RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part CSR-B Common Structural Rules for Bulk Carriers

Rules for the Survey and Construction of Steel Ships
Part CSR-B 2010 AMENDMENT NO.1

Rule No.52 20th May 2010
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Rule No.52 20th May 2010
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Rules for the survey and construction of steel ships" has been partly amended as follows:

Part CSR-B COMMON STRUCTURAL RULES FOR BULK CARRIERS

Chapter 1 GENERAL PRINCIPLES

Section 3 FUNCTIONAL REQUIREMENTS

2. Definition of functional requirements

2.5 Means of access

Paragraph 2.5.1 has been amended as follows.

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 <u>for bulk carriers of 20,000 *gross tonnage* and over</u>. Reference is made to *SOLAS, Chapter II-1, Regulation 3-6*.

Section 4 SYMBOLS AND DEFINITIONS

3. Definitions

3.7 Lightweight

Paragraph 3.7.1 has been amended as follows.

3.7.1
The lightweight is the displacement, in *t*, without cargo, fuel, lubricating oil, ballast water, fresh water and feed water, consumable stores and passengers and crew and their effects~~, but including liquids in piping~~.

Chapter 2 GENERAL ARRANGEMENT DESIGN

Section 3 ACCESS ARRANGEMENT

1. General

Section 1.0 has been added as follows.

1.0 Application

1.0.1

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

Chapter 3 STRUCTURAL DESIGN PRINCIPLES

Section 1 MATERIAL

2. Hull structural steel

2.3 Grades of steel

Paragraph 2.3.1 has been amended as follows.

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 **Table 3** for the material classes and grades given in ~~**Table 4**~~ **Table 4-1**, while in additional requirements for ships with length(L_{CSR-B}) exceeding 150*m* and 250*m*, *BC-A* and *BC-B* ships are given in **Table 4-2** to **Table 4-4**.

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

Table 4 has been deleted.

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

~~Structural member category~~	~~Material class~~	
	~~Within 0.4L_{CSR-B} amidship~~	~~Outside 0.4L_{CSR-B} 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 0.6L_{CSR-B} 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 0.15L_{CSR-B}~~[5]		
~~Web of 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 0.4L_{CSR-B} amidships in ships with length exceeding 250 *m*.~~

~~(2) Not to be less than class III within 0.6L_{CSR-B} 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 0.4L_{CSR-B} 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 0.4L_{CSR-B} amidships are to have breadths, in m, not less than 0.8 + 0.005L_{CSR-B}, 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 to Table 4-4 have been added as follows.

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 $0.4L_{CSR-B}$ amidships - Grade *A/AH* outside $0.4L_{CSR-B}$ 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 $0.4L_{CSR-B}$ amidships - Grade *A/AH* outside $0.4L_{CSR-B}$ 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 $0.4L_{CSR-B}$ amidships - Class II outside $0.4L_{CSR-B}$ amidships - Class I outside $0.6L_{CSR-B}$ amidships
C5 Strength deck plating at corners of cargo hatch openings	- Class III within $0.6L_{CSR-B}$ 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 $0.6L_{CSR-B}$ amidships - Class I outside $0.6L_{CSR-B}$ amidships
C7 Bilge strake in other ships(1)	- Class III within $0.4L_{CSR-B}$ amidships - Class II outside $0.4L_{CSR-B}$ amidships - Class I outside $0.6L_{CSR-B}$ amidships
C8 Longitudinal hatch coamings of length greater than $0.15L_{CSR-B}$ C9 End brackets and deck house transition of longitudinal cargo hatch coamings(2)	- Class III within $0.4L_{CSR-B}$ amidships - Class II outside $0.4L_{CSR-B}$ amidships - Class I outside $0.6L_{CSR-B}$ amidships - Not to be less than Grade *D/DH*
Notes: (1) Single strakes required to be of Class III within $0.4L_{CSR-B}$ amidships are to have breadths not less than $800+5L_{CSR-B}$ (*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 $0.15L_{CSR-B}$	

Table 4-2 Minimum material grades for ships with ship's length ($L_{CSR\text{-}B}$) exceeding 150*m* and single strength deck

Structural member category	Material Grade
Longitudinal strength members of strength deck plating	Grade *B/AH* within $0.4L_{CSR\text{-}B}$ amidships
Continuous longitudinal strength members above strength deck	Grade *B/AH* within $0.4L_{CSR\text{-}B}$ 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 ($L_{CSR\text{-}B}$) exceeding 250*m*

Structural member category	Material Grade
Shear strake at strength deck (1)	Grade *E/EH* within $0.4L_{CSR\text{-}B}$ amidships
Stringer plate in strength deck (1)	Grade *E/EH* within $0.4L_{CSR\text{-}B}$ amidships
Bilge strake (1)	Grade *D/DH* within $0.4L_{CSR\text{-}B}$ amidships
Note: (1) Single strakes required to be of Class III within $0.4L_{CSR\text{-}B}$ amidships are to have breadths not less than 800 + $5L_{CSR\text{-}B}$ (*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*
Notes: (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**)	

Paragraph 2.3.3 has been amended as follows.

2.3.3

Bedplates of seats for propulsion and auxiliary engines inserted in the inner bottom within $0.6L_{CSR\text{-}B}$ amidships are to be of class I. In other cases, the steel is to be at least of grade *A/AH*.

Paragraph 2.3.4 has been deleted.

2.3.4(void)

~~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.~~

Paragraph 2.3.9 has been amended as follows.

2.3.9

Rolled products used for welded attachments of length greater than $0.15L_{CSR\text{-}B}$ on outside of hull plating, such as gutter bars, are to be of the same grade as that used for the hull plating in way.

Section 6 STRUCTURAL ARRANGEMENT PRINCIPLES

9. Deck structure

9.5 Hatch supporting structures

Paragraph 9.5.4 has been amended as follows.

9.5.4

For ships with holds designed for loading / discharging by grabs and having the additional class notation *GRAB*[*X*], ~~W~~wire 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.

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

Table 4 and Table 5 have been amended as follows.

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

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

where:

a : Coefficient taken equal to:

$a = 0.0726$ for Type B freeboard ships

$a = 0.356$ 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

Appendix 1 HOLD MASS CURVES

Definitions of symbols have been amended as follows.

Symbols

h	:	Vertical distance from the top of inner bottom plating to 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 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 accoding 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

Paragraph 2.1.1 has been amended as follows.

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.

Paragraph 2.1.2 has been amended as follows.

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:

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

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

  However, $W_{max}(T_i)$ is 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:

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

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

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

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

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

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

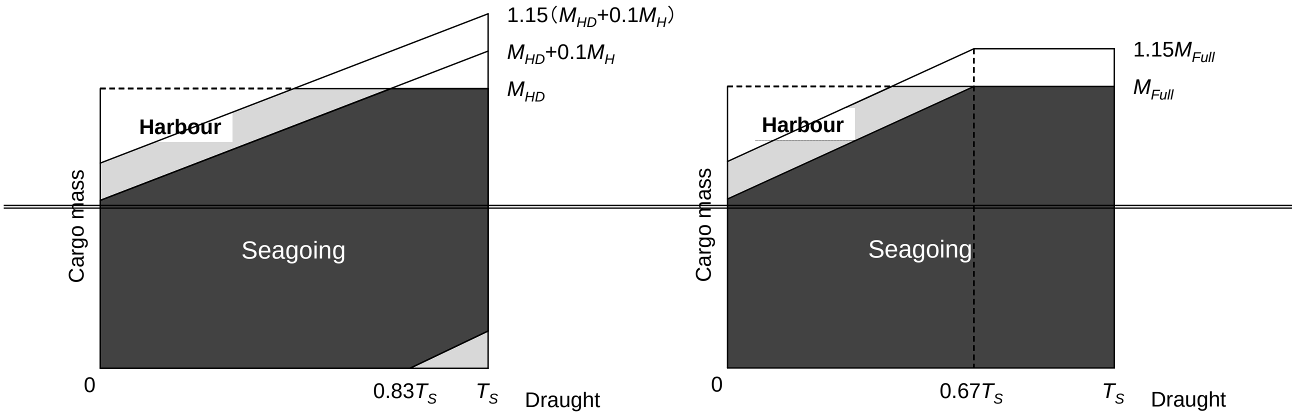
  The minimum required mass ($W_{min}(T_i)$) is obtained, in *t*, by the following formula:

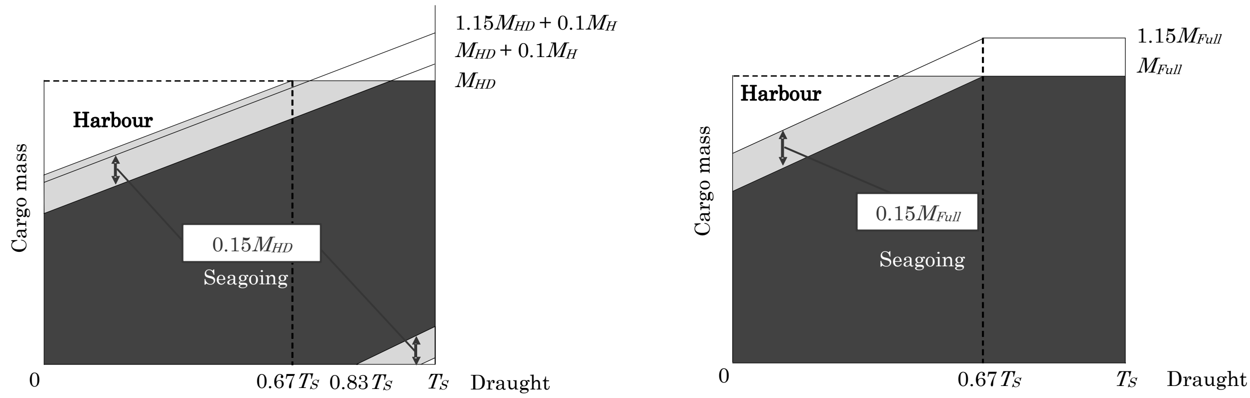
  $$W_{min}(T_i) = 0 \qquad \text{for} \qquad T_i \le T_S$$

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**.

Fig. 1 has been amended as follows.

Fig. 1 Example of mass curve for *BC-A* ships not having {*No MP*} assigned





(a) Loaded hold

(b) Cargo hold which can be empty at themaximum draught

Paragraph 2.1.3 has been amended as follows.

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 $T_i \leq T_{HB}$

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

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

- 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:

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

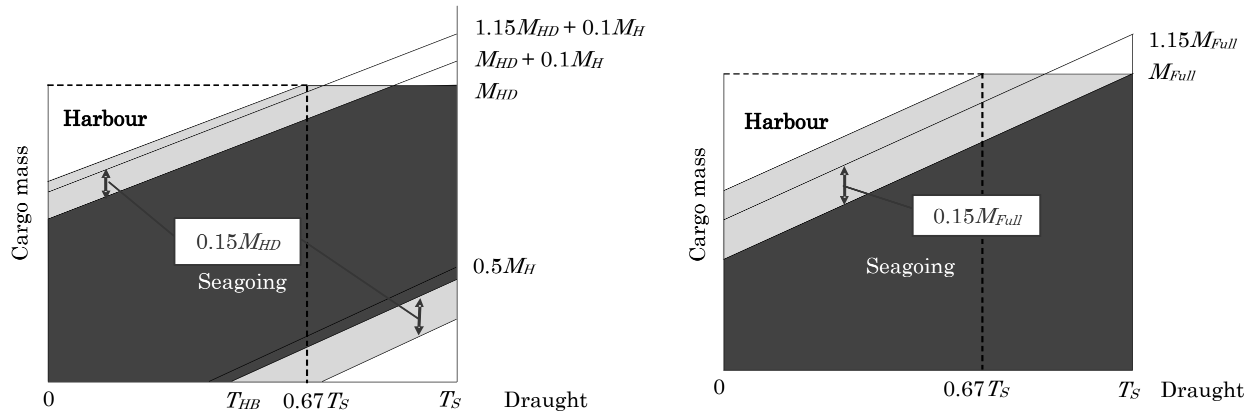
  The minimum required cargo mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in *t*, by the following formulae:

  $W_{min}(T_i) = 0$ for $T_i \leq T_s$

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

Fig. 2 has been added as follows.

Fig. 2 Example of mass curve for *BC-A* ships having {*No MP*} assigned



(a) Loaded hold

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

Paragraph 2.1.4 has been amended as follows.

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:

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

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

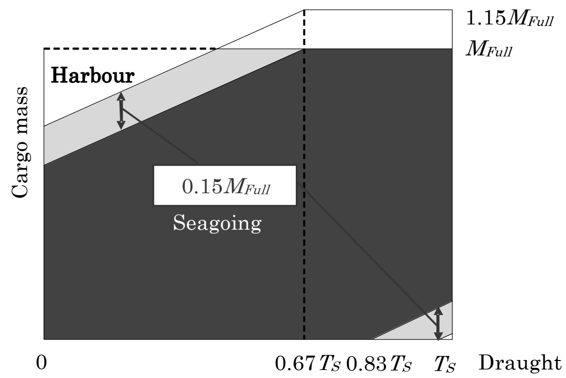
$W_{\min}(T_i) = 0$ for $T_i \leq 0.83T_S$

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

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

Fig. 3 has been added as follows.

Fig. 3 Example of mass curve for *BC-B* and *BC-C* ships not having {*No MP*} assigned



Paragraph 2.1.5 has been amended as follows.

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:

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

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

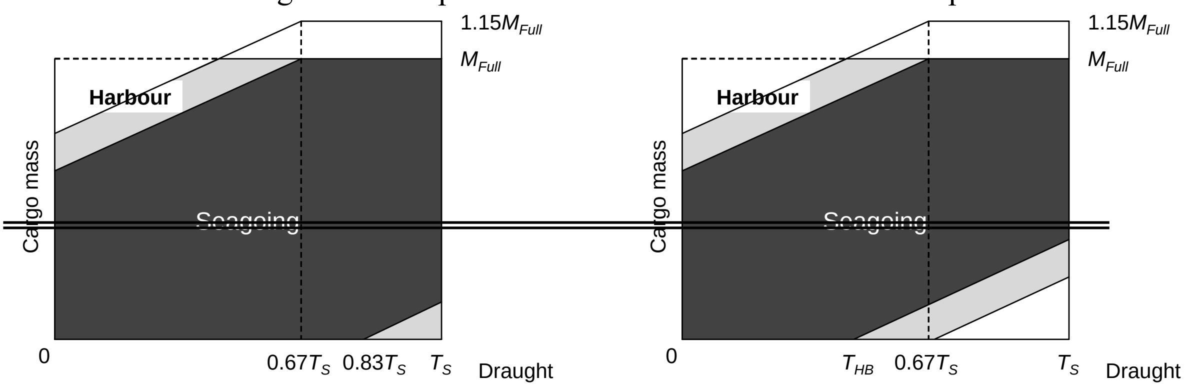
$$W_{\min}(T_i) = 0.5 M_H - 1.025 V_H \frac{(T_S - T_i)}{h} \qquad \text{for} \qquad T_S \ge T_i$$

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

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

Fig. 2 has been deleted.

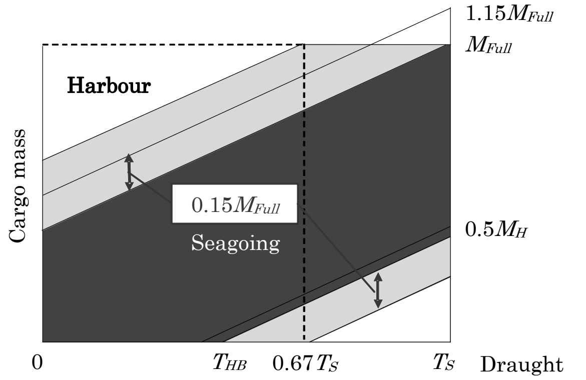
~~Fig. 2 Example of mass curve for *BC-B* or *BC-C* ships~~



~~(a) Without {*No MP*}~~ ~~(b) With {*No MP*}~~

Fig. 4 has been added as follows.

Fig. 4 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

Paragraph 2.2.1 has been amended as follows.

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.

Paragraph 2.2.3 has been added as follows.

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

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

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

Paragraph 2.2.4 has been added as follows.

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

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

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

Paragraph 2.2.5 has been added as follows.

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**.

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

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

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

Paragraph 3.1.1 has been amended as follows.

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.

Paragraph 3.1.2 has been amended as follows.

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:~~

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

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

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

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

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:

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

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

Paragraph 3.1.2 bis has been added as follows.

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:

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

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:

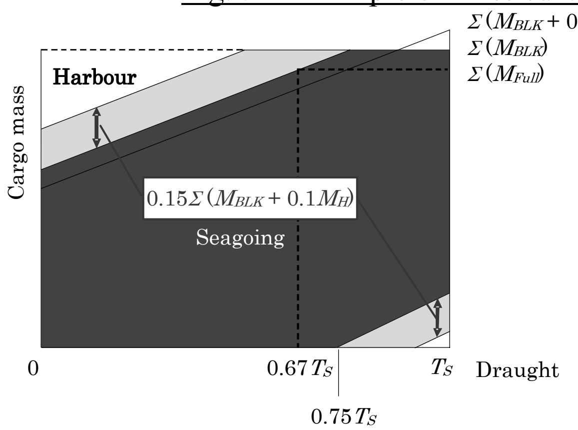
$$W_{min}(T_i) = 0 \quad \text{for} \quad T_i \le T_{HB}$$

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

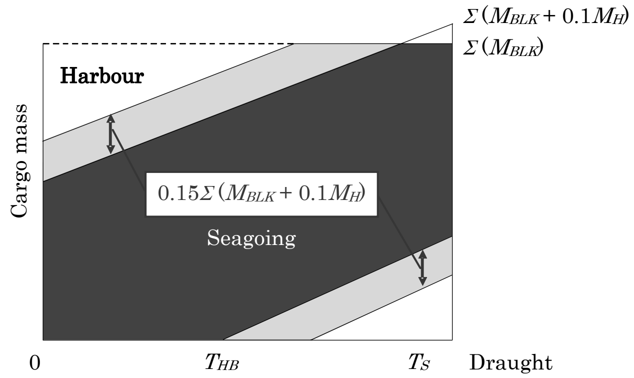
Examples for mass curve of cargo hold for *BC-A* with block loading ships are shown in **Fig 5**.

Fig. 5 has been added as follows.

Fig. 5 Example of mass curve for *BC-A* ships with "Block loading"



(a) without {*No MP*}



(b) with {*No MP*}

Paragraph 3.1.3 has been deleted.

3.1.3 ~~*BC-B* and *BC-C* ships~~(void)

~~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:~~

$$\cancel{W_{max}(T_i) = 2M_{Full}} \quad \text{for} \quad \cancel{T_i \geq 0.67T_S}$$

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

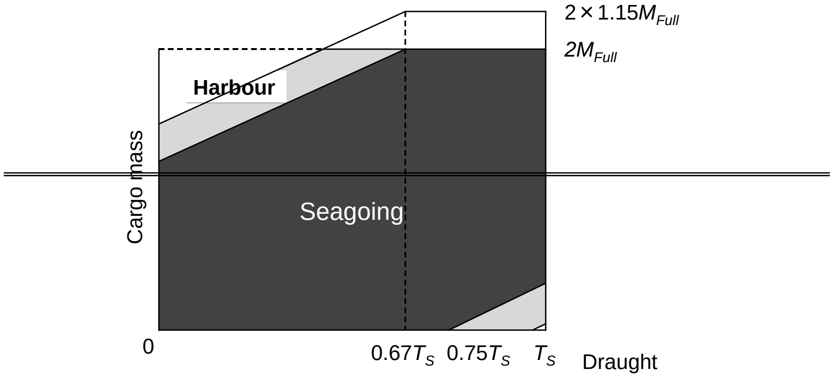
$$\cancel{W_{min}(T_i) = 0} \quad \text{for} \quad \cancel{T_i \leq 0.75T_S}$$

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

~~Examples for mass curve of cargo hold for *BC-B* or *BC-C* ships are shown in **Fig. 3**.~~

Fig. 3 has been deleted.

~~Fig. 3 Example of mass curve for *BC-B* or *BC-C* ships~~



Paragraph 3.1.4 has been added as follows.

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:

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

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

Paragraph 3.1.5 has been added as follows.

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 formula:

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

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

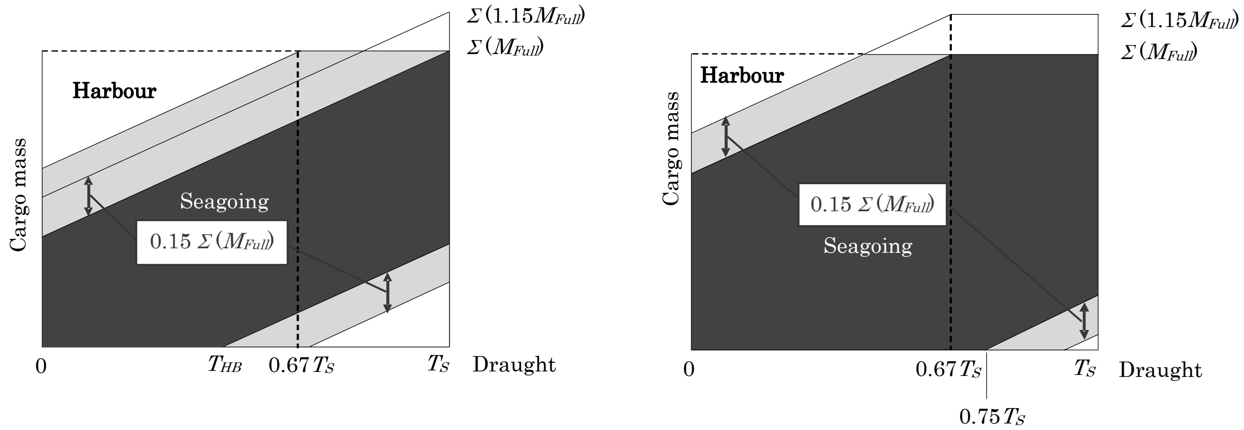
$$W_{min}(T_i) = 0 \quad \text{for} \quad T_i \le T_{HB}$$

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

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

Fig. 6 has been added as follows.

Fig. 6 Example of mass curve for *BC-A* ship without block loading and *BC-B* or *BC-C* ships



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

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

Paragraph 3.2.1 has been amended as follows.

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.

Paragraph 3.2.3 has been added as follows.

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**:

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

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

Paragraph 3.2.4 has been added as follows.

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**:

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

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

Chapter 9 OTHER STRUCTURES

Section 4 SUPERSTRUCTURES AND DECKHOUSES

3. Load model

3.2 Loads

Paragraph 3.2.1 has been amended as follows.

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**.~~

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

Section 5 HATCH COVERS

7. Weathertightness, closing arrangement, securing devices and stoppers

7.3 Closing arrangement, securing devices and stoppers

Paragraph 7.3.5 has been amended as follows.

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 $R_{eH} \leq 235$ 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.

Chapter 10 HULL OUTFITTING

Section 1 RUDDER AND MANOEUVRING ARRANGEMENT

1. General

1.1 Manoeuvring arrangement

Paragraph 1.1.1 has been amended as follows.

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.

Section 1.3 has been deleted.

1.3 ~~Size of rudder area~~(void)

~~In order to achieve sufficient manoeuvring capability the size of the movable rudder area *A* is recommended to be not less than obtained, in *m*^2^, from the following formula:~~

$$\cancel{A = c_1 c_2 c_3 c_4 \frac{1.75 L_{CSR-B} T}{100}}$$

~~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.~~

Chapter 11 CONSTRUCTION AND TESTING

Section 1 CONSTRUCTION

1. Structural details

1.2 Cold forming

Paragraph 1.2.1 has been amended as follows.

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~~2*t* (*t* = as-built thickness).

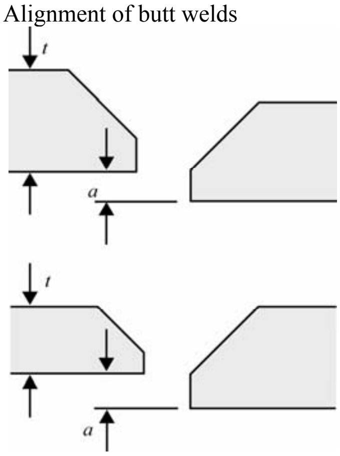
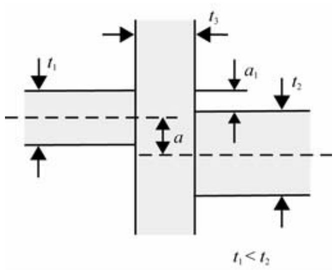
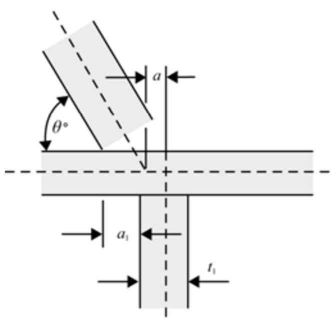
In order to prevent cracking, flame cutting flash or sheering burrs are to be removed before cold forming. After cold forming all structural components and, in particular, the ends of bends (plate edges) are to be examined for cracks. Except in cases where edge cracks are negligible, all cracked components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

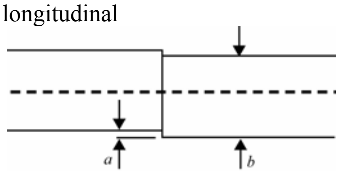
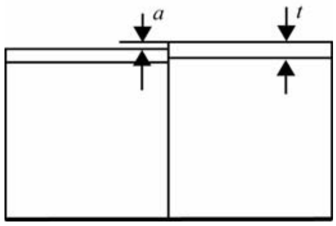
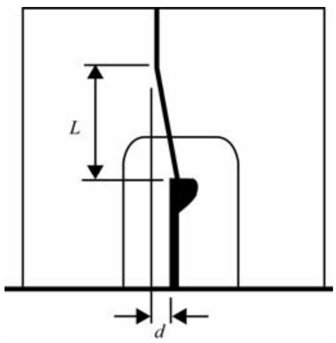
1.3 Assembly, alignment

1.3.1

Table 1 has been amended as follows.

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

Detail	Standard	Limit	Remarks
Alignment of butt welds 	~~$a \le 0.15t$ strength~~ ~~$a \le 0.2t$ other~~	~~$a \le 3.0$ *mm*~~ $a \le 0.15t$ strength member $a \le 0.2t$ other but maximum 4.0 *mm*	t is the lesser plate thickness
Alignment of fillet welds 	~~Strength and higher tensile steel~~ ~~$a \le t_1 / 4$ measured on the median~~ ~~$a \le (5t_1 - 3t_2) / 6$ measured on the heel line~~ ~~Other~~ ~~$a \le t_1 / 2$ measured on the median~~ ~~$a \le (2t_1 - t_2) / 2$ 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 	~~Strength and higher tensile steel~~ ~~$a \le t_1 / 3$ measured on the median~~ ~~Other~~ ~~$a \le t_1 / 2$ 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.			

Detail	Standard	Limit	Remarks
Alignment of face plates of *T* longitudinal  	Strength member $a \leq 0.04b$ ~~strength~~	$a = 8.0$ *mm*	
Alignment of height of *T*-bar, *L*-angle bar or bulb  	Strength member $a \leq 0.15\ t$ ~~for primary supporting members~~ Other $a \leq 0.2\ t$ ~~for ordinary stiffeners~~	$a = 3.0$ *mm*	
Alignment of panel stiffener  	$d \leq L / 50$		
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.			

Section 2 WELDING

2. Types of welded connections

2.6 Fillet welds

2.6.1 Kinds and size of fillet welds and their applications

Table 1 and Table 2 have been amended as follows.

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*
F 0	Double continuous weld	t	$0.7t$	-	-
F 1	Double continuous weld	$t \leq 10$	$0.5t + 1.0$	-	-
		$10 \leq t < 20$	$0.4t + 2.0$	-	-
		$20 \leq t$	$0.3t + 4.0$	-	-
F 2	Double continuous weld	$t \leq 10$	$0.4t + 1.0$	-	-
		$10 \leq t < 20$	$0.3t + 2.0$	-	-
		$20 \leq t$	$0.2t + 4.0$	-	-
F 3	Double continuous weld	$t \leq 10$	$0.3t + 1.0$	-	-
		$10 \leq t < 20$	$0.2t + 2.0$		
		$20 \leq t$	$0.1t + 4.0$		
F 4	Intermittent weld	$t \leq 10$	$0.5t + 1.0$	75	300
		$10 \leq t < 20$	$0.4t + 2.0$		
		$20 \leq t$	$0.3t + 4.0$		

(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 **Ch3**, **Sec 3**, **Table 1** as follows:

+ 1.0 *mm* for $t_C > 5$
+ 0.5 *mm* for $5 \geq t_C > 4$
+ 0.0 *mm* for $4 \geq t_C > 3$
- 0.5 *mm* for $t_C \leq 3$

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

Table 2 Application of fillet welds

Hull area	Connection: Of	Connection: To		Category
General, unless otherwise specified in the table(1)	Watertight plate	Boundary plating		F 1
	Brackets at ends of members			F 1
	Ordinary stiffener and collar plates	Deep tank bulkheads		F 3
		Web of primary supporting members and collar plates		F 2
	Web of ordinary stiffener	Plating (Except deep tank bulkhead)		F 4
		Face plates of built-up stiffeners	At ends (15% of span)	F 2
			Elsewhere	F 4
	End of primary supporting members and ordinary stiffeners without brackets	Deck plate, shell plate, inner bottom plate, bulkhead plate		F 0
	End of primary supporting members and ordinary stiffeners with brackets	Deck plate, shell plate, inner bottom plate, bulkhead plate		F 1
Bottom and double bottom	Ordinary stiffener	Bottom and inner bottom plating		F 3
	Center girder	Shell plates in strengthened bottom forward		F 1
		Inner bottom plate and shell plate except the above		F 2
	Side girder including intercostal plate	Bottom and inner bottom plating		F 3
	Floor	Shell plates and inner bottom plates	At ends, on a length equal to two frame spaces	F 2
		Center girder and side girders in way of hopper tanks		F 2
		Elsewhere		F 3
	Bracket on center girder	Center girder, inner bottom and shell plates		F 2
	Web stiffener	Floor and girder		F 3
Side and inner side in double side structure	Web of primary supporting members	Side plating, inner side plating and web of primary supporting members		F 2
Side frame of single side tructure	Side frame and end bracket	Side shell plate		See **Ch 3 Sec 6 Fig. 19**
	Tripping bracket	Side shell plate and side frame		F 1
Deck	Strength deck, $t \geq 13$	Side shell plating within $0.6L_{CSR\text{-}B}$ midship		Deep penetration
		Elsewhere		F 1
	Strength deck, $t < 13$	Side shell plating		F 1
	Other deck	Side shell plating		F 2
		Ordinary stiffeners		F 4
	Ordinary stiffener and intercostal girder	Deck plating		F 3
	Hatch coamings	Deck plating	At corners of hatchways for 15% of the hatch length	F 1
			Elsewhere	F 2
	Web stiffeners	Coaming webs		F 4

Table 2 Application of fillet welds (continued)

Hull area	Connection			Category
	Of	To		
Bulkheads	Non-watertight bulkhead structure	Boundaries	Swash bulkheads	*F* 3
	Ordinary stiffener	Bulkhead plating	At ends (25% of span), where no end brackets are fitted	*F* 1
Primary supporting members(1)	Web plate ~~and girder plate~~	Shell plating, deck plating, inner bottom plating, bulkhead	At end (15% of span)	*F* 1
			Elsewhere	*F* 2
		Face plate	In tanks, and located within 0.125 L_{CSR-B} from fore peak	*F* 2
			Face area exceeds 65 cm^2	*F* 2
			Elsewhere	*F* 3
After peak	Internal members	Boundaries and each other		*F* 2
Seating	Girder and bracket	Bed plate	In way of main engine, thrust bearing, boiler bearers and main generator engines	*F* 1
		Girder plate	In way of main engine and thrust bearing	*F* 1
		Inner bottom plate and shell	In way of main engine and thrust bearing	*F* 2
Super-structure and deck houses	External bulkhead	Deck		*F* 1
	Ordinary stiffeners	Side wall and deck plate	At end (15% of span)	*F* 3
			Elsewhere	*F* 4 (2)
	End section of ordinary stiffener and Primary supporting member	Without brackets	Side wall and web of primary supporting members	*F* 1
		With bracket		*F* 2
Pillar	Pillar	Heel and head		*F* 1
Ventilator	Coaming	Deck		*F* 1
Rudder	Rudder frame	Vertical frames forming main piece		*F* 1
		Rudder plate		*F* 3
		Rudder frames except above		*F* 2

Notes:

(1) For Hatch cover, weld sizes *F*1, *F*2 and *F*3 instead of *F*0, *F*1 and *F*2, respectively, are to be used.

(2) Where the one side continuous welding is applied, the weld size *F*3 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.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 July 2010.

2. Notwithstanding the amendments to the Rules, the current requirements may 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.