
To: Relevant departments of the Headquarters of CCS, the Society's surveyors, Plan Approval Centers, related shipowners, ship management companies, shipyards and designers

Notice on Resolution MSC.436 (99)-Amendments to the International Convention for the Safety of Life at Sea, 1974, as Amended and Related Circulars Issued by IMO

1. Background

The Maritime Safety Committee of International Maritime Organization (IMO), at its ninety-ninth session, adopted the Resolution MSC.436(99)- *Amendments to the International Convention for the Safety of Life at Sea, 1974, as Amended*, on 24 May 2018. The amendments shall enter into force on 1 January 2020. With a view to providing additional guidance for the uniform implementation of SOLAS regulation II-1/8-1.3, IMO approved the *Revised Guidelines on Operational Information for Masters of Passenger Ships for Safe Return to Port* (MSC.1/Circ.1532.rev.1) and the *Guidelines on Operational Information for Masters in Case of Flooding for Passenger Ships Constructed before 1 January 2014* (MSC.1/Circ.1589).

2. Main content of MSC.436(99)

2.1 Revision of regulations SOLAS II-1/1.1.2 and II-1/2, as amended by resolution MSC.421 (98), makes it clear that all new passenger ships and existing passenger ships should comply with the requirements of regulations II-1/8-1.3. And the existing paragraph 1.3.4 is deleted.

2.2 Revision of regulation SOLAS II-1/8-1

.1 Adding II-1/8-1.3.2, passenger ships constructed before 1 January 2014 shall comply with the provisions in paragraph 3.1 not later than the first renewal survey after 1 January 2025.

.2 Revise the footnote of II-1/8-1.3.1 to clarify the guidance for each passenger ship:

1) refer to *Guidelines on operational information for Masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400) for ships constructed on or after 1 January 2014 but before 13 May 2016;

2) refer to *Revised Guidelines on operational information for masters of passenger ships for safe return to port* (MSC.1/Circ.1532/Rev.1) for ships constructed on or after 13 May 2016;

3) refer to *Guidelines on operational information for masters in case of flooding for passenger ships constructed before 1 January 2014* (MSC.1/Circ.1589).

2.3 Newly add the definition of “recognized mobile satellite service” in the Chapter IV, and synchronously amend all “Inmarsat” to “a recognized mobile satellite service”, including relevant certificate in the Appendix.

3 Related Circulars

3.1 The *Revised Guidelines on Operational Information for Masters of Passenger Ships for Safe Return to Port* (MSC.1/Circ.1532/Rev.1) updated the guidelines for regulation II-1/8-1.3 of the SOLAS as amended by resolution MSC.436(99).

3.2 The newly formulated *Revised Guidelines on Operational Information for Masters of Passenger Ships for Safe Return to Port and the Guidelines on Operational Information for Masters in Case of Flooding for Passenger Ships Constructed Before 1 January 2014* (MSC.1/Circ.1589) provided additional guidance for the uniform implementation of SOLAS regulation II-1/8-1.3, as amended by resolution MSC.436(99), for passenger ships constructed before 1 January 2014. The relevant information required when there is an onboard stability computer or a shore-based support is specified.

3.3 These Guidelines should be kept in abeyance until the date of entry into force of the amendments to SOLAS regulation II-1/8-1.3 adopted by resolution MSC.436(99), i.e. 1 January 2020.

This Notice is made public on CCS website (www.ccs.org.cn), and is to be distributed to relevant ship owner and shipping management companies by CCS branches within their responsible areas. Please contact Technical Management Department of CCS for any inquiry in the implementation. E-mail address: rt@ccs.org.cn.

Annex 1: MSC.436(99)- Amendments to the International Convention for the Safety of Life at Sea, 1974, as amended

Annex 2: MSC.1/Circ.1532/Rev.1-Revised Guidelines on Operational Information for Masters of Passenger Ships for Safe Return to Port

Annex 3: MSC.1/Circ.1589-Revised Guidelines on Operational Information for Masters of Passenger Ships for Safe Return to Port and the Guidelines on Operational Information for Masters in Case of Flooding for Passenger Ships Constructed Before 1 January 2014

ANNEX 1

**RESOLUTION MSC.436(99)
(adopted on 24 May 2018)**

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

THE MARITIME SAFETY COMMITTEE,

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

RECALLING ALSO article VIII(b) of the International Convention for the Safety of Life at Sea (SOLAS), 1974 ("the Convention"), concerning the amendment procedure applicable to the annex to the Convention, other than to the provisions of chapter I,

RECALLING FURTHER resolution MSC.421(98), by which it adopted, inter alia, amendments to regulations II-1/1 and II-1/8-1 of the Convention,

HAVING CONSIDERED, at its ninety-ninth session, amendments to the Convention, proposed and circulated in accordance with article VIII(b)(i) of the Convention,

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

2 AGREES that the amendments to regulations II-1/1 and II-1/8-1 of the Convention, as adopted by resolution MSC.421(98), shall be superseded by the amendments to regulations II-1/1 and II-1/8-1 of the Convention, set out in the annex to the present resolution;

3 DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that said amendments shall be deemed to have been accepted on 1 July 2019, 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% of the gross tonnage of the world's merchant fleet, have notified the Secretary-General of their objections to the amendments;

4 INVITES Contracting Governments to the Convention to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2020 upon their acceptance in accordance with paragraph 2 above;

5 REQUESTS the Secretary-General, for the purposes of 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 Convention;

6 REQUESTS ALSO the Secretary-General to transmit copies of this resolution and its annex to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

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

**CHAPTER II-1
CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND
ELECTRICAL INSTALLATIONS**

**PART A
GENERAL**

Regulation 1 – Application

1 The following new paragraphs 1.1.1 and 1.1.2 are inserted after the existing paragraph 1.1:

"1.1.1 Unless expressly provided otherwise, parts B, B-1, B-2 and B-4 of this chapter shall only apply to ships:

- .1 for which the building contract is placed on or after 1 January 2020;
or
- .2 in the absence of a building contract, the keel of which is laid or
which are at a similar stage of construction on or after 1 July 2020;
or
- .3 the delivery of which is on or after 1 January 2024.

1.1.2 Unless expressly provided otherwise, for ships not subject to the provisions of sub-paragraph 1.1.1 but constructed on or after 1 January 2009, the Administration shall:

- .1 ensure that the requirements for parts B, B-1, B-2 and B-4 which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.216(82), MSC.269(85) and MSC.325(90) are complied with; and
- .2 ensure that the requirements of regulations 8-1.3 and 19-1 are complied with."

2 The existing paragraph 1.3.4 is deleted.

3 The existing paragraph 2 is replaced with the following:

"2 Unless expressly provided otherwise, for ships constructed before 1 January 2009, the Administration shall:

- .1 ensure that the requirements which are applicable under chapter II-1 of the International Convention for the Safety of Life at Sea, 1974, as amended by resolutions MSC.1(XLV), MSC.6(48), MSC.11(55), MSC.12(56), MSC.13(57), MSC.19(58), MSC.26(60), MSC.27(61), Resolution 1 of the 1995 SOLAS Conference, MSC.47(66), MSC.57(67), MSC.65(68), MSC.69(69), MSC.99(73), MSC.134(76), MSC.151(78) and MSC.170(79) are complied with; and
- .2 ensure that the requirements of regulations 8-1.3 and 19-1 are complied with."

PART B-1 STABILITY

Regulation 8-1 – System capabilities and operational information after a flooding casualty on passenger ships

4 The existing text of regulation 8-1 is amended to read as follows:

"1 Application

Passenger ships having length, as defined in regulation II-1/2.5, of 120 m or more or having three or more main vertical zones shall comply with the provisions of this regulation.

2 Availability of essential systems in case of flooding damage*

A passenger ship shall be designed so that the systems specified in regulation II-2/21.4 remain operational when the ship is subject to flooding of any single watertight compartment.

3 Operational information after a flooding casualty

3.1 For the purpose of providing operational information to the master for safe return to port after a flooding casualty, passenger ships, as specified in paragraph 1, shall have:

- .1 an onboard stability computer; or
- .2 shore-based support,

based on the guidelines developed by the Organization.**

3.2 Passenger ships constructed before 1 January 2014 shall comply with the provisions in paragraph 3.1 not later than the first renewal survey after 1 January 2025.

* Refer to the *Interim Explanatory Notes for the assessment of passenger ship systems' capabilities after a fire or flooding casualty* (MSC.1/Circ.1369).

** Refer to the *Guidelines on operational information for Masters of passenger ships for safe return to port by own power or under tow* (MSC.1/Circ.1400) for ships constructed on or after 1 January 2014 but before 13 May 2016, or the *Revised Guidelines on operational information for masters of passenger ships for safe return to port* (MSC.1/Circ.1532/Rev.1) for ships constructed on or after 13 May 2016, or the *Guidelines on operational information for masters in case of flooding for passenger ships constructed before 1 January 2014* (MSC.1/Circ.1589)."

CHAPTER IV RADIOCOMMUNICATIONS

PART A GENERAL

Regulation 2 – Terms and definitions

5 In paragraph 1, the existing sub-paragraph .16 is amended and new sub-paragraph .17 is added as follows:

".16 *Global maritime distress and safety system (GMDSS) identities* means maritime mobile services identity, the ship's call sign, recognized mobile satellite service identities and serial number identity which may be transmitted by the ship's equipment and used to identify the ship.

.17 *Recognized mobile satellite service* means any service which operates through a satellite system and is recognized by the Organization, for use in the global maritime distress and safety system (GMDSS)."

PART C SHIP REQUIREMENTS

Regulation 7 – Radio equipment: General

6 In paragraph 1, the existing sub-paragraph .5 is amended to read as follows:

".5 a radio facility for reception of maritime safety information by a recognized mobile satellite service enhanced group calling system if the ship is engaged in voyages in sea area A1, or A2 or A3 but in which an international NAVTEX service is not provided. However, ships engaged exclusively in voyages in areas where an HF direct-printing telegraphy maritime safety information service is provided and fitted with equipment capable of receiving such service, may be exempt from this requirement.*

* Refer to the *Recommendation on promulgation of maritime safety information* adopted by the Organization by resolution A.705(17), as amended."

Regulation 8 – Radio equipment: Sea area A1

7 In paragraph 1, the existing sub-paragraph .5 is amended to read as follows:

"5 through a recognized mobile satellite service; this requirement may be fulfilled by:

.5.1 a ship earth station;* or

.5.2 the satellite EPIRB, required by regulation 7.1.6, either by installing the satellite EPIRB close to, or by remote activation from, the position from which the ship is normally navigated.

* This requirement can be met by recognized mobile satellite service ship earth stations capable of two-way communications, such as Fleet-77 (resolutions A.808(19) and MSC.130(75)) or Inmarsat-C (resolution A.807(19), as amended) ship earth stations. Unless otherwise specified, this footnote applies to all requirements for a recognized mobile satellite service ship earth station prescribed by this chapter."

Regulation 9 – Radio equipment: Sea areas A1 and A2

8 In paragraph 1, the existing sub-paragraph .3.3 is amended to read as follows:

".3.3 through a recognized mobile satellite service by a ship earth station."

9 In paragraph 3, the existing sub-paragraph .2 is amended to read as follows:

".2 a recognized mobile satellite service ship earth station."

Regulation 10 – Radio equipment: Sea areas A1, A2 and A3

10 In paragraph 1, the existing chapeau of sub-paragraph .1 is amended to read as follows:

".1 a recognized mobile satellite service ship earth station capable of:".

11 In paragraph 1, the existing sub-paragraph .4.3 is amended to read as follows:

".4.3 through a recognized mobile satellite service by an additional ship earth station."

12 In paragraph 2, the existing sub-paragraph .3.2 is amended to read as follows:

".3.2 through a recognized mobile satellite service by a ship earth station; and".

Regulation 12 – Watches

13 In paragraph 1, the existing sub-paragraph .4 is amended to read as follows:

".4 for satellite shore-to-ship distress alerts, if the ship, in accordance with the requirements of regulation 10.1.1, is fitted with a recognized mobile satellite service ship earth station."

Regulation 13 – Sources of energy

- 14 In paragraph 2, the word "Inmarsat" is deleted from the second sentence.

**APPENDIX
CERTIFICATES**

RECORD OF EQUIPMENT FOR PASSENGER SHIP SAFETY (FORM P)

- 15 In section 3, the existing description of item 1.4 is amended to read as follows:
"Recognized mobile satellite service ship earth station".

RECORD OF EQUIPMENT FOR CARGO SHIP SAFETY RADIO (FORM R)

- 16 In section 2, the existing description of item 1.4 is amended to read as follows:
"Recognized mobile satellite service ship earth station".

RECORD OF EQUIPMENT FOR CARGO SHIP SAFETY (FORM C)

- 17 In section 3, the existing description of item 1.4 is replaced by the following:
"Recognized mobile satellite service ship earth station".

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1532/Rev.1
24 May 2018

**REVISED GUIDELINES ON OPERATIONAL INFORMATION FOR MASTERS
OF PASSENGER SHIPS FOR SAFE RETURN TO PORT***

1 The Maritime Safety Committee, at its ninety-sixth session (11 to 20 May 2016), having considered a proposal by the Sub-Committee on Ship Design and Construction, at its third session, approved the *Revised guidelines on operational information for masters of passenger ships for safe return to port* to provide additional guidance for the uniform implementation of SOLAS regulation II-1/8-1.3.

2 The Maritime Safety Committee, at its ninety-ninth session (16 to 25 May 2018), approved the revision of the *Revised guidelines on operational information for masters of passenger ships for safe return to port* (MSC.1/Circ.1532), as set out in the annex, updating the references to the paragraphs of SOLAS regulation II-1/8-1.3 amended by resolution MSC.436(99).

3 Member States are invited to apply the annexed Revised guidelines to passenger ships constructed on or after 13 May 2016 and to bring them to the attention of owners of passenger ships, operators and all other parties concerned.

* In accordance with the decision of MSC 99 (MSC 99/22, paragraph 3.81.6), these Guidelines should be kept in abeyance until the date of the entry into force of the amendments to SOLAS regulation II-1/8-1.3 adopted by resolution MSC.436(99), i.e. 1 January 2020.

ANNEX

REVISED GUIDELINES ON OPERATIONAL INFORMATION FOR MASTERS OF PASSENGER SHIPS FOR SAFE RETURN TO PORT

General

1 When an onboard stability computer is provided in accordance with regulation II-1/8-1.3.1.1, the system referred to in these Guidelines should comprise an onboard stability computer capable of receiving and processing manual and electronic data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty. Two-way communication links to shore-based support should also be available to provide the master with post-damage residual structural strength information.

2 When shore-based support is provided in accordance with regulation II-1/8-1.3.1.2, the system referred to in these Guidelines should comprise two-way communication links to the shore-based support with a stability computer capable of receiving and processing manual and electronic data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty. In addition, the shore-based support should also have the capability to provide the master with post-damage residual structural strength information.

3 The stability computers should utilize software with the following capabilities:

Using the pre-damage loading condition, software calculating the residual damage stability following any flooding casualty by processing data from both manual entry and from sensor readings to compute operational information required by the master using an accurate and detailed computer model of the entire hull, including superstructures and appendages, all internal compartments and tanks, etc. together with up-flooding/down-flooding points, cross-flooding arrangements, escape routes, ship profile and watertight door status (i.e. open or closed).

System overview

4 At least two independent stability computers should be available at all times (either two onboard, or two through shore-based support, or one each), which are capable of receiving and processing the data necessary to provide operational information to the master.

5 The onboard system should have an uninterruptible power supply (UPS) connected to both main and emergency switchboards.

Input

6 The system should be pre-loaded with a detailed computer model of the complete hull, including appendages, all compartments, tanks and the relevant parts of the superstructure considered in the damage stability calculation, wind profile, down-flooding and up-flooding openings, cross-flooding arrangements, internal compartment connections and escape routes. Each internal space should be assigned its standard regulation II-1/7-3 permeability, unless a more accurate permeability has been calculated.

7 The system should utilize the latest approved lightship weight and centre of gravity information.

8 Details of the damage location(s) and extent(s) or the damaged compartments should be input manually by the ship's staff and combined with data from electronic sensors such as draught gauges, tank level devices, watertight door indicators and flooding level sensors.

9 If it is considered at any time that a sensor or sensors are faulty, or have been damaged, the ship's staff should be able to override the sensor data with manual data. The system should clearly indicate to the operator if a sensor that should be available is being manually overridden.

10 The system should always be updated to the current loading condition which will form the basis of any damage stability calculation.

Calculation methods

The system should:

11 Utilize software (see paragraph 3) capable of analysing the damage stability following any real flooding casualty including multi-compartment, non-linked breaches.

12 Use the actual pre-damage loading state obtained from the routine operations mode.

13 Be capable of accounting for applied moments such as wind, lifeboat launching, cargo shifts and passenger relocation.

14 Account for the effect of wind by using the method in regulation II-1/7-2.4.1.2 as the default, but allow for manual input of the wind speed/pressure if the on-scene pressure is significantly different ($P = 120 \text{ N/m}^2$ equates to Beaufort 6; approximately 13.8 m/s or 27 knots).

15 Be capable of assessing the impact of open main watertight doors on stability.

16 Have the capability of using the same detailed hull model for damage control drills or to assess potential damage and stability scenarios during a flooding casualty. This should not interfere with the ability of the onboard computer or shore-based support to monitor the actual situation and provide operational information to the master.

Output

17 The system should output the residual GZ curve both graphically and numerically. It should also provide the following information: draught (forward, midships and aft), trim, heel angle, GZ max, GZ range, angle of vanishing stability, down-flooding immersion angles and escape route immersion angles.

18 The output format and units of the information supplied by the ship's staff or shore-based support team should be consistent with the format and units of the approved stability booklet in order to facilitate easy comparison. The output should be within the tolerances specified in the *Guidelines for the approval of stability instruments* (MSC.1/Circ.1229).

19 The system should show a profile view, deck views and cross-sections of the ship, indicating the flooded water-plane and the damaged compartments.

Other issues

20 An operation manual should be provided for the system software printed in a language in which the ship's staff are fully conversant. The manual should also indicate the limitations of the system.

21 At least two crew members should be competent in the operation of the system including the communication links to the shore-based support. They should be capable of interpreting the output of the system in order to provide the required operational information to the master.

22 When shore-based support is provided in accordance with regulation II-1/8-1.3.1.2, there should be a contract for the supply of shore-based support at all times during the validity of the ship's certificate.

23 When shore-based support is provided in accordance with regulation II-1/8-1.3.1.2, the shore-based support should be manned by adequately qualified persons with regard to stability and ship strength; no less than two qualified persons should be available to be on call at all times.

24 When shore-based support is provided in accordance with regulation II-1/8-1.3.1.2, the shore-based support should be operational within one hour (i.e. with the ability to input details of the condition of the ship, including structural damage, as instructed).

Strength

25 The system should have the capability of two-way communication with the shore-based team with an agreed method of specifying and transmitting details of structural loss and/or degradation.

26 The strength aspects of the shore-based computer should be in compliance with the requirements of a classification society which is recognized by the Administration.

Ro-ro passenger ships

27 There should be algorithms in the software for estimating the effect of water accumulation on deck (WOD).

Approval and testing

28 The stability aspects of the system should be initially approved and periodically checked against validated test conditions based on a number of loading/damage scenarios from the approved stability information book to ensure that it is operating correctly and that the stored data has not been subject to unauthorized alteration.

Limitations of the system

29 The system is not intended to compute transient asymmetrical flooding whereby the ship could capsize under the immediate inrush of floodwater before there is time for equalization measures to take effect.

30 The system is not intended to make any allowance for the motion of the ship in a seaway, including the effects of tide, current or wave action.

Equivalence

31 Equivalent arrangements for the provision of operational information to the master following a flooding casualty may be employed to the satisfaction of the Administration.

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1589
24 May 2018

**GUIDELINES ON OPERATIONAL INFORMATION FOR MASTERS IN CASE OF FLOODING
FOR PASSENGER SHIPS CONSTRUCTED BEFORE 1 JANUARY 2014***

1 The Maritime Safety Committee, at its ninety-ninth session (16 to 25 May 2018), having considered a proposal made by the Sub-Committee on Ship Design and Construction at its fifth session, approved the *Guidelines on operational information for masters in case of flooding for passenger ships constructed before 1 January 2014*, as set out in the annex, with a view to providing additional guidance for the uniform implementation of SOLAS regulation II-1/8-1.3, as amended by resolution MSC.436(99), for passenger ships constructed before 1 January 2014.

2 Member States are invited to apply the annexed Guidelines to passenger ships constructed before 1 January 2014; and bring them to the attention of owners and operators of passenger ships, and all other parties concerned.

* In accordance with the decision of MSC 99 (MSC 99/22, paragraph 3.81.6), these Guidelines should be kept in abeyance until the date of entry into force of the amendments to SOLAS regulation II-1/8-1.3 adopted by resolution MSC.436(99), i.e. 1 January 2020.

ANNEX

GUIDELINES ON OPERATIONAL INFORMATION FOR MASTERS IN CASE OF FLOODING FOR PASSENGER SHIPS CONSTRUCTED BEFORE 1 JANUARY 2014

General

1 When an onboard stability computer is provided in accordance with SOLAS regulation II-1/8-1.3.1.1, the system referred to in these Guidelines should comprise an onboard stability computer capable of receiving and processing data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty.

2 When shore-based support is provided in accordance with SOLAS regulation II-1/8-1.3.1.2, the system referred to in these Guidelines should comprise two-way communication links to the shore-based support with a stability computer capable of receiving and processing data to provide the master with regularly updated operational information on the residual damage stability of the ship after a flooding casualty.

3 Stability computer software should use an accurate and detailed computer model of the entire hull, the pre-damage loading condition and the status of the watertight doors to calculate the residual damage stability following any flooding casualty by processing data to provide operational information required by the master.

System overview

4 At least two independent stability computers should be available at all times (either two on board, or two through shore-based support, or one of each), which are capable of receiving and processing the data necessary to provide operational information to the master.

5 The onboard system should have an uninterruptible power supply (UPS) connected to both the main and the emergency switchboards.

Input

6 The system should be pre-loaded with a detailed computer model of the complete hull including:

- .1 appendages, compartments, tanks and the relevant parts of the superstructure considered in the damage stability calculation;
- .2 wind profile;
- .3 openings generating progressive flooding;
- .4 internal compartment connections;
- .5 cross-flooding arrangements; and
- .6 escape routes or margin line (where applicable).

Each internal space should be assigned the same permeability used in the approved damage stability calculations, unless a more accurate permeability has been calculated.

7 The system should utilize the latest approved lightship weight and centre of gravity information.

8 Details of the damage location(s) and extent(s) or the damaged compartments should be input manually and combined with data from electronic sensors such as draught gauges, tank level devices, watertight door indicators and flooding level sensors, when available.

9 When electronic sensors providing direct data inputs are fitted, if it is considered at any time that a sensor or sensors are faulty, or have been damaged, it should be possible to override the sensor data with manually input data. The system should clearly indicate to its operator if a sensor that should be available is being manually overridden.

10 The system should be updated with the loading condition before the voyage commences and on a daily basis during navigation.

Calculation methods

11 The system should:

- .1 utilize software capable of analysing the damage stability following any real flooding casualty including multi-compartment, non-linked breaches (see also paragraph 3 above);
- .2 use the actual pre-damage loading condition;
- .3 be capable of accounting for applied moments such as wind, lifeboat launching, cargo shifts and passenger relocation;
- .4 account for the effect of wind by using the method in SOLAS regulation II-1/7-2.4.1.2 as the default, but allow for manual input of the wind speed/pressure if the on-scene pressure is significantly different ($P = 120 \text{ N/m}^2$ equates to Beaufort 6, i.e. approximately 13.8 m/s or 27 knots);
- .5 be capable of assessing the impact of open watertight doors on stability; and
- .6 have the capability of using the same detailed hull model for damage control drills or to assess potential damage and stability scenarios during a flooding casualty. This should not interfere with the ability of the onboard computer or shore-based support to monitor the actual situation and provide operational information to the master.

Output

12 The system should output the residual GZ curve both graphically and numerically. It should also provide the following information:

- .1 draughts (forward, amidships and aft);
- .2 trim;
- .3 heel angle;
- .4 GZ_{\max} ;

- .5 GZ range;
- .6 angle of vanishing stability;
- .7 down-flooding immersion angles; and
- .8 immersion angles of escape routes or margin line (where applicable).

13 The output format and units of the information supplied to the operators of the system should be consistent with the format and units of the approved stability booklet in order to facilitate easy comparison. The output should be within the tolerances specified in the *Guidelines for the approval of stability instruments* (MSC.1/Circ.1229). Deviation from these tolerances should not be accepted unless there is an explanation satisfactory to the Administration.

14 The system should show a profile view, deck views and cross-sections of the ship indicating the flooded water-plane and the damaged compartments.

Other issues

15 An operation manual should be provided for the system software, printed in a language in which the operators of the system are fully conversant. The manual should also indicate the limitations of the system.

16 At least two crew members should be competent in the operation of the system including the communication links to the shore-based support, when provided. They should be capable of interpreting the output of the system in order to provide the required operational information to the master.

17 When shore-based support is provided in accordance with SOLAS regulation II-1/8-1.3.1.2:

- .1 there should be a contract for the supply of shore-based support at all times during the validity of the Passenger Ship Safety Certificate;
- .2 the shore-based support should be manned by adequately qualified persons with regard to stability, i.e. no less than two qualified persons should be available to be on call at all times; and
- .3 the shore-based support should be operational within one hour (i.e. with the ability to input details of the condition of the ship, as instructed).

Ro-ro passenger ships

18 If applicable, there should be algorithms in the software for estimating the effect of water accumulation on deck.

Approval and testing

19 The stability aspects of the system should be initially approved and periodically checked against validated test conditions based on a number of loading/damage scenarios from the approved stability information book to ensure that it is operating correctly and that the stored data has not been subject to unauthorized alteration.

Limitations of the system

20 The system is not intended to compute transient asymmetrical flooding whereby the ship could capsize under the immediate inrush of floodwater before there is time for equalization measures to take effect.

21 The system is not intended to make any allowance for the motion of the ship in a seaway, including the effects of tide, current or wave action.

Equivalence

22 Equivalent arrangements to the provisions in these Guidelines may be employed to the satisfaction of the Administration.

Ships fitted with onboard damage stability computers before required by SOLAS regulation II-1/8-1.3

23 The Administration should be advised by the company, as defined in SOLAS regulation IX/1.2, of any ships fitted with systems before they are required by SOLAS regulation II-1/8-1.3, which may not fully comply with these Guidelines, to allow for a decision to be made on what further action, if any, is necessary. As a minimum, the system should have the functionality described under "Calculation methods" (see paragraph 11), "Output" (see paragraphs 12 to 14) and, if applicable, "Ro-ro passenger ships" (see paragraph 18).
