Treaty No. 3 (1998)

Amendments to the International Convention for the Safety of Life at Sea, 1974 (MSC.19 (58))

Adopted London, 25 May 1990

[The Amendments entered into force on 1 February 1992]

Presented to Parliament
by the Secretary of State for Foreign and Commonwealth Affairs
by Command of Her Majesty
January 1998

£3·00

Cm 3845

RESOLUTION MSC.19 (58)
(Adopted on 25 May 1990)

ADOPTION OF AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974[1]

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING FURTHER that by resolution A.265(VIII) the Assembly adopted regulations on subdivision and stability of passenger ships, which may be used as an equivalent to part B "Subdivision and stability" of chapter II-1 of the 1974 SOLAS Convention,

RECOGNIZING that safety of ships will be enhanced by incorporating regulations on subdivision and damage stability applicable to cargo ships in the Convention,

NOTING that, at its fifty-seventh session, regulations on subdivision and damage stability of dry cargo ships, including ro-ro ships, based on the probabilistic concept of survival, were approved in the form of amendments to the SOLAS Convention and circulated in accordance with article VIII(b)(i) of the Convention,

HAVING CONSIDERED the regulations on subdivision and damage stability of dry cargo ships, including ro-ro ships, prepared as a new part B-1 "Subdivision and damage stability of cargo ships" of chapter II-1 of the Convention,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, the amendments to the Convention, the text of which is set out in the Annex to the present resolution;

2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on 31 July 1991 unless prior to that date more than one third of the Contracting Governments to the Convention, or Contracting Governments the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;

3. INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 February 1992 upon their acceptance in accordance with paragraph 2 above;

4. URGES Contracting Governments to apply the regulations in conjunction with the explanatory notes developed by the Organization in order to ensure their uniform application;

5. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the International Convention for the Safety of Life at Sea, 1974;

6. FURTHER REQUESTS the Secretary-General to transmit copies of the resolution to Members of the Organization which are not Contracting Governments to the Convention.

---

[1]Treaty Series No. 46 (1980), Cmnd. 7874

ANNEX

AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974

CHAPTER II-1

CONSTRUCTION—SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

Insert the following new part B-1, comprising regulations 25-1 to 25-10, after existing part B:

"PART B-1—SUBDIVISION AND DAMAGE STABILITY OF CARGO SHIPS[1]

(This part applies to cargo ships constructed on or after 1 February 1992).

REGULATION 25-1

Application

1 The requirements in this part shall apply to cargo ships over 100 m in length ("L_S") but shall exclude those ships which are shown to comply with subdivision and damage stability regulations in other instruments[2] developed by the Organization.

2 Any reference hereinafter to regulations refers to the set of regulations contained in this part.

3 The Administration may for a particular ship or group of ships accept alternative arrangements, if it is satisfied that at least the same degree of safety as represented by these regulations is achieved. Any Administration which allows such alternative arrangements shall communicate to the Organization particulars thereof.

[1]The Maritime Safety Committee, in adopting the regulations contained in part B-1, invited Administrations to note that the regulations should be applied in conjunction with the explanatory notes developed by the Organization in order to ensure their uniform application.

[2]Such as Annex I to MARPOL 73/78, IBC, IGC, BCH and GC Codes, Guidelines for the Design and Construction of Offshore Supply Vessels (resolution A.469 (XII)), Code of Safety for Special Purpose Ships (resolution A.534 (13)) and regulation 27 of the 1966 LL Convention for bulk carriers assigned B-60 or B-100 freeboards.

REGULATION 25-2

Definitions

For the purpose of these regulations, unless expressly provided otherwise:

1.1 *Subdivision load line* is a waterline used in determining the subdivision of the ship.

1.2 *Deepest subdivision load line* is the subdivision load line which corresponds to the summer draught to be assigned to the ship.

1.3 *Partial load line* is the light ship draught plus 60% of the difference between the light ship draught and deepest subdivision load line.

2.1 *Subdivison length of the ship* ("L_s") is the greatest projected moulded length of that part of the ship at or below deck or decks limiting the vertical extent of flooding with the ship at the deepest subdivision load line.

2.2 *Mid-length* is the mid point of the subdivision length of the ship.

2.3 *Aft terminal* is the aft limit of the subdivision length.

2.4 *Forward terminal* is the forward limit of the subdivision length.

3 *Breadth* ("B") is the greatest moulded breadth of the ship at or below the deepest subdivision load line.

4 *Draught* ("d") is the vertical distance from the moulded baseline at mid-length to the waterline in question.

5 *Permeability* ("w") of a space is the proportion of the immersed volume of that space which can be occupied by water.

REGULATION 25-3

Required subdivision index "R"

1 These regulations are intended to provide ships with a minimum standard of subdivision.

2 The degree of subdivison to be provided shall be determined by the required subdivision index "R", as follows:

$R = (0.002 + 0.0009L_s)^{1/3}$ where "L_s" is in metres.

REGULATION 25-4

Attained subdivision index "A"

1 The attained subdivision index "A", calculated in accordance with this regulation, shall not be less than the required subdivision index "R", calculated in accordance with paragraph 2 of regulation 25-3.

2 The attained subdivision index "A" shall be calculated for the ship by the following formula:

$$A = \Sigma p_i s_i$$

where:

"i" represents each compartment or group of compartments under consideration,

"p_i" accounts for the probability that only the compartment or group of compartments under consideration may be flooded, disregarding any horizontal subdivision,

"s_i" accounts for the probability of survival after flooding the compartment or group of compartments under consideration, including the effects of any horizontal subdivision.

3 In calculation "A", level trim shall be used.

4 This summation covers only those cases of flooding which contribute to the value of the attained subdivision index "A".

5 The summation indicated by the above formula shall be taken over the ship's length for all cases of flooding in which a single compartment or two or more adjacent compartments are involved.

6 Wherever wing compartments are fitted, contribution to the summation indicated by the forumula shall be taken for all cases of flooding in which wing compartments are involved; and additionally, for all cases of simultaneous flooding of a wing compartment or compartments and the adjacent inboard compartment or compartments, assuming a rectangular penetration which extends to the ship's centreline, but excludes damage to any centreline bulkhead.

7 The assumed vertical extent of damage is to extend from the baseline upwards to any watertight horizontal subdivision above the waterline or higher. However, if a lesser extent will give a more severe result, such extent is to be assumed.

8 If pipes, ducts or tunnels are situated within assumed flooded compartments, arrangements are to be made to ensure that progressive flooding cannot thereby extend to compartments other than those assumed flooded. However, the Administration may permit minor progressive flooding if it is demonstrated that its effects can be easily controlled and the safety of the ship is not impaired.

9 In the flooding calculations carried out according to the regulations, only one breach of the hull need be assumed.

REGULATION 25-5

Calculation of the factor "p_i"

1 The factor "p_i" shall be calculated according to paragraph 1.1 as appropriate, using the following notations:

x_1 = the distance from the aft terminal of "L_S" to the foremost portion of the aft end of the compartment being considered;

x_2 = the distance from the aft terminal of "L_S" to the aftermost portion of the forward end of the compartment being considered;

$E_1 = x_1/L_S$

$E_2 = x_2/L_S$

$E = E_1 + E_2 - 1$

$J = E_2 - E_1$

$J^1 = J - E$, if $E > 0$

$J^1 = J + E$, if $E < 0$

The maximum nondimensional damage length,

$J_{max} = 48/L_s$, but not more than 0.24.

The assumed distribution density of damage location along the ship's length

$a = 1.2 + 0.8E$, but not more than 1.2.

The assumed distribution function of damage location along the ship's length

$F = 0.4 + 0.25\,E\,(1.2 + a)$

$y = J/J_{max}$

$P = F_1 J_{max}$

$q = 0.4\,F_2\,(J_{max})^2$

$F_1 = y^2 - \frac{y^3}{3}$, if $y < 1$,

$F_1 = y - \frac{1}{3}$, otherwise;

$F_2 = \frac{y^3}{3} - \frac{y^4}{12}$, if $y < 1$,

$F_2 = \frac{y^2}{2} - \frac{y}{3} + \frac{1}{12}$ otherwise.

1.1 The factor "p_i" is determined for each single compartment:

1.1.1 Where the compartment considered extends over the entire ship length, "L_s":

$p_i = 1$

1.1.2 Where the aft limit of the compartment considered coincides with the aft terminal:

$p_i = F + 0.5ap + q$

1.1.3 Where the forward limit of the compartment considered coincides with the forward terminal:

$p_i = 1 - F + 0.5ap$

1.1.4 When both ends of the compartment considered are inside the aft and forward terminals of the ship length, "L_s":

$p_i = ap$

1.1.5 In applying the formulae of paragraphs 1.1.2, 1.1.3 and 1.1.4, where the compartment considered extends over the "mid-length", these formulae values shall be reduced by an amount determined according to the formula for "q", in which "F_2" is calculated taking "y" to be J^1/J_{max}.

2 Wherever wing compartments are fitted, the "p_i"-value for a wing compartment shall be obtained by multiplying the value, as determined in paragraph 3, by the reduction factor "r" according to subparagraph 2.2, which represents the probability that the inboard spaces will not be flooded.

2.1 The "p_i"-value for the case of simultaneous flooding of a wing and adjacent inboard compartment shall be obtained by using the formulae of paragraph 3, multiplied by the factor (1 − r).

2.2 The reduction factor "r" shall be determined by the following formulae:

For $J \geqslant 0.2\ b/B$:

$$r = \frac{b}{B}\left(2.3 + \frac{0.08}{J + 0.02}\right) + 0.1, \text{ if } b/B \leqslant 0.2$$

$$r = \left(\frac{0.016}{J + 0.02} + \frac{b}{B} + 0.36\right), \text{ if } b/B > 0.2$$

For $J < 0.2\ b/B$ the reduction factor "r" shall be determined by linear interpolation between

$r = 1$, for $J = 0$

and

$r =$ as for the case where $J \geqslant 0.2\ b/B$, for $J = 0.2\ b/B$,

where:

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 outermost portion of and parallel to that part of the longitudinal bulkhead which extends between the longitudinal limits used in calculating the factor "P_i".

3 To evaluate "P_i" for compartments taken singly the formulae in paragraphs 1 and 2 shall be applied directly.

3.1 To evaluate the "P_i"- values attributable to groups of compartments the following applies:

for compartments taken by pairs:

$P_i = P12 - P1 - P2$

$P_i = P23 - P2 - P3$, etc.

for compartments taken by groups of three:

$P_i = P123 - P12 - P23 + P2$

$P_i = P234 - P23 - P34 + P3$ etc.

for compartments taken by groups of four:

$P_i = P1234 - P123 - P234 + P23$

$P_i = P2345 - P234 - P345 + P34$, etc.

where:

P12, P23, P34, etc.,

P123, P234, P345, etc. and

P1234, P2345, P3456, etc.

shall be calculated according to the formulae in paragraphs 1 and 2 for a single compartment whose nondimensional length "J" corresponds to that of a group consisting of the compartments indicated by the indices assigned to "p".

3.2 The factor "P_i" for a group of three or more adjacent compartments equals zero if the nondimensional length of such a group minus the nondimensional length of the aftermost and foremost compartments in the group is greater than "J max.".

REGULATION 25-6

Calculation of factor "s_i"

1 The factor "s_i", shall be determined for each compartment or group of compartments according to the following:

1.1 in general for any condition of flooding from any initial loading condition "s" shall be

$$s = C\sqrt{0.5\,(GZmax)\,(range)}$$

with $C = 1$, if $\theta e \leq 25°$,

$C = 0$, if $\theta e > 30°$,

$C = \frac{30 - \theta e}{5}$ otherwise

GZmax = maximum positive righting lever (in metres) within the range as given below but not more than 0.1 m;

range = range of positive righting levers beyond the angle of equilibrium (in degrees) but not more than 20°; however, the range shall be terminated at the angle where openings not capable of being closed weathertight are immersed;

θe = final equilibrium angle of heel (in degrees);

1.2 $s = 0$ where the final waterline taking into account sinkage, heel and trim, immerses the lower edge of openings through which progressive flooding may take place. Such opening shall include air-pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers, and may exclude those openings closed by means of watertight manhole covers and flush scuttles, small watertight hatch covers which maintain the high integrity of the deck, remotely operated sliding watertight doors, access doors and access hatch covers, of watertight integrity, normally closed at sea and sidescuttles of the non-opening type. However, if the compartments so flooded are taken into account in the calculations the requirements of this regulation shall be applied.

1.3 For each compartment or group of compartments "s_i" shall be weighted according to draught considerations as follows:

$$s_i = 0.5\,s_1 + 0.5\,s_p$$

where

"s_i" is the "s"-factor at the deepest subdivision load line

"s_p" is the "s"-factor at the partial load line.

2 For all compartments forward of the collision bulkhead, the "s"-value, calculated assuming the ship to be at its deepest subdivision load line and with assumed unlimited vertical extent of damage is to be equal to 1.

3 Wherever a horizontal subdivision is fitted above the waterline in question the following applies.

3.1 The "s"-value for the lower compartment or group of compartments shall be obtained by multiplying the value as determined in subparagraph 1.1 by the reduction factor "v" according to subparagraph 3.3, which represents the probability that the spaces above the horizontal subdivision will not be flooded.

3.2 In cases of positive contribution to index "A" due to simultaneous flooding of the spaces above the horizontal subdivision, the resulting "s" – value for such a compartment or group of compartments shall be obtained by an increase of the value as determined by subparagraph 3.1 by the "s" – value for simultaneous flooding according to subparagraph 1.1, multiplied by the factor $(1 - v)$.

3.3 The probability factor "v_i" shall be calculated according to:

$v_i = \frac{H - d}{Hmax - d}$, for the assumed flooding up to the horizontal subdivision above the subdivision load line, where "H" is to be restricted to a height of "Hmax",

$v_i = 1$, if the uppermost horizontal subdivision in way of the assumed damaged region is below "Hmax",

where:

"H" is the height of the horizontal subdivision above the baseline (in metres) which is assumed to limit the vertical extent of damage,

"Hmax" is the maximum possible vertical extent of damage above the baseline (in metres), or

$$Hmax = d + 0.056\, L_s \left(1 - \frac{L_s}{500}\right), \text{ if } L_s \leqslant 250 \text{ m};$$

$$Hmax = d + 7, \text{ if } L_s > 250\text{m}$$

whichever is less.

REGULATION 25-7

Permeability

For the purpose of the subdivision and damage stability calculations of the regulations, the permeability of each space or part of a space shall be as follows:

Spaces	*Permeability*
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Void spaces	0.95
Dry cargo spaces	0.70
Intended for liquid	0 or 0.95*

REGULATION 25-8

Stability information

1 The master of the ship shall be supplied with such reliable information as is necessary to enable him by rapid and simple means to obtain accurate guidance as to the stability of the ship under varying conditions of service. The information shall include:

.1 a curve of minimum operational metacentric height (GM) versus draught which assures compliance with the relevant intact stability requirements and the requirements of regulations 25-1 to 25-6, alternatively a corresponding curve of the maximum allowable vertical centre of gravity (KG) versus draught, or with the equivalents of either of these curves;

.2 instructions concerning the operation of cross-flooding arrangements; and

.3 all other data and aids which might be necessary to maintain stability after damage.

2 There shall be permanently exhibited, or readily available on the navigating bridge, for the guidance of the officer in charge of the ship, plans showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of

any list due to flooding. In addition, booklets containing the aforementioned information shall be made available to the officers of the ship.

3 In order to provide the information referred to in 1.1, the limiting GM (or KG) values to be used, if they have been determined from considerations related to the subdivision index, the limiting GM shall be varied linearly between the deepest subdivision load line and the partial load line. In such cases, for draughts below the partial load line if the minimum GM requirement at this draught results from the calculation of the subdivision index, then this GM value shall be assumed for lesser draughts, unless the intact stability requirements apply.

REGULATION 25-9

Openings in watertight bulkheads and internal decks in cargo ships

1 The number of openings in watertight subdivisions is to be kept to a minimum compatible with the design and proper working of the ship. Where penetrations of watertight bulkheads and internal decks are necessary for access, piping, ventilation, electrical cables, etc., arrangements are to be made to maintain the watertight integrity. The Administration may permit relaxation in the watertightness of openings above the freeboard deck, provided that it is demonstrated that any progressive flooding can be easily controlled and that the safety of the ship is not impaired.

2 Doors provided to ensure the watertight integrity of internal openings which are used while at sea are to be sliding watertight doors capable of being remotely closed from the bridge and are also to be operable locally from each side of the bulkhead. Indicators are to be provided at the control position showing whether the doors are open or closed, and an audible alarm is to be provided at the door closure. The power, control and indicators are to be operable in the event of main power failure. Particular attention is to be paid to minimize the effect of control system failure. Each power-operated sliding watertight door shall be provided with an individual hand-operated mechanism. It shall be possible to open and close the door by hand at the door itself from both sides.

3 Access doors and access hatch covers normally closed at sea, intended to ensure the watertight integrity of internal openings, shall be provided with means of indication locally and on the bridge showing whether these doors or hatch covers are open or closed. A notice is to be affixed to each such door or hatch cover to the effect that it is not to be left open. The use of such doors and hatch covers shall be authorized by the officer of the watch.

4 Watertight doors or ramps of satisfactory construction may be fitted to internally subdivide large cargo spaces, provided that the Administration is satisfied that such doors or ramps are essential. These doors or ramps may be hinged, rolling or sliding doors or ramps, but shall not be remotely controlled. Such doors or ramps shall be closed before the voyage commences and shall be kept closed during navigation; the time of opening such doors or ramps in port and of closing them before the ship leaves port shall be entered in the log book. Should any of the doors or ramps be accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening.

5 Other closing appliances which are kept permanently closed at sea to ensure the watertight integrity of internal openings shall be provided with a notice which is to be affixed to each such closing appliance to the effect that it is to be kept closed. Manholes fitted with closely bolted covers need not be so marked.

External openings in cargo ships

1 All external openings leading to compartments assumed intact in the damage analysis which are below the final damage waterline, are required to be watertight.

2 External openings required to be watertight in accordance with paragraph 1 shall be of sufficient strength and, except for cargo hatch covers, shall be fitted with indicators on the bridge.

3 Openings in the shell plating below the deck limiting the vertical extent of damage shall be kept permanently closed while at sea. Should any of these openings be accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening.

4 Notwithstanding the requirements of paragraph 3, the Administration may authorize that particular doors may be opened at the discretion of the master, if necessary for the operation of the ship and provided that the safety of the ship is not impaired.

5 Other closing appliances which are kept permanently closed at sea to ensure the watertight integrity of external openings shall be provided with a notice affixed to each appliance to the effect that it is to be kept closed. Manholes fitted with closely bolted covers need not be so marked.

Printed in the UK by The Stationery Office Limited on behalf of
the Controller of Her Majesty's Stationery Office
316543 1/98 19585

ISBN 0-10-13845
9 780101 38454