COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2
April 2010

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

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[1] Note:

- Rule Change Proposals 2-1, 2-8, 2-10, 2-14 and 2-16 are not included in this Rule Change Notice document pending further consideration by IACS following feedback during the review process.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-2

Loads on exposed decks considering UR S21 and loads on non-exposed decks

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-2.

CHAPTER 4 – DESIGN LOADS

Section 5 – External Pressures

2. External pressures on exposed decks

2.2 Load cases H1, H2, F1 and F2

2.2.1

The external pressure p_D, for load cases H1, H2, F1 and F2, at any point of an exposed deck is to be obtained, in kN/m^2, from the following formula:

$$p_D = \varphi p_W$$

where:

p_W : Pressure obtained from the formulae in Tab 4

φ : Coefficient defined in Tab 5

Table 4: Pressures on exposed decks for H1, H2, F1 and F2

Location	**Pressure p_W, in kN/m^2**	
	$L_{LL} \geq 100$ m	**$L_{LL} < 100$ m**
$0 \leq x_{LL}/L_{LL} \leq 0.75$	34.3	$14.9 + 0.195 L_{LL}$
$0.75 < x_{LL}/L_{LL} < 1$	$34.3 + (14.8 + \alpha(L_{LL} - 100))\left(4\frac{x_{LL}}{L_{LL}} - 3\right)$	$12.2 + \frac{L_{LL}}{9}\left(5\frac{x_{LL}}{L_{LL}} - 2\right) + 3.6\frac{x_{LL}}{L_{LL}}$

where:

α: Coefficient taken equal to:
$\alpha = 0.0726$ for Type B freeboard ships
$\alpha = 0.356$ for Type B-60 or Type B-100 freeboard ships.

x_{LL}: X coordinate of the load point measured from the aft end of the freeboard length L_{LL}.

Table 5: Coefficient for pressure on exposed decks

Exposed deck location	**φ**
Freeboard deck ~~and forecastle deck~~	1.00
Superstructure deck~~, excluding forecastle deck~~ including forecastle deck	0.75
1st tier of deckhouse	0.56
2nd tier of deckhouse	0.42
3rd tier of deckhouse	0.32
4th tier of deckhouse	0.25
5th tier of deckhouse	0.20
6th tier of deckhouse	0.15
7th tier of deckhouse and above	0.10

CHAPTER 9 – OTHER STRUCTURES

Section 4 – SUPERSTRUCTURES AND DECKHOUSES

3. Load model

3.2 Loads

3.2.1 Lateral pressure for decks

The lateral pressure for decks of superstructures and deckhouses, in kN/m^2, is to be taken equal to:

- the external pressure p_D defined in Ch 4, Sec 5, [2.1] for exposed decks,
- $5 kN/m^2$ for unexposed decks.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-2

Loads on exposed decks considering UR S21 and loads on non-exposed decks

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) The Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-2 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reason for the Rule Changes

1.1 Chapter 4, Section 5, Table 4

KC references: question id 628 and 671

External pressures on exposed decks for load case H1, H2, F1 and F2 are calculated based on x/L_{LL} where L_{LL} is a freeboard length as defined in Chapter 1, Section 4, [3.2], while x is the X co-ordinate of the load calculation point from the aft end of the rule length L. The aft end (AE) in Chapter 1, Section 4, Figure 4 is relevant to the rule length L only despite the fact that positions of the aft end and fore end in L are not the same as those in L_{LL}. This is not in line with the text in IACS UR S21 and the amended ILLC. The distance "x" should be modified in order to reflect this difference.

1.2 Chapter 4, Section 5, Table 5

KC reference: question id 628

Table 5 in Chapter 4, Section 5 gives the exact values of pressures for hatch covers in position 1, as stated in ILLC Reg. 16.2 (1966 and protocol 1988, as amended in 2003). Regarding the pressure on forecastle deck, it has been noticed that it is too severe to apply the same pressure as for hatch covers in position 1. Table 5 should be modified in order to lower the value of the pressure on forecastle deck.

1.3 Chapter 9, Section 4, [3.2.1]

KC references: question id 693 and 785

The lateral pressure for decks of superstructures and deckhouses is defined in Chapter 9, Section 4, [3.2.1]. This requirement refers to the external pressure p_D defined in Chapter 4, Section 5, [2.1], which is a pressure for exposed deck. In case of non-exposed decks of superstructure and deckhouses, no internal pressure is defined. Such pressure should be added Chapter 9, Section 4, [3.2.1], and should be a value including static and dynamic effects, as it is in the Common Structural Rules for Oil Tankers.

2 Summary of Rule Changes

2.1 Chapter 4, Section 5, Table 4

The definition of the distance "x" is modified and replaced by the new distance "x_{LL}" which is measured from the aft end of freeboard length L_{LL}: then Chapter 4, Section 5, [2.2.1] is in line with the text in the amended ILLC and IACS UR S21.

2.2 Chapter 4, Section 5, Table 5

Since it is severe to apply the same pressure on forecastle deck as for hatch cover in position 1, Table 5 is modified by deleting the words "and forecastle deck" in the first line and deleting the word "excluding forecastle deck" in the second line: a reduction factor of 0.75 is used to determine the pressure on forecastle.

2.3 Chapter 9, Section 4, [3.2.1]

As the scantling formulae are coming from GL Rules and in order to keep consistency, the value of the pressure for non-exposed decks of superstructures and deckhouses should also be based on GL Rules. This pressure value is equal to 3.5 kN/m² in GL Rules. However, it is a static value and when dynamic load effects are included, it gives a total pressure of 5 kN/m².

Moreover, the load on the unexposed deck is always an internal one because it is not exposed to weather.

3 Impact on Scantling

3.1 Chapter 4, Section 5, Table 4

There is no change in term of steel weight by comparing that before and after the proposed Rule Change.

3.2 Chapter 4, Section 5, Table 5

It will be a change in terms of steel weight by comparing that before and after the proposed Rule Change: the calculated pressure on forecastle deck after the Rule Change will be lower than before, but in line with the designs of CSR bulk carriers. No scantling impact study is required to evaluate such modification.

3.3 Chapter 9, Section 4, [3.2.1]

The scantling impact, if any, cannot be evaluated as no pressure on non-exposed deck was defined before.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-3

Hatch cover

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-3.

CHAPTER 9 – OTHER STRUCTURES

Section 5 – HATCH COVERS

7. Weathertightness, closing arrangement, securing devices and stoppers

7.3 Closing arrangement, securing devices and stoppers

7.3.5 Area of securing devices

The ~~gross~~ net cross area of each securing device is to be not less than the value obtained, in cm^2, from the following formula:

$$A = 1.4 S_S \left(\frac{235}{R_{eH}} \right)^{\alpha}$$

where:

S_S : Spacing, in m, of securing devices

α : Coefficient taken equal to:

$\alpha = 0.75$ for $R_{eH} > 235$ N/mm^2

$\alpha = 1.0$ for $R_{eH} \le 235$ N/mm^2

In the above calculations, R_{eH} may not be taken greater than $0.7R_m$.

Between hatch cover and coaming and at cross-joints, a packing line pressure sufficient to obtain weathertightness is to be maintained by securing devices. For packing line pressures exceeding 5 N/mm, the net cross area A is to be increased in direct proportion. The packing line pressure is to be specified.

In the case of securing arrangements which are particularly stressed due to the unusual width of the hatchway, the net cross area A of the above securing arrangements is to be determined through direct calculations.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-3

Hatch Cover

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-3 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reason for the Rule Changes

Chapter 9, Section 5, [7.3.5] is the copy of a part of UR S21.5.1 which specifies A as net sectional area. In light of UR S21.5.1, “gross cross area” is a typo which should be corrected.

As it is referred to the sectional area of securing devices, it is to be understood that the “net sectional area” is the “nominal sectional area”.

2 Summary of Rule Changes

In the first part of Chapter 9, Section 5, [7.3.5], the general formula for determining the “gross cross area” A of each securing device is given. Then, in the second part of [7.3.5], some special cases are specified and the corresponding “net cross area” A.

However, Chapter 9, Section 5, [7.3.5] is based on UR S21.5.1, in which only “net cross area” is used. To be fully consistent with UR S21, the “gross cross area” is to be replaced by “net cross area”. In addition, to avoid any misunderstanding, it is specified that the net cross area of the securing device is the nominal cross area.

3 Impact on Scantling

There is no change in term of steel weight by comparing that before and after the proposed Rule Change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-4

Rudder Area Recommendation

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-4.

CHAPTER 10 – HULL OUTFITTING

Section 1 – RUDDER AND MANOEUVRING ARRANGEMENT

1 General

1.1 Manoeuvring arrangement

1.1.1

~~Each ship is to be provided with a manoeuvring arrangement which will guarantee sufficient manoeuvring capability.~~

The manoeuvring arrangement includes all parts from the rudder and steering gear to the steering position necessary for steering the ship.

1.3 ~~Size of rudder area~~

~~In order to achieve sufficient manoeuvring capability the size of the movable rudder area *A* is recommended to be not less than obtained, in m2, from the following formula:~~

$$A = c_1 c_2 c_3 c_4 \frac{1.75LT}{100}$$

~~where:~~

~~c_1 = Factor taken equal to 0.9~~

~~c_2 = Factor for the rudder type:~~

~~c_2 = 1.0 in general~~

~~c_2 = 0.9 for semi-spade rudders~~

~~c_2 = 0.7 for high lift rudders~~

~~c_3 = Factor for the rudder profile:~~

~~c_3 = 1.0 for NACA-profiles and plate rudder~~

~~c_3 = 0.8 for hollow profiles and mixed profiles~~

~~c_4 = Factor for the rudder arrangement:~~

~~c_4 = 1.0 for rudders in the propeller jet~~

~~c_4 = 1.5 for rudders outside the propeller jet~~

~~For semi-spade rudders 50% of the projected area of the rudder horn may be included into the rudder area *A*.~~

~~Where more than one rudder is arranged the area of each rudder can be reduced by 20%.~~

~~In estimating the rudder area *A*, [2.1] is to be considered.~~

(void)

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-4

Rudder Area Recommendation

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-4 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reasons for the Rule Changes

1.1 Chapter 10, Section 1, [1.1.1] and [1.3]

KC reference: question id 744

The formula, given in Ch 10, Sec 1, [1.3], is only a recommendation, which gives a minimum size based on some major parameters, and is not mandatory.

The size and efficiency of the rudder has to be proven by the ITTC manoeuvring trials and the questions relevant to manoeuvrability should not be included in structural Rules.

2 Summary of Rule Changes

2.1 Chapter 10, Section 1, [1.1.1] and [1.3]

[1.3] and the first sentence of [1.1.1] are deleted to avoid any misleading use of the Area Recommendation formula.

3 Impact on Scantling

3.1 Chapter 10, Section 1, [1.1.1] and [1.3]

The now deleted formula in [1.3] is only a recommendation and not a requirement; hence there is no change in terms of the steel weight by comparing that before and after the proposed Rule Change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-5

Lightweight

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-5.

CHAPTER 1 – GENERAL PRINCIPLES

Section 4 – SYMBOLS AND DEFINITIONS

3. Definitions

3.7 Lightweight

3.7.1

The lightweight is the displacement, in t, without cargo, fuel, lubricating oil, ballast water, fresh water and feed water in tanks, consumable stores and passengers and crew and their effects~~, but including liquids in piping~~.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-5

Lightweight

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) These Technical Background for Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-5 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reason for the Rule Changes

1.1 Chapter 1, Section 4, [3.7.1]

KC reference: question id 713

The definition of lightweight is made to be in line with the definition in the Reg.3.22 Chapter II-1 of SOLAS.

2 Summary of Rule Changes

2.1 Chapter 1, Section 4, [3.7.1]

According to Reg.3.22 Chapter II-1 of SOLAS, "Lightweight is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects.", the rule change is made to be in line with the definition in it.

3 Impact on Scantling

3.1 Chapter 1, Section 4, [3.7.1]

There is no change in terms of the steel weight by comparing that before and after the proposed Rule Change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-6

Protection Measure From Grab Wire

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-6.

CHAPTER 3 – STRUCTURAL DESIGN PRINCIPLES

Section 6 – STRUCTURAL ARRANGEMENT PRINCIPLES

9. Deck structure

9.5 Hatch supporting structures

9.5.4

For ships with holds designed for loading / discharging by grabs and having the additional class notation **GRAB[X]**, Wwire rope grooving in way of cargo holds openings is to be prevented by fitting suitable protection such as half-round bar on the hatch side girders (i.e. upper portion of top side tank plates)/hatch end beams in cargo hold or and upper portion of hatch coamings.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-6

Protection Measure From Grab Wire

Notes: (1) These Rule Changes enter into force on 1st July 2010.
(2) This Technical Background For Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-6 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reasons for the Rule Changes

1.1 Chapter 3, Section 6, [9.5.4]

SOLAS XII/6.5.1 applies to ships having length L of 150m or above and carrying the cargoes of 1 t/m^3 and above, i.e. BC-A and BC-B ships. Accounting for the reality, protection measure from loading/discharge equipment wire, such as grab, should be taken for bulk carriers.

In the CSR for BC, the additional class notation "GRAB" is mandatory for BC-A and BC-B ships and is voluntary for ships other than BC-A and BC-B ships.

Therefore, this requirement should apply to ships having the additional class notation **GRAB [X]** including those ships other than BC-A and BC-B ships

To be in line with SC 208, the position to fit protection bars is specified.

2 Summary of Rule Changes

2.1 Chapter 3, Section 6, [9.5.4]

The application of [9.5.4] is added, referring to those ships having the additional class notation GRAB[X].

The conjunction “or” is changed to “and”.

3 Impact on Scantling

3.1 Chapter 3, Section 6, [9.5.4]

There is no change in terms of steel weight by comparing that before and after the proposed Rule Change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-7

PMA

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-7.

CHAPTER 1 – GENERAL PRINCIPLES

Section 3 – FUNCTIONAL REQUIREMENTS

2. Definition of functional requirements

2.5 Means of access

2.5.1

Ship structures subject to overall and close-up inspection and thickness measurements are to be provided with means capable of ensuring safe access to the structures. The means of access are to be described in a Ship Structure Access Manual for bulk carriers of 20, 000 gross tonnage and over. Reference is made to SOLAS, Chapter II-1, Regulation 3-6.

CHAPTER 2 – GENERAL ARRANGEMENT DESIGN

Section 3 – ACCESS ARRANGEMENT

1. General

1.0 Application

1.0.1

This section applies to ships of 20, 000 gross tonnage and over.

1.1 Means of access to cargo and other spaces

1.1.1

Ref. SOLAS Reg.II-1/3-6 .2.1 (Resolution MSC.151(78))

Each space is to be provided with means of access to enable, throughout the life of a ship, overall and close-up inspections and thickness measurements of the ship's structures. Such means of access are to comply with [1.3] and [2].

1.1.2

Ref. SOLAS Reg.II-1/3-6 .2.2 (Resolution MSC.151(78))

Where a permanent means of access may be susceptible to damage during normal cargo loading and unloading operations or where it is impracticable to fit permanent means of access, the Administration may allow, in lieu thereof, the provision of movable or portable means of access, as specified in [2], provided that the means of attaching, rigging, suspending or supporting the portable means of access forms a permanent part of the ship's structure. All portable equipment are to be capable of being readily erected or deployed by ship's personnel.

1.1.3

Ref. SOLAS Reg.II-1/3-6 .2.3 (Resolution MSC.151(78))

The construction and materials of all means of access and their attachment to the ship's structure are to be to the satisfaction of the Society.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-7

PMA

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Technical Background For Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-7 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reasons for the Rule Changes

1.1 Chapter 1, Section 3, [2.5.1]

KC reference: question id 351

The change is made to be in line with the SOLAS II-1/3-6.

1.2 Chapter 2, Section 3, [1]

KC references: questions id 351 & 853

These changes are made to be in line with the SOLAS II-1/3-6 and the Resolution MSC.151/158(78).

2 Summary of Rule Changes

2.1 Chapter 1, Section 3, [2.5.1]

According to the SOLAS II-1/3-6, the requirement is to be applied to bulk carriers of 20000 gross tonnage and above, the application of the requirement for PMA is specified in a new sub-article named “Application”, referring to the whole section 3.

2.2 Chapter 2, Section 3, [1]

According to the SOLAS II-1/3-6 and the Resolution MSC.151/158 (78), the requirements are to be applied to bulk carriers of 20000 gross tonnage and above.

3 Impact on Scantling

3.1 Chapter 1, Section 3, [2.5.1]

There is no change in terms of steel weight by comparing that before and after the proposed Rule Change.

3.2 Chapter 2, Section 3, [1]

There is no change in terms of steel weight by comparing that before and after the proposed Rule Change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-9

Recommendation No. 47

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-9.

CHAPTER 11 – CONSTRUCTION AND TESTING

Section 1 – CONSTRUCTION

1. Structural details

1.2 Cold forming

1.2.1

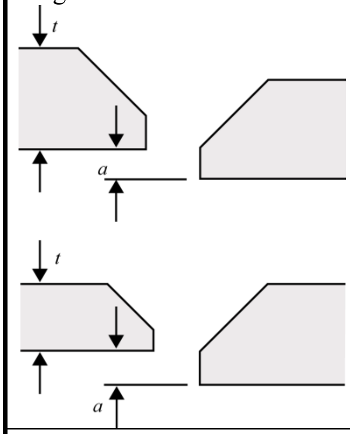
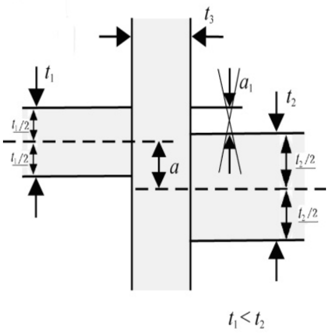
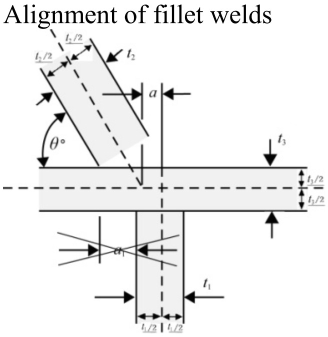
For cold forming (bending, flanging, beading) of ~~plates~~ corrugated bulkhead the ~~minimum average~~ inside bending radius is to be not less than ~~3 t~~ 2·t (t = as-built thickness).

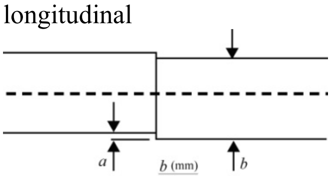
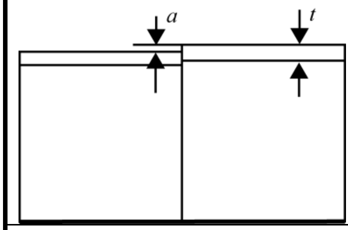
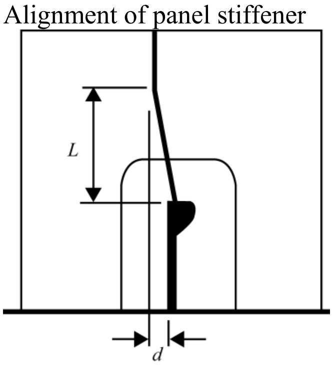
In order to prevent cracking, flame cutting flash or sheering burrs are to be removed before cold forming. After cold forming all structural components and, in particular, the ends of bends (plate edges) are to be examined for cracks. Except in cases where edge cracks are negligible, all cracked components are to be rejected. Repair welding is not permissible.

1.3 Assembly, alignment

1.3.1

Table 1: Alignment (t, t_1 and t_2: as-built thickness)

Detail	Standard	Limit	Remarks
Alignment of butt welds 	~~a ≤ 0.15t strength~~ ~~a ≤ 0.2t other~~	~~a ≤ 3.0 mm~~ a ≤ 0.15t strength member a ≤ 0.2t other but maximum 4.0 mm	t is the lesser plate thickness
Alignment of fillet welds 	~~a) Strength and higher tensile steel~~ ~~a ≤ t₁ / 4 measured on the median~~ ~~a ≤ (5t₁ – 3t₂) / 6 measured on the heel line~~ ~~b) Other~~ ~~a ≤ t₁ / 2 measured on the median~~ ~~a ≤ (2 t₁ – t₂) / 2 measured on the heel line~~	Strength member and higher stress member: $a \le t_1/3$ Other: $a \le t_1/2$	Alternatively, heel line can be used to check the alignment. Where ~~t_2~~ t_3 is less than t_1, then ~~t_2~~ t_3 should be substituted for t_1.
Alignment of fillet welds 	~~a) Strength and higher tensile steel~~ ~~a ≤ t₁ / 3 measured on the median~~ ~~b) Other~~ ~~a ≤ t₁ / 2 measured on the heel line~~	Strength member and higher stress member: $a \le t_1/3$ Other: $a \le t_1/2$	Alternatively, heel line can be used to check the alignment. Where t_3 is less than t_1, then t_3 should be substitute for t_1.
Note: "strength" means the following elements: strength deck, inner bottom, bottom, lower stool, lower part of transverse bulkhead, bilge hopper and side frames of single side bulk carriers.			

Alignment of face plates of T longitudinal 	Strength member $a \le 0.04b$ ~~strength~~	a = 8.0 mm	
Alignment of height of T-bar, L-angle bar or bulb 	Strength member $a \le 0.15\ t$ ~~for primary supporting members~~ Other $a \le 0.2\ t$ ~~for ordinary stiffeners~~	a = 3.0 mm	
Alignment of panel stiffener 	$d \le L / 50$		
Note: “strength” means the following elements: strength deck, inner bottom, bottom, lower stool, lower part of transverse bulkhead, bilge hopper and side frames of single side bulk carriers.			

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-9

Recommendation No 47

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Technical Background For Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-9 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reasons for the Rule Changes

1.1 Chapter 11, Section 1, [1.2.1]

These changes are made to be in line with the Revision 4 of IACS Recommendation No.47.

1.2 Chapter 11, Section 1, Table 1

These changes are made to be in line with the Revision 4 of IACS Recommendation No.47.

2 Summary of Rule Changes

2.1 Chapter 11, Section 1, [1.2.1]

The "plates" is changed to "corrugated bulkhead"; the "3t" is changed to "2t".

2.2 Chapter 11, Section 1, Table 1

These changes are made according to the Revision 4 of IACS Recommendation No.47.

3 Impact on Scantling

3.1 Chapter 2, Section 1, [3.1.1]

There is no change in terms of steel weight by comparing that before and after the proposed Rule Change.

3.2 Chapter 9, Section 3, [2.1.2]

There is no change in terms of steel weight by comparing that before and after the proposed Rule Change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-11

Welding

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-11.

CHAPTER 11 – CONSTRUCTION AND TESTING

Section 2 – WELDING

2. Types of welded connections

2.6 Fillet welds

2.6.1 Kinds and size of fillet welds and their applications

Kinds and size of fillet welds for as-built thickness of abutting plating up to 50 mm are classed into 5 categories as given in Tab 1 and their application to hull construction is to be as required by Tab 2.

In addition, for zones “*a*” and “*b*” of side frames as shown in Ch 3, Sec 6, Fig 19, the weld throats are to be respectively $0.44t$ and $0.4t$, where t is as-built thickness of the thinner of two connected members.

Table 1: Categories of fillet welds

Category	Kinds of fillet welds	As-built thickness of abutting plate, *t*, in mm (1)	Leg length of fillet weld, in mm (2), (3)	Length of fillet welds, in mm	Pitch, in mm
F0	Double continuous weld	t	$0.7t$	-	-
F1	Double continuous weld	$t \le 10$	$0.5t + 1.0$	-	-
		$10 \le t < 20$	$0.4t + 2.0$	-	-
		$20 \le t$	$0.3t + 4.0$	-	-
F2	Double continuous weld	$t \le 10$	$0.4t + 1.0$	-	-
		$10 \le t < 20$	$0.3t + 2.0$	-	-
		$20 \le t$	$0.2t + 4.0$	-	-
F3	Double continuous weld	$t \le 10$	$0.3t + 1.0$	-	-
		$10 \le t < 20$	$0.2t + 2.0$		
		$20 \le t$	$0.1t + 4.0$		
F4	Intermittent weld	$t \le 10$	$0.5t + 1.0$	75	300
		$10 \le t < 20$	$0.4t + 2.0$		
		$20 \le t$	$0.3t + 4.0$		

(1) t is as-built thickness of ~~the thinner of two connected members~~ the abutting plate, in mm. In case of cross joint as specified in Fig.1, t is the thinner thickness of the continuous member and the abutting plate, to be considered independently for each abutting plate.

(2) Leg length of fillet welds is made fine adjustments corresponding to the corrosion addition t_C specified in Ch 3, Sec 3, Tab 1 as follows:

+ 1.0 mm for $t_C > 5$
+ 0.5 mm for $5 \ge t_C > 4$
+ 0.0 mm for $4 \ge t_C > 3$
- 0.5 mm for $t_C \le 3$

(3) ~~The weld sizes are to be rounded to~~ Leg length is rounded to the nearest half millimeter.

Table2: Application of fillet welds

Hull area	Connection: Of	Connection: To		Category
General, unless otherwise specified in the table (1)	Watertight plate	Boundary plating		F1
	Brackets at ends of members			F1
	Ordinary stiffener and collar plate	Deep tank bulkheads		F3
		Web of primary supporting members and collar plates		F2
	Web of ordinary stiffener	Plating (Except deep tank bulkhead)		F4
		Face plates of built-up stiffeners	At ends (15% of span)	F2
			Elsewhere	F4
	End of primary supporting members and ordinary stiffeners without brackets	Deck plate, shell plate, inner bottom plate, bulkhead plate		F0
	End of primary supporting members and ordinary stiffeners with brackets	Deck plate, shell plate, inner bottom plate, bulkhead plate		F1
Bottom and double bottom	Ordinary stiffener	Bottom and inner bottom plating		F3
	Center girder	Shell plates in strengthened bottom forward		F1
		Inner bottom plate and shell plate except the above		F2
	Side girder including intercostal plate	Bottom and inner bottom plating		F3
	Floor	Shell plates and inner bottom plates	At ends, on a length equal to two frame spaces	F2
		Center girder and side girders in way of hopper tanks		F2
		Elsewhere		F3
	Bracket on center girder	Center girder, inner bottom and shell plates		F2
	Web stiffener	Floor and girder		F3
Side and inner side in double side structure	Web of primary supporting members	Side plating, inner side plating and web of primary supporting members		F2
Side frame of single side structure	Side frame and end bracket	Side shell plate		Sea Ch 3 Sec 6 Fig. 19
	Tripping bracket	Side shell plate and side frame		F1
Deck	Strength deck, $t \geq 13$	Side shell plating within 0.6L midship		Deep penetration
		Elsewhere		F1
	Strength deck, $t < 13$	Side shell plating		F1
	Other deck	Side shell plating		F2
		Ordinary stiffeners		F4
	Ordinary stiffener and intercostal girder	Deck plating		F3
	Hatch coamings	Deck plating	At corners of hatchways for 15% of the hatch length	F1
			Elsewhere	F2
	Web stiffeners	Coaming webs		F4

Hull area	Connection: Of	Connection: To		Category
Bulkheads	Non-watertight bulkhead structure	Boundaries	Swash bulkheads	F3
Bulkheads	Ordinary stiffener	Bulkhead plating	At ends (25% of span), where no end brackets are fitted	F1
Primary supporting members (1)	Web plate ~~and girder plate~~	Shell plating, deck plating, inner bottom plating, bulkhead	At end (15% of span)	F1
Primary supporting members (1)	Web plate ~~and girder plate~~	Shell plating, deck plating, inner bottom plating, bulkhead	Elsewhere	F2
Primary supporting members (1)	Web plate ~~and girder plate~~	Face plate	In tanks, and located within 0.125*L* from fore peak	F2
Primary supporting members (1)	Web plate ~~and girder plate~~	Face plate	Face area exceeds 65 cm^2	F2
Primary supporting members (1)	Web plate ~~and girder plate~~	Face plate	Elsewhere	F3
After peak	Internal members	Boundaries and each other		F2
Seating	Girder and bracket	Bed plate	In way of main engine, thrust bearing, boiler bearers and main generator engines	F1
Seating	Girder and bracket	Girder plate	In way of main engine and thrust bearing	F1
Seating	Girder and bracket	Inner bottom plate and shell	In way of main engine and thrust bearing	F2
Super-structure and deck houses	External bulkhead	Deck		F1
Super-structure and deck houses	Ordinary stiffeners	Side wall and deck plate	At end (15% of span)	F3
Super-structure and deck houses	Ordinary stiffeners	Side wall and deck plate	elsewhere	F4(2)
Super-structure and deck houses	End section of ordinary stiffener and Primary supporting member	Without brackets	Side wall and web of primary supporting members	F1
Super-structure and deck houses	End section of ordinary stiffener and Primary supporting member	With bracket	Side wall and web of primary supporting members	F2
Pillar	Pillar	Heel and head		F1
Ventilator	Coaming	Deck		F1
Rudder	Rudder frame	Vertical frames forming main piece		F1
Rudder	Rudder frame	Rudder plate		F3
Rudder	Rudder frame	Rudder frames except above		F2

(1) For Hatch cover, weld sizes F1, and F2 and F3 instead of F0, F1 and F2, respectively, are to be used.

(2) Where the one side continuous welding is applied, the weld size F3 is to be applied.

(3) The interior bulkheads are not included in this category. The welding of the interior bulkheads is to be subjected to the discretion of the Society.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-11

Welding

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) The Technical Background For Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-10 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reason for the Rule Changes

KC references: questions id 507, 651, 669, 672, 781 and 803

The note (3) of Table 1 regarding rounding operation for determining the weld size is added for clarification.

Table 2 is revised for clarifying the application of primary supporting members and end connection of ordinary stiffener and primary supporting members with bracket in accordance with the KC # 651 and #672. In addition, the applications for one side welding, which is normally applied to the connection of ordinary stiffener with the wall or deck of superstructure or deckhouses and for welding of hatch cover, are added for clarification according to KC #781 and #803.

2 Summary of Rule Changes

2.1 Table 1

Fillet weld size should be determined by rounding the value obtained by this Table.

2.2 Table 2

1) Categories for the case where a bracket is provided at the end connection of ordinary stiffener and primary supporting member are added and weld size of such connection is “F1”.
2) Primary supporting member is clarified.
3) Weld size of ordinary stiffener and primary supporting members in superstructures and deckhouses is added.
4) Application of weld size for hatch cover is added as a note of Table 2.

3 Impact on Scantling

Weld size where the thickness of abutting plate is different may be bigger, but the impact may be less because the current weld design is determined based on the abutting plate thickness as proposed by this RCP.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-12

Hold Mass Curves

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-12.

CHAPTER 4 – DESIGN LOADS

Appendix 1 – HOLD MASS CURVES

Symbols

h : Vertical distance from the top of inner bottom plating to the lowest point of the upper deck plating at the ship's centreline, in m.

h_a : vertical distance from the top of inner bottom plating to the lowest point of the upper deck plating at the ship's centreline of the aft cargo hold in a block loading, in m.

h_f : vertical distance from the top of inner bottom plating to the lowest point of the upper deck plating at the ship's centreline of the fore cargo hold in a block loading, in m.

M_H : As defined in Ch 4, Sec 7

M_{Full} : As defined in Ch 4, Sec 7

M_{HD} : As defined in Ch 4, Sec 7

M_D : The maximum cargo mass given for each cargo hold, in t

M_{BLK} : The maximum cargo mass in a cargo hold according to the block loading condition in the loading manual, in t

T_{HB} : As defined in Ch 4, Sec 7

T_i : Draught in loading condition No. i, at mid-hold position of cargo hold length ℓ_H , in m

V_H : As defined in Ch 4, Sec 6

V_f and V_a : Volume of the forward and after cargo hold excluding volume of the hatchway part, in m^3.

T_{min} : $0.75T_S$ or draught in ballast conditions with the two adjacent cargo holds empty, whichever is greater, in m.

Σ : The sum of masses of two adjacent cargo holds

2 Maximum and minimum masses of cargo in each hold

2.1 Maximum permissible mass and minimum required masses of single cargo hold in seagoing condition

2.1.1 General

The cargo mass curves of single cargo hold in seagoing condition are defined in [2.1.2] to [2.1.5]. However if the ship structure is checked for more severe loading conditions than the ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass and the maximum allowable cargo mass can be based on those corresponding loading conditions.

2.1.2 BC-A ship not having {No MP} assigned

- **For loaded holds**

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

~~$W_{max}(T_S) = M_{HD} + 0.1M_H$~~

$$W_{max}(T_i) = M_{HD} + 0.1M_H - 1.025V_H \frac{(T_S - T_i)}{h}$$

However, $W_{max}(T_i)$ is in no case to be greater than M_{HD}.

The minimum required cargo mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$W_{min}(T_i) = 0$ for $T_i \le 0.83T_S$

$W_{min}(T_i) = 1.025V_H \dfrac{(T_i - 0.83T_S)}{h}$ for $T_S \ge T_i > 0.83T_S$

- **For empty holds which can be empty at the maximum draught**

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

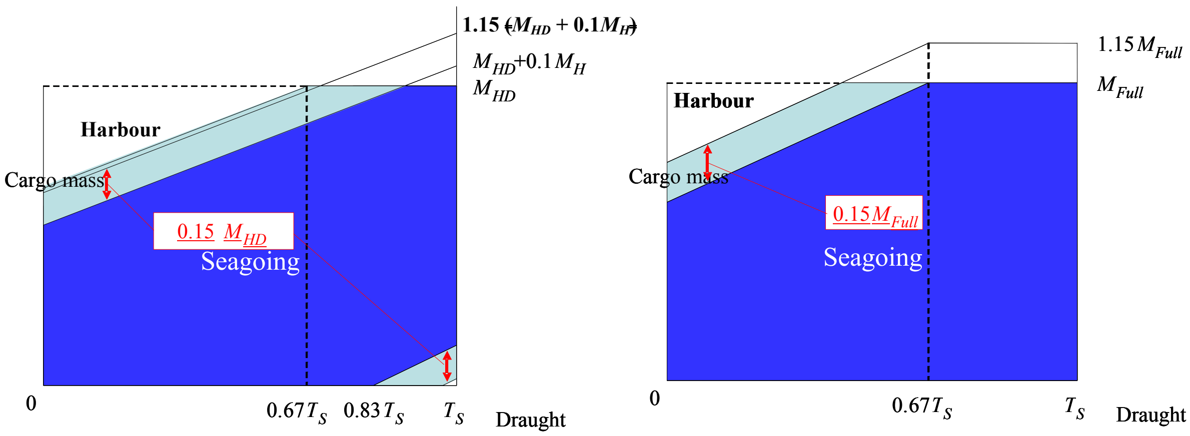
$W_{max}(T_i) = M_{Full}$ for $T_S \ge T_i \ge 0.67T_S$

$W_{max}(T_i) = M_{Full} - 1.025V_H \dfrac{(0.67T_S - T_i)}{h}$ for $T_i < 0.67T_S$

The minimum required mass ($W_{min}(T_i)$) is obtained, in t, by the following formula:

$W_{min}(T_i) = 0$ for $T_i \le T_S$

Examples for mass curve of loaded cargo hold and cargo hold which can be empty at the maximum draught for **BC-A** ships not having {No MP} assigned are shown in Fig 1.



(a) Loaded hold (b) Cargo hold which can be empty at the maximum draught

Figure 1: Example of mass curve for BC-A ships not having {No MP} assigned

2.1.3 BC-A ship ~~with {No MP}~~ having {No MP} assigned

- **For loaded holds**

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is the same specified in [2.1.2].

The minimum required mass ($W_{min}(T_i)$) is obtained, in t, by the following formulae:

$W_{min}(T_i) = 0$ for $T_i \le T_{HB}$

$W_{min}(T_i) = 1.025V_H \dfrac{(T_i - T_{HB})}{h}$ for $T_S \ge T_i > T_{HB}$ or

$W_{min}(T_i) = 0.5M_H - 1.025V_H \dfrac{(T_S - T_i)}{h} \ge 0$ for $T_S \ge T_i$

- **For empty hold which can be empty at the maximum draught**

~~The maximum permissible mass ($W_{max}(T_i)$) and the minimum required mass ($W_{min}(T_i)$) at various draughts (T_i) are the same specified in [2.1.2].~~

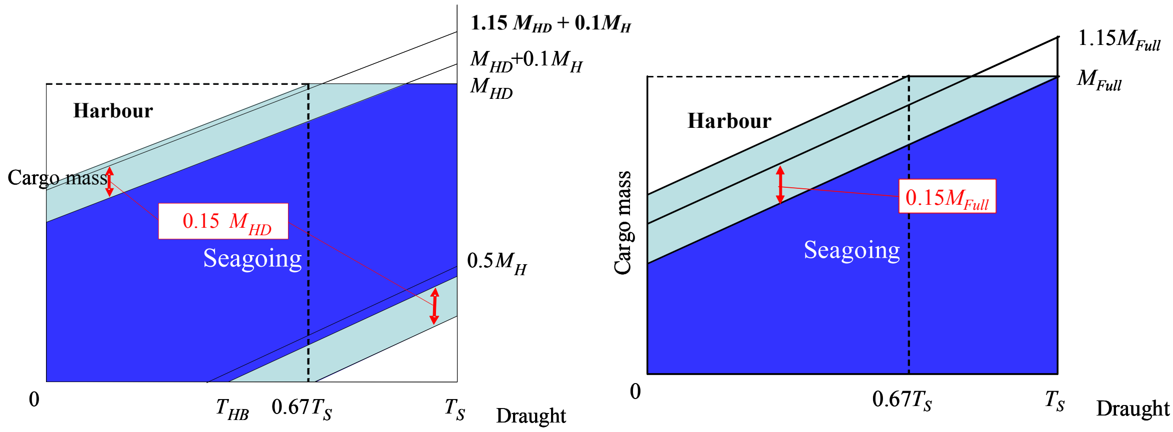
The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\max}(T_i) = M_{Full} - 1.025 V_H \frac{(T_S - T_i)}{h}$$

The minimum required cargo mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\min}(T_i) = 0 \quad \text{for} \quad T_i \le T_S$$

Examples for mass curve of cargo hold for **BC-A** ships, having {No MP} assigned are shown in Fig 2.



(a) Loaded hold (b) Cargo hold which can be empty at the maximum draught

Figure 2: Example of mass curve for BC-A ships having {No MP} assigned

2.1.4 BC-B and BC-C ships not having {No MP} assigned

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\max}(T_i) = M_{Full} \quad \text{for} \quad T_S \ge T_i \ge 0.67 T_S$$

$$W_{\max}(T_i) = M_{Full} - 1.025 V_H \frac{(0.67 T_S - T_i)}{h} \quad \text{for} \quad T_i < 0.67 T_S$$

The minimum required cargo mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\min}(T_i) = 0 \quad \text{for} \quad T_i \le 0.83 T_S$$

$$W_{\min}(T_i) = 1.025 V_H \frac{(T_i - 0.83 T_S)}{h} \quad \text{for} \quad T_S \ge T_i > 0.83 T_S$$

Example for mass curve of cargo hold for BC-B and BC-C ships is shown in Fig. 3.

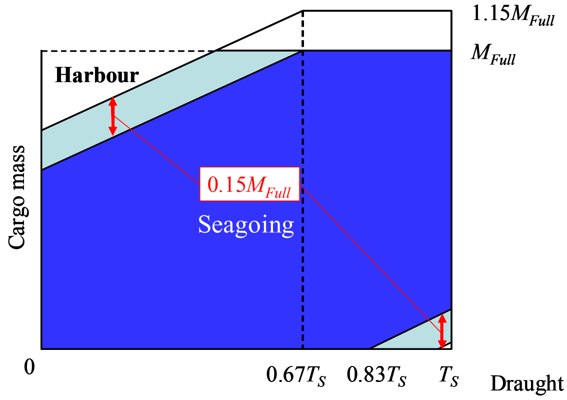


Figure 3: Example of mass curve for BC-B and BC-C ships not having {No MP} assigned

2.1.5 BC-B and BC-C ships ~~with~~ having {No MP} assigned

~~The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is the same specified in [2.1.4].~~

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

$$W_{\max}(T_i) = M_{Full} - 1.025 V_H \frac{(T_S - T_i)}{h}$$

The minimum required cargo mass $W_{min}(T_i)$ at various draughts (T_i) is obtained, in t, by the following formulae:

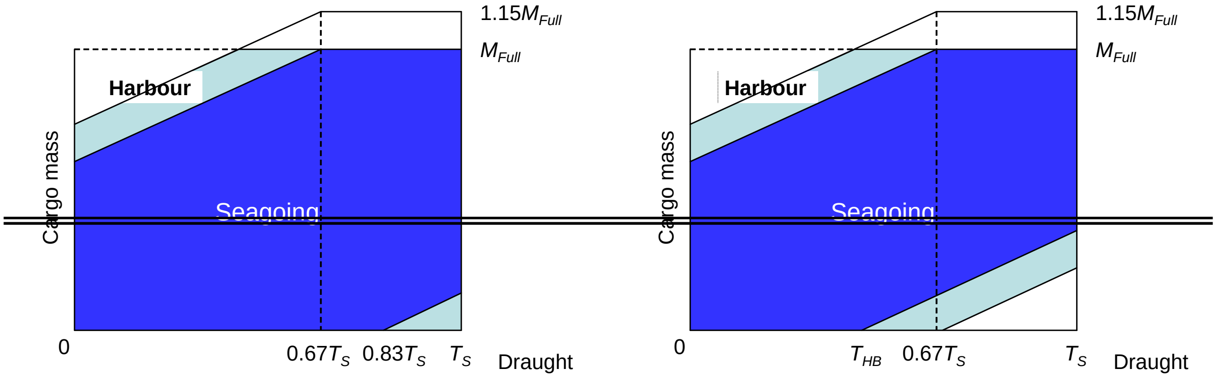
$$W_{\min}(T_i) = 0 \quad \text{for} \quad T_i \le T_{HB}$$

$$W_{\min}(T_i) = 1.025 V_H \frac{(T_i - T_{HB})}{h} \quad \text{for} \quad T_S \ge T_i > T_{HB} \quad \text{or}$$

$$W_{\min}(T_i) = 0.5 M_H - 1.025 V_H \frac{(T_S - T_i)}{h} \quad \text{for} \quad T_S \ge T_i$$

$W_{min}(T_i) \ge 0.0$

Examples for mass curve of cargo hold for **BC-B** or **BC-C** ships with {No MP} is shown in Fig ~~2~~4.



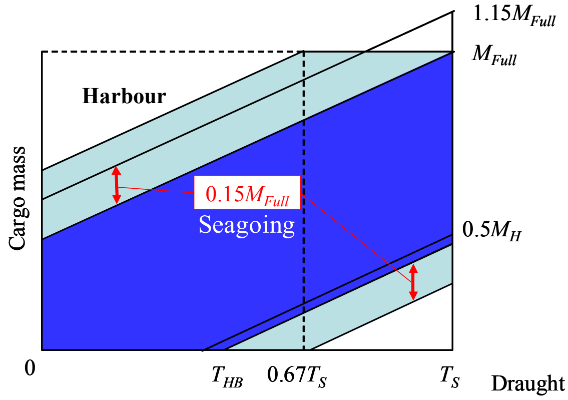


Figure ~~2~~ 4: ~~Example of mass curve for BC-B or BC-C ships~~ Example of mass curve for BC-B and BC-C ships with having {No MP} assigned

2.2 Maximum permissible mass and minimum required masses of single cargo hold in harbour condition

2.2.1 General

The cargo mass curves of single cargo hold in harbour condition are defined in [2.2.2]. However if the ship structure is checked for more severe loading conditions than ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass and the maximum allowable cargo mass can be based on those corresponding loading conditions.

2.2.2 All ships

The maximum permissible cargo mass and the minimum required cargo mass corresponding to draught for loading/unloading conditions in harbour may be increased or decreased by 15% of the maximum permissible mass at the maximum draught for the cargo hold in seagoing condition. However, maximum permissible mass is in no case to be greater than the maximum permissible cargo mass at designed maximum load draught for each cargo hold.

2.2.3 BC-A ship not having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i in harbour condition is also to be checked by the following formulae in addition to the requirements in [2.1.2]:

For loaded hold $W_{max}(T_i) = M_{HD}$ for $T_i \geq 0.67T_S$

$W_{max}(T_i) = M_{HD} + 0.1M_H - 1.025V_H \dfrac{0.67T_S - T_i}{h}$ for $T_i < 0.67T_S$

2.2.4 BC-A ship having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i in harbour condition is also to be checked by the following formulae in addition to the requirements in [2.1.3]:

For empty hold which can be empty at the maximum draught

$W_{max}(T_i) = M_{Full}$ for $T_S \geq T_i \geq 0.67T_S$

$W_{max}(T_i) = M_{Full} - 1.025V_H \dfrac{(0.67T_S - T_i)}{h}$ for $T_i < 0.67T_S$

2.2.5 BC-B and BC-C ships having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i in harbour condition is also to be checked by the following formulae in addition to the requirements in [2.2.2]:

$$W_{\max}(T_i) = M_{Full} \quad \text{for} \quad T_S \geq T_i \geq 0.67T_S$$

$$W_{\max}(T_i) = M_{Full} - 1.025V_H \frac{(0.67T_S - T_i)}{h} \quad \text{for} \quad T_i < 0.67T_S$$

3 Maximum and minimum masses of cargo of two adjacent holds

3.1 Maximum permissible mass and minimum required masses of two adjacent holds in seagoing condition

3.1.1 General

The cargo mass curves of two adjacent cargo holds in seagoing condition are defined in [3.1.2] and [3.1.3].

However if the ship structure is checked for more severe loading conditions than ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass and the maximum allowable cargo mass can be based on those corresponding loading conditions.

3.1.2 BC-A ships with "Block loading" and not having {No MP} assigned

~~The maximum permissible cargo mass ($W_{max}(T_i)$) and the minimum required cargo mass ($W_{min}(T_i)$) for the adjacent two holds at various draughts (T_i) are determined, in t, by the following formulae:~~

~~$W_{\max}(T_i) = 2(M_{Full} \text{ or } M_{HD}) + 0.1M_H$, whichever is the greater for $T_S \geq T_i \geq 0.67T_S$~~

~~$W_{\max}(T_i) = W_{\max}(0.67T_S) - 1.025(V_f + V_a)\frac{(0.67T_S - T_i)}{h}$ for $T_i < 0.67T_S$~~

~~$W_{\min}(T_i) = 0$ for $T_i \leq 0.75T_S$~~

~~$W_{\min}(T_i) = 1.025(V_f + V_a)\frac{T_i - 0.75T_S}{h}$ for $T_S \geq T_i > 0.75T_S$~~

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the greater of the following formulae:

$$W_{\max}(T_i) = \sum (M_{BLK} + 0.1M_H) - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_s - T_i) \quad \text{or}$$

$$W_{\max}(T_i) = \sum M_{Full} - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(0.67T_s - T_i)$$

However, $W_{max}(T_i)$ is no case to be greater than ΣM_{BLK}.

The minimum required cargo mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\min}(T_i) = 0 \quad \text{for} \quad T_i \leq 0.75T_S$$

$$W_{\min}(T_i) = 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_i - 0.75T_S) \quad \text{for} \quad T_S \geq T_i > 0.75T_S$$

3.1.2 bis BC-A ships with "Block loading" and having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i is obtained, in t, by the following formula:

$$W_{\max}(T_i) = \sum (M_{BLK} + 0.1 M_H) - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_s - T_i)$$

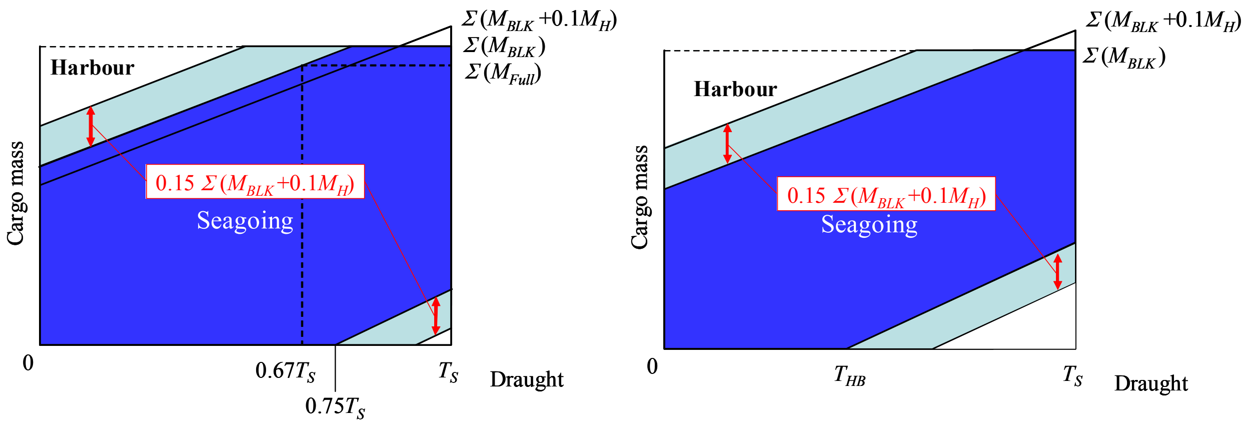
However, $W_{max}(T_i)$ is no case to be greater than ΣM_{BLK}.

The minimum required cargo mass $W_{min}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

$W_{\min}(T_i) = 0$ for $T_i \le T_{HB}$

$W_{\min}(T_i) = 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_i - T_{HB})$ for $T_S \ge T_i > T_{HB}$

Examples for mass curve of cargo hold for **BC-A**~~,~~ **with** block loading ships are shown in Fig 5.



(a) without {No MP]   (b) with {No MP}

Figure 5: Example of mass curve for BC-A ships with "Block loading"

3.1.3 ~~BC-B and BC-C ships~~

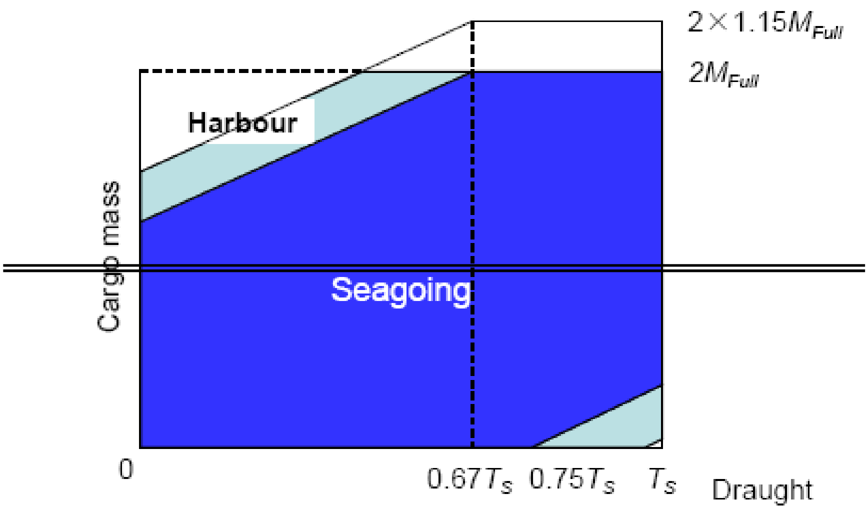
~~The maximum permissible mass ($W_{max}(T_i)$) and the minimum required mass ($W_{min}(T_i)$) at various draughts (T_i) are obtained, in t, by the following formulae:~~

~~$W_{\max}(T_i) = 2M_{Full}$ for $T_i \ge 0.67T_S$~~

~~$W_{\max}(T_i) = W_{\max}(0.67T_S) - 1.025(V_f + V_a)\frac{(0.67T_S - T_i)}{h}$ for $T_i < 0.67T_S$~~

~~$W_{\min}(T_i) = 0$ for $T_i \le 0.75T_S$~~

~~$W_{\min}(T_i) = 1.025(V_f + V_a)\frac{T_i - 0.75T_S}{h}$ for $T_S \ge T_i > 0.75T_S$~~



~~**Figure 3:** Example of mass curve for BC-B or BC-C ships~~

(void)

3.1.4 BC-A ships without "Block loading" and BC-B, BC-C ships, not having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

$$W_{max}(T_i) = \sum M_{Full} \quad \text{for} \quad T_S \geq T_i \geq 0.67T_S$$

$$W_{max}(T_i) = \sum M_{Full} - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(0.67T_S - T_i) \quad \text{for} \quad T_i < 0.67T_S$$

The minimum required cargo mass $W_{min}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

$$W_{min}(T_i) = 0 \quad \text{for} \quad T_i \leq 0.75T_S$$

$$W_{min}(T_i) = 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_i - 0.75T_S) \quad \text{for} \quad T_S \geq T_i > 0.75T_S$$

3.1.5 BC-A ships without "Block loading" and BC-B, BC-C ships, having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

$$W_{max}(T_i) = \sum M_{Full} - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_S - T_i) \quad \text{for} \quad T_i < T_S$$

The minimum required cargo mass $W_{min}(T_i)$ at various draughts T_i is obtained, in t, by the following formulae:

$$W_{min}(T_i) = 0 \quad \text{for} \quad T_i \leq T_{HB}$$

$$W_{min}(T_i) = 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(T_i - T_{HB}) \quad \text{for} \quad T_S \geq T_i > T_{HB}$$

Examples for mass curve of cargo hold for **BC-A** without block loading and **BC-B** or **BC-C** are shown in Fig 6.

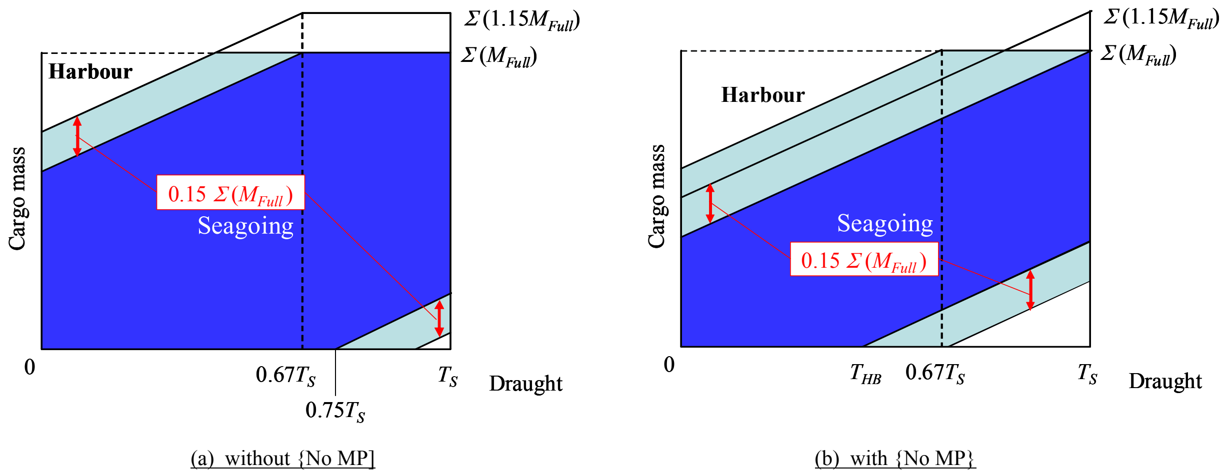


Figure 6: Example of mass curve for BC A-ship without block loading and BC-B or BC-C ships

3.2 Maximum permissible mass and minimum required masses of two adjacent cargo holds in harbour condition

3.2.1 General

The cargo mass curves of two adjacent cargo holds in harbour condition are defined in [3.2.2]. However if the ship structure is checked for more severe loading conditions than ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass and the maximum allowable cargo mass can be based on those corresponding loading conditions.

3.2.2 All ships

The maximum permissible cargo mass and minimum required cargo mass corresponding to draught for loading/unloading conditions in harbour may be increased or decreased by 15% of the maximum permissible mass at the maximum draught for the cargo hold in seagoing condition. However, maximum permissible mass is in no case to be greater than the maximum permissible cargo mass at designed maximum load draught for each cargo hold.

3.2.3 BC-A ships with "Block loading" and having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i in harbour condition is also to be checked by the following formulae in addition to the requirements in [3.1.2 bis]:

$$W_{max}(T_i) = \sum M_{Full} - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(0.67T_S - T_i)$$

$$W_{max}(T_i) \le \sum M_{BLK}$$

3.2.4 BC-A ships without "Block loading" and BC-B, BC-C ships, having {No MP} assigned

The maximum permissible mass $W_{max}(T_i)$ at various draughts T_i in harbour condition is also to be checked by the following formulae in addition to the requirements in [3.1.5]:

$$W_{max}(T_i) = \sum M_{Full} \quad \text{for} \quad T_S \ge T_i \ge 0.67T_S$$

$$W_{\max}(T_i) = \sum M_{Full} - 1.025\left(\frac{V_f}{h_f} + \frac{V_a}{h_a}\right)(0.67T_S - T_i) \quad \text{for} \quad T_i < 0.67T_S$$

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-12

Hold Mass Curves

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) The Technical Background For Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-12 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reason for the Rule Changes

The requirements for hold mass curves in Chapter 4 Appendix 1 came from IACS UR S25.

The current requirements are not specific for a ship with a variety of class notations.

Rule change requests have been raised on KC #515 and #633. This rule change refers to the request on KC #633 and also corresponds to the one on KC #515.

2 Summary of the Rule Changes

This Rule Change is to revise the requirements corresponding to each class notation.

5) Maximum permissible mass and minimum required mass of single cargo hold

Maximum permissible mass and minimum required mass of single cargo hold regulated in Chapter 4 Appendix 1, paragraph 2 are based on following design loading conditions regulated in Chapter 4 Section 7, [3.2] to [3.6], except [3.5.1].

<table>
<tr><td colspan="3" rowspan="2"></td><td colspan="2">Sea going</td><td colspan="2">Harbour(1)</td></tr>
<tr><td>Max</td><td>Min</td><td>Max</td><td>Min</td></tr>
<tr><td rowspan="5">BC-B and BC-C</td><td colspan="2" rowspan="3">{No MP}not assigned in Ch4 App1, 2.1.4</td><td>Ch4 Sec7, 3.2.1
T_S, M_{Full}</td><td>Ch4 Sec7, 3.2.2
T_S, $M_H/2$</td><td></td><td>-
-</td></tr>
<tr><td></td><td>Ch4 Sec7, 3.2.3
T_{HB}, empty</td><td></td><td></td></tr>
<tr><td>Ch4 Sec7, 3.3.1
67%T_S, M_{Full}</td><td>Ch4 Sec7, 3.3.2
83%T_S, empty</td><td></td><td></td></tr>
<tr><td colspan="2" rowspan="2">{No MP}assigned in Ch4 App1, 2.1.5</td><td>Ch4 Sec7, 3.2.1
T_S, M_{Full}</td><td>Ch4 Sec7, 3.2.2
T_S, $M_H/2$</td><td>Ch4 Sec7, 3.6.1
67%T_S, M_{Full}</td><td>-</td></tr>
<tr><td></td><td>Ch4 Sec7, 3.2.3
T_{HB}, empty</td><td></td><td>-</td></tr>
<tr><td rowspan="4">BC-A (Additional cases)</td><td rowspan="4">Cases in addition of those defined above for BC-B and BC-C</td><td rowspan="2">Hold loaded in alternate</td><td>Ch4 Sec7, 3.4.2</td><td></td><td>Ch4 Sec7, 3.6.1</td><td>-</td></tr>
<tr><td>T_S, M_{HD}+0.1M_H</td><td></td><td>67%T_S, M_{HD}</td><td>-</td></tr>
<tr><td rowspan="2">Hold empty in alternate</td><td></td><td>Ch4 Sec7, 3.4.1</td><td>-</td><td>-</td></tr>
<tr><td></td><td>T_S, empty</td><td>-</td><td>-</td></tr>
</table>

(1) Maximum permissible mass and minimum required mass in harbour condition are generally increased or decreased by 15% of the maximum permissible mass at the maximum draught in seagoing condition as stipulated in Chapter 4 Appendix 1, 2.2.2 and based on Chapter 4 Section 7, 3.6.3. The notes for harbour in this table show only the additional conditions based on Chapter 4 Section 7, 3.6.1.

6) Maximum permissible mass and minimum required mass of two adjacent holds

Maximum permissible mass and minimum required mass of two adjacent holds regulated in Chapter 4 Appendix 1, paragraph 3 are based on following design loading conditions regulated in Chapter 4 Section 7, [3.2] to [3.6], except [3.5.1].

		Sea going		Harbour (2)	
		Max	Min	Max	Min
BC-A with "Block loading" in Ch4 App1, 3.1.2	without {No MP}	Ch4 Sec7, 3.3.3 Ch4 Sec7, 3.4.3	Ch4 Sec7, 3.3.4	-	-
		67%Ts, $\Sigma(M_{full})$ Ts, $\Sigma(M_{BLK}+0.1M_H)$	$75\%T_S$, empty	-	-
	with {No MP}	Ch4 Sec7, 3.4.3	Ch4 Sec7, 3.2.3	Ch4 Sec7, 3.6.2	-
		Ts, $\Sigma(M_{BLK}+0.1M_H)$	T_{HB}, empty	$67\%T_S$, $\Sigma(M_{Full})$	-
BC-A without "Block loading", BC-B and BC-C in Ch4 App1, 3.1.3	without {No MP}	Ch4 Sec7, 3.3.3	Ch4 Sec7, 3.3.4	-	-
		$67\%T_S$, $\Sigma(M_{Full})$	$75\%T_S$, empty	-	-
	with {No MP}	Ch4 Sec7, 3.2.1	Ch4 Sec7, 3.2.3	Ch4 Sec7, 3.6.2	-
		T_S, $\Sigma(M_{Full})$	T_{HB}, empty	$67\%T_S$, $\Sigma(M_{Full})$	-

(2) Maximum permissible mass and minimum required mass in harbour condition are generally increased or decreased by 15% of the maximum permissible mass at the maximum draught in seagoing condition as stipulated in Chapter 4 Appendix 1, 3.2.2 and based on Chapter 4 Section 7, 3.6.3. The notes for harbour in this table show only the additional conditions based on Chapter 4 Section 7, 3.6.2.

3 Impact on Scantling

As this rule change is so made for the clarification corresponding to each class notation or simple correction of typo and scantling check is carried out based on the requirement in Ch 4 Sec 7 which is the same of IACS UR S25, there is no scantling impact due to this change.

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Rule Change Notice No. 2-13

Use of Steel Grades for Hull Members

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) This Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

For technical background for Rule Changes in this present document, reference is made to separate document Technical Background for Rule Change Notice No. 2-13.

CHAPTER 3 – STRUCTURAL DESIGN PRINCIPLES

Section 1 – MATERIAL

2. Hull structural steel

2.3 Grades of Steel

2.3.1

Steel materials in the various strength members are not to be of lower grade than those corresponding to classes I, II and III, as given in Tab 3 for the material classes and grades given in ~~Tab 4~~ Tab 4-1, while in additional requirements for ships with length (L) exceeding 150m and 250m, BC-A and BC-B ships are given in Tab 4-2 to Tab 4-4.,

For strength members not mentioned ~~in Tab 3~~ in Tab 4-1 to Tab 4-4, grade *A/AH* may be used.

Table 3: Material grade requirements for classes I, II and III

Class	I		II		III	
As-built thickness (mm)	NSS	HSS	NSS	HSS	NSS	HSS
$t \leq 15$	*A*	*AH*	*A*	*AH*	*A*	*AH*
$15 < t \leq 20$	*A*	*AH*	*A*	*AH*	*B*	*AH*
$20 < t \leq 25$	*A*	*AH*	*B*	*AH*	*D*	*DH*
$25 < t \leq 30$	*A*	*AH*	*D*	*DH*	*D*	*DH*
$30 < t \leq 35$	*B*	*AH*	*D*	*DH*	*E*	*EH*
$35 < t \leq 40$	*B*	*AH*	*D*	*DH*	*E*	*EH*
$40 < t \leq 50$	*D*	*DH*	*E*	*EH*	*E*	*EH*
Notes : NSS : Normal strength steel HSS : Higher strength steel						

~~**Table 4**: Application of material classes and grades~~

~~**Structural member category**~~	~~**Material class**~~	
	~~**Within 0.4*L* amidship**~~	~~**Outside 0.4*L* amidship**~~
~~SECONDARY~~		
~~Longitudinal bulkhead strakes, other than that belonging to the Primary category~~	~~I~~	~~*A/AH*~~
~~Deck Plating exposed to weather, other than that belonging to the Primary or Special category~~		
~~Side plating (7)~~		
~~PRIMARY~~		
~~Bottom plating, including keel plate~~	~~II~~	~~*A/AH*~~
~~Strength deck plating, excluding that belonging to the Special category~~		
~~Continuous longitudinal members above strength deck, excluding hatch coamings~~		
~~Uppermost strake in longitudinal bulkhead~~		
~~Vertical strake (hatch side girder) and uppermost sloped strake in top wing tank~~		
~~SPECIAL~~		
~~Sheer strake at strength deck (1), (6)~~	~~III~~	~~II (I outside 0.6*L* amidships)~~
~~Stringer plate in strength deck (1), (6)~~		
~~Deck strake at longitudinal bulkhead (6)~~		
~~Strength deck plating at corners of cargo hatch openings in bulk carriers, ore carriers, combination carriers and other ships with similar hatch openings configuration (2)~~		
~~Bilge strake (3), (4), (6)~~		
~~Longitudinal hatch coamings of length greater than 0.15*L* (5)~~		
~~Lower bracket of side frame of single side bulk carriers having additional service feature **BC-A** or **BC-B** (5)~~		
~~End brackets and deck house transition of longitudinal cargo hatch coamings (5)~~		

~~Notes:~~

~~(1) Not to be less than grade *E/EH* within 0.4*L* amidships in ships with length exceeding 250 m.~~

~~(2) Not to be less than class III within 0.6*L* amidships and class II within the remaining length of the cargo region.~~

~~(3) May be of class II in ships with a double bottom over the full breadth and with length less than 150 m.~~

~~(4) Not to be less than grade *D/DH* within 0.4*L* amidships in ships with length exceeding 250 m.~~

~~(5) Not to be less than grade *D/DH*.~~

~~(6) Single strakes required to be of class III or of grade *E/EH* and within 0.4*L* amidships are to have breadths, in m, not less than 0.8 + 0.05*L*, need not be greater than 1.8 m, unless limited by the geometry of the ship's design.~~

~~(7) For **BC-A** and **BC-B** ships with single side skin structures, side shell strakes included totally or partially between the two points located to 0.125ℓ above and below the intersection of side shell and bilge hopper sloping plate are not to be less than grade *D/DH*, ℓ being the frame span.~~

Table 4-1: - Material Classes and Grades for ships in general

Structural member category	Material class/grade
SECONDARY: A1 Longitudinal bulkhead strakes, other than that belonging to the Primary category A2 Deck plating exposed to weather, other than that belonging to the Primary or Special category A3 Side plating	- Class I within 0.4L amidships - Grade A/AH outside 0.4L amidships
PRIMARY: B1 Bottom plating, including keel plate B2 Strength deck plating, excluding that belonging to the Special category B3 Continuous longitudinal members above strength deck, excluding hatch coamings. B4 Uppermost strake in longitudinal bulkhead B5 Vertical strake (hatch side girder) and uppermost sloped strake in top wing tank	- Class II within 0.4L amidships - Grade A/AH outside 0.4L amidships
SPECIAL: C1. Sheer strake at strength deck (1) C2 Stringer plate in strength deck (1) C3 Deck strake at longitudinal bulkhead, excluding deck plating in way of inner-skin bulkhead of double-hull ships (1)	- Class III within 0.4L amidships - Class II outside 0.4L amidships - Class I outside 0.6L amidships
C5 Strength deck plating at corners of cargo hatch openings	- Class III within 0.6L amidships - Class II within rest of cargo region
C6 Bilge strake in ships with double bottom over the full breadth and length less than 150 m (1)	- Class II within 0.6L amidships - Class I outside 0.6L amidships
C7 Bilge strake in other ships (1)	- Class III within 0.4L amidships - Class II outside 0.4L amidships - Class I outside 0.6L amidships
C8 Longitudinal hatch coamings of length greater than 0.15L C9 End brackets and deck house transition of longitudinal cargo hatch coamings (2)	- Class III within 0.4L amidships - Class II outside 0.4L amidships - Class I outside 0.6L amidships - Not to be less than Grade D/DH

(1) Single strakes required to be of Class III within 0.4L amidships are to have breadths not less than 800+5L (mm), and need not be greater than 1800 (mm), unless limited by the geometry of the ship's design.

(2) Applicable to bulk carriers having the longitudinal hatch coaming of length greater than 0.15L.

Table 4-2: Minimum material grades for ships with ship's length (*L*) exceeding 150m and single strength deck

Structural member category	**Material Grade**
Longitudinal strength members of strength deck plating	Grade B/AH within 0.4L amidships
Continuous longitudinal strength members above strength deck	Grade B/AH within 0.4L amidships
Single side strakes for ships without inner continuous longitudinal bulkheads between bottom and the strength deck	Grade B/AH within cargo region

Table 4-3: Minimum Material Grades for ships with ship's length (*L*) exceeding 250m

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

Table 4-4: Minimum material grades for BC-A and BC-B ships

Structural member category	**Material Grade**
Lower bracket of ordinary side frame(1), (2)	Grade D/DH
Side shell strakes included totally or partially between the two points located to 0.125 l above and below the intersection of side shell and bilge hopper sloping plate or inner bottom plate (2)	Grade D/DH
(1) The term "lower bracket" means webs of lower brackets and webs of the lower part of side frames up to the point 0.125 l above the intersection of side shell and bilge hopper sloping plate or inner bottom plate. (2) The span of the side frame, l, is defined as the distance between the supporting structure (See Ch. 3 Sec 6 Fig.19)	

2.3.2

Plating materials for stern frames, rudders, rudder horns and shaft brackets are in general not to be of lower grades than corresponding to class II. For rudder and rudder body plates subjected to stress concentrations (e.g. in way of lower support of semi-spade rudders or at upper part of spade rudders) class III is to be applied.

2.3.3

Bedplates of seats for propulsion and auxiliary engines inserted in the inner bottom within 0.6L amidships are to be of class I. In other cases, the steel is to be at least of grade *A/AH.*

2.3.4

~~Plating at corners of large hatch openings on decks located below the strength deck, in the case of hatches of holds for refrigerated cargoes, and insert plates at corners of large openings on side shell plating are generally to be of class III.~~

(void)

2.3.5

The steel grade is to correspond to the as-built thickness.

2.3.6

Steel grades of plates or sections of as-built thickness greater than the limiting thicknesses in Table 3 are considered by the Society on a case by case basis.

2.3.7

In specific cases, such as [2.3.8], with regard to stress distribution along the hull girder, the classes required within 0.4*L* amidships may be extended beyond that zone, on a case by case basis.

2.3.8

The material classes required for the strength deck plating, the sheerstrake and the upper strake of longitudinal bulkheads within 0.4*L* amidships are to be maintained for an adequate length across the poop front and at the ends of the bridge, where fitted.

2.3.9

Rolled products used for welded attachments <u>of length greater than 0.15*L*</u> on <u>outside</u> of hull plating, such as gutter bars, are to be of the same grade as that used for the hull plating in way.

2.3.10

In the case of full penetration welded joints located in positions where high local stresses may occur perpendicular to the continuous plating, the Society may, on a case by case basis, require the use of rolled products having adequate ductility properties in the through thickness direction, such as to prevent the risk of lamellar tearing (Z type steel).

COMMON STRUCTURAL RULES FOR BULK CARRIERS

JULY 2008

Technical Background For Rule Change Notice No. 2-13

Use of steel grades for hull member

Notes: (1) These Rule Changes enter into force on 1st July 2010.

(2) The Technical Background For Rule Change Notice should be read in conjunction with the July 2008 consolidated edition of Bulk Carriers CSR.

This document gives the technical background of the Rule Change Notice No. 2-13 of the July 2008 edition of the Common Structural Rules for Bulk Carriers.

1 Reason for the Rule Changes

1.1 Chapter 3, Section 1, [2.3.1]

KC references: question id 787

The requirement in Ch. 3 Sec. 1 [2.3.1] is based on IACS UR S6 Rev. 4, July 2003. This UR has been revised and issued as Rev. 5 in September 2007.

The Rule change is made in order to be in line with IACS UR Rev.5.

1.2 Chapter 3, Section 1, 2.3.4

As no bulk carrier has a large hatch opening on deck located below the strength deck, this requirement is not applicable to bulk carriers.

1.3 Chapter 3, Section 1, 2.3.9

KC references: question id 617 and 720

The rolled products used for welded attachment on hull plating seem vague, although the example as gutter bars is mentioned in the text. Because rolled products cover all most all members such as coamings for deck machineries or spill coaming for air pipes, bulwark stay, hatch coaming stay, etc. and even longitudinals which they are not exposed to the weather fitted to inside of hull plating.

In order to be clear the applicable members, the requirement is revised.

2 Summary of Rule Changes

2.1 Ch 3 Sec 1, [2.3.1]

The requirements in IACS UR S6 Rev.5 applicable to bulk carriers are taken into the CSR.

2.2 Ch 3 Sec 1 [2.3.4]

This paragraph is deleted.

2.3 Ch 3 Sec 1 [2.3.9]

The applicable role products welded attachment is clarified to that with length more than 0.15L and fitted to outside of hull plating.

2.4 Others

The correction is made for the paragraph number and reference due to the deletion of [2.3.4].

3 Impact on Scantling

There is no scantling impact due to this change but steel grade is affected.

The steel grade of side shell for single side skin BC and of outer shell of ships with ice strengthening is enhanced, but as IACS UR S6 Rev. 5 is already implemented by all Class, the effect due to this change is ignored.