

Translation: Only the Danish document has legal validity.

*Executive Order no. 1077 of 28/08/2024*

*issued by the Danish Maritime Authority*

## **Executive Order on special stability requirements for ro-ro passenger ships<sup>1)</sup>**

Pursuant to Section 1(2) and (3), Section 3(1), Section 5 and Section 32(9) of the Act on Safety at Sea, cf. Order no. 1629 of 17 December 2018, and Section 1(2 and 3), Section 3(1), Section 5 and Section 32(2) of the Executive Order on the entry into force for Greenland of the Act on Safety at Sea, cf. Executive Order no. 1674 of 16 December 2015, shall be determined after authorisation in accordance with Section 1(1)(no. 3), in Executive Order no. 261 of 23 March 2020 on the transfer of certain powers to the Danish Maritime Authority and on the right of appeal, etc., and Section 1(1)(no. 2), in Executive Order no. 279 of 23 March 2020 for Greenland on the transfer of certain powers to the Danish Maritime Authority and on the right of appeal, etc.:

### *Scope of application*

**Section 1.** All ro-ro passenger ships engaged on regular international scheduled services to and from a port of an EU Member State, irrespective of the flag they fly, shall comply with the provisions of Directive 2003/25/EC of the European Parliament and of the Council of 14 April 2003 on specific stability requirements for ro-ro passenger ships (Stockholm Directive), as amended, as reproduced in the appendix to this Executive Order.

### *Marine areas*

**Section 2.** The list of marine areas and the corresponding significant wave heights in Northern Europe required by Article 5 of the Stockholm Directive is reproduced in Appendix 2.

### *Penalty provisions and measures, etc.*

**Section 3.** Violation of Section 1 of this Executive Order is punishable by a fine or imprisonment for up to one year.

*Subsection 2.* The penalty can increase to imprisonment for up to 2 years if:

1) The infringement, including in connection with causing an accident at sea or sailing in breach of good seamanship, has caused injury to life or health or has created a danger thereof,

- 2) A prohibition or an order has previously been issued in respect of the same or a similar matter, or
- 3) The infringement has resulted in or is intended to result in a financial benefit for the person concerned or for others.

*Subsection 3.* Where no confiscation of the proceeds of the infringement is ordered, the amount of any financial advantage obtained or intended shall be taken into account, in particular, in the assessment of any fine, including any additional fine.

*Subsection 4.* Criminal liability may be imposed on companies or other legal persons in accordance with the rules laid down in Chapter 5 of the Criminal Code.

**Section 4.** If the matter is covered by an order on the entry into force for Greenland of the Act on Safety at Sea, measures may be taken in accordance with the Criminal Code for Greenland.

*Subsection 2.* The circumstances mentioned in Section 3(2) shall be regarded as aggravating circumstances.

*Subsection 3.* If no confiscation of proceeds is made, cf. Section 120 of the Criminal Code for Greenland, the amount of any financial benefit obtained or intended shall be taken into account, in particular, when imposing a fine, including an additional fine.

*Subsection 4.* Where an infringement is committed by companies, etc., or other legal persons, the legal person as such may be held liable to pay a fine. If the infringement is committed by the State, the Government of Greenland, a municipality, or a settlement board, the public authority as such may be held liable to a pay fine.

*Subsection 5.* If a person is not resident in Greenland, or if the person's connection with Greenlandic society is of such a loose nature that the conditions for the application of measures are not met, the case may be brought or referred for prosecution in Denmark, cf. Section 7 of the Greenland Criminal Code.

#### *Entry into force*

**Section 5.** The Executive order will enter into force on 5 December 2024.

*Subsection 2.* Executive Order no. 941 of 23 June 2020 on special stability requirements for ro-ro passenger ships is repealed.

The Danish Maritime Authority, 28 August 2024

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1) The Executive Order contains provisions implementing Directive 2003/25/EC of the European Parliament and of the Council of 14 April 2003 on specific stability requirements for ro-ro passenger ships, Official Journal of the European Union 2003, no. OJ L 123, p. 22-41, as amended by Directive (EU) 2023/946 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/25/EC as regards the inclusion of improved stability requirements and adapting it to the stability requirements defined by the International Maritime Organisation (Text with EEA relevance) L 128, page 1-10.

**Consolidation of Directive 2003/25/EC of the European Parliament and of the Council of 14 April 2003 on specific stability requirements for ro-ro passenger ships, as amended**

DIRECTIVE 2003/25/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 14 April 2003

on specific stability requirements for ro-ro passenger ships

(EEA-relevant text)

*Article 1*

**Purpose**

The purpose of this Directive is to introduce a uniform level of specific stability requirements for ro-ro passenger ships in order to improve the survivability of this type of ship in the event of a wreck and to ensure a high level of safety for passengers and crew.

*Article 2*

**Definitions**

For the purposes of this Directive, the following definitions apply:

- a) 'ro-ro passenger ship' means a ship carrying more than 12 passengers with a ro-ro cargo hold or specialised cargo holds as defined in Regulation II-2/3 of the SOLAS Convention, as amended
- b) 'existing ro-ro passenger ship' means a ro-ro passenger ship the keel of which is laid or which is at an equivalent stage of construction before 5 December 2024; an equivalent stage of construction means the stage where:
  - i. construction identifiable with a specific ship/vessel has commenced; and
  - ii. assembly of that ship/vessel has commenced and is not less than 50 tonnes or at least 1% of the estimated total hull weight, whichever is less
- c) 'new ro-ro passenger ship' means a ro-ro passenger ship which is not an existing ro-ro passenger ship
- d) 'passenger' means any person other than the master and the members of the crew or other persons employed or engaged in any capacity on board a ship and other than children under one year of age
- e) 'SOLAS Convention' means the 1974 International Convention for the Safety of Life at Sea, as amended'

- ea) 'SOLAS 90' means the International Convention for the Safety of Life at Sea, 1974, as last amended by Resolution MSC. 117(74)
- eb) 'SOLAS 2009' means the International Convention for the Safety of Life at Sea, 1974, as last amended by Resolution MSC. 216(82)
- ec) 'SOLAS 2020' means the International Convention for the Safety of Life at Sea, 1974, as last amended by Resolution MSC. 421(98)'.
- f) 'regular service' means a series of ro-ro passenger ship crossings between the same two or more ports or a series of voyages from and to the same port without intermediate calls either:
- i) in accordance with a published timetable; or
  - ii) with crossings so regular or frequent that they constitute a systematic series of voyages'
- g) The 'Stockholm Agreement' means the Agreement entered into in Stockholm on 28 February 1996 pursuant to Resolution 14 'Regional Agreements on Specific Stability Requirements for ro-ro Passenger Ships', adopted on 29 November 1995 at the 1995 Solas Conference
- h) 'flag State administration' means the competent authorities of the State whose flag the ro-ro passenger ship is entitled to fly
- i) 'port State' means a Member State to or from whose ports a ro-ro passenger ship operates a regular scheduled service'
- j) 'international voyage' means a voyage by sea from a port of a Member State to a port outside that Member State or vice versa
- k) 'specific stability requirements', when used as a generic term, means the stability requirements referred to in Article 6'.
- l) 'significant wave height' ( $h_s$ ) means the average height of the largest third of the observed waves in a given time period
- m) 'residual freeboard' ( $f_r$ ) means the minimum distance between the damaged ro-ro deck and the final waterline at the place of damage, not taking into account the effect of water accumulated on the damaged ro-ro deck.
- n) 'company' means the owner of a ro-ro passenger ship or any other organisation or person, such as the operator or the bareboat charterer, who has taken over the responsibility for the operation of the passenger ship from the owner.

### *Article 3*

#### **Scope of application**

1. This Directive shall apply to all ro-ro passenger ships operating on regular international regular services to and from a port of a Member State, irrespective of the flag they fly.

2. Each Member State, in its capacity as port State, shall ensure that ro-ro passenger ships flying the flag of a non-Member State fully comply with the requirements of this Directive before they may operate regular services from or to ports of that Member State, cf. Directive (EU) 2017/2110 of the European Parliament and of the Council<sup>2)</sup>.
3. Member States which do not have seaports and which do not have ro-ro passenger ships flying their flag falling within the scope of this Directive, may deviate from the provisions of this Directive except for the obligation laid down in the second subparagraph.

Member States intending to make use of such a deviation shall notify the Commission by 5 December 2024 whether the conditions for such a deviation are fulfilled and shall notify the Commission of any subsequent change. Such Member States shall not allow ro-ro passenger ships falling within the scope of this Directive to fly their flag until they have implemented this Directive.

#### *Article 4*

##### **Significant wave heights**

Significant wave heights ( $h_s$ ) are used to calculate the height of water on the vehicle deck used in the specific stability requirements in Appendix I Section A. The significant wave height figures must not be exceeded with a probability of more than 10% per year.

#### *Article 5*

##### **Marine areas**

1. Port States shall establish a list of marine areas through which ro-ro passenger ships pass in regular service to or from their ports and the corresponding significant wave heights in these areas and keep the list up to date.
2. The marine areas and the applicable values of significant wave height shall be determined jointly by the States at both ends of the route, whether Member States or, where appropriate and possible, third countries. If the ship's route passes through more than one marine area, the ship must fulfil the specific stability requirements for the maximum significant wave height occurring in these areas.
3. The list shall be published in a public database accessible through the website of the competent maritime authority. The Commission shall be informed of the location of such information and of any updates and the reasons for such updates.

#### *Article 6*

##### **Special stability requirements**

1. Without prejudice to Directive 2009/45/EC of the European Parliament and of the Council<sup>3)</sup>, new ro-ro passenger ships certified to carry more than 1,350 persons on board shall comply with the specific stability requirements set out in SOLAS 2020 Chapter II-1 Part B.
2. At the company's option, new ro-ro passenger ships certified to carry not more than 1,350 persons on board shall fulfil:
  - a) the specific stability requirements set out in Appendix I, Section A to this Directive, or
  - b) the specific stability requirements set out in Section B of Appendix I to this Directive.

For each such ship, the flag State administration shall, within a period of two months from the date of issue of the certificate referred to in Article 8, notify the Commission which of the options referred to in the first subparagraph has been chosen and include in the notification the information referred to in Appendix III.

3. When applying the requirements set out in Appendix I, Section A, Member States shall follow the guidelines set out in Appendix II as far as practicable and compatible with the design of the ship concerned.
4. At the choice of the company, existing ro-ro passenger ships certified to carry more than 1,350 persons on board, which it deploys on a regular service to or from a port of a Member State after 5 December 2024 and which have never been certified in accordance with this Directive shall comply with:
  - a) the specific stability requirements set out in SOLAS 2020, Chapter II-1, Part B, or
  - b) the specific stability requirements set out in Appendix I, Section A to this Directive, in addition to those set out in SOLAS 2009, Chapter II-1, Part B.

The stability requirements applied shall be recorded in the ship's certificate as required under Article 8.

5. At the choice of the company, existing ro-ro passenger ships certified to carry no more than 1,350 persons on board, which it deploys on a regular service to or from a port of a Member State after 5 December 2024 and which have never been certified in accordance with this Directive shall comply with:
  - a) the specific stability requirements set out in Appendix I, Section A to this Directive, or
  - b) the specific stability requirements set out in Section B of Appendix I to this Directive.

The stability requirements applied shall be recorded in the ship's certificate referred to in Article 8.

6. Existing ro-ro passenger ships operating on a regular service to or from a port of a Member State on or before 5 December 2024 shall continue to comply with the specific stability requirements set out in Appendix I, in the version applicable before the entry into force of Directive (EU) 2023/946<sup>4)</sup> of the European Parliament and of the Council.

## *Article 7*

**Omitted**

## *Article 8*

### **Certificates**

1. Both new and existing ro-ro passenger ships flying the flag of a Member State shall carry a certificate confirming that the ship fulfils the specific stability requirements set out in Article 6.

The certificates must be issued by the flag state administration and can be combined with other relevant certificates. For ro-ro passenger ships complying with the specific stability requirements set out in Appendix I, Section A, the significant wave height up to which the ship can fulfil the specific stability requirements shall be indicated in the certificate.

The certificate is valid as long as the ro-ro passenger ship operates in a marine area with the same or a lower significant wave height.

2. Each Member State shall, in its capacity as port State, accept certificates issued by another Member State in accordance with this Directive.
3. Each Member State shall, in its capacity as port State, accept certificates issued by a third country declaring that the ro-ro passenger ship fulfils the specific stability requirements set out in this Directive.

## *Article 9*

### **Seasonal and other fixed-time sailing**

1. If a company operating an annual scheduled service wishes to deploy additional ro-ro passenger ships to operate for a shorter period on that scheduled service, it shall notify the competent authorities of the port State or States at least one month before the ships are deployed on that service.
2. However, in cases where, due to unforeseen circumstances, the rapid deployment of another ro-ro passenger ship is necessary to ensure the continuity of operations, Article 4(4) of Directive (EU) 2017/2110 and Subsection 1.3 of Appendix XVII to Directive 2009/16/EC<sup>5)</sup> of the European Parliament and of the Council shall apply instead of the notification requirement in Subsection 1.
3. If a company wishes to operate a seasonal regular service for a shorter period not exceeding six months a year, it shall notify the competent authorities of the port State or States at least three months in advance.
4. For ro-ro passenger ships which fulfil the specific requirements set out in Appendix I, Section A and where the voyage referred to in Subsections 1, 2 and 3 of this Article takes place in conditions of lower significant wave height than those established for the same sea area for year-round operation, the competent authority may use the value of significant wave height applicable for this shorter period to determine the water level on deck when applying



the specific stability requirements in Appendix I, Section A. The value of the significant wave height applicable for this shorter period shall be agreed between Member States or, where appropriate and possible, between Member States and third countries at both ends of the route.

5. When the competent authority of the port State or States has authorised a voyage as referred to in Subsections 1, 2 and 3, ro-ro passenger ships engaged on such voyages shall carry a certificate confirming that the ship complies with the provisions of this Directive in accordance with Article 8(1).

#### *Article 10*

##### **Amendments of the appendices**

The Commission shall be empowered to adopt delegated acts in accordance with Article 10a concerning the amendment of the Appendices in order to take account of international developments, in particular in the IMO, and to make the Directive more effective in the light of experience gained and technical progress.

#### *Article 10a*

##### **Exercise of the delegated powers**

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.
2. The power to adopt delegated acts referred to in Article 10 shall be conferred on the Commission for a period of five years from 26 July 2019. The Commission shall draw up a report in respect of the delegation of power not later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than three months before the end of each period.
3. The delegation of power referred to in Article 10 may be revoked at any time by the European Parliament or by the Council. A decision of revocation shall put an end to the delegation of the powers specified in that decision. It shall take effect on the day following the publication of the decision in the Official Journal of the European Union or on a later date specified in the decision. It does not affect the validity of delegated acts already in force.
4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles of the Inter-institutional Agreement of 13 April 2016 on Better Lawmaking<sup>6)</sup>.
5. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.
6. A delegated act adopted pursuant to Article 10 shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the

Commission that they will not object. The deadline shall be extended by two months at the initiative of the European Parliament or the Council.

*Article 11*

**Omitted.**

*Article 12*

**Sanctions**

Member States shall lay down the rules on penalties applicable to infringements of the national provisions adopted pursuant to this Directive and shall take all measures necessary to ensure that they are implemented. Sanctions must be effective, proportionate and dissuasive.

*Article 13*

**Implementation**

Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 17 November 2004. They shall immediately inform the Commission thereof.

When Member States adopt those provisions, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The detailed rules for this reference shall be laid down by the Member States.

*Article 13a*

**Evaluation**

The Commission shall carry out an evaluation of the implementation of this Directive and shall submit the result of that evaluation to the European Parliament and the Council by 5 June 2033. Information based on the notifications referred to in Article 6(2) shall be made available in anonymised form.

*Article 14*

**Entry into force**

This Directive shall enter into force on the day of its publication in the Official Journal of the European Union.

*Article 15*

**Addressees**

This Directive is addressed to the Member States.

*APPENDIX I*

**SPECIFIC STABILITY REQUIREMENTS FOR RO-RO PASSENGER SHIPS**

cf. Article 6,

**Section A**

For the purposes of Section A, references to regulations of the SOLAS Convention shall be construed as references to those regulations as applied under SOLAS 90.

1. In addition to the requirements of SOLAS Regulation II-1/B/8 concerning watertight subdivision and stability in damaged condition, the requirements of this section shall be complied with. .

1.1. The provisions of Regulation II-1/B/8.2.3 shall be complied with, taking into account the effect of a hypothetical quantity of sea water assumed to have accumulated on the first deck above the design waterline of the ro-ro cargo hold or special category hold as defined in Regulation II-2/3, which is assumed to be damaged (hereinafter referred to as 'the damaged ro-ro deck'). It is not necessary to fulfil the other requirements of Regulation II-1/B/8 when applying the stability standard contained in this Appendix. The amount of sea water that is assumed to accumulate should be calculated based on a water level with a fixed height above:

- a) the lowest point of the deck edge in the damaged compartment of the ro-ro deck, or
- b) when the edge of the deck in the damaged compartment is submerged, the calculations shall be based on a fixed height above the still water surface at all heeling and trim angles,

as follows:

0.5 m if the residual freeboard (fr) is 0.3 m or less

0.0 m if the residual freeboard (fr) is 2.0 m or more and

intermediate values must be calculated by linear interpolation if the residual freeboard (fr) is 0.3 m or more but less than 2.0 m,

where the residual freeboard (fr) in the actual damage case is the minimum distance between the damaged ro-ro deck and the final waterline at the point of damage, not taking into account the effect of the amount of water accumulated on the damaged ro-ro deck.

1.2. Where a high-efficiency bilge system is installed, the flag state administration may authorise a reduction of the water surface height used.

1.3. For ships with geographically restricted trading areas, the Administration of the flag State may accept a reduction of the applied height of the water surface as determined in accordance with Subsection 1.1 by replacing this height by the following:

1.3.1. 0.0 m if the significant wave height ( $h_s$ ) determined for that area is 1.5 m or less

1.3.2. the value determined in accordance with Subsection 1.1 if the significant wave height ( $h_s$ ) determined for the area concerned is 4.0 m or more

1.3.3. intermediate values shall be calculated by linear interpolation if the significant wave height ( $h_s$ ) determined for the area in question is 1.5 m or more but less than 4.0 m provided that the following conditions are met:

1.3.4. The flag state administration is satisfied that the significant wave height ( $h_s$ ) in question is not exceeded with a probability of more than 10%.

1.3.5. The trading area and, if applicable, the part of the year for which a certain value of the wave height ( $h_s$ ) is determined is entered on the certificates.

1.4. As an alternative to the requirements of Subsections 1.1 or 1.3, the flag State Administration may waive compliance with these requirements and accept evidence from modelling trials carried out for the individual ship in accordance with the method in the appendix showing that the ship will not capsize with an assumed damage extent as specified in regulation II-1/B/8.4 in the worst location in accordance with Subsection 1.1 in an irregular sea state, and

1.5. A reference to the acceptance of the results of the modelling trials as an equivalence for meeting the requirements of Subsections 1.1 or 1.3, and the value of the significant wave height ( $h_s$ ) used in the modelling trials shall be entered on the ship's certificates.

1.6. The information to be provided to the master of the ship in accordance with Regulations II-1/B/8.7.1 and II-1/B/8.7.2, developed to comply with Regulations II-1/B/8.2.3 to II-1/B/8.2.3.4 shall be complied with unchanged for ro-ro passenger ships authorised in accordance with this requirement.

2. In order to assess the effect of the volume of assumed accumulated sea water on the damaged ro-ro deck as specified in Subsection 1, the following provisions shall apply:

2.1. A transverse or longitudinal bulkhead shall be considered intact if all parts of it lie within the vertical surfaces on both sides of  $1/5$  of the ship, situated at a distance from the outer plating equal to the width of the ship as defined in Regulation II-1/2 and measured at right angles to the centreline at the deepest subdivision load line.

2.2. Where the hull of the ship has been structurally widened in any part to comply with the provisions of this Appendix, the resulting increase in the value of  $1/5$  of the width shall be used

except in determining the location of existing bulkhead penetrations, pipework, etc., which were acceptable before the increase in width.

2.3. The watertightness of transverse and longitudinal bulkheads which are taken into account as effective to contain the assumed accumulated sea water in the relevant compartment of the damaged ro-ro deck shall be assessed together with the bilge system used and shall withstand the hydrostatic pressure in accordance with the results of the damage calculations. Such bulkheads must be at least 4 metres high, unless the water height is less than 0.5 metres. In such cases, the height of the bulkheads can be calculated according to the following:

$$B_h = 8h_w$$

where:

where  $B_h$  is the bulkhead height, and

$h_w$  is the water height.

The minimum height of the bulkhead must never be less than 2.2 metres. However, in the case of a ship with a suspended vehicle deck, the minimum height of the bulkhead shall not be less than the height to the underside of the suspended deck when in the lowered position.

2.4. When it comes to special arrangements such as full-width suspended decks and wide side casings, other bulkhead heights can be accepted based on detailed modelling trials.

2.5. The effect of the assumed accumulated volume of seawater need not be considered for any compartment on the damaged ro-ro deck, provided that such compartment is provided with evenly distributed bilge ports along the sides of the compartment, on each side of the deck. These must fulfil the following:

2.5.1.  $A \geq 0.3 l$

where  $A$  is the total area of bilge ports on each side of the deck in  $m^2$  and  $l$  is the length of the compartment in metres.

2.5.2. The ship shall have a residual freeboard of at least 1.0 m in the worst damage condition without taking into account the effect of the assumed accumulated volume of water on the damaged ro-ro deck.

2.5.3. Such bilge ports shall be located within 0.6 metres above the damaged ro-ro deck and the lower edge of the bilge ports shall not be more than 2 cm above the damaged ro-ro deck.

2.5.4. Such bilge ports shall have closing devices or flaps to prevent water ingress on the ro-ro deck while allowing water that may accumulate on the ro-ro deck to drain away.

2.6. When a bulkhead above the ro-ro deck is assumed to be damaged, both compartments adjacent to the bulkhead shall be considered to be flooded to the same water level height as calculated in Subsections 1.1 or 1.3.

3. Significant wave heights shall be the wave heights on the maps or lists of marine areas established by Member States pursuant to Article 5 of this Directive.

3.1. For ships sailing only part of the year, the significant wave height to be used shall be determined by the administration of the host State in consultation with the other countries whose ports the ship calls at on its route.

4. Modelling trials are conducted in accordance with the appendix.

## Section B

The requirements of SOLAS 2020 Chapter II-1 Part B must be met. Regardless of SOLAS 2020, Regulation II-1/B/6.2.3, the required subdivision index (R) is determined as follows:

People on board (N)	Subdivision index (R)
$N < 1,000$	$R = 0.000088 * N + 0.7488$
$1,000 \leq N \leq 1,350$	$R = 0.0369 * \ln(N + 89.048) + 0.579$

where:

N = total number of people on board.

### *Supplement*

## **Methodology for running modelling trials**

### **1. Objectives**

This revised methodology for conducting modelling trials is a revision of the methodology described in the Appendix to the Appendix to Resolution 14 of the 1995 Solas Conference. Since the Stockholm Agreement came into force, a number of modelling trials have been carried out using the methodology that has been in place so far. During the trials, it was found that the method can be improved in a number of ways. This new methodology for conducting modelling trials incorporates these improvements and, together with the associated guidelines, should provide a more robust method for assessing the survivability of a damaged ro-ro passenger ship at sea. The modelling trials prescribed in Subsection 1.4 of the stability requirements of Appendix I shall be capable of withstanding a sea state as defined in Subsection 4 while taking into account the worst case damage conditions.

### **2. Definitions**

$L_{BP}$  is the length between the perpendiculars

$H_s$  is the significant wave height

B is the maximum width of the ship on the frame

$T_P$  is the peak period

$T_Z$  is the zero-crossing period

### 3. Ship model

3.1. The model must be a replica of the actual ship, both in terms of external shape and internal arrangement, which applies especially to all damaged areas that affect water filling and water movement. Intact draught, trim, heel and the maximum allowable operational centre of gravity KG corresponding to the worst-case damage scenario must be used. Furthermore, the cases under consideration shall represent the worst case(s) as defined in Regulation II-1/8.2.3.2 of SOLAS 90 with respect to the total area under the positive GZ curve and the centre line of the damage opening shall be within the following range:

3.1.1.  $\pm 35\%$   $L_{BP}$  from amidships

3.1.2. An additional worst-case test shall be carried out within  $\pm 10\%$   $L_{BP}$  from amidships if the damage in Subsection 1 is outside  $\pm 10\%$   $L_{BP}$  from amidships.

3.2. The model must comply with the following:

3.2.1. The length between perpendiculars ( $L_{BP}$ ) shall be at least 3 metres, with a scale of at least 1:40, and the vertical height shall be at least three times the standard height of superstructures above the bulkhead deck (freeboard deck)

3.2.2. The hull thickness in water-filled compartments must not exceed 4 mm

3.2.3. In both undamaged and damaged condition, the model must match the correct displacement and draught marks ( $T_A$ ,  $T_M$ ,  $T_F$ , port and starboard) within a maximum tolerance of +2 mm. Depth marks fore and aft should be placed as close to FP and AP as practical

3.2.4. All damaged compartments and compartments on the ro-ro deck shall be constructed with the correct area and volume permeability (actual values and distribution) so that the mass and mass distribution of the inflowing water is correctly represented.

3.2.5. The motion characteristics of the actual ship shall be correctly modelled, paying particular attention to the tolerance on intact GM and correct scaling of the gyrations radius for rolling and pitching. Both radii are measured in air and should be between 0.35B and 0.4B for rolling and between 0.2LOA and 0.25LOA for pitching.

3.2.6. Essential construction details, such as watertight bulkheads, air ducts, etc., above and below the bulkhead deck, which may cause unsymmetrical water filling, shall, as far as practicable, be correctly modelled to represent the real situation. Ventilation and cross filling arrangements must have a minimum cross section of 500 mm<sup>2</sup>;

3.2.7. The shape of the damage opening shall be as follows:

- 1) Trapezoidal profile with 15 a degree lateral inclination to the vertical and width at the design waterline according to Solas Regulation II-1/8.4.1
- 2) Isosceles triangular profile in the horizontal plane with a depth equal to B/5 according to Solas Regulation II-1/8.4.2. If there are side casings within B/5, the damaged length of such casings must be at least 25 mm
- 3) Regardless of the provisions of Subsections 3.2.7.1 and 3.2.7.2, all compartments considered damaged for the calculation of the worst damage case(s) in Subsection 3.1 shall be water-filled for the modelling trials.

3.3. The model in the water-filled equilibrium state is heeled by an additional angle that would be produced by a heeling moment  $M_h = \max(M_{\text{pass}}, M_{\text{launch}}) - M_{\text{wind}}$ , but such that the final heel angle is not less than 1 degree towards the damage.  $M_{\text{pass}}$ ,  $M_{\text{launch}}$  and  $M_{\text{wind}}$  are as defined in Solas Regulation II-1/8.2.3.4. For existing ships, the angle can be set to 1 degree.

#### 4. Method for the modelling trial

4.1. The model must be exposed to a long-crested, irregular sea state defined by a JONSWAP wave spectrum with a significant wave height

$$H_s, \text{ en forstærkningsfaktor } \gamma = 3.3 \text{ og en peakperiode } T_p = 4 \sqrt{\frac{H_s}{T_z} = \frac{T_p}{1.285}}$$

$H_s$  is the significant wave height in the trading area that is not exceeded with a probability of more than 10% on an annual basis, with a maximum of 4 metres.

It also applies to

- 4.1.1. The pool must be wide enough so that the model does not touch or otherwise interfere with the pool edge; a minimum width of LBP + 2 m is recommended
- 4.1.2. The pool must be deep enough to model the waves correctly, but at least 1 m
- 4.1.3. Prior to the test, measurements must be taken at three different locations within the area where the model can drift, so that a representative wave realisation can be used
- 4.1.4. The wave probe closest to the wave generator shall be at the location where the model is placed at the beginning of the test
- 4.1.5. The variation in  $H_s$  and  $T_p$  shall be within  $\pm 5\%$  for all three places, and
- 4.1.6. A tolerance of  $+2.5\%$  for  $H_s$ ,  $\pm 2.5\%$  for  $T_p$  and  $\pm 5\%$  for  $T_z$  relative to the probe closest to the wave generator shall be allowed during a test for approval purposes.



4.2. The model must be able to drift freely and be positioned in a beam sea (90 degrees to the direction of travel) with the hole that constitutes the damage facing the waves, without having any permanent mooring system. To maintain a beam sea of approximately 900 during the trial, the following requirements must both be met:

4.2.1. Lines to hold the sailing direction, which are for minor adjustments only, shall be placed in the centre line between bow and stern in a symmetrical manner, at a level between the position of the KG and the damaged waterline

4.2.2. The measuring device shall travel at the same speed as that at which the model actually operates, adjusting the speed if necessary.

4.3. At least ten trials must be performed. The duration of each trial shall be such that steady-state is achieved, but not less than 30 minutes at full scale. Different realisations of wave trains must be used for each trial.

### **5. Survival criterion**

The model shall be considered not wrecked if a steady state has been achieved by the alternating tests required in Subsection 4.3. The model shall be considered capsized if roll angles of more than 30 degrees from vertical or a steady (average) roll of more than 20 degrees for more than 3 minutes at full scale, even if a steady state has been reached.

### **6. Documentation of the trial**

6.1. The modelling trial programme must be pre-approved by the administration.

6.2. The trial must be documented by means of a report and a video or other visual documentation containing all relevant information about the model and the trial results, which must be approved by the administration. This must include at least the theoretical and measured wave spectra and wave elevation parameters (HS, TP, TZ) for a representative wave realisation at the three different locations in the pool, and the results of the tests with the model in the form of time series of the main parameters of the measured wave elevation in the vicinity of the wave generator and the recording of the rolling, settling and heave motions of the model and the speed at which it drifts.

## **APPENDIX II**

### **GUIDELINES FOR MEMBER STATE ADMINISTRATIONS**

cf. Article 6(3)

#### **PART I**

#### **APPLICATION**

As stated in Article 6(3) of the Directive, Member State administrations shall use these guidelines when applying the specific stability requirements of Appendix I, Section A, as far as practicable and compatible with the design of the ship concerned. The numbers in the following refer to the items in Appendix I, Section A.

### *Subsection 1*

Firstly, all ro-ro passenger ships referred to in Article 3(1) of the Directive shall comply with the Solas 90 standard on residual stability as applied to all passenger ships built on or after 29 April 1990. In applying this requirement, the residual freeboard,  $f_r$ , necessary for the calculations in Subsection 1.1 is defined.

#### *Subsection 1.1*

1. This subsection deals with the accumulation of a hypothetical amount of water on the bulkhead deck (ro-ro deck). The water is assumed to have entered the deck through a damage opening. This subsection requires the ship to comply with all the requirements of the Solas 90 standard and in addition the part of the Solas 90 requirements contained in Subsections 2.3 to 2.3.4 of Regulation 8 of Chapter II-1 Part B with the specified amount of water on deck. The calculation need not take into account any of the other requirements of Regulation 8 of Chapter II-1. For example, it is not necessary for the calculation to fulfil the equilibrium angle requirements or the requirement that the immersion line must not be under water.
2. The accumulated water is added as a liquid load with the same surface in all compartments of the vehicle deck that are assumed to be filled with water. The height of water on the deck ( $h_w$ ) depends on the residual freeboard ( $f_r$ ) after damage and is measured at the point of damage (see Figure 1). The residual freeboard is the minimum distance between the damaged ro-ro deck and the final waterline (after any equalisation) at the point of damage after considering all possible damage scenarios for compliance with the Solas 90 standard as required in Subsection 1 of Appendix I. When calculating  $f_r$ , the effect of the amount of water assumed to have accumulated on the damaged ro-ro deck should not be taken into account.
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,  $h_w$  is set to 0.5 m. Intermediate water height values are obtained by linear interpolation (see Figure 2).

#### *Subsection 1.2*

Means of drainage can only be considered effective if they have sufficient capacity to prevent the accumulation of large amounts of water on deck, i.e. many thousands of tonnes per hour, which is far more than the installed capacity at the time the regulations were adopted. Such highly efficient bilge systems may be developed and authorised in the future (based on new guidelines from IMO).

#### *Subsection 1.3*

1. The amount of water that is assumed to accumulate on the deck can - in addition to the reduction according to Subsection 1.1 - be reduced for sailing in geographically restricted areas. Such areas are designated based on the significant wave height ( $h_s$ ) that delimits the area as defined in Article 5 of the Directive.
2. If the significant wave height  $h_s$  in the area in question is 1.5 m or less, it is assumed that no further water accumulates on the damaged ro-ro deck. If the significant wave height in the area is 4.0 m or more, the amount of water assumed to be accumulated is calculated as specified in Subsection 1.1. Intermediate values are calculated by linear interpolation (see Figure 3).
3. As the height  $h_w$  is kept constant, the amount of water added is variable, i.e. dependent on the angle of heel and whether the deck edge is submerged at the given angle of heel (see Figure 4). It should be noted that the compartments on the vehicle deck are assumed to have a fillability of 90% (cf. MSC/Circ. 649), while other water-filled compartments are assumed to have a fillability as prescribed by the Solas Convention.
4. If the calculations to demonstrate compliance with the requirements of the Directive are based on a significant wave height of less than 4.0 metres, the actual wave height shall be indicated on the ship's safety certificate.

#### *Subsection 1.4/1.5*

Instead of meeting the new stability requirements in Subsection 1.1 or 1.3, the administration may accept fulfilment of the requirements via modelling trials. The modelling trials are described in the annex of Appendix I. The guidelines for the modelling trials can be found in Part II of this Appendix.

#### *Subsection 1.6*

(KG or GM) limit curves conventionally calculated according to the Solas 90 standard will not necessarily be applicable in cases where water is assumed in the Directive to be present on the deck, and it may be necessary to revise the limit curve calculations taking into account the effects of this water. This requires a sufficient number of calculations at different depths and trims.

**Note:** Revised KG/GM limit curves can be derived by iteration, adding the minimum excess GM from leak stability calculations with water on deck to the KG (or subtracting it from the GM) used to calculate the damaged freeboard ( $f_r$ ) on which the amount of water on deck is based; this process is repeated until the excess GM becomes negligible.

It is expected that operators will begin such an iteration with the largest KG/smallest GM that can be reasonably accommodated during sailing, and then change the position of the bulkheads on deck to minimise the excess GM from leak stability calculations with water on deck.

#### *Subsection 2.1*

As in the conventional Solas damage requirements, bulkheads that lie within the B/5 line are considered intact in the event of a side impact.

### *Subsection 2.2*

If, for the purpose of complying with Regulation II-1/B/8, sponson tanks are fitted whereby the width of the ship B) And thus the distance B/5 from the ship's side is increased, this change must not result in the relocation of existing structural components or existing penetrations in watertight transverse bulkheads below the bulkhead deck (see Figure 5).

### *Subsection 2.3*

1. Transverse or longitudinal bulkheads/barriers fitted to restrict the movement of accumulated water on the damaged ro-ro deck need not be absolutely watertight. Minor leaks may be allowed provided that the drainage arrangements can prevent water from accumulating on the "other side" of the bulkhead/barrier. If scuppers do not work because there is no positive difference in water height, other means of passive drainage must be provided.
2. The height of the transverse and longitudinal bulkheads/barriers shall not be less than  $(8 \times hw)$  metres, where  $hw$  is the height of accumulated water calculated from the residual freeboard and the significant wave height (see Subsections 1.1 and 1.3). In all cases, these bulkheads/barriers must have a minimum height of
  - a) 2.2 metres, but at least
  - b) The height between the bulkhead deck and the lowest point of the underside of the intermediate or suspended vehicle deck when in the lowered position, if this height is greater. Note that any gaps between the top edge of the bulkhead and the underside of the cladding should be closed in the transverse or longitudinal direction, whichever is most appropriate (see Figure 6).

Bulkheads/barriers with a lower height than required above may be accepted if modelling trials carried out in accordance with Part II have confirmed that the second design ensures adequate survivability. When determining the height of bulkheads/barriers, it must be carefully considered that it must be sufficient to prevent continued filling within the relevant stability range. This extent cannot be narrowed down by modelling trials.

**Note :** The extension can be reduced to 10 degrees provided that the corresponding area under the curve is increased (cf. MSC 64/22).

### *Subsection 2.5.1*

Only permanent openings are included in area "A". It should be noted that bilge ports are not an appropriate option for ships that depend entirely or partially on superstructure buoyancy to fulfil the criteria. The requirement is that bilge ports must be fitted with closing flaps that prevent water from entering but allow water to drain out.

Such flaps must not depend on active impact. They must work automatically and it must be demonstrated that they do not significantly impede the outflow. Any significant reduction in efficiency must be compensated for by installing additional openings to fulfil the area requirement.

### *Subsection 2.5.2*

Bilge ports are only considered effective if the distance from the lower edge of the bilge port to the waterline in damaged condition is at least 1.0 metres. When calculating the minimum distance, the effects of any additional water on the deck should not be taken into account (see Figure 7).

#### *Subsection 2.5.3*

Bilge ports should be positioned as low as possible in the bulwark or outer plating. The lower edge of the bilge ports must not be more than 2 cm above the bulkhead deck and their upper edge no more than 0.6 metres above the bulkhead deck (see Figure 8).

**Note:** Compartments covered by Subsection 2.5, i.e. compartments fitted with bilge ports or similar openings, are not counted as intact compartments when calculating the intact stability and leakage stability curves.

#### *Subsection 2.6*

- 1) The extent of the required damage applies along the entire length of the ship. Depending on the subdivision standard, the damage may affect a bulkhead above the bulkhead deck, a bulkhead below the bulkhead deck, a combination of these or no bulkhead at all.
- 2) All transverse and longitudinal bulkheads/barriers that limit the assumed accumulated water volume shall be in place and secured throughout the voyage.
- 3) In cases where transverse bulkheads/barriers are damaged, the height of the accumulated water volume on deck is assumed to be the same on both sides of the damaged bulkhead/barrier,  $h_w$  (see Figure 9).

## PART II

### MODELLING TRIALS

The purpose of these guidelines is to ensure that consistent methods are used in the construction and verification of the model, and that experiments are performed and analysed consistently.

Subsections 1 and 2 of the Appendix to Appendix I are considered not to require further explanation.

#### **Subsection 3 – Ship model**

3.1. The material the model is made of is not important in itself, provided that the model is so rigid, both undamaged and damaged, that it has the same hydrostatic properties as the actual ship and that the bending of the hull in waves is negligible.

It is also important to ensure that the modelling of the damaged compartments is as accurate as practically possible so that the amount of water flowing in is correct.

As even small amounts of water entering the intact part of the model will affect its behaviour, precautions must be taken against such ingress.

In modelling trials with the worst Solas damage near the ends of the ship, it has been found that continued water filling is not possible as the water on the deck tends to accumulate near the damage

opening and flow out from there. Such models can survive in very heavy seas while capsizing in much smaller seas if they have less severe Solas damage that is not near either end; the 35% limit has been introduced to counteract this.

Extensive research to develop suitable criteria for new ships has clearly shown that GM and freeboard are parameters of great importance for the survivability of passenger ships, but that the area under the residual stability curve is also a crucial factor. Therefore, to fulfil the requirements in Subsection 3.1, the worst Solas damage should be selected as the damage that gives the smallest area under the residual stability curve.

### 3.2. Model details

3.2.1. Recognising that scale effects have a significant impact on the behaviour of the model during trials, it is important to ensure that such effects are as small as practically possible. The model should be as large as possible, as details in damaged compartments are easier to construct and scale effects are smaller in large models. It is therefore required that the model has a scale of at least 1:40 and a length of at least 3 metres.

Tests have found that the vertical extent of the model can affect the results of the dynamic tests. It is therefore required that the ship model is built to at least three times the standard height of superstructures above the bulkhead deck (freeboard deck) so that large waves do not break over the model.

3.2.2. The model should be as thin as practically possible at the point of damage so that the amount of water flowing in and its centre of gravity are correctly represented. The hull thickness should not exceed 4 mm. It is acknowledged that it may be impossible to construct the model hull and primary and secondary subdivision elements in sufficient detail at the point of failure, and that as a result of this limitation, it may not be possible to accurately calculate the assumed fill level of the compartment.

3.2.3. It is important that not only the draught in undamaged condition is checked, but also that the draught of the damaged model is measured accurately so that it can be compared with the draught found when calculating leak stability. For practical reasons, a tolerance of +2 mm is accepted on all draught values.

3.2.4. Once the post-wreck draught is measured, it may be necessary to adjust the degree of filling in the damaged compartments, either by inserting non-water-filled compartments or by adding weights. It is also important to ensure that the centre of gravity of the incoming water is represented correctly. In such cases, any adjustments should always be made in the direction of greater safety.

If the model is required to be fitted with barriers on the deck and the barriers are lower than the bulkhead heights listed below, CCTV cameras must be installed in the model to monitor whether water is overflowing or accumulating on the undamaged part of the deck. In this case, a video recording of the trial is included as part of the results material.

Transverse and longitudinal bulkheads which are taken into account as effective to contain the assumed accumulated sea water in the compartment concerned on the damaged ro-ro deck shall be at least 4 metres high unless the water height is less than 0.5 metres. In such cases, the height of the bulkheads can be calculated according to the following:

$$B_h = 8h_w$$

where  $B_h$  is the bulkhead height, and

$h_w$  is the water height.

The minimum height of the bulkhead must never be less than 2.2 metres. However, in the case of a ship with a suspended vehicle deck, the minimum height of the bulkhead must not be less than the height to the underside of the suspended deck when in the lowered position.

3.2.5. To ensure that the model's motion characteristics match those of the actual ship, it is important that the model is subjected to both heeling and rolling in an undamaged condition, so that the intact GM value and mass distribution are checked. Mass distribution is measured in air. The gyrations radius of the actual ship's transverse hull must be between 0.35B and 0.4B and its longitudinal hull gyrations radius between 0.2L and 0.25L.

*Note* : Heeling and rolling of the model in damaged condition is acceptable as a check of the residual stability curve, but such tests are not acceptable as a substitute for tests in undamaged condition.

3.2.6. It is assumed that the fans in the damaged compartment of the actual ship do not obstruct the water filling or the movement of the inflowing water. However, when attempting to scale down the ventilation arrangements on the actual ship, unwanted scale effects may appear in the model. To ensure that this is not the case, it is recommended that the ventilation systems are made to a different scale than the model to ensure that this does not affect the movement of water on the vehicle deck.

3.2.7. It is considered appropriate to use a damage shape that represents the cross-section of the colliding ship's bow. The angle of 15 degrees is determined based on an examination of the cross section of a representative sample of ships of different types and sizes at a distance of B/5 from the bow.

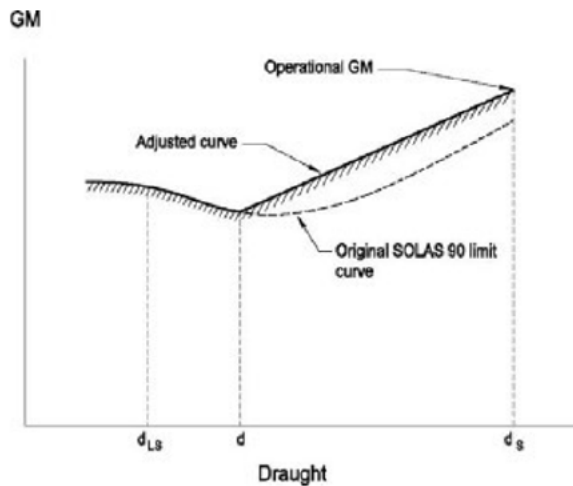
The isosceles triangle profile of the prism-shaped damage opening is located next to the loading waterline.

If the ship is fitted with side casings with a width of less than B/5, the damage length of such side casings must be at least 25 mm; this also avoids scale effects.

3.3. The original methodology for conducting model trials in Resolution 14 of the Solas 1995 conference did not take into account the heeling effect of the largest of the moments due to passenger entrainment, survival craft launching or wind pressure and turning, although this effect was included in Solas. However, a study has shown that it would be wise to take these effects into

account and in practice set a heeling of at least 1 degree against the damage. It should be noted that heeling due to turning was not considered relevant.

3.4. In cases where there is a margin between the GM of the actual loading condition and the GM limit curve (as determined by Solas 90), the administration can accept that this margin is taken advantage of in the modelling. In such cases, the GM limit curve must be adjusted. The adjustment can be made as follows:



$$d = d_S - 0.6 (d_S - d_{LS})$$

where  $d_S$  are the subdivision draught and  $d_{LS}$  is the lightship draught.

The adjusted curve is a straight line connecting the GM value used in the modelling trial at the subdivision depth and the intersection of the original Solas 90 curve and depth  $d$ .

#### **Subsection 4 - Method for the modelling trial**

##### **4.1. Wave spectra**

The JONSWAP spectrum should be used as it describes a sea state that is limited by the free distance and duration, which is similar to conditions across most of the globe. In this context, it is important that not only the peak period of the wave train is checked, but also that the zero-crossing period is correct.

The wave spectrum is required to be recorded and documented for each trial. The measurements for this record are taken at the probe closest to the wave generator.

It is also required that the model is instrumented so that both its movements (roll, pitch and yaw) and its orientation (roll, depression and trim) are monitored and recorded throughout the trial.

It has been found that it is not practical to set absolute limits for significant wave heights, peak periods and zero crossing periods in the wave spectra of the model. Therefore, an acceptable margin has been introduced.



4.2. To avoid interference between the mooring system and the dynamics of the ship, the measurement vehicle (to which the mooring system is attached) must follow the model at the same speed as the model actually drifts. In a sea with irregular waves, the model does not drift at a constant speed; if the measurement device travels at a constant speed, low-frequency oscillations with large amplitude will occur, which can affect the behaviour of the model.

4.3. A sufficient number of trials with different wave trains must be performed to ensure statistical reliability, the goal being to detect with a high degree of confidence that an unsafe ship will capsize under the given circumstances. To achieve a reasonable confidence level, ten single trials are considered a minimum.

#### **Subsection 5 - Survival criterion**

This subsection requires no further explanation.

#### **Subsection 6 - Trial approval**

The report to the administration must include the following documentation:

- a) Leakage stability calculations for worst Solas case and worst mid-ship damage (if different)
- b) The general arrangement of the model with construction details and instrumentation details
- c) Heeling tests and gyrations radius measurements
- d) Nominal and measured wave spectra (at the three different locations for the representative wave realisation, and for the trials with the model from the probe closest to the model)
- e) Representative data of the model's movements, orientation and operation
- f) Relevant video recordings.

*Note :*

All attempts must be witnessed by the administration.

### *APPENDIX III*

#### **INFORMATION TO BE INCLUDED IN THE NOTIFICATION**

Information to be reported in accordance with Article 6(2):

##### **I. General information**

- 1) Applicable stability requirements: Section A or Section B of Appendix I
- 2) Ship identification number (IMO number and call sign)
- 3) Main data

- 4) Overall aperture drawing
- 5) Number of people on board
- 6) BT
- 7) Does the ship have a port fore and aft: Yes/No
- 8) Does the ship have long low-lying cargo holds: Yes/No.

## **II. Specific information - for ro-ro passenger ships subject to the probability-based requirements set out in the SOLAS Convention**

- 1)  $d_i, d_p, d_s$
- 2) R – required index
- 3) Plan view (watertightness plan) of compartments with all internal and external openings, including connecting compartments, and the information used to measure the compartments, e.g. general arrangement drawing and tank plan. The longitudinal, transverse and vertical boundaries of the divisions must be included<sup>7)</sup>
- 4) Obtained classification index A with a summary table of all contributions for all damaged zones<sup>8)</sup> with a separate column with the achievable classification index ( $w \cdot p \cdot v$ )
- 5) For injury cases in one or two zones, the percentage of injury cases that were not investigated (i.e. cases not included in the factor ( $w \cdot p \cdot v$ )), where  $s = 0, s = 1$  and  $0 < s < 1$
- 6) For single or dual zone damage cases, the percentage of damage cases involving ro-ro cargo holds that were not investigated (i.e. cases not included in the factor ( $w \cdot p \cdot v$ )), where  $s = 0, s = 1$  and  $0 < s < 1$
- 7) For each damage contributing to the obtained classification index A, flooded compartment mapping, contributing value and factor " $s$ "<sup>9)</sup>
- 8) Detailed information on non-contributing damage ( $s = 0$  and  $p > 0$ ) for ro-ro passenger ships with long low-lying cargo holds, including all information on the calculated factors<sup>10)</sup>.

## **III. Specific information - for ro-ro passenger ships to which Appendix I, Section A applies**

- 1) Method of provision compliance:

- Modelling trials
- Calculations

Indicate whether the calculations of water on the deck are avoided, e.g. because the residual freeboard exceeds 2.0 m in all cases of damage: Yes/No.

- 2) Significant wave height according to Directive 2003/25/EC.

- 2) Directive (EU) 2017/2110 of the European Parliament and of the Council of 15 November 2017 on an inspection regime for the safe operation of regular ro-ro ferry and high-speed passenger craft services, amending Directive 2009/16/EC and repealing Council Directive 1999/35/EC (OJ L 315, 30.11.2017, p. 61).
- 3) Directive 2009/45/EC of the European Parliament and of the Council of 6 May 2009 on safety regulations and standards for passenger ships (OJ L 163, 25.6.2009, p. 1).
- 4) Directive (EU) 2023/946 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/25/EC as regards the inclusion of enhanced stability requirements and adapting it to the stability requirements defined by the International Maritime Organisation (OJ L 128, 15.5.2023, p. 1).
- 5) Directive 2009/16/EC of the European Parliament and of the Council of 23 April 2009 on port State control (OJ L 131, 28.5.2009, p. 57).
- 6) OJ L 123, 12.5.2016, p. 1.
- 7) This documentation shall be submitted to the administrations in accordance with Subsection 2.2 of the Appendix to IMO Resolution MSC. 429 (98).
- 8) This documentation shall be submitted to administrations in accordance with Subsection 2.3.1 of the Appendix to IMO Resolution MSC. 429 (98).
- 9) This documentation shall be submitted to administrations in accordance with Subsection 2.3.1 of the Appendix to IMO Resolution MSC. 429 (98).
- 10) This documentation is submitted to administrations in accordance with Subsection 2.3.1 of the Appendix to IMO Resolution MSC. 429 (98)

## Appendix 2

### Marine areas and the corresponding significant wave heights in Northern Europe

