RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part CS Hull Construction and Equipment of Small Ships

Rules for the Survey and Construction of Steel Ships
Part CS 2008 AMENDMENT NO.1
Guidance for the Survey and Construction of Steel Ships
Part CS 2008 AMENDMENT NO.1

Rule No.13 / Notice No.9 27th February 2008
Resolved by Technical Committee on 30th November 2007
Approved by Board of Directors on 25th December 2007

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RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part CS Hull Construction and Equipment of Small Ships

2008 AMENDMENT NO.1

Rule No.13 27th February 2008

Resolved by Technical Committee on 30th November 2007

Approved by Board of Directors on 25th December 2007

Rule No.13 27th February 2008
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 CS HULL CONSTRUCTION AND EQUIPMENT OF SMALL SHIPS

Amendment 1-1

Chapter 22 CEILINGS, SPARRINGS, CEMENTING AND PAINTING

Section 22.4 has been amended as follows.

22.4 Painting

22.4.1 General

1 All steelworks ~~except those in oil tanks~~ are to ~~receive the paint of good quality. All steel works are to be coated with a suitable paint~~ be coated with a suitable paint. Special requirements may be additionally made by the Society in accordance with the kind of ships, purpose of spaces, etc. However, where it is recognized by the Society that the spaces are effectively protected against corrosion of steel works by the means other than painting or due to the properties of cargoes, etc., painting may be omitted.

~~**22.4.2 Wash Cement**~~

2 Steelworks in tanks intended for water may be coated with wash cement in lieu of paint.

~~**22.4.3 Cleaning before Painting**~~

3 The surface of steelworks is to be thoroughly cleaned and loose rust, oil and other injurious adhesives are to be removed before being painted. At least the outer surface of shell plating below the load line is to be sufficiently free from rust and mill scale before painting.

22.4.2 Protective Coatings in dedicated seawater ballast tanks and double-side skin spaces

For dedicated seawater ballast tanks of all type of ships of not less than 500 *gross tonnage* engaged on international voyages, the requirements are to be complied with *"PERFORMANCE STANDARD FOR PROTECTIVE COATINGS FOR DEDICATED SEAWATER BALLAST TANKS IN ALL TYPE OF SHIPS AND DOUBLE-SIDE SKIN SPACES OF BULK CARRIERS"* (*IMO Performance Standard for Protective Coatings / IMO* resolution *MEPC.*215(82) as may be amended).

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 1 July 2008.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships other than ships that fall under the following:

(1) for which the building contract is placed on or after 1 July 2008; or

(2) in the absence of a building contract, the keels of which are laid or which are at *a similar stage of construction* on or after 1 January 2009; or

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.

(3) the delivery of which is on or after 1 July 2012

Amendment 1-2

Chapter 1 GENERAL

1.3 Materials, Scantlings, Welding and End Connections

1.3.1 Materials

Sub-paragraph -2 has been amended as follows.

2 Where high tensile steels specified in **Chapter 3, Part K**, are used, the construction and scantlings of ships are to comply with **(1)** to **(3)**:

(1) The section modulus of the transverse sections of hull is not to be less than the value obtained by multiplying the following coefficient to the value specified in **Chapter 15**. And the extent of their use is to be in accordance with the discretion of the Society.
0.78: where high tensile steel, *KA32, KD32, KE32* and *KF32* is used.
0.72: where high tensile steel, *KA36, KD36, KE36* and *KF36* is used.
0.68: where high tensile steel, *KA40, KD40, KE40* and *KF40* is used.

(2) The thickness of deck and shell platings, the section modulus of stiffeners, and other scantlings etc., are to be at the discretion of the Society.

(3) Where high tensile steels except mentioned in ~~**1**~~**(1)** are used, the construction and scantlings of ships are to be at the discretion of Society.

Notes of Table CS1.1 and Table CS1.2 have been amended as follows.

（Notes）

1. *A, B, D, E* in **Table CS1.1** and *AH, DH, EH* in **Table CS1.2** mean the grades of steel as follows:
(1) *A*:*KA*, *B*:*KB*, *D*:*KD*, *E*:*KE*
(2) *AH*:*KA*32~~ and~~, *KA*36 and *KA*40, *DH*:*KD*32~~ and~~ *KD*36 and *KD*40, *EH*:*KE*32~~ and~~ *KE*36 and *KE*40
2. L_1 in **Table CS1.1** and **Table CS1.2** is the length of a ship specified in **2.1.2, Part A** or 0.97 *times* the length of a ship on the load line, whichever is smaller (*m*).
3. In case, strength deck strake adjoining to longitudinal bulkhead which is in way of inner skin bulkhead of double hull ships and is not a deck stringer plate of the strength deck, the deck strake may be applied as ordinary strength deck.

Chapter 3 RUDDERS

3.1 General

3.1.2 Materials

Sub-paragraph -3 has been amended as follows.

3 Welded members of rudders such as rudder plates, rudder frames, rudder main pieces are to be made of rolled steels for hull conforming to the requirements in **Part K** of the Rules. The required scantlings may be reduced when high tensile steels are applied.
When reducing the scantling, the material factor K is to be ~~as follows :~~ the values specified in **1.3.1-2(1)**.
~~0.78 for *HT*32~~
~~0.72 for *HT*36~~

Chapter 19 HATCHWAYS, MACHINERY SPACE OPENINGS AND OTHER DECK OPENINGS

19.2 Hatchways

19.2.5 Additional Requirements for Steel Hatch Covers intended to carry cargoes on them

Sub-paragraph -3 has been amended as follows.

3 Local plate thickness
For hatch covers on which cargoes are carried, the thickness of top plating t is not to be less than that obtained from following formula.
$t = 1.25S\sqrt{Kh} + 2.5 \quad (mm)$
S : Spacing of stiffeners (m)
h : Design cargo load specified in the preceding **-2** (kN/m^2)
K : Coefficient ~~given in **Table CS19.7**~~ corresponding to kinds of steel *e.g.* 1.0 for mild steel the values specified in **1.3.1-2(1)** for high tensile steel.

Table CS19.7 has been deleted, and Table CS19.8 has been renumbered to Table CS19.7.

~~**Table CS19.7 Coefficient *K***~~

~~Type of steel~~	~~Mild steel~~	~~*HT32*~~	~~*HT36*~~
~~***K***~~	~~**1**~~	~~0.78~~	~~0.72~~

Table CS19.~~8~~7 Coefficients C_1, C_2 and C_3

C_1	C_2	C_3
1.07	1.81	0.064*

Note:
*: Steel hatchway covers are not to be applied.

Sub-paragraph -4 and -5 have been amended as follows.

4 Secondary stiffeners

The section modulus of stiffeners supported by girders and subjected to a uniformly distributed loads may be obtained from the direct strength calculations, or obtained from the following formulae according to the type of the steel hatch covers.

$0.71CKShl^2$ (cm^3)

C : Coefficient given below according to the type of end connections of stiffeners;

In case of lug at both ends: 1.0

In case of snip at both ends or one end snip and another end lug: 1.5

K : Coefficient ~~given in **Table CS19.7**~~ corresponding to kinds of steel as specified in the proceeding **-3**.

S : Spacing of stiffeners (m)

h : Design cargo load as specified in the preceding **-2** (kN/m^2)

l : Unsupported span of stiffeners (m)

5 Scantlings of primary supporting members and of portable beams

The net scantlings of primary supporting members of steel hatch covers, which are simply supported between hatch coamings with uniformly distributed loads imposed thereupon, and of portable beams are to comply with the following formulae. For steel hatch covers, S and l are to read as b and S, respectively.

Net section modulus at mid-span of portable beams or primary supporting members:

$C_1Kk_1Shl^2$ (cm^3)

Net moment of inertia at mid-span of portable beams or primary supporting members:

$C_2k_2Shl^3$ (cm^4)

Net cross-sectional area of web plates at the ends of portable beams or primary supporting members:

C_3KShl (cm^2)

S, b, l, k_1 and k_2 : As specified in **19.2.4-5**

C_1, C_2 and C_3 : Coefficients given in **Table CS19.~~8~~7**

h : Design cargo loads given by the preceding **-2**

K : Coefficients ~~given in **Table CS19.7** according to the type of steels~~ corresponding to kinds of steel as specified in the proceeding **-3**.

19.2.6 Special Requirements for Portable Beams, Hatchway Covers, Steel Pontoon Covers and Steel Weathertight Covers

Sub-paragraph -4(4) has been amended as follows.

4 Steel weathertight covers are to comply with the following **(1)** to **(4)**.

(1) The depth of steel weathertight covers at supports is not to be less than one-third the depth at mid-span or 150 *mm*, whichever is greater.

(2) The strength and closing arrangements of small or special types of steel weathertight covers to which the requirements in **(1)**, **19.2.4** and **19.2.5** are not applicable and those of covers for hatchways, coaming of which is omitted by **19.2.2-2.**, will be specially considered.

(3) The means for securing and maintaining weathertightness are to be to the satisfaction of the Society. The arrangements are to ensure that the weathertightness can be maintained in any sea conditions.

(4) For steel weathertight hatch covers, effective means for stoppers complying with the requirements in **Table CS19.~~9~~8** against the horizontal forces acting on their forward end and the side are to be provided.

Table CS19.9 has been renumbered to Table CS19.8.

Table CS19.~~9~~8 Strength Requirements for Stoppers

Design pressure	Following (1) or (2) in accordance with the kind of ships are to be applied. (1) For Bulk Carriers defined in **1.3.1(13)**, **Part B** of the Rules (a) Hatch covers for the foremost cargo hold The longitudinal forces acting on their forward end: 230 kN/m^2 (Where a forecastle complying with the requirements of **18.4**, **Part C** of the Rules, is fitted, the pressure may be reduced to 175 kN/m^2.) The transverse forces: 175 kN/m^2 (b) Other hatch covers The longitudinal forces acting on their forward end and the transverse forces: 175 kN/m^2 (2) Ships other than those specified in the preceding **(1)** Following **(a)** and **(b)** are to be applied. For ships with unusually large freeboard, however, the pressure is to be at the discretion of the Society. (a) Hatch covers for the foremost cargo hold The longitudinal forces acting on their forward end: 230 kN/m^2 (Where a forecastle complying with the requirements of **18.4**, **Part C** of the Rules, is fitted, the pressure may be reduced to 175 kN/m^2.) The transverse forces: 175 kN/m^2 (b) Other hatch covers The longitudinal forces acting on their forward end and the transverse forces: 175 kN/m^2 (In case, one forward transverse hatch coaming is protected by the adjacent forward cargo hold hatch cover or other structures effectively against the green sea forces, however, the longitudinal forces acting on their forward end is to be at the discretion of the Society.)
Allowable equivalent stress	In stoppers, their supporting structures and the stopper welds (calculated at the throat of welds), the equivalent stress is not to exceed the allowable value of 0.8 *times* yield stress of the material.

Chapter 21 BULWARKS, GUARDRAILS, FREEING ARRANGEMENTS, CARGO PORTS AND OTHER SIMILAR OPENINGS, SIDE SCUTTLES, RECTANGULAR WINDOWS, VENTILATORS AND GANGWAYS

21.3 Bow Doors and Inner Doors

21.3.3 Strength Criteria

Sub-paragraph -1 has been amended as follows.

1 Scantling of the prime menders, securing and supporting devices of doors and inner doors are to be determined withstand each design loads using the following permissible stresses :

Shearing stress $\tau = 80/K$ (N/mm^2)

Bending stress $\sigma = 120/K$ (N/mm^2)

Equivalent stress $\sigma_e = \sqrt{\sigma^2 + 3\tau^2} = 150/K$ (N/mm^2)

K :Coefficient ~~as follows ;~~ corresponding to kinds of steel *e.g.* 1.0 for mild steel the values specified in **1.3.1-2(1)** for high tensile steel.

~~where mild steel *KA, KB, KE* or *KF* as specified in **Chapter 3 of Part K** are applied 1.00~~

~~where high tensile steel *KA*32, *KD*32, *KE*32 or *KF*32 as specified in **Chapter 3 of Part K** are applied : 0.78~~

~~where high tensile steel *KA*36, *KD*36, *KE*36 or *KF*36 as specified in **Chapter 3 of Part K** are applied : 0.72~~

21.4 Side Shell Doors and Stern Doors

21.4.3 Strength Criteria

Sub-paragraph -1 has been amended as follows.

1 Scantlings of the primary members, securing and supporting devices of doors are to be determined to withstand the design loads defined in **21.4.4**, using the following permissible stresses:

shear stress : $\tau = \frac{80}{K}$ (N/mm^2)

bending stress : $\sigma = \frac{120}{K}$ (N/mm^2)

equivalent stress : $\sigma_e = \sqrt{\sigma^2 + 3\tau^2} = \frac{150}{K}$ (N/mm^2)

K : Coefficient ~~as follows;~~ corresponding to kinds of steel *e.g.* 1.0 for mild steel the values specified in **1.3.1-2(1)** for high tensile steel.

~~where mild steel *KA, KB, KD, KE* or *KF* specified in **Chapter 3 of Part K** are applied : 1.00~~

~~where high tension steel *KA*32, *KD*32, *KE*32 or *KF*32 specified in **Chapter 3 of Part K** are applied : 0.78~~

~~where high tension steel *KA*36, *KD*36, *KE*36 or *KF*36 specified in **Chapter 3 of Part K~~**

~~are applied : 0.72~~

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 September 2008.

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 IACS Procedural Requirement (PR) No.29 (Rev.4).

IACS PR No.29 (Rev.4)

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.

Notes:
1. This Procedural Requirement applies to all IACS Members and Associates.
2. This Procedural Requirement is effective for ships "contracted for construction" on or after 1 January 2005.
3. Revision 2 of this Procedural Requirement is effective for ships "contracted for construction" on or after 1 April 2006.
4. Revision 3 of this Procedural Requirement was approved on 5 January 2007 with immediate effect.
5. Revision 4 of this Procedural Requirement was adopted on 21 June 2007 with immediate effect.

Amendment 1-3

Chapter 4 SUBDIVISIONS

Section 4.1 has been amended as follows.

4.1 General

4.1.1 Application

The requirements in this Chapter apply cargo to ships engaged in international voyages, of not less than 500 gross tonnage with length for freeboard (L_f) ~~, L_s, specified in **4.1.2-6**~~ which is 80 *m* and over. However, tankers specified in **Chapter 24** of this Part, ships to which the requirements in **Part N** or **Part S** apply and those ships specifically approved by the Society may be exempted.

4.1.2 Definitions

For the purpose of this chapter, the following definitions apply.

(1) "Compartment" is a part of the hull formed by shells, decks and bulkheads which are to be watertight as a rule.

(2) "Group of compartments" is a part of the hull formed by two or more compartments which are adjacent with each other.

~~(3) "Subdivision load line" is a water line used in determining the subdivision of the ship.~~

(~~4~~3) "Deepest subdivision ~~load line~~ draught" (d_s) is the ~~subdivision load line~~ draught which corresponds to the summer ~~load line~~ draught assigned to the ship in accordance with the requirements of **Part V**.

(4) "Light service draught" (d_l) is the service draught corresponding to the lightest anticipated loading and associated tankage, including, however, such ballast as may be necessary for stability and/or immersion. Passenger ships should include the full complement of passengers and crew on board.

(5) "Partial ~~load line~~ subdivision draught" (d_p) is the ~~subdivision load line~~ draught which corresponds to ~~what is~~ the summation of ~~the draught corresponding to LW specified in 2.1.29 of Part A (hereinafter referred to as "light ship draught")~~ light service draught specified in **(4)** above and 60% of the difference between light ~~ship~~ service draught and the ~~draught corresponding to~~ deepest subdivision ~~load line~~ draught.

(6) "Subdivision length of the ship" (L_s) is the greatest projected moulded length in metres of the ship at or below deck or decks limiting the vertical extent of flooding with the ship at the deepest subdivision ~~load line~~ draught.

(7) "Mid-length" is the midpoint of L_s.

(8) "Aft terminal" is the aft limit of L_s.

(9) "Forward terminal" is the forward limit of L_s.

(10) "Trim" is the difference between the draught forward and the draught aft, where the draughts are measured at the forward and aft terminals respectively, disregarding any rake of keel.

(1~~0~~1) "~~Subdivision~~ breadth of ship" (B') is the greatest moulded breadth in metres of the ship at or below the deepest subdivision ~~load line~~ draught.

(1~~1~~2) "~~Subdivision~~ draught" (d') is the vertical distance in metres from ~~base line~~ keel line to the water line in question at ~~mid-length~~ the midpoint of L_s.

(12~~=~~3) "Permeability of a space" (μ) is the proportion, at the immersed part of a compartment (or a group of compartments) estimated a damage, of the volume which can be occupied by water to the volume of the immersed part. The value of μ is to be given in accordance with **Table CS4.1-1** and **Table CS4.1-2** according to the service of the space. In the space intended for liquid μ is to be of whichever becomes more severe requirements. Where substantiated by calculations and specifically accepted by the Society, other figures for permeability specified in **Table CS4.1-1** and **Table CS4.1-2** may be used notwithstanding the provision above.

(13~~4~~) "Internal opening" is the opening provided in decks or bulkheads forming a compartment except exposed one.

(14~~5~~) "External opening" is the opening provided in shells, exposed decks or bulkheads forming a compartment.

(16) "Machinery spaces" are spaces between the watertight boundaries of a space containing the main and auxiliary propulsion machinery, including boilers, generators and electric motors primarily intended for propulsion.

Table CS4.1-1 Permeability of ~~a Space~~ general compartment

Space	Locker	Accommodation	Machinery	Void	Dry cargo	Liquid
Permeability	0.60	0.95	0.85	0.95	0.70	0 or 0.95

Table CS4.1-2 Permeability of cargo compartment

Space for	Permeability at draught d_s	Permeability at draught d_p	Permeability at draught d_l
Dry cargo spaces	0.70	0.80	0.95
Container spaces	0.70	0.80	0.95
Ro-ro spaces	0.90	0.90	0.95
Cargo liquids	0.70	0.80	0.95

4.2 Subdivision Index

Paragraph 4.2.1 has been amended as follows.

4.2.1 Subdivision Index

1 The value of the Required Subdivision Index (R) is to be given by the following formula:

~~(1) In case $L_s \geq 100m$~~

~~$R = (0.002 + 0.0009L)^{1/3}$~~

~~(2) In case $100m > L_s \geq 80m$~~

$$R = 1 - \left[1/\left(1 + \frac{L_s}{100} \cdot \frac{R_0}{1 - R_0} \right) \right]$$

R_0 : The value ~~R as~~ calculated in accordance with the following formula ~~in **(1)** above~~.

$$R_0 = 1 - \frac{128}{L_s + 152}$$

2 The Attained Subdivision Index (A) for ship is to be not less than the Required Subdivision Index (R), calculated in accordance with **-1** above. ~~R is to be calculated by the following formula~~ A is obtained by the summation of the partial indices A_s, A_p and A_l, (weighted as shown) calculated for

the draughts d_s, d_p and d_l specified in **4.1.2(3)** to **(5)** in accordance with the following formula:

$A = 0.4A_s + 0.4A_p + 0.2A_l$

Each partial index is a summation of contributions from all damage cases taken in consideration, using the following formula:

~~**A**~~ $A_x = \Sigma\, p_i \cdot s_i$

Where, each partial index is not less than 0.5*R*.

A_x: Each partial index correspond to draughts, d_s, d_p and d_l specified in **4.1.2(3)** to **(5)**.

p_i : Probability that ~~only~~ a compartment or a group of compartments in question may be flooded (hereinafter referred to as "compartment flooding probability"), which is to be in accordance with the requirements in **4.2.2**.

s_i : Probability of survival after flooding a compartment or a group of compartments in question (hereinafter referred to as "survival probability"), which is to be in accordance with the requirements in **4.2.3**.

i : Indication of each compartment or group of compartments in question.

~~Σ : Summation of all cases of loading in which a compartment or a group of compartments is involved.~~

3 ~~**A**~~ Partial index (A_x) is to be calculated under the following conditions:

(1) ~~Subdivision load lines specified in **4.1.2(2)** and **(3)** are assumed, in principle, to be in parallel with base line~~ Level trim is to be used for the deepest subdivision draught and the partial subdivision draught. The actual service trim is to be used for the light service draught. Where any service condition, the trim variation in comparison with the calculated trim is greater than $0.005L_s$, one or more additional calculations of *A* are to be submitted for the same draughts but different trims so that, for all service conditions, the difference in trim in comparison with the reference trim used for one calculation will be less than $0.005L_s$.

(2) All flooding cases for ~~all of~~ a compartment and a group of compartments over the ship's subdivision length are to be taken into account. ~~However, what is counted in *A* may be limited to flooding cases contributing to *A* only.~~

(3) Assumed extent of hull damage is ~~to be limited to one breach with~~ the following ~~extents~~:

(a) Vertical extent is to extend upwards to ~~H_{MAX} specified in **4.2.3-3**~~ $d' + 12.5(m)$ from baseline. However, if a lesser extent will give a more severe result, such extent is to be assumed.

(b) ~~Horizontal extent is to extend to the centreline from the side of the ship. However, the damage to any centreline bulkheads may be excluded.~~ Horizontal extent of damage is measured inboard from Ship's side, at a right angle to the centreline at the level of the deepest subdivision draught and damage of the transverse extent greater than half breadth ($B'/2$) of the ship may be exempted. In case that the ship has a compartment formed by longitudinal watertight bulkheads which are not in the ship's centreline, all damages which extend from the outmost compartment (hereinafter referred to as "wing compartment") to the ship's centreline are to be assumed.

(4) In the flooding calculations carried, only one breach of the hull damage need to be assumed and only one free surface need to be considered.

(5) In the case of unsymmetrical arrangements, the calculated *A* value is to the mean value obtained from calculations involving both sides. Alternatively, it is to be taken as that corresponding to the side which evidently gives the least favourable result.

(6) When determining the positive righting lever (*GZ*) of the residual stability curve, the displacement for the intact condition is to be used.

Paragraph 4.2.2 has been amended as follows.

4.2.2 Compartment Flooding Probability (p_i)

~~**1** p_i for a single compartment is to be determined by the following procedure according to its longitudinal position.~~

~~(1) Where the compartment considered equals or extends over L_s:~~

~~$p_i = 1$~~

~~(2) Where the aft limit of the compartment considered coincides with the aft terminal:~~

~~$p_i = F + 0.5ap + q$~~

~~where:~~

~~F: Coefficient given below~~

~~$0.4 + 0.25 E (1.2 + a)$~~

~~E: Coefficient given below~~

~~$E_1 + E_2 - 1$~~

~~E_1: Coefficient given below~~

~~x_1 / L_s~~

~~x_1: The distance from the aft terminal to the foremost portion of the aft end of the compartment considered (m)~~

~~E_2: Coefficient given below~~

~~x_2 / L_s~~

~~x_2: The distance from the aft terminal to the aftermost portion of the forward end of the compartment considered (m)~~

~~a: Coefficient given below, but not more than 1.2.~~

~~$1.2 + 0.8 E$~~

~~p: Coefficient given below~~

~~$F_1 J_{max} - 1$~~

~~F_1: Coefficient given below according to the value of y~~

~~In case $y < 1.0$: $y^2 - (y^3/3)$~~

~~In case $y \geq 1.0$: $y - (1/3)$~~

~~y: Coefficient given below~~

~~J / J_{max}~~

~~J: Nondimensional subdivision length given below~~

~~$E_2 - E_1$~~

~~J_{max}:The maximum nondimensional damage length given below, but not more than 0.24~~

~~$48 / L_s$~~

~~q: Coefficient given below~~

~~$0.4 F_2 (J_{max})^2$~~

~~F_2: Coefficient given below according to the value of y~~

~~In case $y < 1.0$: $(y^2/3) - (y^4/12)$~~

~~In case $y \geq 1.0$: $(y^2/2) - (y/3) + (1/12)$~~

~~(3) In case that the forward limit of the compartment considered coincides with the forward terminal:~~

~~$p_i = 1 - F + 0.5ap$~~

~~where, F, a and p are as specified in **(2)** above.~~

~~(4) In case that neither of **(1)** to **(3)** above is applicable:~~

~~$p_i = ap$~~

~~where, a and p are as specified in **(2)** above.~~

~~(5) Notwithstanding the provision of **(2)** to **(4)** above, if the compartment considered extends over the midlength, p_i for such a compartment is to be of the value which is reduced by~~

~~the amount determined according to the formula for q, in which F_z is calculated taking y to be $((J' / J_{max}))$. J' is to be given bellow according to the value of E:~~

~~In case $E \geq 0$: $J = B$~~

~~In case $E < 0$: $J = B$~~

~~where, J and B are as specified in **(2)** above.~~

~~**2** p_s for a group of compartments is to be determined in accordance with the following procedure according to the number of compartments in the group of compartments considered. However, in the group of compartments which is consisting of three or more adjacent compartments, if J of one excluded the aftermost and foremost compartments from it is greater than J_{max}, p_s for it is to be of zero.~~

~~(1) In case that the group of compartments is consisting of two compartments:~~

~~$p_s = p_{n(n+1)} - p_n - p_{(n+1)}$~~

~~$p_{n(n+1)}$: p_s for the group of compartments considered which is determined by applying the requirements of preceding **-1** assumed as a single compartment.~~

~~(2) In case that the group of compartments is consisting of three compartments:~~

~~$p_s = p_{n(n+1)(n+2)} - p_{n(n+1)} - p_{(n+1)(n+2)} + p_{(n+1)}$~~

~~$p_{n(n+1)(n+2)}$: p_s for the group of compartments considered which is determined by applying the requirements of preceding **-1** assumed as a single compartment.~~

~~(3) In case that the group of compartments is consisting of four compartments:~~

~~$p_s = p_{n(n+1)(n+2)(n+3)} - p_{n(n+1)(n+2)} - p_{(n+1)(n+2)(n+3)} + p_{(n+1)(n+2)}$~~

~~$p_{n(n+1)(n+2)(n+3)}$: p_s for the group of compartments considered which is determined by applying the requirements of preceding **-1** assumed as a single compartment.~~

~~(4) In case that the group of compartments is consisting of five or more adjacent compartments, p_s for it is to be determined by applying the above procedure correspondingly.~~

~~**3** Where a wing compartment is fitted, p_s for it and inner compartments is to be determined in accordance with the following procedure.~~

~~(1) p_s for only a wing compartment considered is to be obtained by multiplying the value, as determined by the requirements of preceding **-1** according to the longitudinal position of the compartment, by the reduction factor r. Where r is to be given below:~~

~~In case $J \geq 0.2b/B'$:~~

~~$(b/B')\{2.3 + 0.08/(J + 0.02)\} + 0.1$~~

~~if $b/B' \leq 0.2$~~

~~$0.016/(J + 0.02) + (b/B') + 0.36$~~

~~if $b/B' > 0.2$~~

~~In case $J < 0.2b/B'$, r is to be determined by linear interpolation between the following values according to the value of J:~~

~~$(b/B')\{2.3 + 0.08/(J + 0.02)\} + 0.1$~~

~~if $J=0.2b/B'$~~

~~1.0, if $J=0$~~

~~J: As specified in **-2** above.~~

~~b: The mean transverse distance in metres measured at right angles to the centreline at the deepest subdivision load line between the shell and a plane through the outmost portion of and parallel to that part of the longitudinal limits forming the wing compartment considered.~~

~~(2) p_s for a group of compartments formed by a wing compartment and adjacent inboard compartments is to be obtained by multiply p_s, which is determined by applying the provision of **-2** above, by the factor $(1 - r)$.~~

1 The Compartment Flooding Probability (p_i) for a compartment or group of compartments is to

be determined by the following **(1)**, **(2)** or **(3)** according to the number of damaged compartment.

(1) Where the damage involves a single zone only:

$$p_i = p(x1_j, x2_j) \cdot [r(x1_j, x2_j, b_k) - r(x1_j, x2_j, b_{k-1})]$$

Where:

x1: The distance (*m*) from the aft terminal of L_s to the aft end of the zone in question

x2: The distance (*m*) from the aft terminal of L_s to the forward end of the zone in question

b: The mean transverse distance (*m*) measured at right angles to the centreline at the deepest subdivision loadline between the shell and an assumed vertical plane extended between the longitudinal limits used in calculating the factor p_i and which is a tangent to, or common with, all or part of the outermost portion of the longitudinal bulkhead under consideration. This vertical plane is to be so orientated that the mean transverse distance to the shell is a maximum, but not more than twice the least distance between the plane and the shell. If the upper part of a longitudinal bulkhead is below the deepest subdivision loadline the vertical plane used for determination of *b* is assumed to extend upwards to the deepest subdivision waterline. In any case, *b* is not to be taken greater than *B*'/2.

j: The aftmost damage zone number involved in the damage starting with no.1 at the stern

k: The number of a particular longitudinal bulkhead as barrier for transverse penetration in a damage zone counted from shell towards the centre line. However, value of *k* according to side shell is to be taken as zero.

p(*x1*, *x2*): It is specified in **-2**.

r(*x1*, *x2*, *b*): It is specified in **-3**. However, $r(x1, x2, b_0)$ is to be taken as zero.

(2) Where the damage involves two adjacent zones:

$$\begin{aligned} p_i = {} & p(x1_j, x2_{j+1}) \cdot [r(x1_j, x2_{j+1}, b_k) - r(x1_j, x2_{j+1}, b_{k-1})] \\ & - p(x1_j, x2_j) \cdot [r(x1_j, x2_j, b_k) - r(x1_j, x2_j, b_{k-1})] \\ & - p(x1_{j+1}, x2_{j+1}) \cdot [r(x1_{j+1}, x2_{j+1}, b_k) - r(x1_{j+1}, x2_{j+1}, b_{k-1})] \end{aligned}$$

(3) Where the damage involves three or more adjacent zones:

$$\begin{aligned} p_i = {} & p(x1_j, x2_{j+n-1}) \cdot [r(x1_j, x2_{j+n-1}, b_k) - r(x1_j, x2_{j+n-1}, b_{k-1})] \\ & - p(x1_j, x2_{j+n-2}) \cdot [r(x1_j, x2_{j+n-2}, b_k) - r(x1_j, x2_{j+n-2}, b_{k-1})] \\ & - p(x1_{j+1}, x2_{j+n-1}) \cdot [r(x1_{j+1}, x2_{j+n-1}, b_k) - r(x1_{j+1}, x2_{j+n-1}, b_{k-1})] \\ & + p(x1_{j+1}, x2_{j+n-2}) \cdot [r(x1_{j+1}, x2_{j+n-2}, b_k) - r(x1_{j+1}, x2_{j+n-2}, b_{k-1})] \end{aligned}$$

n: The number of adjacent damage zones involved in the damage

2 The Compartment Flooding Probability (p_i) is to be determined by the following **(1)**, **(2)** or **(3)** according to longitudinal position of compartment under consideration.

(1) Where neither limits of the compartment or group of compartments under consideration coincides with the aft or forward terminals:

In case $J \leq J_k$:

$$p(x1, x2) = p_1 = \frac{1}{6} J^2 (b_{11} J + 3 b_{12})$$

In case $J > J_k$:

$$\begin{aligned} p(x1, x2) = p_2 = {} & -\frac{1}{3} b_{11} {J_k}^3 + \frac{1}{2} (b_{11} J - b_{12}) {J_k}^2 + b_{12} J J_k - \frac{1}{3} b_{21} \left({J_n}^3 - {J_k}^3 \right) \\ & + \frac{1}{2} (b_{21} J - b_{22}) \left({J_n}^2 - {J_k}^2 \right) + b_{22} J (J_n - J_k) \end{aligned}$$

J: Non-dimensional damage length given below:

$$J = \frac{(x2 - x1)}{L_s}$$

x1 and *x2* are specified in **-1** above.

J_k: As given by the following formula:

$$J_k = \frac{J_m}{2} + \frac{\sqrt{1 - \frac{55}{6} J_m + \frac{121}{4} {J_m}^2}}{11}$$

$$J_m = \min\left\{\frac{10}{33}, \frac{60}{L_s}\right\}$$

b_{11}, b_{12}, b_{21} and b_{22}: Coefficient given by the following:

$$b_{11} = \frac{1}{6}\left(\frac{2}{(J_m - J_k)J_k} - \frac{11}{{J_k}^2}\right)$$

$$b_{12} = 11$$

$$b_{21} = -\frac{1}{6}\frac{1}{(J_m - J_k)^2}$$

$$b_{22} = \frac{1}{6}\frac{J_m}{(J_m - J_k)^2}$$

J_n: Normalized length of a compartment or group of compartments is to be taken as the lesser of *J* and J_m:

(2) Where the aft limit of the compartment or group of compartments under consideration coincides with the aft terminal or the forward limit of the compartment or group of compartments under consideration coincides with the forward terminal:

In case $J \leq J_k$:

$$p(x1, x2) = \frac{1}{2}(p_1 + J)$$

In case $J > J_k$:

$$p(x1, x2) = \frac{1}{2}(p_2 + J)$$

x1, *x2*, p_1, p_2, *J* and J_k are specified in **(1)** above.

(3) Where the compartment or groups of compartments considered extends over the entire subdivision length (Ls):

$p(x1, x2) = 1$

x1 and *x2* are specified in **(1)** above.

3 The factor $r(x1, x2, b)$ is to be determined by the following formulae:

$$r(x1, x2, b) = 1 - (1 - C) \cdot \left[1 - \frac{G}{p(x1, x2)}\right]$$

x1, *x2* and *b* are specified in **-1** above.

C: Coefficient given by the following:

$$C = 12 \cdot J_b \cdot (-45 \cdot J_b + 4)$$

J_b: Coefficient given by the following:

$$J_b = \frac{b}{15 \cdot B'}$$

G: As given by the following formula:

Where the compartment or groups of compartments considered extends over the entire subdivision length (L_s):

$$G = G_1 = \frac{1}{2} b_{11} J_b{}^2 + b_{12} J_b$$

Where neither limits of the compartment or group of compartments under consideration coincides with the aft or forward terminals:

$$G = G_2 = -\frac{1}{3} b_{11} J_0{}^3 + \frac{1}{2}\left(b_{11} J - b_{12}\right) J_0{}^2 + b_{12} J J_0$$

Where the aft limit of the compartment or group of compartments under consideration coincides with the aft terminal or the forward limit of the compartment or group of compartments under consideration coincides with the forward terminal:

$$G = \frac{1}{2} \cdot \left(G_2 + G_1 \cdot J\right)$$

b_{11}, b_{12} and J are specified in **-2** above.

J_0: Coefficient given by the following:

$$J_0 = \min\left(J, J_b\right)$$

Paragraph 4.2.3 has been amended as follows.

4.2.3 Probability of Survival (s_i)

~~**1** The probability of survival after flooding the compartment or group of compartments is to be determined by the following formula.~~

~~$s_i = 0.5 S_L + 0.5 S_p$~~

~~S_L: The value of S at the deepest subdivision load line~~

~~S_p: The value of S at the partial load line~~

~~S: Coefficient given below. However, if the water line at the final equilibrium state immerses the lower edge of openings through which progressive flooding may take place, it is to be of zero.~~

~~$C\sqrt{0.5 RL \cdot GZ_{max}}$~~

~~C: Coefficient according to the final equilibrium angle of heel(θ_e) as given below.~~

~~1.0 if $\theta_e \leq 25^\circ$~~

~~$\sqrt{(30 - \theta_e)/5}$ if $25^\circ < \theta_e \leq 30^\circ$~~

~~0 if $\theta_e > 30^\circ$~~

~~RL: Range of positive righting levers beyond the angle of equilibrium in degrees but not more than 20° However, the range is to be terminated at the angle where openings not capable of being closed weathertight are immersed.~~

~~GZ_{max}: Maximum positive righting lever (m) within RL, but not more than 0.1 m.~~

1 The Probability of Survival (s_i) for any damage case at any initial loading condition is to be obtained from the formula:

$$s_i = \min\left\{ s_{\text{final,i}} \right\}$$

$s_{\text{final,i}}$: It is the probability to survive in the final equilibrium stage of flooding.

$$s_{\text{final,i}} = K \cdot \left[\frac{GZ_{\max}}{0.12} \cdot \frac{Range}{16} \right]^{\frac{1}{4}}$$

K: Coefficient given by the following:

$K = 1.0$ if $\theta_e \le \theta_{\min}$

$K = 1.0$ if $\theta_e \ge \theta_{\max}$

$K = \sqrt{\frac{\theta_{\max} - \theta_e}{\theta_{\max} - \theta_{\min}}}$ Otherwise

Where, $\theta_{\min}$ is 25° and $\theta_{\max}$ is 30° for cargo ships.

$GZ_{\max}$: It is the maximum positive righting lever (*m*) up to the angle θ_v. However, in the calculations of $s_{\text{final,i}}$, It is not to be taken as more than 0.12*m*.

θ_v: It is the angle (°), in any stage of flooding, where the righting lever becomes negative, or the angle (°) at which an opening incapable of being closed weathertight becomes submerged.

Range: It is the range (°) of positive righting levers measured from the angle θ_e. However, the positive range is to be taken up to the angle θ_v and, in the calculations of $s_{\text{final,i}}$, it is not to be taken as more than 16 °.

θ_e: It is the equilibrium heel angle (°) in any stage of flooding.

~~**2** *S* for a compartment and/or a group of compartments forward of the collision bulkhead is to be equal to 1.0 calculated assuming the ship to be at its deepest subdivision load line and with assumed unlimited vertical extent of damage.~~

~~**3**~~**2** ~~When a compartment or a group of compartments has the decks, two or more tiers of which are above load line considered, *S* for such a compartment or a group of compartments is to be the summation of the following **(1)** and **(2)**~~ Where horizontal watertight boundaries are fitted above the waterline under consideration, the factor (*s*) calculated for the lower compartment or group of compartments is to be obtained by multiplying the value as determined in **-1** above by the factor v_m given by following formula.

~~(1) *S* for the lower compartment or group of compartments is to be obtained by multiplying the value as determined in **-1** above by the reduction factor *V* given by the following formula. However, when the uppermost deck is lower than H_{max}, *V* is to be taken as 1.0.~~

~~$(H - d')/(H_{max} - d')$~~

~~where ;~~

~~*H*: Height from the baseline to the deck considered (*m*)~~

~~H_{max}: Height from the baseline to the point given below (*m*):~~

~~In case $L_s \le 250m$: $d' + 0.056L_s\{1 - (L_s/500)\}$~~

~~In case $L_s > 250m$: $d' + 7$~~

$$v_m = v\left(H_{j,n,m}, d'\right) - v\left(H_{j,n,m-1}, d'\right)$$

$H_{j,n,m}$: It is the least height (*m*) above the baseline within the longitudinal range of $x1_{(j)} \cdots x2_{(j+n-1)}$ of the *m*-th horizontal boundary which is assumed to limit the vertical extent of flooding for the damaged compartments under consideration;

$H_{j,n,m-1}$: It is the least height (*m*) above the baseline within the longitudinal range of $x1_{(j)} \cdots x2_{(j+n-1)}$ of the *m-1*-th horizontal boundary which is assumed to limit the

vertical extent of flooding for the damaged compartments under consideration;

j, n, x1 and *x2* are specified in **4.2.2-1**.

m: It is each horizontal boundary counted upwards from the waterline under consideration;

$v(H_{j,n,m}, d')$ and $v(H_{j,n,m-1}, d')$: Coefficient given by the following:

$$v(H,d') = 0.8\frac{(H-d')}{7.8} \qquad \text{if } H_m - d' \le 7.8m$$

$$v(H,d') = 0.8 + 0.2\left[\frac{(H-d')-7.8}{4.7}\right] \qquad \text{Otherwise}$$

$v(H_{j,n,m}, d')$ is to be taken as 1, if H_m coincides with the uppermost watertight boundary of the ship within the range $x1_{(j)} \cdots x2_{(j+n-1)}$, and $v(H_{j,n,0}, d')$ is to be taken as 0.

v_m is to be taken as 0, if v_m determined by above formula is taken as less than 0, and v_m is to be taken as 1, if v_m determined by above formula is taken as more than 1.

~~(2) *S* for the upper compartment or group of compartments above the horizontal subdivision is to be obtained for simultaneous flooding by multiplying the value as determined in **-1** above by the factor (1-*V*).~~

3 Where the requirement in **-3** above is applied, in general, each contribution *dA* to the Attained Subdivision Index *A* is obtained from the formula:

$$dA = p_i \cdot \left[v_1 \cdot s_{\min 1} + (v_2 - v_1) \cdot s_{\min 2} + \cdots + (1 - v_{m-1}) \cdot s_{\min m}\right]$$

v_m: The value calculated in accordance with **-3** above;

$s_{\min}$: The least factor of *s* for all combinations of damages obtained when the assumed damage extends from the assumed damage height H_m downwards.

4 In all cases, probability of survival (s_i) is to be taken as 0 in those cases where, taking into account sinkage, heel and trim, the openings in accordance with following **(1)** and **(2)** immerse at the final waterline:

(1) The openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of probability of survival (s_i)

(2) Air-pipes, ventilators and the openings which are closed by means of weathertight doors or hatch covers

5 The probability of survival (s_i) is to be taken as 0 if, taking into account sinkage, heel and trim, any of the following **(1)** to **(3)** occur in any intermediate stage or in the final stage of flooding:

(1) Immersion of any vertical escape hatch in the bulkhead deck

(2) Any controls intended for the operation of watertight doors, valves on piping or on ventilation ducts intended to maintain the integrity of watertight bulkheads from above the bulkhead deck become inaccessible or inoperable

(3) Immersion of piping or ventilation ducts maintained a watertight and located within any compartment

4.3 Openings

4.3.2 External Openings

Sub-Paragraph 4.3.2-2(4) has been amended as follows.

1 All external openings, which are below the final damage waterline in the calculation of subdivision index, are to be watertight.
2 The closing appliances for the external openings required to be watertight under the requirements of **-1** above are to be permanently closed at sea, and are to comply with the following **(1)** to **(4)**.

(1) (Omitted)
(2) (Omitted)
(3) (Omitted)
(4) Closing appliances for openings in the shell plating below the bulkhead deck accessible during the voyage, are to be fitted with a device which prevents unauthorized opening, except where specially accepted by the Society.

3 (Omitted)

Chapter 6 DOUBLE BOTTOMS

6.1 General

6.1.1 Application

Sub-Paragraph -1 and -3 have been amended as follows.

1 Ships, in principle, are to be provided with watertight double bottoms extending from the collision bulkhead to the after peak bulkhead. The longitudinal system of framing is, in general, to be adopted. The inner bottom is to be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge, and is not lower at any part than a plane parallel with the keel line and which is located not less than a vertical distance h (m) measured from the keel line specified in **2.1.47, Part A of the Rules** .

$h = B'/20$

B' : It is specified in **4.1.2(11)**.

However, in no case is the value of h to be less than 0.76 m, and need not be taken as more than 2.0 m.

3 Double bottoms may be omitted in way of watertight tanks, including dry tanks of moderate size ~~used exclusively for the carriage of liquids~~ subject to ~~the approval by the Society~~ the safety of the ship is not impaired in the event of bottom or side damage.

Paragraph 6.1.7 has been added as follows.

6.1.7 Wells

1 Small wells constructed in the double bottom in connection with drainage arrangements of holds are not to extend downward more than necessary. A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel.

2 Other wells (e.g. for lubricating oil under main engines) may be permitted by the Society if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this Chapter.

3 For wells specified in **-1** and **-2** above except a well at the end of the shaft tunnel, the vertical distance from the bottom of such a well to a plane coinciding with the keel line specified in **2.1.47, Part A of the Rules** is not to be less than 0.5 *m*.

6.7 Inner Bottom Plating and Margin Plates

Paragraph 6.7.3 has been deleted, and paragraphs 6.7.4 to 6.7.6 have been renumbered to 6.7.3 to 6.7.5 respectively.

~~**6.7.3 Intersections of Margin Plates and Shell Plating**~~

~~It is recommended that the intersections of margin plates and shell plating be of sufficient height to protect the bottom up to the turn of bilge of shell plating by the double bottom, and for 0.2 *L* from the stem the margin plates be extended to the ship's sides horizontally as far as practicable.~~

Chapter 13 WATERTIGHT BULKHEADS

13.1 Arrangement of Watertight Bulkheads

Paragraph 13.1.1 has been amended as follows.

13.1.1 Collision Bulkheads

1 All ships are to have a collision bulkhead, at a position not less than $0.05L_f$, but not more than $0.08L_f$ or $0.05L_f + 3.0$ (*m*), whichever is greater, except where the larger distance be accepted by the Society due to a special reason as to structure, from the forward terminal of the length for freeboard. However, where any part of the ship below the waterline at 85% of the least moulded depth extends forward beyond the forward terminal of the length for freeboard, the above-mentioned distance is to be measured from a point either.:

(a) at the mid-length of such extension ; or

(b) at a distance $0.015L_f$ forward from the above-mentioned forward terminal ;

whichever gives the smallest measurement.

2 The bulkhead may have steps or recesses within the limits specified in the above **-1**.

3 Any access openings, doors, manholes or ducts for ventilation, etc. are not to be cut in the collision bulkhead below ~~freeboard~~ bulkhead deck. Where a collision bulkhead extends up to a deck above the freeboard deck in accordance with the requirements of **13.1.5(2)**, the number of openings in the extension of the collision bulkhead is to be kept to a necessary minimum and all such openings are to be provided with weathertight means of closing.

4 Arrangement of collision bulkhead in a ship provided with bowdoor is to be at the discretion of the Society. However, where a sloping ramp forms a part of the collision bulkhead above the

~~freeboard~~ bulkhead deck, the part of the ramp which is more than 2.3 *m* above the ~~freeboard~~ bulkhead deck may extend forward of the limit specified in the above **-1**. In this case, the ramp is to be weathertight over its complete length. However, ramps not meeting the above requirement are to be disregarded as an extension of the collision bulkhead.

Section 13.4 has been added as follows.

13.4 Other Watertight Construction

13.4.1 Maintaining the Watertightness of Trunks

For the application of this chapter, trunks required to maintain watertightness are to be capable of withstanding internal or external pressure under the most severe conditions at the intermediate or final stages of flooding.

Chapter 16 SHELL PLATINGS

16.1 General

Paragraph 16.1.3 has been added as follows.

16.1.3 Moving Parts Penetrating the Shell Plating

Moving parts penetrating the shell plating below the deepest subdivision draught specified in **4.1.2(3)**, are to be fitted with a watertight sealing arrangement acceptable to the Society. The inboard gland is to be located within a watertight space of such volume that, if flooded, the bulkhead deck is not to be submerged. The Society may require that if such a compartment is flooded, essential or emergency power and lighting, internal communication, signals or other emergency devices remain available in other parts of the ship.

Chapter 17 DECKS

17.2 General

Paragraph 17.2.2 has been amended as follows.

17.2.2 Watertightness of Decks

1 Weather decks, except where hatchway and other openings specified in **Chapter 20** are provided, are to be made watertight. Weather decks, however, may be made weathertight, subject to the approval by the Society.

2 Special consideration is to be given to the water influx to the compartments under the bulkhead

deck on ro-ro spaces.

3 Special consideration is to be given to maintaining watertightness where the decks are required to be watertight in compliance with the requirements of **Chapter 4**.

Chapter 21 BULWARKS, GUARDRAILS, FREEING ARRANGEMENTS, CARGO PORTS AND OTHER SIMILAR OPENINGS, SIDE SCUTTLES, RECTANGULAR WINDOWS, VENTILATORS AND GANGWAYS

21.4 Side Shell Doors and Stern Doors

21.4.2 Arrangement of Doors

Sub-paragraph -3 has been amended as follows.

2 Where the lower edges of any openings of the doors are situated below the freeboard deck, the doors are to be watertight.

3 Notwithstanding the requirements in **-2**, the lower edges of the doors are not to be below a line drawn parallel to the freeboard deck at side, which has at its lowest point at least 230*mm* above the ~~upper edge of the uppermost load line~~ deepest subdivision draught specified in **4.1.2(3)**, unless the implementation of additional measures for ensuring watertightness such as the following **(1)** to **(4)**.

(1) A second door of equivalent strength and watertightness is to be fitted inside the watertight door

(2) A leakage detection device is provided in the compartment between the two doors

(3) Drainage of this compartment to the bilges is controlled by a readily accessible screw-down valve

(4) The outer door opens outwards

21.5 Side Scuttles and Rectangular Windows

Paragraph 21.5.2 has been amended as follows.

21.5.2 General Requirement for Position of Side Scuttles

1 No side scuttle is to be provided in such a position as its sill is below a line drawn parallel to the freeboard deck at side and having its lowest point ~~$0.025B_f$~~ 2.5% of the breadth of the ship (B') specified in **4.1.2(11)** or 500*mm*, whichever is greater, above the ~~uppermost load line~~ deepest subdivision draught specified in **4.1.2(3)**. All side scuttles sill of which is below the freeboard deck and which are of hinged type are to be provided with locking arrangements.

2 No side scuttle is to be provided to any space solely engaged in carriage of cargoes.

3 The deadlights of side scuttles deemed appropriate by Society may be portable, provided that such scuttles comply with the following requirements **(1)** to **(4)**:

(1) Fitting class *A* side scuttles or class *B* side scuttles is not required.

(2) Such side scuttles are fitted abaft one eighth of the subdivision length (L_S) specified in **4.1.2(6)** from the forward perpendicular.

(3) Such side scuttles are fitted above a line drawn parallel to the bulkhead deck at side and

having its lowest point at a height of 3.7 *m* plus 2.5% of the breadth of the ship (*B*') specified in **4.1.2(11)** above the deepest subdivision draught specified in **4.1.2(3)**.

(4) Such portable deadlights are to be stowed adjacent to the side scuttles they serve.

4 Automatic ventilating side scuttles is not to be fitted in the shell plating below the freeboard deck.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 1 January 2009.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships the keels of which were laid or which were at *a similar stage of construction* before the effective date.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part CS Hull Construction and Equipment of Small Ships

2008 AMENDMENT NO.1

Notice No.9 27th February 2008
Resolved by Technical Committee on 30th November 2007

Notice No.9 27th February 2008
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

Part CS HULL CONSTRUCTION AND EQUIPMENT OF SMALL SHIPS

Appendix 1 APPLICATION OF PART C OF THE GUIDANCE

Notes 12 of Table CS have been amended as follows.

Notes :

1. In Guidance **C1.1.3-2(2)(a)**, **5.5.2, Part C of the Rules** is to read as **5.4.3, Part CS of the Rules**.
   In Guidance **C1.1.3-2(2)(c)**, **10.2.1-2, Part C of the Rules** is to read as **17.1.1-2, Part CS of the Rules**.
   In Guidance **C1.1.3-2(2)(g)**, **20.1.2, Part C of the Rules** is to read as **19.1.2, Part CS of the Rules**.
2. In Guidance **C7.6.2**, **7.6.2, Part C of the Rules** is to read as **7.5.2, Part CS of the Rules**.
3. In Guidance **C7.6.3**, **7.6.2-2**, **7.7.1** and **7.8.1, Part C of the Rules** are to read respectively as **7.5.2-1**, **7.6.1** and **7.6.3, Part CS of the Rules**.
4. In Guidance **C9.1.2**, **9.2.2-2(2), Part C of the Rules** is to read as **9.2.2-5, Part CS of the Rules**.
5. In Guidance **C10.3.3**, **10.3.3-1** and **10.3.3-2, Part C of the Rules** is to read as **10.2.3-1** and **10.2.3-2, Part CS of the Rules**.
6. In Guidance **C12.2.1**, **12.2.1-1** and **12.2.1-2, Part C of the Rules** is to read as **12.2.1-1** and **12.2.1-2, Part CS of the Rules**.
7. In Guidance **C10.2.1**, **10.2.1-1, Part C of the Rules** is to read as **17.1.1-1, Part CS of the Rules**.
8. In Guidance **C20.2.3**, **20.2.3-1(1)(b)** and **20.2.3-1(4)(c), Part C of the Rules** are to read respectively as **19.2.3-1(1)(b)** and **19.2.3-1(4)(c), Part CS of the Rules**.
9. In Guidance **C20.2.4**, **20.2.4-2**, **20.2.4-3**, **20.2.4-4**, **20.2.4-6**, **20.2.4-6(1)(c)**, **20.2.4-7** and **Table C20.2, Part C of the Rules** are to read respectively as **19.2.4-2**, **19.2.4-3**, **19.2.4-4**, **19.2.4-6**, **19.2.4-6(1)(c)**, **19.2.4-7** and **Table CS19.2, Part CS of the Rules**.
10. In Guidance **C20.2.5**, **20.2.4-2**, **20.2.4-3** and **20.2.4-4, Part C of the Rules** are to read respectively as **19.2.4-2**, **19.2.4-3** and **19.2.4-4, Part CS of the Rules**.
11. In Guidance **C20.2.6**, **20.2.4**, **20.2.5** and **20.2, Part C of the Rules** are to read respectively as **19.2.4**, **19.2.5** and **19.2, Part CS of the Rules**.
12. In Guidance **C20.2.9**, **20.2.4**, **20.2.5**, **20.2.6** and **20.2.9**, ~~**Table C20.7 and**~~ **Table C20.4, Part C of the Rules** are to read respectively as **19.2.4**, **19.2.5**, **19.2.6**, **19.2.9**, ~~**Table CS19.7 and**~~ **Table CS19.4, Part CS of the Rules**.
13. In Guidance **C20.3.5**, **20.3.5, Part C of the Rules** is to read as **19.3.5, Part CS of the Rules**.
14. In Guidance **C23.1.1**, **23.1.1-2(2)**, **Part C of the Rules** is to read as **21.1.1-2(2)**, **Part CS of the Rules**.
15. In Guidance **C23.1.2**, **23.1.2, Part C of the Rules** is to read as **21.1.2, Part CS of the Rules**.
16. In Guidance **C23.2.1**, **23.2.1-3**, **23.2.1-4** and **23.2.2-4, Part C of the Rules** are to read respectively as **21.2.1-3**, **21.2.1-4** and **21.2.2-4, Part CS of the Rules**.
17. In Guidance **C23.2.2**, **23.2.2**, **23.2.2-1**, **23.2.2-2** and **23.2.2-3, Part C of the Rules** are to read respectively as **21.2.2**, **21.2.2-1**, **21.2.2-2** and **21.2.2-3, Part CS of the Rules**.
18. In Guidance **C23.4.5-2**, " *L′* " is to read as "*L*". *L* is ship's length specified in **2.1.2, Part A of the Rules**.
19. In Guidance **C23.5.3**, **23.5.3-5, Part C of the Rules** is to read as **21.5.3-5, Part CS of the Rules**.
20. In Guidance **C23.5.7**, **23.5.7-3, Part C of the Rules** is to read as **21.5.7-3, Part CS of the Rules**.
21. In Guidance **C23.6.7**, **23.6.7** and **23.6.1, Part C of the Rules** are to read respectively as **21.6.7** and **21.6.1, Part CS of the Rules**.
22. In Guidance **C23.7.1**, **Chapter 19**, **23.1.2-2** and **23.7.1, Part C of the Rules** are to read as respectively **Chapter 18**, **21.1.2-2** and **21.7.1, Part CS of the Rules**.
23. In Guidance **C23.8.1**, **23.8.1-1, Part C of the Rules** is to read as **21.8.1-1, Part CS of the Rules**.

24. Ships not engaged on international voyages need not to apply the provisions of **C25.2.1-2**.
25. The title of Guidance **C27.1.6** is to read respectively as "Tow Lines".
26. In Guidance **C29.1.1-1(1)**, **Chapter 29, Part C of the Rules** is to read as **Chapter 24, Part CS of the Rules**.
27. In Guidance **C29.1.1-3(1)(b)i)**, **29.4**, **29.5** and **29.6, Part C of the Rules** are to read respectively as **24.3**, **24.4** and **24.7, Part CS of the Rules**.
28. In Guidance **C29.1.2-4(1)**, **29.1.2-2, Part C of the Rules** is to read as **24.1.2-2, Part CS of the Rules**.
29. In Guidance **C34.1.2**, **34.1.2-1, Part C of the Rules** is to read as **25.1.2-1, Part CS of the Rules**.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 September 2008.

2. Notwithstanding the amendments to the Guidance, 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 IACS Procedural Requirement (PR) No.29 (Rev.4).

IACS PR No.29 (Rev.4)

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.

Notes:
1. This Procedural Requirement applies to all IACS Members and Associates.
2. This Procedural Requirement is effective for ships "contracted for construction" on or after 1 January 2005.
3. Revision 2 of this Procedural Requirement is effective for ships "contracted for construction" on or after 1 April 2006.
4. Revision 3 of this Procedural Requirement was approved on 5 January 2007 with immediate effect.
5. Revision 4 of this Procedural Requirement was adopted on 21 June 2007 with immediate effect.