INTERNATIONAL MARITIME ORGANIZATION

E

SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION
8th session
Agenda item 13

SDC 8/13
15 October 2021
Original: ENGLISH
Pre-session public release: ☒

REVISION OF THE PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS (RESOLUTION MSC.188(79))

Proposed amendments to resolution MSC.188(79)

Submitted by Belgium, United States and IACS

SUMMARY

Executive summary:	This document proposes amendments to the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers* (resolution MSC.188(79)) to take into account relevant changes to SOLAS since the adoption of resolution MSC.188(79) on 3 December 2004
Strategic direction, if applicable:	6
Output:	6.43
Action to be taken:	Paragraph 7
Related document:	MSC 103/3/4

Background

1 The Maritime Safety Committee (MSC), at its 102nd session, considered the draft amendments to SOLAS chapter II-1 which will include requirements for water level detectors on non-bulk carrier cargo ships with multiple cargo holds, other than tankers. MSC 103 adopted the above SOLAS amendments by resolution MSC.482(103) with the entry into force date of 1 January 2024.

2 During the period of consideration of the draft amendments, the co-sponsors of this document submitted document MSC 103/3/4, proposing to revise the *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers* (resolution MSC.188(79)) as a consequence of the adoption of the new SOLAS regulation II-1/25-1.

3 MSC 103, having considered document MSC 103/3/4, identifying parts of resolution MSC.188(79) requiring consequential amendment, agreed to:

.1 extend the scope of the output and change its title to "Revision of the Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers (resolution MSC.188(79))";

.2 instruct the SDC Sub-Committee to review the Performance Standards to include provisions for detectors for multiple hold cargo ships and to consider the equivalency between bilge alarms and water level detectors; and

.3 extend the target completion year for the output to 2022.

Discussion

4 The co-sponsors have carefully considered the current *Performance standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers* (resolution MSC.188(79)), the new SOLAS regulation II-1/25-1 and concerns presented in document MSC 103/3/4.

5 During that review, the co-sponsors identified that the following amendments were considered necessary:

.1 the heading of the annex and the appendix to resolution MSC.188(79) needed to refer to all ship types covered by the relevant SOLAS regulations;

.2 references to specific SOLAS regulations required to be updated in paragraphs 1 and 2.1 of the annex and paragraph 1 of the appendix to resolution MSC.188(79); consequently, related footnotes were deleted;

.3 references to specific SOLAS regulations in paragraph 2.4 of the annex to resolution MSC.188(79) were deleted;

.4 a text was needed to refer to multiple cargo holds of cargo ships in paragraphs 1 and 4 of the annex and paragraph 1 of the appendix to resolution MSC.188(79);

.5 paragraph 3.2.5 of the annex to resolution MSC.188(79) was amended to cover intrinsic safety requirements in more detail;

.6 reference to the Code on Alarms and Indicators, 1995, in paragraph 3.3.2 of the annex to resolution MSC.188(79) was updated to refer to the Code on Alerts and Indicators, 2009;

.7 to cover operation in low temperatures, a new paragraph 3.4.1*bis* was added to the annex and new paragraphs 2.1.3 and 4.1.5*bis* were added to the appendix to resolution MSC.188(79);

.8 a new section 5 in the annex and paragraph 4.2 in the appendix to resolution MSC.188(79) were provided to address situations when bilge level alarms are used as water level detectors;

.9 paragraph 2.1.2 of the appendix to resolution MSC.188(79) was amended to clarify the location of electrical equipment;

.10 new paragraphs 2.2.1*bis* and 2.2.1*ter* were included in the appendix to clarify where the height of the water level detector is measured from when a lining or insulation is fitted to a hold;

.11 paragraph 2.2.5 of the appendix to resolution MSC.188(79) was amended to include sensors; and

.12 the word "preset" was changed to read "pre-set" in paragraph 3.2.1 of the annex and paragraph 2.1.1 of the appendix to resolution MSC.188(79).

Proposal

6 The co-sponsors have prepared the revised version of resolution MSC.188(79) contained in the annex to this document for consideration by the Sub-Committee. Throughout the text tracked changes indicate "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.

Action requested of the Sub-Committee

7 The Sub-Committee is invited to consider the foregoing, the proposed amendments in the annex and to take action, as appropriate.

***

ANNEX

DRAFT REVISIONS TO THE ANNEX TO RESOLUTION MSC.188(79)

PERFORMANCE STANDARDS FOR WATER LEVEL DETECTORS ON ~~BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS~~ SHIPS SUBJECT TO SOLAS REGULATIONS II-1/25, II-1/25-1 AND XII/12

1 PURPOSE

These standards provide technical functional requirements for water level detection and alarm arrangements installed in bulk carriers for compliance with SOLAS regulation XII/12 or in single hold cargo ships other than bulk carriers for compliance with SOLAS regulation II-1/~~23-3~~25.~~*~~

They also provide technical functional requirements for water level detection and alarm arrangements installed in multiple hold cargo ships other than bulk carriers and tankers for compliance with SOLAS regulation II-1/25-1.

2 DEFINITIONS

2.1 *Water level detector* means a system comprising sensors and ~~indication devices~~ alarms that detect and warn of water ingress in cargo holds and other spaces as required in SOLAS regulations ~~XII/12.1 or~~ II-1/~~23-3~~25, II-1/25-1 or XII/12.1.

2.2 *Sensor* means a unit fitted at the location being monitored that activates a signal to identify the presence of water at the location.

2.3 *Pre-alarm level* means the lower level at which the sensor(s) in the cargo hold space will operate.

2.4 *Main alarm level* means the higher level at which the sensor(s) in the cargo hold space will operate or the sole level in spaces other than cargo holds ~~to which the requirements of SOLAS regulations XII/12 or II-1/23-3 apply~~.

2.5 *Visual indication* means indication by activation of a light or other device that is visible to the human eye in all levels of light or dark at the location where it is situated.

2.6 *Audible indication* means an audible signal that is detectable at the location where it is signalled.

3 FUNCTIONAL REQUIREMENTS

3.1 Means of detecting the water level

3.1.1 The method of detecting the water level may be by direct or indirect means as defined below:

.1 A direct means of detection determines the presence of water by physical contact of the water with the detection device.

~~* Refer to the third, fourth and fifth preambular paragraphs of the covering MSC resolution.~~

.2 Indirect means of detection include devices without physical contact with the water.

3.1.2 The sensors should be capable of being located~~, in the case of single hold cargo ships complying with SOLAS regulation II-1/23-3,~~ in the aft part of the hold or above its lowest point in such ships having an inner bottom not parallel to the designed waterline, or, in the case of bulk carriers complying with SOLAS regulation XII/12, in the aft part of each cargo hold or in the lowest part of the spaces other than cargo holds to which that regulation applies.

3.1.3 The systems of detecting the water level should be capable of continuous operation while the ship is at sea.

3.2 Detector system requirements

3.2.1 Detector systems should provide a reliable indication of water reaching a ~~preset~~ pre-set level.

3.2.2 The system should be capable of the following:

For cargo holds:

.1 An alarm, both visual and audible, activated when the depth of water at the sensor reaches the pre-alarm level in the space being monitored. The indication should identify the space.

.2 An alarm, both visual and audible, activated when the level of water at the sensor reaches the main alarm level, indicating increasing water level in a cargo hold. The indication should identify the space and the audible alarm should not be the same as that for the pre-alarm level.

For compartments other than cargo holds:

.3 An alarm, both visual and audible, indicating the presence of water in a compartment other than a cargo hold when the level of water in the space being monitored reaches the sensor. The visual and audible characteristics of the alarm indication should be the same as those for the main alarm level in a hold space.

3.2.3 Detection equipment should be suitably corrosion resistant for all intended cargoes.

3.2.4 The detector indicating the water level should be capable of activating to an accuracy of ±100 mm.

3.2.5 Detection equipment should be of certified safe type appropriate for the intended cargoes. The part of the system which has circuitry in the cargo area should be intrinsically safe or explosion proof with appropriate apparatus group and temperature class which is to be determined depending on the cargo carried.

3.3 Alarm system requirements

3.3.1 The visual and audible alarms should be suitable for location on the navigation bridge.*

* Reference is made to the requirements of SOLAS regulations V/17 and V/18.

3.3.2 Visual and audible alarms should conform to the Code on Alerts and Indicators, 2009~~Alarms and Indicators, 1995~~, as may be amended, as applicable to a primary alarm for the preservation or safety of the ship.

3.3.3 The visual and audible alarms should be capable of the following:

.1 Visual indication using a light of a distinct colour, or digital display that is clearly visible in all expected light levels, which does not seriously interfere with other activities necessary for the safe operation of the ship. The visual indication should be capable of remaining visible until the condition activating it has returned below the level of the relevant sensor. The visual indication should not be capable of being extinguished by the operator.

.2 In conjunction with the visual indication for the same sensor, the system should be capable of providing audible indication and alarms in the space in which the indicator is situated. The audible indication should be capable of being muted by the operator.

3.3.4 Time delays may be incorporated into the alarm system to prevent spurious alarms due to sloshing effects associated with ship motions.

3.3.5 The system may be provided with a capability of overriding indication and alarms for the detection systems installed only in tanks and holds that have been designed for carriage of water ballast (SOLAS regulation XII/12.1).

3.3.6 An override visual indication capability should be provided throughout deactivation of the water level detector for the holds or tanks referred to in 3.3.5 above. Where such an override capability is provided, cancellation of the override condition and reactivation of the alarm should automatically occur after the hold or tank has been de-ballasted to a level below the lowest alarm indicator level.

3.3.7 Requirements for malfunctions, alarms and indications should include a facility for continuous monitoring of the system which, on detecting a fault, activates a visual and audible alarm. The audible alarm should be capable of being muted, but the visual indication should remain active until the malfunction is cleared.

3.3.8 The water level detector system should be capable of being supplied with electrical power from two independent electrical supplies. Failure of the primary electrical power supply should be indicated by an alarm.

3.4 Testing

3.4.1 Water level detector systems should be type tested to demonstrate their robustness and suitability under the appropriate internationally recognized conditions.*

3.4.1*bis* Water level detector systems should be type tested to demonstrate their continued functioning under the expected service temperature.

* With regard to testing, reference is made to IEC 60092-504 and IEC 60529. Electrical components installed in cargo holds, ballast tanks and dry spaces should satisfy the requirements of IP68 in accordance with IEC 60529.

3.4.2 Detectors serving a cargo hold should be capable of being functionally tested, *in situ*, when the hold is empty using either direct or indirect methods.

3.5 Manuals

Documented operating and maintenance procedures for the water level detection system should be kept on board and be readily accessible.

4 INSTALLATION AND TESTING

Guidelines on installation and testing of water level detection systems for bulk carriers and single and multiple hold cargo ships other than bulk carriers are set out in the appendix.

5 BILGE ALARMS USED AS WATER LEVEL DETECTORS

5.1 Bilge alarms may be used as water level detectors provided that they meet the functional requirements and installation and testing requirements set out in sections 3 and 4.

5.2 Some cargoes require the bilge pumping system to be protected to prevent the spread of contaminated or potentially dangerous fluids.

5.3 Where the cargo hold bilge well will be completely sealed when specific cargoes are carried, and the bilge well therefore cannot be used for the entry of ingress water to the detector(s), suitable alternative detection point(s) is/are to be provided.

5.4 If the bilge well is used for when specific cargoes are carried, the bilge well is not to be completely sealed in order to allow the entry of water ingress for activating the detectors.

APPENDIX

GUIDELINES ON INSTALLATION AND TESTING OF WATER LEVEL DETECTION SYSTEMS FOR ~~BULK CARRIERS AND SINGLE HOLD CARGO SHIPS OTHER THAN BULK CARRIERS~~ SHIPS SUBJECT TO SOLAS REGULATIONS II-1/25, II-1/25-1 AND XII/12

1 PURPOSE

These Guidelines provide procedures for installation and testing of water level detection and alarm systems installed in bulk carriers for compliance with SOLAS regulation XII/12 and in single hold cargo ships other than bulk carriers for compliance with SOLAS regulation II-1/~~23-3~~25.*

They also provide procedures for installation and testing of water level detection and alarm systems installed in multiple hold cargo ships other than bulk carriers and tankers for compliance with SOLAS regulation II-1/25-1.

2 EQUIPMENT

2.1 Detector equipment type test requirements

2.1.1 Detector equipment should provide a reliable indication of water reaching a pre-set ~~preset~~ level and should be type tested to demonstrate their robustness and suitability under the appropriate conditions of IEC 60092-504 and the following:

.1 Protection of the enclosures of electrical components installed in the cargo holds, ballast tanks and dry spaces should satisfy the requirements of IP68 in accordance with IEC 60529. The water pressure testing of the enclosure should be based on a pressure head held for a period depending on the application. For detectors to be fitted in holds intended for the carriage of water ballast or ballast tanks the application head should be the hold or tank depth and the hold period should be 20 days. For detectors to be fitted in spaces intended to be dry the application head should be the depth of the space and the hold period should be 24 h.

.2 Operation in cargo/water mixture for a selected range of cargo groups such as iron ore dust, coal dust, grains and oils using seawater with a suspension of representative fine material for each cargo group. For type test purposes an agitated suspension of representative fine materials in seawater, with a concentration of 50% by weight, should be used with the complete detector assembly including any filtration fitted. The functioning of the detection assembly with any filtration arrangements should be verified in the cargo/water mixture with immersion repeated ten times without cleaning any filtration arrangements.

2.1.2 Protection of the enclosures of electrical equipment ~~installed above~~ located on the deck above ballast and cargo spaces should satisfy the requirements of IP56 in accordance with IEC 60529.

~~* Refer to the third, fourth and fifth preambular paragraphs of the covering MSC resolution.~~

2.1.3 Equipment which is to be used in refrigerated cargo spaces should satisfy the requirements of a suitable industry standard covering the relevant service temperatures.

2.2 Detector equipment installation requirements

2.2.1 The sensors should be located in a protected position that is in communication with the specified part of the cargo hold (usually the aft part) such that the position of the sensor detects the level that is representative of the levels in the actual hold space. These sensors should be located:

.1 either as close to the centreline as practicable, or

.2 at both the port and starboard sides of the cargo hold.

2.2.1*bis* The sensors should be located at the height specified in the regulations. These heights are to be measured from the upper surface of the inner bottom and if the bottom of the bilge well is below the upper surface of the inner bottom, its heights are to be measured from the bottom of the bilge well.

2.2.1*ter* When a lining or insulation is fitted, if the lining or insulation is not constructed to a watertight standard then the height is to be measured from the upper surface of the inner bottom. If the lining or insulation is tested as watertight then the heights may be measured from the upper surface of the lining/insulation.

2.2.2 The detector installation should not inhibit the use of any sounding pipe or other water level gauging device for cargo holds or other spaces.

2.2.3 Detectors and equipment should be installed where they are accessible for survey, maintenance and repair.

2.2.4 Any filter element fitted to detectors should be capable of being cleaned before loading.

2.2.5 Sensors, electrical cables and any associated equipment installed in cargo holds should be protected from damage by cargoes or mechanical handling equipment associated with bulk carrier operations, such as in tubes of robust construction or in similar protected locations.

2.2.6 Any changes/modifications to the ship's structure, electrical systems or piping systems that involves cutting and/or welding should be approved by the classification society before work is carried out.

3 SYSTEMS

3.1 Alarm system requirements

3.1.1 Alarm systems should be type tested in accordance with IEC 60092-504, as appropriate.

3.1.2 A switch for testing audible and visual alarms should be provided at the alarm panel and the switch should return to the off position when not operated.

3.2 Alarm system testing requirements

The visual and audible alarms should be tested to demonstrate the following:

.1 The visual indication may not be extinguished by the operator.

.2 It should be set at a level that alerts operators but does not interfere with the safe operation of the ship.

.3 They should be distinguishable from other alarms.

3.3 System test requirements

3.3.1 After installation, a functionality test should be carried out. The test should represent the presence of water at the detectors for every level monitored. Simulation methods may be used where the direct use of water is impracticable.

3.3.2 Each detector alarm should be tested to verify that the pre-alarm and main alarm levels operate for every space where they are installed and indicate correctly. Also, the fault monitoring arrangements should be tested as far as practicable.

3.3.3 Records of testing of alarm systems should be retained on board.

4 MANUALS

4.1 Manuals should be provided on board and should contain the following information and operational instructions:

.1 A description of the equipment for detection and alarm arrangements together with a listing of procedures for checking that, as far as practicable, each item of equipment is working properly during any stage of ship operation.

.2 Evidence that the equipment has been type tested to the requirements of 2.1 above.

.3 Line diagrams of the detection and alarm system showing the positions of equipment.

.4 Installation instructions for orientation, setting, securing, protecting and testing.

.5 List of cargo groups for which the detector is suitable for operating in a 50% seawater slurry mixture (see 2.1.1.2).

.5*bis* Temperature range for which the equipment is suitable.

.6 Procedures to be followed in the event of equipment not functioning correctly.

.7 Maintenance requirements for equipment and system.

4.2 Manuals for bilge alarm systems used as water level detection systems are to contain the following information in addition to that in 4.1 (see paragraph 5.3 of these Performance standards):

.1 Procedure for switching to the alternative arrangements provided for occasions when the bilge alarm system cannot be used as a water level detection system.

.2 List of cargoes for which alternative provisions are to be used.