_{AV}}{L_C} + 0.6\right)a_3 - 0.1a_4y$ $-0.95a_5(x - x_G)$	
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 $x_G = 0.45(0.36 + 0.2C_{B_LC})L_C$. 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

Amended	Original	Remarks											
Part 2-10SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT TANKS OF TYPE C) Chapter 4LOADS 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 2-10SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT TANKS OF TYPE C) Chapter 4LOADS 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													
<table><tr><td></td><td></td><td>$P_{DB}(kN/m^2)^{(1) (2)}$</td><td>$P_{DS}(kN/m^2)^{(1) (2)}$</td></tr><tr><td rowspan="2">Double bottom</td><td>S1⁽³⁾</td><td>$P_{exs} + P_{exw}$</td><td>$P_{exs} + P_{exw}$</td></tr><tr><td>S2</td><td>$P_{exs} + P_{exw}$</td><td>$P_{exs} + P_{exw}$</td></tr></table>					$P_{DB}(kN/m^2)^{(1) (2)}$	$P_{DS}(kN/m^2)^{(1) (2)}$	Double bottom	S1 ⁽³⁾	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$	S2	$P_{exs} + P_{exw}$	$P_{exs} + P_{exw}$
		$P_{DB}(kN/m^2)^{(1) (2)}$	$P_{DS}(kN/m^2)^{(1) (2)}$										
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.													
		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
Chapter 7 STRENGTH OF PRIMARY SUPPORTING STRUCTURES 7.1 General 7.1.1 Application 7.1.1.2 Application Example of Assessment Model for Liquified Gas Bulk Carriers with Independent Tanks Type C 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 for Liquified Gas Bulk Carriers with Independent Tanks Type C 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 Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 2))

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 <u>C7.2.2 Strength Assessment</u> <u>C7.2.2.1 General</u> <u>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.</u>	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				• Newly adds the list of applications of web frames
	<u>Single-deck ships</u>	<u>Double-deck ships</u>	<u>Multi-deck ships with three or more decks</u>	
<u>Web frames subject to external pressure</u>	<u>7.2.2.1, Part 1, Part C of the Rules</u>	<u>7.2.2.1, Part 1, Part C of the Rules</u>	<u>7.2.2.1, Part 1, Part C of the Rules or 7.2.1.1, Part 2-6, Part C of the Rules</u>	
<u>Web frames supporting cantilever beams</u>	<u>7.2.2.2(1), Part 1, Part C of the Rules</u>	<u>Double-deck ships with the first layers being double side and the second layers being single side:</u> <u>7.2.2.2(1), Part 1, Part C of the Rules</u> <u>Double-deck ships with the first and second layers being single side:</u> <u>7.2.2.2(2), Part 1, Part C of the Rules</u>	<u>7.2.2.2(1), Part 1, Part C of the Rules</u>	

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
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>	Appendix C1 REFERENCE DATA FOR DESIGN (Newly added)	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.

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 1 Simplified Method for Deriving Stress due to Hull Girder Loads					Amendment (6) Simplified method for deriving stress due to hull girder loads
<u>Design load scenario</u>	<u>Load Condition</u>	<u>Stress due to hull girder loads</u>	β	<u>Wave and still water vertical bending moments to be considered M_W and M_S</u>	
<u>Maximum load condition</u>	$\underline{HF}^{(1)}$ or $\underline{HM}^{(2)}$	$\sigma_{BM} = \sigma_{BM-HF}$ where $\sigma_{BM-HF} = \begin{cases} \frac{190}{K} f_D \frac{z - z_n}{z_D - z_n} & \text{for } z \geq z_n \\ \frac{190}{K} f_B \frac{z - z_n}{z_B - z_n} & \text{for } z < z_n \end{cases}$	$\underline{\hspace{1cm}}$	$\underline{\hspace{1cm}}$	
	$\underline{RP}^{(1)}$ or $\underline{BP}^{(2)}$	$\sigma_{BM} = \max(\beta \sigma_{BM-HF} + 0.35 C_{MH} \gamma , C_{MH} \gamma)$ where $C_{MH} = \min\left(\frac{118}{B_{x2}}, 5.9\right)$	$\frac{0.35 M_W + M_S}{M_W + M_S}$	<u>Wave and still water vertical bending moments for hogging and sagging load cases</u>	
<u>(Notes)</u> 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 <u>(Remarks)</u> (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.					
EFFECTIVE DATE AND APPLICATION					
1. Effective date of this amendment is 20 December 2025. 2. Notwithstanding 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 may apply to ships for which the date of contract for construction is before the effective date upon requests.					