# ANNEX II

## INDICATIVE GUIDELINES TO NATIONAL ADMINISTRATIONS as referred to in Article 6(3)

## PART I

## APPLICATION

In line with the provisions of Article 6(3) of this Directive, these guidelines shall be used by the national administrations of Member States in the application of the specific stability requirements set out in Annex I, in so far as this is practicable and compatible with the design of the ship in question. The paragraph numbers appearing below correspond to those in Annex I.

Paragraph 1

As a first step all ro-ro passenger ships referred to in Article 3(1) of this Directive must comply with the SOLAS 90 standard of residual stability as it applies to all passenger ships constructed on or after 29 April 1990. It is the application of this requirement that defines the residual freeboard $f_r$, necessary for the calculations required in paragraph 1.1.

Paragraph 1.1

1. This paragraph addresses the application of a hypothetical amount of water accumulated on the bulkhead (ro-ro) deck. The water is assumed to have entered the deck via a damage opening. This paragraph requires that the ship in addition to complying with the full requirements of the SOLAS 90 standard further complies with that part of the SOLAS 90 criteria contained in points 2.3 to 2.3.4 of Regulation II-1/B/8 with the defined amount of water on deck. For this calculation no other requirements of Regulation II-1/B/8 need be taken into account. For example the ship does not, for this calculation, need to comply with the requirements for the angles of equilibrium or non-submergence of the margin line.

2. The accumulated water is added as a liquid load with one common surface inside all compartments which are assumed flooded on the car deck. The height ($h_w$) of water on deck is dependent on the residual freeboard ($f_r$) after damage, and is measured in way of the damage (see figure 1). The residual freeboard, is the minimum distance between the damaged ro-ro deck and the final waterline (after equalisation measures if any have been taken) in way of the assumed damage after examining all possible damage scenarios in determining the compliance with the SOLAS 90 standard as required in paragraph 1 of Annex I. No account should be taken of the effect of the hypothetical volume of water assumed to have accumulated on the damaged ro-ro deck when calculating $f_r$.

3. If $f_r$ is 2,0 m or more, no water is assumed to accumulate on the ro-ro deck. If $f_r$ is 0,3 m or less, then height $h_w$ is assumed to be 0,5 m. Intermediate heights of water are obtained by linear interpolation (see figure 2).

Paragraph 1.2

Means for drainage of water can only be considered as effective if these means are of a capacity to prevent large amounts of water from accumulating on the deck i.e. many thousands of tonnes per hour which is far beyond the capacities fitted at the time of the adoption of these regulations. Such high efficiency drainage systems may be developed and approved in the future (based on guidelines to be developed by the International Maritime Organisation)

Paragraph 1.3

1. The amount of assumed accumulated water on deck may, in addition to any reduction in accordance with paragraph 1.1, be reduced for operations in geographically defined restricted areas. These areas are designated in accordance with the significant wave height ($h_s$) defining the area in line with the provisions of Article 5 of this Directive.

2. If the significant wave height (hs), in the area concerned, is 1,5 m or less then no additional water is assumed to accumulate on the damaged ro-ro deck. If the significant wave height in the area concerned is 4,0 m or more then the height of the assumed accumulated water shall be the value calculated in accordance with paragraph 1.1. Intermediate values to be determined by linear interpolation (see figure 3).

3. The height $h_w$ is kept constant, therefore the amount of added water is variable as it is dependent upon the heeling angle and whether at any particular heeling angle the deck edge is immersed or not (see figure 4). It should be noted that the assumed permeability of the car deck spaces is to be taken as 90 % (MSC/Circ.649 refers), whereas other assumed flooded spaces permeabilities are to be those prescribed in the SOLAS Convention.

4. If the calculations to demonstrate compliance with this Directive relate to a significant wave height less than 4,0 m that restricting significant wave height must be recorded on the vessel's passenger ship safety certificate.

Paragraphs 1.4 and 1.5

As an alternative to complying with the new stability requirements in paragraph 1.1 or 1.3 an administration may accept proof of compliance via model tests. The model test requirements are detailed in the Appendix to Annex I. Guidance notes on the model tests are contained in part II of this Annex.

Paragraph 1.6

Conventionally derived SOLAS 90 standard limiting operational curve(s) (KG or GM) may not remain applicable in cases where ‘water on deck’ is assumed under the terms of this Directive and it may be necessary to determine revised limiting curve(s) which take into account the effects of this added water. To this effect sufficient calculations corresponding to an adequate number of operational draughts and trims must be carried out.

*Note*: Revised limiting operational KG/GM Curves may be derived by iteration, whereby the minimum excess GM resulting from damage stability calculations with water on deck is added to the input KG (or deducted from the GM) used to determine the damaged freeboards ($f_r$), upon which the quantities of water on deck are based, this process being repeated until the excess GM becomes negligible.

It is anticipated that operators would begin such an iteration with the maximum KG/minimum GM which could reasonably be sustained in service and would seek to manipulate the resulting deck bulkhead arrangement to minimisethe excess GM derived from damage stability calculations with water on deck.

Paragraph 2.1

As for conventional SOLAS damage requirements bulkheads inboard of the B/5 line are considered intact in the event of side collision damage.

Paragraph 2.2

If side structural sponsons are fitted to enable compliance with Regulation II-1/B/8, and as a consequence there is an increase in the breadth (B) of the ship and hence the vessel's B/5 distance from the ship's side, such modification shall not cause the relocation of any existing

structural parts or any existing penetrations of the main transverse watertight bulkheads below the bulkhead deck (see figure 5).

Paragraph 2.3

1. Transverse or longitudinal bulkheads/barriers which are fitted and taken into account to confine the movement of assumed accumulated water on the damaged ro-ro deck need not be strictly 'watertight'. Small amounts of leakage may be permitted subject to the drainage provisions being capable of preventing an accumulation of water on the 'other side' of the bulkhead/barrier. In such cases where scuppers become inoperative as a result of a loss of positive difference of water levels other means of passive drainage must be provided.

2. The height ($B_h$) of transverse and longitudinal bulkheads/barriers shall be not less than ($8 \times h_w$) metres, where $h_w$ is the height of the accumulated water as calculated by application of the residual freeboard and significant wave height ( as referred to in paragraphs 1.1 and 1.3). However in no case is the height of the bulkhead/barrier to be less than the greater of:

(a) 2,2 metres; or

(b) the height between the bulkhead deck and the lower point of the underside structure of the intermediate or hanging car decks, when these are in their lowered position. It should be noted that any gaps between the top edge of the bulkhead and the underside of the plating must be 'plated-in' in the transverse or longitudinal direction as appropriate (see figure 6).

Bulkheads/barriers with a height less than that specified above, may be accepted if model tests are carried out in accordance with part II of this Annex to confirm that the alternative design ensures appropriate standard of survivability. Care needs to be taken when fixing the height of the bulkhead/barrier such that the height shall also be sufficient to prevent progressive flooding within the required stability range. This range is not to be prejudiced by model tests.

*Note*: The range may be reduced to 10 degrees provided the corresponding area under the curve is increased (as referred to in MSC 64/22).

Paragraph 2.5.1

The area 'A' relates to permanent openings. It should be noted that the 'freeing ports' option is not suitable for ships which require the buoyancy of the whole or part of the superstructure in order to meet the criteria. The requirement is that the freeing ports shall be fitted with closing flaps to prevent water entering, but allowing water to drain.

These flaps must not rely on active means. They must be self-operating and it must be shown that they do not restrict outflow to a significant degree. Any significant efficiency reduction must be compensated by the fitting of additional openings so that the required area is maintained.

Paragraph 2.5.2

For the freeing ports to be considered effective the minimum distance from the lower edge of the freeing port to the damaged waterline shall be at least 1,0 m. The calculation of the minimum distance shall not take into account the effect of any additional water on deck (see figure 7).

Paragraph 2.5.3

Freeing ports must be sited as low as possible in the side bulwark or shell plating. The lower edge of the freeing port opening must be no higher than 2 cm above the bulkhead deck and the upper edge of the opening no higher than 0,6 m (see figure 8).

*Note*: Spaces to which paragraph 2.5 applies, i.e. those spaces fitted with freeing ports or similar openings, shall not be included as intact spaces in the derivation of the intact and damage stability curves.

Paragraph 2.6

1. The statutory extent of damage is to be applied along the length of the ship. Depending on the subdivision standard the damage may not affect any bulkhead or may only affect a bulkhead below the bulkhead deck or only bulkhead above the bulkhead deck or various combinations.

2. All transverse and longitudinal bulkheads/barriers which constrain the assumed accumulated amount of water must be in place and secured at all times when the ship is at sea.

3. In those cases where the transverse bulkhead/barrier is damaged the accumulated water on deck shall have a common surface level on both sides of the damaged bulkhead/barrier at the height $h_w$ (see figure 9).