Amendment on 27 June 2024
Resolved by Technical Committee on 30 January 2024

Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part CS

Reason for Amendment

IACS Unified Requirement (UR) S3 specifies requirements related to the strength of superstructure end bulkheads and deckhouse boundary walls for cargo ships in general regardless of their length, and these requirements have already been incorporated by ClassNK into Part C and Part CS of its Rules for the Survey and Construction of Steel Ships.

Although UR S3 applies to all cargo ships, its requirements related to the minimum thicknesses of superstructure end bulkheads and deckhouse boundary walls were, however, established mainly in consideration of relatively large ships. IACS, therefore, reviewed these requirements so as to make their application also suitable for small ships. An amended version of the UR was adopted as IACS UR S3 (Rev.2) in June 2023.

In addition, with regard to requirements related to the calculation of the heads of water to be considered for superstructure end bulkheads and deckhouse boundary walls specified in the UR, ClassNK had previously specified a simplified formula for the sake of convenience in its Rules. It has, however, decided to take advantage of the opportunity provided by the amending of the UR to also amend the notation it uses for this formula so that it is in line with notation used in the UR.

Accordingly, relevant requirements are amended in accordance with UR S3 (Rev.2).

Outline of the Amendment

The main contents of this amendment are as follows:

(1) Amends requirements related to the minimum thicknesses of superstructure end bulkheads and deckhouse boundary walls for ships less than 65 *m* in length.
(2) Amends the formula for calculating the heads of water to be considered when determining the dimensions of superstructure end bulkheads and deckhouse boundary walls so that it is in line with the notation used in UR S3.

Effective Date and application

This amendment applies to ships for which the date of contract for construction is on or after 1 July 2024.

ID: DH23-11

Amended-Original Requirements Comparison Table
(Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls)

Amended	Original	Remarks
RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part CS HULL CONSTRUCTION AND EQUIPMENT OF SMALL SHIPS** **Chapter 18 SUPERSTRUCTURES AND DECKHOUSES** **18.2 Construction and Scantlings** **18.2.1 Head of Water *h*** **1** The head of water for the calculation of the scantlings of superstructure end bulkheads and boundary walls of deckhouses is not to be less than that obtained from the following formula: $ac\ (bf - y)\ (m)$ Where: a: As given by the following formulae: Exposed front bulkhead and wall of the first tier: $2.0 + \frac{L_1}{120}$ Exposed front bulkhead and wall of the second tier: $1.0 + \frac{L_1}{120}$ Exposed front bulkhead and wall of the third tier, and side walls and protected end bulkheads and front walls: $0.5 + \frac{L_1}{150}$ Aft bulkheads and walls located abaft the midship:	**RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part CS HULL CONSTRUCTION AND EQUIPMENT OF SMALL SHIPS** **Chapter 18 SUPERSTRUCTURES AND DECKHOUSES** **18.2 Construction and Scantlings** **18.2.1 Head of Water *h*** **1** The head of water for the calculation of the scantlings of superstructure end bulkheads and boundary walls of deckhouses is not to be less than that obtained from the following formula: $ac(0.067bL - y)\ (m)$ Where: a: As given by the following formulae: Exposed front bulkhead and wall of the first tier: $2.0 + \frac{L}{120}$ Exposed front bulkhead and wall of the second tier: $1.0 + \frac{L}{120}$ Exposed front bulkhead and wall of the third tier, and side walls and protected end bulkheads and front walls: $0.5 + \frac{L}{150}$ Aft bulkheads and walls located abaft the midship:	UR S3.2

Amended-Original Requirements Comparison Table
(Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls)

Amended	Original	Remarks
$0.7 + \frac{L_1}{1000} - 0.8\frac{x}{L_1}$ Aft bulkheads and walls located afore the midship: $0.5 + \frac{L_1}{1000} - 0.4\frac{x}{L_1}$ b: As given by the following formulae: Where $\frac{x}{L_1}$ is less than 0.45: $1.0 + \left(\frac{0.45 - \frac{x}{L_1}}{C_{b1} + 0.2}\right)^2$ Where $\frac{x}{L_1}$ is 0.45 and over: $1.0 + 1.5\left(\frac{\frac{x}{L_1} - 0.45}{C_{b1} + 0.2}\right)^2$ x: Distance (m) from the bulkhead or end wall to the after perpendicular, or distance from the mid-point of the side wall to the after perpendicular However, where the length of the side wall exceeds 0.15 L_1, the side wall is to be equally subdivided into span not exceeding 0.15 L_1 and the distance from the mid-point of the subdivisions to the after perpendicular is to be taken. C_{b1}: Block coefficient However, where C_b is 0.6 or under, C_{b1} is to be taken as 0.6 and where C_b is 0.8 and over, C_{b1} is to be taken as 0.8. In calculating b for the aft wall located afore the midship, C_{b1} is to be taken as	$0.7 + \frac{L}{1000} - 0.8\frac{x}{L}$ Aft bulkheads and walls located afore the midship: $0.5 + \frac{L}{1000} - 0.4\frac{x}{L}$ b: As given by the following formulae: Where $\frac{x}{L}$ is less than 0.45: $1.0 + \left(0.5 - 1.1\frac{x}{L}\right)^2$ Where $\frac{x}{L_1}$ is 0.45 and over: $1.0 + 1.5\left(1.1\frac{x}{L} - 0.5\right)^2$ x: Distance (m) from the bulkhead or end wall to the after perpendicular, or distance from the mid-point of the side wall to the after perpendicular However, where the length of the side wall exceeds 0.15 L, the side wall is to be equally subdivided into span not exceeding 0.15 L and the distance from the mid-point of the subdivisions to the after perpendicular is to be taken. (Newly added)	

Amended-Original Requirements Comparison Table
(Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls)

Amended	Original	Remarks
0.8. c: Coefficient as given by the following formulae: For end bulkheads of superstructures: 1.0 For boundary walls of deckhouses: $0.3 + 0.7\frac{b'}{B'}$ However, where b'/B' is less than 0.25, b'/B' is to be taken as 0.25. b': Breadth (m) of deckhouse at the position under consideration. B': Breadth (m) of ship on the exposed deck at the position under consideration. y: Vertical distance (m) from the designed maximum load line to the mid-point of the span of stiffeners when determining the scantlings of stiffeners; and to the mid-point of plating when determining the thickness of bulkhead or boundary wall plating. f: Determined as follows: $\frac{L_1}{10}e^{-\frac{L_1}{300}} - \left[1 - \left(\frac{L_1}{150}\right)^2\right]$ L_1: Distance (m) measured on the waterline at the scantling draught d_S from the forward side of the stem to the centre of the rudder stock. L_1 is to be not less than 96 % need not exceed 97% of the extreme length on the waterline at the scantling draught d_S. In ships without rudder stocks (e.g. ships fitted with azimuth thrusters), the Rule length L_1 is to be taken equal to 97 % of the extreme length on the waterline at the scantling draught d_S. d_S: Scantling draught (m) at which the strength requirements for the scantlings of the ship are met and represents the full load condition. d_S is to be not less than that corresponding to the assigned freeboard.	c: Coefficient as given by the following formulae: For end bulkheads of superstructures: 1.0 For boundary walls of deckhouses: $0.3 + 0.7\frac{b'}{B'}$ However, where b'/B' is less than 0.25, b'/B' is to be taken as 0.25. b': Breadth (m) of deckhouse at the position under consideration. B': Breadth (m) of ship on the exposed deck at the position under consideration. y: Vertical distance (m) from the designed maximum load line to the mid-point of the span of stiffeners when determining the scantlings of stiffeners; and to the mid-point of plating when determining the thickness of bulkhead or boundary wall plating. (Newly added)	UR S2.1

Amended-Original Requirements Comparison Table
(Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls)

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<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
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2 The head of water for the calculation of the scantlings of superstructure end bulkheads and boundary walls of deckhouses is not to be less than that obtained from the formulae in **Table CS18.1** irrespective of the provision in **-1**.

Table CS18.1

	Exposed front bulkhead and wall of the first tier	Others
L_1 is 50 *metres* and under	3.0 (m)	1.5 (m)
L_1 exceeds 50 *metres*	$2.5 + \frac{L_1}{100}$ (m)	$1.25 + \frac{L_1}{200}$ (m)

18.2.2 Thickness of Bulkhead and Wall Plating

1 The thickness of superstructure end bulkhead plating and boundary wall plating is not to be less than that obtained from the following formula:

$3S\sqrt{h}$ (mm)

Where:

h: Head of water (m) specified in **18.2.1**

S: Spacing of stiffeners (m)

2 The thickness of bulkhead and wall plating is not to be less than that obtained from the following formulae, irrespective of the provisions in **-1**:

(1) In the case of $L_1 \geq 65$ *m*

Bulkhead plating of the first tier:

$5.0 + \frac{L_1}{100}$ (mm)

Plating of other bulkheads, but not less than 5.0 *mm*:

$4.0 + \frac{L_1}{100}$ (mm)

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2 The head of water for the calculation of the scantlings of superstructure end bulkheads and boundary walls of deckhouses is not to be less than that obtained from the formulae in **Table CS18.1** irrespective of the provision in **-1**.

Table CS18.1

	Exposed front bulkhead and wall of the first tier	Others
L_1 is 50 *metres* and under	3.0 (m)	1.5 (m)
L_1 exceeds 50 *metres*	$2.5 + \frac{L}{100}$ (m)	$1.25 + \frac{L}{200}$ (m)

18.2.2 Thickness of Bulkhead and Wall Plating

1 The thickness of superstructure end bulkhead plating and boundary wall plating is not to be less than that obtained from the following formula:

$3S\sqrt{h}$ (mm)

Where:

h: Head of water (m) specified in **18.2.1**

S: Spacing of stiffeners (m)

2 The thickness of bulkhead and wall plating is not to be less than that obtained from the following formulae or 5 *mm*, whichever is greater, irrespective of the provisions in **-1**:

Bulkhead plating of the first tier:

$5.0 + \frac{L_1}{100}$ (mm)

Plating of other bulkheads:

$4.0 + \frac{L_1}{100}$ (mm)

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UR S3.2 Table1

UR S3.4

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Amended-Original Requirements Comparison Table
(Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls)

Amended	Original	Remarks
(2) In the case of $L_1 < 65$ *m* The lowest unprotected front: 5.0 (*mm*) All other cases: 4.0 (*mm*)	(Newly added)	

Amended-Original Requirements Comparison Table
(Minimum Thicknesses of Superstructure End Bulkheads and Deckhouse Boundary Walls)

Amended	Original	Remarks
EFFECTIVE DATE AND APPLICATION **1.** The effective date of the amendments is 1 July 2024. **2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction* is before the effective date. * "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29. IACS PR No.29 (Rev.0, July 2009) **1.** The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding. **2.** The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided: (1) such alterations do not affect matters related to classification, or (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval. The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed. **3.** If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply. **4.** If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder. Note: This Procedural Requirement applies from 1 July 2009.		