RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part C Hull Construction and Equipment

2019 AMENDMENT NO.2

Rule No.103 27 December 2019

Resolved by Technical Committee on 22 July 2019

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Rule No.103 27 December 2019
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 C HULL CONSTRUCTION AND EQUIPMENT

Amendment 2-1

Chapter 1 GENERAL

1.2 Welding

1.2.3 Details of Joints*

Sub-paragraph -5 has been added as follows.

1 The details of butt welded joints are to be within the set limits which are approved in accordance with the requirements in **Chapter 4**, **Part M**. The breadth of overlap for lap joints or joggled lap joints which may be subject to bending is to be equivalent to the standards specified below.

(1) The breadth of overlap for lap joints is not to be less than that obtained from the following formula, but need not exceed 50*mm*.

$2t + 25$ (*mm*)

Where:

t: Thickness (*mm*) of the thinner plate

(2) The breadth of overlap for joggled lap joints is not to be less than that obtained from the following formula, but need not exceed 40*mm*.

$t + 25$ (*mm*)

Where:

t: Thickness (*mm*) of the thinner plate

2 Butt welded joints of plates having a difference in thickness over 4*mm* are generally to be tapered by not more than one-third at the end of the thicker plate.

3 The kind and size of fillet welds are to be in accordance with **Table C1.4** and their application to the hull construction is to be as required by **Table C1.5**. In tankers, they are also to be in accordance with **Table C29.20**.

4 Slot welds are to have adequate shapes to permit a thoroughly fused bead to be applied all around the bottom edge of the opening. The fillet size of slot welds is to be *F*1 as specified in **Table C1.4** and the spacing of the slots is to be as determined by the Society.

5 In the case of a cross-joint where high in-plane loads act upon the attached plate and are transmitted through the weld and the intermediate plate (see **Fig. C1.3**), differences in thickness are to be taken into account and special consideration is to be given to measures such as appropriately increasing the fillet weld leg length, providing a groove, etc. in order to avoid any excessive stress concentrations.

Fig. C1.3 has been renumbered to Fig. C1.4, and Fig. C1.3 has been added as follows.

Fig. C1.3 Example of Cross-joint

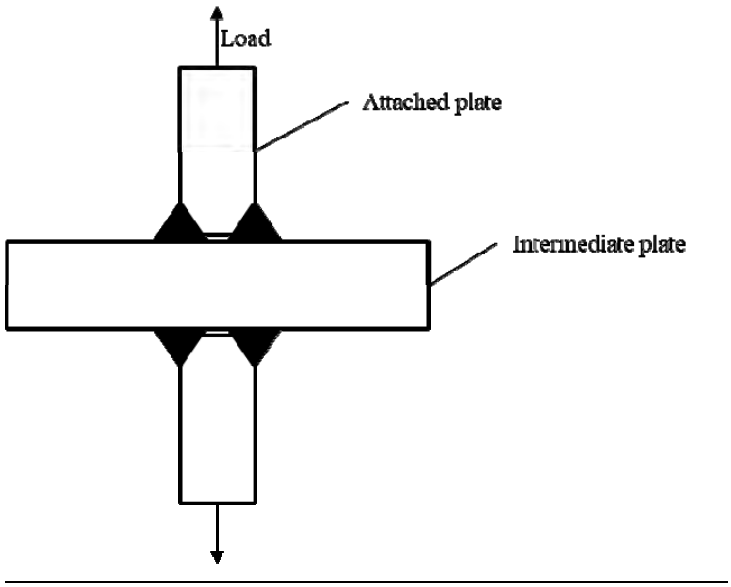

Fig. C1.~~3~~4 Parts of Continuous Fillet Weld
(Figure is omitted.)

Notes of Table C1.5 have been amended as follows.

Table C1.5 Application of Fillet Welds
(Table is omitted.)

Notes:

1 Where longitudinal strength members are mutually connected by fillet welds, the fillet sizes are to be in accordance with **Table C1.4** and this Table, except that the total throat areas of fillet joints are not to be less than the minimum sectional area of the members.

2 Where the ends of frames, beam and stiffeners are directly fillet welded to deck, shell, inner bottom or bulkhead plates, the fillet sizes are not to be less than 0.7 times the web thickness of the members.

3 Where beams, frames, stiffeners and girders are intermittently welded to deck, shell, inner bottom plates and bulkhead plates, the fillet welds are to be partly continuous as shown in **Fig. C1.~~3~~4**(a). Where the members are backed by other members at the opposite side as shown in **Fig. C1.~~3~~4** (b) or (c), the fillet welds are to be continuous for a proper length at the ends of the members or at the toes of the brackets of the members. The fillet weld may be as shown in **Fig. C1.~~3~~4**(d), where the whole lengths of the joints are welded with the effective fillet size not less than *F*2.

4 Where the rider plates or inner bottom plates consist of bed plates of the main engine seating or seatings of other important machinery, the kind of fillet is to be in accordance with the requirements for the type of seating.

5 For connections other than those specified in double bottoms with longitudinal framing, the requirements for transverse framing are to be applied.

6 In cases where the bulkheads of compartments intended to carry liquid cargoes are corrugated bulkheads, the welding of the corrugated bulkheads is to be in accordance with the requirements given in **14.4**. In cases where the bulkheads of compartments not intended to carry liquids cargo are corrugated bulkheads, the kind of fillet weld used for the corrugated bulkhead is to be in accordance with the requirements for bulkheads.

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 27 December 2019.

2. Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective date.

Amendment 2-2

Chapter 27 EQUIPMENT

27.1 Anchors, Chain Cables and Mooring Ropes

27.1.1 General*

Table C27.1 has been amended as follows.

Table C27.1 Anchors, Chain Cables and Ropes

(Table C27.1 is omitted.)

Notes:

1 Length of chain cables may include shackles for connection.

2 Tow line is not a condition of Classification, but is listed in this table only for guidance. (ref. **27.1.6**)

3 Values given for anchoring equipment in this table are based on an assumed maximum current speed of 2.5 *m*/*s*, a maximum wind speed of 25 *m*/*s* and a minimum scope of chain cable of 6, the scope being the ratio between the paid-out length of the chain and water depth. However, for ships with a ship length L_1, as defined in **2.1.1 of Part A**, greater than 135 *m*, alternatively the required anchoring equipment may be considered applicable to a maximum current speed of 1.54 *m*/*s*, a maximum wind speed of 11 *m*/*s* and waves with maximum significant height of 2 *m*.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 27 December 2019.

2. Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction* is before the effective date.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the date of contract for construction is on and after 1st July 2018 upon request.

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.

Amendment 2-3

Chapter 4 SUBDIVISIONS

4.1 General

Paragraph 4.1.2 has been amended as follows.

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) "Deepest subdivision draught" (d_s) is ~~the draught which corresponds to~~ the summer 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 subdivision draught" (d_p) is the draught which corresponds to the summation of light service draught specified in **(4)** above and 60% of the difference between light service draught and the deepest subdivision 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 draught.

(7) ~~"Mid-length" is the midpoint of L_s.~~ "Amidships" is at the middle of the length for freeboard (L_f).

(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 perpendiculars for the forward and aft ~~terminals respectively~~ ends of the length for freeboard (L_f), disregarding any rake of keel.

(11) "Breadth of ship" (B') is the greatest moulded breadth in metres of the ship at or below the deepest subdivision draught.

(12) "Draught" (d') is the vertical distance in metres from the keel line to the water line in question at ~~the midpoint of L_s~~ amidships.

(13) "Permeability of a space" (μ) is the proportion of the immersed volume of that space (a compartment or group of compartments) which can be occupied by water. The value μ is shown in **Table C4.1-1** and **Table C4.1-2** according to the purpose of the space. However, in spaces intended for the carriage of liquid, the more stringent value of μ is to be taken when calculating the subdivision index in **4.2**. Where substantiated by calculations and specifically accepted by the Society, other figures for permeability specified in **Table C4.1-1** and **Table C4.1-2** may be used notwithstanding the provision above.

(14) "Internal opening" is the opening provided in decks or bulkheads forming a compartment excluding those that are completely exposed.

(15) "External opening" is the opening provided in shells, exposed decks or bulkheads forming a

compartment.

(16) "Timber deck cargo" means a cargo of timber carried on an uncovered part of a freeboard or superstructure deck. The term does not include wood pulp or similar cargo.

(17) "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.

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 $L_s > 100m$

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

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

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

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

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

$A_x = \Sigma\, p_i \cdot s_i$

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

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 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.

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

(1) ~~Level trim~~ As a minimum, the calculation of A is to be ~~used~~ carried out at level trim for the deepest subdivision draught and the partial subdivision draught. The ~~actual~~ estimated service trim ~~is to~~ may be used for the light service draught. ~~Where~~ If, in any anticipated service condition within the draught range from d_s to d_l, the trim variation in comparison with the calculated trim is greater than 0.005~~L_s~~ L_f, one or more additional calculations of A are to be ~~submitted~~ performed for the same draughts but ~~different~~ including sufficient trims ~~so~~ to ensure that, for all intended service conditions, the difference in trim in comparison with the reference trim used for one calculation will be ~~less~~ not more than 0.005~~L_s~~ L_f. Each additional calculation of A is to comply with **-2** above.

(2) All flooding in compartments and groups of compartments over the entire ship's length is to

be taken into account.

(3) Assumed extent of hull damage is the following:
   (a) Vertical extent is to be up to d' + 12.5 (m) from the baseline. However, if a lesser extent will give a more severe result, then such an extent is to be assumed.
   (b) 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. Where the ship has a compartment formed by longitudinal watertight bulkheads which are not on the ship's centreline, all damage 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 in the intermediate and final equilibrium stages of flooding, the displacement for the intact loading condition is to be used. All calculations are to be done with the ship freely trimming.

4.2.2 Compartment Flooding Probability (p_i) *

Sub-paragraph -1 has been amended as follows.

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~~ draught 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~~ draught 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 centreline. 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) and (3) are omitted.）

Paragraph 4.2.3 has been amended as follows.

4.2.3 Probability of Survival (s_i) *

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

~~$s_i = \min\{s_{final,i}\}$~~

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

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

~~*K*: Coefficient given by the following:~~

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

~~$K = 0$ if $\theta_e \ge \theta_{max}$~~

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

~~Where, θ_{min} is 25° and θ_{max} is 30° for cargo ships.~~

~~θ_e: It is the final equilibrium heel angle (°).~~

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

~~θ_v: It is the angle (°), 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 $s_{final,i}$, it is not to be taken as more than 16°.~~

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

$s_{intermediate,i}$: Probability to survive all intermediate flooding stages until the final equilibrium stage. It is calculated in accordance with **-2**.

$s_{final,i}$: Probability to survive in the final equilibrium stage of flooding. It is calculated in accordance with **-3**.

2 The factor $s_{intermediate,i}$ is to be obtained from the following formula.

(1) For cargo ships fitted with cross-flooding devices, the factor $s_{intermediate,i}$ is taken as the least of the values obtained from all flooding stages including the stage before equalization, if any, and is to be calculated as follows. Where the intermediate heel angle exceeds 30º, $s_{intermediate,i}$ is to be taken as 0.

$$s_{intermediate,i} = \left[\frac{GZ_{max}}{0.05} \cdot \frac{Range}{7}\right]^{\frac{1}{4}}$$

GZ_{max}: Maximum positive righting lever (*m*) up to angle θ_v. However, in calculations of $s_{intermediate,i}$, it is not to be taken as more than 0.05 *m*.

θ_v: Angle (°), at 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: Range of positive righting levers (°) measured from angle θ_e. However, the positive range is to be taken up to angle θ_v and, in the calculations of $s_{intermediate,i}$, it is not to be taken as more than 7°.

θ_e: Equilibrium heel angle (°) at any stage of flooding.

(2) Where cross-flooding fittings are required, the time for equalization is not to exceed 10 min.

(3) For cargo ships not fitted with cross-flooding devices the factor $s_{\text{intermediate,i}}$ is taken as 1, except if the Administration considers that the stability in intermediate stages of flooding may be insufficient, it is to require further investigation thereof.

3 The factor $s_{\text{final,i}}$ is to be obtained from the following formula.

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

K: Coefficient given by the following:

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

$K = 0$ if $\theta_e \ge \theta_{\max}$

$K = \sqrt{\dfrac{\theta_{\max} - \theta_e}{\theta_{\max} - \theta_{\min}}}$ otherwise

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

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

$GZ_{\max}$: As specified in **-2** above. However, in the calculations of $s_{\text{final,i}}$, it is not to be taken as more than 0.12 (*m*).

θ_e: Equilibrium heel angle (°) at any stage of flooding.

Range: As specified in **-2** above. However, the positive range is to be taken up to angle θ_v and, in calculations of $s_{\text{final,i}}$, it is not to be taken as more than 16°.

~~**2**~~**4** 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.

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

$H_{j,n,m}$: It is the least height (*m*) above the baseline within the longitudinal range of $x1_{(j)} \ldots x2_{(j+n-1)}$ 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 $x1_{(j)} \ldots x2_{(j+n-1)}$ 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:

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

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

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

~~**3**~~**5** Where the requirement in ~~**-2**~~**-4** 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 ~~-2~~**4** 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~~**6** ~~In all cases, p~~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~~**7** 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~~ freeboard 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~~ freeboard deck become inaccessible or inoperable

(3) Immersion of piping or ventilation ducts ~~maintained a watertight and located within any compartment~~ located within the assumed extent of damage and carried through a watertight boundary if this can lead to the progressive flooding of compartments not assumed as flooded.

8 Notwithstanding the requirements given in **-7** above, where compartments are assumed to be flooded due to progressive flooding in the damage stability calculations, s_i may be taken as $s_{intermediate,i}$ for the flooding of those compartments under consideration.

9 Unsymmetrical flooding is to be in accordance with following **(1)** and **(2)**.

(1) Unsymmetrical flooding is to be kept to a minimum consistent with the efficient arrangements.

(2) Where it is necessary to correct large angles of heel, the means adopted is to, where practicable, be self-acting, but in any case where controls to equalization devices are provided they are to be operable from above the freeboard deck. These fittings together with their controls are to be acceptable to the Society.

~~6~~**10** Where the ship carries timber deck cargo, the calculation of s_i may be modified as deemed appropriate by the Society.

Chapter 6 DOUBLE BOTTOMS

6.1 General

Paragraph 6.1.3 has been amended as follows.

6.1.3 Drainage*

1 Efficient arrangements are to be provided for draining water from the tank top.

2 Regarding the application of **-1** above**,** small wells may be constructed in the double bottom in connection with drainage arrangements ~~of holds~~. Such wells are not to extend downward more than necessary. ~~In addition, such wells are not to extend for more than one-half the depth of the double bottom as far as practicable. However, a well extending to the outer bottom is permitted at the after end of the shaft tunnel.~~ The vertical distance from the bottom of such a well to a plane coinciding with the keel line is not to be less than 0.5*h* (*h* is specified in **6.1.1-1**) or 500 *mm*, whichever is greater, or as deemed appropriate by the Society.

3 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.

~~**4** For wells specified in **-2** and **-3** above, except those at the ends of shaft tunnels, the vertical distance from the bottom of such a well to a plane coinciding with the keel line specified in **2.1.48, Part A of the Rules** is not to be less than 0.5 *m*. This requirement may be waived, however, where bilge tanks deemed appropriate by the Society are provided instead of wells for the purpose of complying with **-1** above or where it is ascertained that the ship meets the requirements for the omission of double bottoms given in **6.1.1-2** or **6.1.1-3**.~~

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 $0.05L_f$ or 10 *m*, whichever is less, from the forward terminal of the length for freeboard, but not more than $0.08L_f$ or $0.05L_f + 3.0$ (*m*), whichever is greater, unless for special structural reasons which are approved by the Society. 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 the point that gives the smallest measurement from the following.

(a) The mid-length of such an extension
(b) A distance $0.015L_f$ forward from the above-mentioned forward terminal
(c) A distance 3 *m* forward from the forward terminal

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

3 Any access openings, doors, manholes or ducts for ventilation, etc. are not to be cut in to the collision bulkhead below the ~~bulkhead~~ freeboard 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 The arrangement of the collision bulkhead in a ship provided with bow doors is to be at the discretion of the Society. However, where a sloping ramp forms a part of the collision bulkhead above the ~~bulkhead~~ freeboard deck, the part of the ramp which is more than 2.3 *m* above the ~~bulkhead~~ freeboard deck may extend forward of the limit specified in **-1** above. 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.

5 The factor s_i calculated in accordance with **4.2.3** will not be less than 1 at the deepest subdivision draught loading condition, level trim or any forward trim loading conditions, if any part of the ship forward of the collision bulkhead is flooded without vertical limits.

Paragraph 13.1.5 has been amended as follows.

13.1.5 Height of Watertight Bulkheads*

The watertight bulkheads required in **13.1.1** to **13.1.4** are to extend to the freeboard deck with the following exceptions.

(1) A watertight bulkhead in way of the raised quarter or the sunken forecastle deck is to extend up to the said deck.

(2) Where a forward superstructure having openings without closing appliances leads to a space below the freeboard deck, or a long forward superstructure is provided, the collision bulkhead is to extend up to the ~~superstructure~~ deck next above the freeboard deck and to be made weathertight. However, where all parts of the extension ~~is~~, including any part of the ramp attached to it are located within the limits specified in **13.1.1** and the part of the deck which forms the step is made effectively weathertight, it need not be fitted directly above the collision bulkhead.

(3) The aft peak bulkhead may terminate at a deck above the designed maximum load line provided that this deck is made watertight to the stern of the ship.

13.4 Other Watertight Construction

Paragraph 13.4.1 has been amended as follows.

13.4.1 Maintaining the Watertightness ~~of Trunks*~~

~~For the application of this chapter, t~~Trunks, etc. 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~~ comply with this chapter.

Chapter 16 PLATE KEELS AND SHELL PLATING

16.1 General

Paragraph 16.1.6 has been amended as follows.

16.1.6 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~~ freeboard 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

17.1 General

17.1.2 Watertightness of Decks*

Sub-paragraph -2 has been deleted, Sub-paragraph -3 has been renumbered to Sub-paragraph -2.

1 Weather decks, except where hatchway and other openings specified in **Chapter 20** are provided, are to be made watertight.

~~**2 Special consideration is to be given to the water influx to the compartments under the bulkhead deck on ro-ro spaces.**~~

~~**3**~~**2** 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 23 BULWARKS, GUARDRAILS, FREEING ARRANGEMENTS, CARGO PORTS AND OTHER SIMILAR OPENINGS, SIDE SCUTTLES, RECTANGULAR WINDOWS, VENTILATORS AND GANGWAYS

23.3 Bow Doors and Inner Doors

23.3.2 Arrangement of Doors and Inner Doors

Sub-paragraph -6 has been amended as follows.

6 Doors ~~and~~, inner doors and ramps are to be arranged so as to preclude the possibility of the door or ramp causing structural damage to the inner door or to the bulkhead when damage to or detachment of the door or ramp occurs. If this is not possible, a separate inner weathertight door is to be installed, as indicated in **13.1.1**.

23.5 Side Scuttles and Rectangular Windows

23.5.2 General Requirement for Position of Side Scuttles

Sub-paragraph -3(2) has been amended as follows.

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)**~~ the length for freeboard 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.

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2020.

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

(1) for which the contract for construction is placed on or after the effective date; or

(2) in the absence of a contract for construction, the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2020; or

(3) the delivery of which is on or after 1 January 2024.

(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.

Amendment 2-4

Chapter 4 SUBDIVISIONS

4.3 Openings

4.3.1 Internal Openings*

Sub-paragraph -2(2) has been amended as follows.

1 Internal openings below the final damage waterline or the intermediate waterline and considered to prevent progressive flooding in the calculation of the subdivision index are to be watertight.
2 The number of internal openings required to be watertight under the requirement of **-1** above is to be minimized, and their closing appliances are to comply with the following **(1)** to **(5)**. Relaxation of the requirements regarding watertight openings above the freeboard deck may be considered, where deemed by the Society that the safety of the ship is not impaired.
((1) is omitted.)
(2) Closing appliances for internal openings which are used while at sea are to be sliding watertight doors complying with the following conditions.
((a) and (b) are omitted.)
(c) Provided with position indicators <u>on the bridge and at all operating positions</u> showing whether the doors are open or closed ~~at all operating positions~~
((d) and (e) are omitted.)
((3) to (5) are omitted.)

Chapter 13 WATERTIGHT BULKHEADS

13.3 Watertight Doors

Paragraph 13.3.5 has been amended as follows.

13.3.5 Indication*

~~1~~ Watertight doors, except those permanently closed at sea, are to be provided with position indicators showing whether the doors are open or closed on the bridge and at all operating positions.
~~2 For watertight doors which are to be capable of being remotely closed, an indication is to be placed locally showing that the door is in remote control mode.~~

Chapter 33 DAMAGE CONTROL

33.2 Damage Control

Paragraph 33.2.1 has been deleted, and Paragraph 33.2.2 has been renumbered to Paragraph 33.2.1.

~~**33.2.1 Watertight Doors***~~

~~**1** For watertight doors in the watertight bulkhead, except those permanently closed at sea, position indicators showing whether the doors are open or closed are to be provided on the bridge and at all operating positions.~~

~~**2** Electrical installations for watertight doors specified in **-1** except those of a waterproof type approved by the Society are not to be provided under the freeboard deck.~~

33.2.~~2~~1 Cargo Ports and Other Similar Openings*

For bow doors, stern doors or shell doors required to be watertight, indicators showing whether the doors are opened or closed are to be provided on the navigation bridge. However, where it is deemed appropriate by the Society, this requirement may be dispensed with.

EFFECTIVE DATE AND APPLICATION (Amendment 2-4)

1. The effective date of the amendments is 1 January 2020.

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

(1) for which the date of contract for construction* is placed on or after 1 January 2020; or

(2) in the absence of a contract for construction, the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2020; 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 January 2024.

* "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.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part C Hull Construction and Equipment

2019 AMENDMENT NO.2

Notice No.70 27 December 2019

Resolved by Technical Committee on 22 July 2019

Notice No.70 27 December 2019
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 C HULL CONSTRUCTION AND EQUIPMENT

Amendment 2-1

C27 EQUIPMENT

C27.2 Towing and Mooring Fittings

Paragraph C27.2.3 has been amended as follows.

C27.2.3 Mooring Fittings
(-1 and -2 are omitted.)
3 The requirements in **27.2, Part C of the Rules** are to apply to additional mooring fittings and their supporting hull structures. However, ~~the design load of these fittings and their supporting hull structures may be 1.15 times the intended maximum mooring load instead of the requirements in **27.2.3-3(1) to (4), Part C of the Rules**.~~ "minimum breaking strength of mooring line" specified in **27.2.3-2(1)**, **Part C of the Rules** and "minimum design load" specified in **27.2.3-3**, **Part C of the Rules** may be read as assumed values in consideration of intended use. This information is to be incorporated into the Towing and Mooring Fitting Arrangement Plan specified in **27.2.6, Part C of the Rules.**
(-4 and -5 are omitted.)
~~**6** "The intended maximum brake holding load" as prescribed in **27.2.3-3(6), Part C of the Rules** means the rated brake holding load or the rated hauling load specified in the mooring winch manufacturers' standards.~~
~~**7**~~**6** "Normal stress" referred to in **27.2.3-4(1), Part C of the Rules** is the sum of bending stress and axial stress with the corresponding shearing stress acting perpendicular to the normal stress.
~~**8**~~**7** With respect to the provisions of **27.2.3-4(1), Part C of the Rules**, stress concentration factors need not be taken into account for strength assessments using beam theory or grillage analysis.
~~**9**~~**8** The provisions for *SWL* specified in **27.2.3-5, Part C of the Rules** are to be applied in cases where no more than one line.
~~**10**~~**9** Mooring arrangements are recommended as follows.
(1) As far as possible, a sufficient number of mooring winches is to be fitted to allow for all mooring lines to be belayed on winches. If the mooring arrangement is designed such that mooring lines are partly belayed on bitts or bollards, it is to be considered that these lines may not be as effective as the mooring lines belayed on winches. Mooring lines are to have as straight a lead as is practicable from the mooring drum to the fairlead.
(2) At points of changes in direction, sufficiently large radii of the contact surface of a rope on a fitting is to be provided to minimize the wear experienced by mooring lines and as recommended by the rope manufacturer for the rope type intended to be used.
(3) Attention is to be given to the arrangement of the equipment for mooring operations in order

to prevent interference of the mooring lines as far as practicable.

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 27 December 2019.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction* is before the effective date.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Guidance may apply to ships for which the date of contract for construction is on and after 1st July 2018 upon request.

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.

Amendment 2-2

C35 MEANS OF ACCESS

C35.2 Special Requirements for Oil Tankers and Bulk Carriers

C35.2.3 Means of Access to Spaces

Sub-paragraph -6(2) has been amended as follows.

6 With respect to the provisions of **35.2.3-4(2)**, **(4)**, **-5(3)** and **(7), Part C of the Rules**, adjacent sections of a vertical ladder are to be in accordance with following **(1)** to **(3)**. (Refer to **Fig. C35.2.3-1**, **Fig. C35.2.3-2** and **Table C35.2.3**)

(1) The minimum "lateral offset" between two adjacent sections of a vertical ladder is the distance between the sections, upper and lower, so that the adjacent stringers are spaced at least 200 *mm* apart, measured from half thickness of each stringer.

(2) Adjacent sections of vertical ladder are to be installed so that the upper end of the lower section is vertically overlapped, in respect to the lower end of the upper section, to a height of 1,500 *mm* in order to permit a safe transfer between ladders. However, this requirement does not apply to cases where structural members (e.g. side stringers) are used to move between adjacent vertical ladders and are provided with safety measures such as handrails.

(3) No section of the access ladder is to be terminated directly or partly above an access opening.

Appendix C3 SAMPLE OF SHIP STRUCTURAL ACCESS MANUAL

Part I Manual for Safe Access

2 Scope of Access Manual

2.1 General

Paragraph 2.1.1 has been amended as follows.

2.1.1 Permanent means of access provided for the ship do not give access to all areas required to be surveyed and measured. It is necessary that all areas outside of reach (*i.e.*, normally beyond hand's reach) of the permanent means of access can be accessed by alternative means in combination with the permanent means of access, including those specified by ~~resolution *A*.1049(27) (2011~~the *ESP* code~~)~~, as amended. Critical structural areas, if necessary, also can be accessed by appropriate means of access.

Section 2.3 has been amended as follows.

2.3 Relevant Rules and Regulations

Reference is to be made to the following publications:

((a) to (b) are omitted.)

(c) ~~International Code on the Enhanced Programme of Inspection During Surveys of Bulk Carriers and Oil Tankers adopted by resolution *A*.1049(27) (2011~~The *ESP* code~~)~~, as amended

((d) to (i) are omitted.)

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 27 December 2019.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction is before the effective date.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Guidance may apply to ships for which the date of contract for construction is before the effective date upon request by the owner.

Amendment 2-3

C4 SUBDIVISIONS

C4.2 Subdivision Index

C4.2.1 Subdivision Index

Sub-paragraph -5 has been added as follows.

5 In setting the trim and G_0M used to calculate the subdivision index, reference is also to be made to **1.3.10-11** and **-12**, **Annex U1.2.1 "GUIDANCE FOR STABILITY INFORMATION FOR MASTER", Part U of the Guidance**.

Paragraph C4.2.3 has been amended as follows.

C4.2.3 Probability of Survival (s_i)

1 Openings (e.g., access openings provided in the end bulkhead of the superstructure and cargo hatchways), air pipes, and ventilators which are provided only with the weathertight closing apparatus specified in **Part C** of the Rules are to be treated as allowing progress of flooding when the water line at the final equilibrium state immerses their lower edge.

2 In applying θ_v specified in **4.2.3-1, Part C of the Rules**, an "opening incapable of being closed weathertight" includes ventilators provided with weathertight closing appliances in accordance with the requirements of **23.6.5-2, Part C of the Rules** that for operational reasons have to remain open to supply air to the engine room or emergency generator room (if the same is considered buoyant in the stability calculation or protecting openings leading below) for the effective operation of the ship.

3 The calculation of s_i in ~~**4.2.3-7**~~**4.2.3-10, Part C** of the Rules is to be treated as follows.

(1) Where timber deck cargo is stowed to the standard height of one superstructure or more, the buoyancy of the cargo may be taken into account provided that the cargo is in compliance with the provisions of **Chapter 3** and **Chapter 4** of the *CODE OF SAFE PRACTICE FOR SHIPS CARRYING TIMBER DECK CARGOES, 1991* (resolution *A*.715(17)).

(2) Only one standard superstructure height of timber deck cargo may be taken into account when calculating its buoyancy, and it is assumed to have a permeability of not less than 25%.

(3) When the buoyancy of any timber deck cargo is taken into account, the timber deck cargo in way of a damaged zone is deemed ineffective to all areas in an athwartships direction. However, when the vertical extent of the damage stops at the upper deck and the coefficient (v_m) from ~~**4.2.3-2**~~**4.2.3-4, Part C** of the Rules is used in the calculations, the buoyancy of the timber deck cargo may be taken into account in accordance with **(2)** above even if it is directly above the damaged area.

~~**4 Unsymmetrical flooding is to be in accordance with following (1) and (2).**~~

~~(1) Unsymmetrical flooding is to be kept to a minimum consistent with the efficient arrangements.~~

~~(2) Where it is necessary to correct large angles of heel, the means adopted is to, where practicable, be self-acting, but in any case where controls to equalization devices are provided they is to be operable from above the bulkhead deck. These fittings together with their controls are to be acceptable to the Society.~~

~~**5** Where cross-flooding fittings are required, the time for equalization is not to exceed 10 min.~~

~~**6**~~**4** Tanks and compartments taking part in such equalization is to be fitted with air pipes or equivalent means of sufficient cross-section to ensure that the flow of water into the equalization compartments is not delayed.

5 In applying the requirements specified in **4.2.3-9(2), Part C of the Rules**, with respect to equalization devices, reference is to be made to the *IMO Res. MSC*.362(92) "*Revised Recommendation on a standard method for evaluating cross-flooding arrangements"*, as amended.

C6 DOUBLE BOTTOMS

C6.1 General

C6.1.1 Application

Sub-paragraph -3 has been amended as follows.

1 "Ships deemed by the Society to not require a double bottom for special reasons" stipulated in **6.1.1-2, Part C** of the Rules refer to the following.

(1) Ships complying with **Part N** or **Part S** of the Rules

(2) Ships complying with **3.2.2**, **Part 3 of the** "**Rules for Marine Pollution Prevention Systems**"

2 "Deemed appropriate by the Society" stipulated in **6.1.1-2, Part C** of the Rules refers to cases where the safety of the ship can be ascertained through flooding calculations.

3 Application of requirements related to the omission of double bottoms or unusual bottom arrangements in **6.1.1-3, Part C** of the Rules is to be in accordance with following **(1)** and **(2)**. For example, arrangements in which parts of the double bottom do not extend for the full width of the ship or in which the inner bottom is located higher than the partial subdivision draught (d_p) defined in **4.1.2(5), Part C** of the Rules are to be considered to be unusual bottom arrangements.

(1) When it is assumed that such spaces are subject to a bottom damage, compartments are to be arranged to demonstrate that the factor s_i, when calculated in accordance with **4.2.3, Part C** of the Rules, is not less than 1 for those service conditions which are the three loading conditions used to calculate the Attained Subdivision Index (A) specified in **4.2.1-~~1~~2, Part C** of the Rules. Assumed extent of damage is to be in accordance with following **Table C6.1.1-1**. If any damage of a lesser extent than the maximum damage specified in **Table C6.1.1-1** would result in a more severe condition, such damage is to be considered.

(2) Flooding of such spaces is not to render emergency power and lighting, internal communication, signals or other emergency devices inoperable in other parts of the ship.

Table C6.1.1-1 has been amended as follows.

Table C6.1.1-1 Assumed Extent of Damage

	For 0.3*L* from the forward perpendicular of the ship	Any other part of the ship
Longitudinal extent	$1/3\,L_f^{2/3}$ or 14.5*m*, whichever is less	$1/3\,L_f^{2/3}$ or 14.5*m*, whichever is less
Transverse extent	*B*'/6 or 10*m*, whichever is less	*B*'/6 or 5*m*, whichever is less
Vertical extent, measured from the keel line	*B*'/20 ~~or 2*m*, whichever is less~~, to be taken not less than 0.76 *m* and not more than 2 *m*	*B*'/20 ~~or 2*m*, whichever is less~~, to be taken not less than 0.76 *m* and not more than 2 *m*

Notes:
1. Keel line is to be in accordance with **2.1.48, Part A** of the Rules.
2. Ship breadth (*B*') is to be in accordance with **4.1.2(11), Part C** of the Rules.

Paragraph C6.1.3 has been amended as follows.

C6.1.3 Drainage

1 In the application of **6.1.3-1, Part C** of the Rules, the requirements in the following **(1)** to **(3)** are to be complied with where bilge tanks are provided instead of bilge wells.

(1) Bilge tanks are to have sufficient strength as deep tanks as required in **Chapter 14, Part C** of the Rules.

(2) Drain pipes leading to bilge tanks are to comply with the requirement in **D13.5.8**.

(3) Bilge tanks are to be provided with manholes and covers for the purpose of conducting internal inspections easily.

2 "As deemed appropriate by the Society" stipulated in **6.1.3-2, Part C** of the Rules means that the requirements specified in **C6.1.1-3(1)** are satisfied.

3 "Protection equivalent to that afforded by a double bottom complying with this chapter" stipulated in **6.1.3-3, Part C** of the Rules means that the requirements specified in **C6.1.1-3(1)** are satisfied. However, wells for lubricating oil below main engines may protrude into the double bottom below the boundary line defined by the distance *h* (*h* is specified in **6.1.1-1, Part C** of the Rules) provided that the vertical distance between the well bottom and a plane coinciding with the keel line is not less than 0.5*h* or 500 *mm*, whichever is greater.

C13 WATERTIGHT BULKHEADS

C13.3 Watertight Doors

C13.3.3 Strength and Watertightness

Sub-paragraph -2(1) has been amended as follows.

2 Hydrostatic tests specified in **13.3.3-1, Part C** of the Rules are to be carried out as follows:

(1) The head of water used for the hydrostatic test is to correspond at least to the head measured from the lower edge of the door opening (at the location in which the door is to be fitted in the ship) to 1 *m* above the ~~bulkhead~~ freeboard deck. However, for watertight doors subject to **4.3.1, Part C** of the Rules, the head is not to be less than the height of the final damage waterline or the intermediate waterline, whichever is greater.

(2) The acceptable leakage rate at the test is not to be greater than the following values.
   (a) Doors with gaskets: No leakage
   (b) Doors with metallic sealing: 1 *l/min*

(3) Notwithstanding **(2)** above, the following leakage rate may be accepted for hydrostatic tests on large doors located in cargo spaces employing gasket seals or guillotine doors located in conveyor tunnels.
   (a) For doors of design head exceeding 6.10 *m*:

$$\frac{(P + 4.572) \cdot h^3}{6568} \quad (l/min)$$

   P : Perimeter of door opening (m)
   h : Test head of water (m)

   (b) For doors with a design head not exceeding 6.10 *m*, the acceptable leakage rate is the value calculated by the formula specified in **(a)** above or 0.375 *l/min*, whichever is greater.

Section C13.4 has been deleted.

~~**C13.4 Other Watertight Construction**~~

~~**C13.4.1 Maintaining the Watertightness of Trunks**~~

~~Double bottom (including watertight compartment specified in **6.1.1-3 Part C** of the Rules), double side shell and aft peak tank as well as trunks and others leading to such constructions, are to be capable of supporting at least the pressure due to a head of water up to the bulkhead deck.~~

C17 DECKS

C17.1 General

Paragraph C17.1.2 has been amended as follows.

C17.1.2 Watertightness of Decks

1 Where the rudder stock penetrates the deck lower than 1.5 *m* above the load line, special attention is to be given to the watertightness at the penetration.

~~**2** With respect to the provisions of **17.1.2-2, Part C** of the Rules, where all or part of the penetration of the bulkhead deck is on the main ro-ro deck, the trunks for ventilation provided for compartment below the bulkhead deck are to be capable of withstanding impact pressure due to internal water motions of water trapped on the ro-ro deck.~~

~~**3**~~**2** With respect to the provisions of **17.1.2-~~3~~2, Part C** of the Rules, decks required to be watertight are to be in accordance with following **(1)** and **(2)**.

(1) Deck structures are to comply with related provisions of **Chapter 17, Part C** of the Rules for the pressure due to head of water in the most severe conditions at the intermediate or final stages of flooding specified in **Chapter 4, Part C** of the Rules. In this case, such decks are to be regarded as the part of the deck which forms bulkhead recesses.

(2) Where the trunks and other constructions penetrating watertight deck are provided, such trunks are to be capable of withstanding the pressure due to a head of water up to the bulkhead deck and head of water in the most severe conditions at the intermediate or final stages of flooding specified in **Chapter 4, Part C** of the Rules.

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2020.

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

(1) for which the contract for construction is placed on or after the effective date; or

(2) in the absence of a contract for construction, the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2020; or

(3) the delivery of which is on or after 1 January 2024.

(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.

Amendment 2-4

C4 SUBDIVISIONS

C4.3 Openings

C4.3.1 Internal Openings

Sub-paragraph -3 has been amended as follows.

3 General requirements of **4.3.1-2, Part C** of the Rules are shown in **Table C4.3.1-1**.

C4.3.2 External Openings

Sub-paragraph -1 has been amended as follows.

1 General requirements of closing appliances specified in **4.3.2**, **Part C** of the Rules are shown in **Table C4.3.1-2**.

Table C4.3.1 has been deleted, and Table C4.3.1-1 and Table C4.3.1-2 have been added as follows.

~~Table C4.3.1 Requirements for Closing Devices for Internal/External Openings~~

	~~Position relative to equilibrium or intermediate waterplane~~	~~Frequency of use (See C4.3.1-2)~~	~~Type of closing appliance~~	~~Remote control~~	~~Control in listed conditions~~	~~Open/close indications~~	~~Audible alarms~~	~~Notices~~	~~Devices to prevent opening~~	~~Reference regulation in Part C of the Rules~~
~~Internal openings~~	~~At or below~~	~~Used~~	~~POS~~	~~Required~~	~~Required~~	~~All operating positions (incl. bridge)~~	~~Required~~	~~Not Required~~	~~Not required~~	~~4.3.1-2(2)~~
		~~Norm. closed~~	~~S or H*2~~	~~Not required~~	~~Required~~	~~Bridge & all operating positions~~	~~NA*3~~	~~Required *4,6~~	~~Not required~~	~~4.3.1-2(3)~~
		~~Perm. closed (cargo spaces)~~	~~S or H~~	~~Prohibited~~	~~Not required~~	~~Not required~~	~~NA~~	~~Required *5~~	~~Required *7~~	~~4.3.1-2(4)~~
		~~Perm. closed (others)~~	~~S or H~~	~~Prohibited~~	~~Not required~~	~~Not required~~	~~NA~~	~~Required *5~~	~~Required *7~~	~~4.3.1-2(5)~~
~~External openings~~	~~At or below~~	~~Perm. closed~~	~~S or H~~	~~Not required~~	~~Not required~~	~~Bridge~~	~~NA*3~~	~~Required *5~~	~~Required *8~~	~~4.3.2-2~~
	~~Above *1~~	~~Perm. closed~~	~~S or H~~	~~Not required~~	~~Not required~~	~~Bridge~~	~~NA*3~~	~~Required *5~~	~~Required *7~~	~~4.3.2-3~~
		~~Norm. closed~~	~~S or H*2~~	~~Not required~~	~~Required~~	~~Bridge~~	~~NA*3~~	~~Required *4~~	~~Required *7~~	~~4.3.2-3~~

~~Notes:~~

~~POS : Power operated, sliding or rolling~~

~~S : Sliding or rolling~~

~~H : Hinged~~

~~*1 : Subject to the application in **4.3.2-3, Part C of the Rules**~~

~~*2 : If hinged, this door is to be of quick acting or single action type~~

~~*3 : If remotely operated, this door is to be provided with an audible alarm~~

~~*4 : "Kept closed at sea"~~

~~*5 : "Not to be opened at sea"~~

~~*6 : If provided with means of remote closure, notices might not be required~~

~~*7 : Applicable only to closing appliances accessible during the voyage~~

~~*8 : Applicable only to those closing appliances fitting above the bulkhead deck and accessible during the voyage~~

Table C4.3.1-1 Requirements for Closing Devices for Internal Openings

Position relative to bulkhead or freeboard deck	Referenced requirement in **Part C** of the Rules	Frequency of use	Type of closing appliance	Remote closure	Open/close indicators	Audible or visual alarms	Notices	Notes
Below	**4.3.1-2(2), 13.3.4-2 13.3.5, 13.3.6**	Used	POS	Yes	Yes	Yes (Local)	No	---
	4.3.1-2(3), 13.3.5-1 13.3.8-1	Norm. Closed	S or H	No	Yes	No	Yes	*1, 6
	4.3.1-2(4), 13.3.4-3 13.3.8-2	Perm. Closed (cargo spaces)	S or H	Prohibited	No	No	Yes	*3, 4, 7
	4.3.1-2(5), 13.3.8-2	Perm. Closed (others)						
At or above	**4.3.1-2(2), 13.3.4-2 13.3.5, 13.3.6**	Used	POS	Yes	Yes	Yes (Local)	No	*2, 5
	4.3.1-2(3), 13.3.5-1 13.3.8-1	Norm. Closed	S or H	No	Yes	No	Yes	*1, 6
	4.3.1-2(4), 13.3.8-2	Perm. Closed	S or H	Prohibited	No	No	Yes	*3, 4, 7

Notes:

*1 : If hinged, this door is to be of a quick-acting or single-action type.

*2 : Under the "International Convention on Load Lines, 1966", doors separating a main machinery space from a steering gear compartment may be hinged quick-acting types provided the lower sill of such doors is above the Summer Load Line and the doors remain closed at sea whilst not in use.

*3 : The time of opening such doors in port and closing them before the ship leaves port is to be entered into the logbook in the case of doors in watertight bulkheads subdividing cargo spaces.

*4 : Doors are to be fitted with devices which prevent unauthorized opening.

*5 : Under *MARPOL*, hinged watertight doors may be acceptable in watertight bulkheads of the superstructure.

*6 : Notices are to state "Kept closed at sea".

*7 : Notices are to state "Not to be opened at sea".

Table C4.3.1-2 Requirements for Closing Devices for External Openings

Position relative to bulkhead or freeboard deck	Referenced requirement in **Part C** of the Rules	Frequency of use	Type of closing appliance	Remote closure	Open/close indicators	Audible or visual alarms	Notices	Notes
Below	**4.3.2-2, 4.3.2-3 13.3.8-2**	Perm. Closed	S or H	No	Yes	No	Yes	*2, 3, 5
At or above	**13.3.5-1, 13.3.8-1**	Norm. Closed	S or H	No	Yes	No	Yes	*1, 4
	4.3.2-2, 13.3.8-2	Perm. Closed	S or H	No	Yes	No	Yes	*2, 3, 5

Notes:

*1 : If hinged, this door is to be of a quick-acting or single-action type.

*2 : The time of opening such doors in port and closing them before the ship leaves port is to be entered into the logbook in the case of doors in watertight bulkheads subdividing cargo spaces.

*3 : Doors are to be fitted with devices which prevent unauthorized opening.

*4 : Notices are to state “Kept closed at sea”.

*5 : Notices are to state “Not to be opened at sea”.

C13 WATERTIGHT BULKHEADS

C13.3 Watertight Doors

C13.3.1 General

Sub-paragraph -3 has been added as follows.

3 With respect to the provisions of **13.3**, **Part C** of the Rules, **Table C4.3.1-1** and **Table C4.3.1-2** are also referenced as general requirements for watertight doors.

Paragraph C13.3.5 has been amended as follows.

C13.3.5 Indication

1 For watertight doors with dogs/cleats for securing watertightness, position indicators required by **13.3.5-1**, **Part C** of the Rules are to be provided to show whether all dogs/cleats are fully and properly engaged or not.

2 With respect to the provisions of **13.3.5-1**, **Part C** of the Rules, a position indicator may not be required for doors which are designed to confirm easily whether the doors are open or closed from either side and, if applicable, all dogs/cleats are fully and properly engaged or not.

3 The door position indicating system required by **13.3.5**, **Part C** of the Rules is to be of a self-monitoring type and the means for testing it are to be provided at the position where the indicators are fitted.

4 ~~The indicator~~ "Position indicators on the bridge showing whether the doors are open or closed" required by **13.3.5-2, Part C** of the Rules is to be ~~placed locally showing that the door is in the "door closed" mode specified in **C13.3.4-2(1)(b)** (*i.e.* a red light)~~ in accordance with **C13.3.4-2(2)**.

5 "Those permanently closed at sea" stated in **13.3.5**, **Part C** of the Rules means "other closing appliances which are kept permanently closed at sea" stated in **4.3.1-2(4)**, **Part C** of the Rules.

Paragraph C13.3.6 has been amended as follows.

C13.3.6 Alarms

1 An audible alarm required by **13.3.6**, **Part C** of the Rules is to ~~sound from the door when the door begins to move and continue sounding until the door is completely closed~~ have a sound distinctive from any other alarms in the area, which will sound whenever the door is remotely closed.

2 Failure of the normal power supply of alarms required to be installed by **13.3.6**, **Part C** of the Rules is to be indicated by an audible and visual alarm.

3 With respect to the provisions of **13.3.6**, **Part C** of the Rules, all watertight doors (including sliding doors) operated by hydraulic door actuators, irrespective of whether their control positions are a central hydraulic unit or local operating position, are to be provided with either a low fluid level alarm, a low gas pressure alarm or some other means as applicable for monitoring the loss of stored energy in the hydraulic accumulators. This alarm is to be both audible and visible and located on the central operating console of the bridge.

C33 DAMAGE CONTROL

C33.2 Damage Control

Paragraph 33.2.1 has been deleted, and Paragraph 33.2.2 has been renumbered to Paragraph 33.2.1.

~~**C33.2.1 Watertight Doors**~~

~~**1** In applying the requirements of **33.2.1, Part C of the Rules**, position indicators showing whether the watertight doors are open or closed do not need to be provided at operating positions where the operator can visually confirm the position of the doors.~~

~~**2** "Electrical installations for watertight doors" stated in **33.2.1-2, Part C of the Rules** refer to electrical motors for opening and closing the doors and their control components (only in case of power-operated devices), indicators for whether the doors are open or closed, audible alarms (only in case of power-operated devices), and limit switches for ensuring the door position and their associated cables.~~

C33.2.~~2~~1 Cargo Ports and Other Similar Openings

"Where it is to be deemed appropriate by the Society" stipulated in **33.2.~~2~~1, Part C of the Rules** refers to circumstances such as where the doors are located high enough above the freeboard deck and their opening areas are considered small enough.

EFFECTIVE DATE AND APPLICATION (Amendment 2-4)

1. The effective date of the amendments is 1 January 2020.

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

(1) for which the contract for construction* is placed on or after the effective date; or

(2) in the absence of a contract for construction, the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2020; 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 January 2024.

* "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.

Amendment 2-5

C23 BULWARKS, GUARDRAILS, FREEING ARRANGEMENTS, CARGO PORTS AND OTHER SIMILAR OPENINGS, SIDE SCUTTLES, RECTANGULAR WINDOWS, VENTILATORS AND GANGWAYS

C23.8 Means of Embarkation and Disembarkation

C23.8.1 General

Sub-paragraph -2(10) has been amended as follows.

2 With respect to the requirements specified in **23.8.1, Part C of the Rules**, the means of embarkation and disembarkation are to be in accordance with the following. However, ships that have small freeboards and are provided with boarding ramps needs not to be in accordance with the following:

((1) to (9) are omitted.)

(10) A lifebuoy equipped with a self-igniting light and a buoyant lifeline is to be available for immediate use in the vicinity of the embarkation and disembarkation arrangement when in use. This lifebuoy is not to be taken into account when determining the minimum number and distribution of lifebuoys as required by *SOLAS* Reg. III/32.1.1.

(11) (Omitted)

EFFECTIVE DATE AND APPLICATION (Amendment 2-5)

1. The effective date of the amendments is 1 January 2020.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction* is before the effective date.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.