

SC 180

(Sep 2005)
(Rev.1
May 2004)
(Rev.2
Nov 2005)
(Rev.3
Mar 2012)
(Rev.4
Feb 2021)

Hold, ballast and dry space water level detectors (~~Chapter II-1/25 and Chapter XII/12~~) and Performance Standards for Water Level Detectors on Bulk Carriers and Single Hold Cargo Ships other than Bulk Carriers (Resolution MSC.188(79))

Interpretation of SOLAS Regulation II-1/25 of SOLAS Chapter II-1 as amended by IMO resolutions up to MSC.436(99) and SOLAS Regulation XII/12 of SOLAS Chapter XII as amended by IMO resolutions up to MSC.170(79)

Introduction

When water level detectors are installed on single hold cargo ships other than bulk carriers subject to SOLAS Regulation II-1/25 of SOLAS Chapter II-1 as amended by IMO resolutions up to MSC.436(99) or bulk carriers subject to SOLAS Regulation XII/12 of SOLAS Chapter XII as amended by IMO resolutions up to MSC.170(79), the Performance Standards for water level detectors on bulk carriers and single hold cargo ships other than bulk carriers, annexed to IMO Resolution MSC.188(79) adopted on 3 December 2004 are to be applied, taking into account the following interpretations to the paragraphs of the Performance Standards, as applicable:

Note:

1. IACS Members are to implement this UI and its referenced standards for equipment approval requests received on or after 1 October 2003. Equipment, for which equipment approval requests were received before 1 October 2003 and which may not fully comply with this UI and its referenced standards, may be installed until 31 December 2003 for compliance with SOLAS XII/12.
2. Rev.1 is to be uniformly implemented by IACS Members from 1 July 2004.
3. Rev.2 is to be uniformly implemented by IACS Members on ships contracted for construction on or after 1 January 2007.
4. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.
5. Refer to IMO MSC/Circ.1176.
6. Rev.3 reflects that MSC.188(79) superseded and revoked MSC.145(77) and extended the application of the Performance Standards to include single hold cargo ships other than bulk carriers subject to compliance with SOLAS II-1/25, with no substantive change to the technical requirements of the Performance Standards. Thus, there are no substantive changes in the technical content of the interpretations in Rev.3 in relation to Rev.2 of this UI. Rev.3 is to be uniformly implemented by IACS Members on ships contracted for construction on or after 1 July 2012.
7. Rev.4 is to be uniformly implemented by IACS Members on ships contracted for construction on or after 1 July 2022.

**SC
180**
(cont)**Performance Standards, paragraph 3.2.1 reads as follows.**

3.2.1 *Detector system should provide a reliable indication of water reaching a preset level.*

Interpretation:

One sensor capable of detecting both preset levels (pre-alarm level and main alarm level) is allowed.

Performance Standards, paragraph 3.2.3 reads as follows.

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

Interpretation:

Detection equipment includes the sensor and any filter and protection arrangements for the detector installed in cargo holds and other spaces as required by SOLAS regulation II-1/25 or XII/12.1.

Performance Standards, paragraph 3.2.5 reads as follows.

3.2.5 *The part of the system which has circuitry in the cargo area, should be intrinsically safe.*

Interpretation:

- In general, the construction and type testing is to be in accordance with IEC ~~Publication 60079-11:2011: Electrical Equipment for Explosive Gas Atmospheres~~ to a minimum requirement of EX(ib). Where a ship is designed only for the carriage of cargoes that cannot create a combustible or explosive atmosphere then the requirement for intrinsically safe circuitry is not to be insisted upon, provided the operational instructions included in the Manual required by 4.1 of the Appendix to the Annex specifically exclude the carriage of cargoes that could produce a potential explosive atmosphere. Any exclusion of cargoes identified in the Annex is to be consistent with the ship's Cargo Book and any Certification relating to the carriage of specifically identified cargoes.
- The maximum surface temperature of equipment installed within cargo spaces is to be appropriate for the combustible dusts and/or explosive gasses likely to be encountered. Where the characteristics of the dust and gases are unknown, the maximum surface temperature of equipment is not to exceed 85 deg. C.
- Where intrinsically safe equipment is installed, it is to be of a certified safe type.
- Where detector systems include intrinsically safe circuits, plans of the arrangements are to be appraised/approved by individual classification societies.

Performance Standards, paragraph 3.3.2 reads as follows.

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

Interpretation:

The pre-alarm, as a primary alarm, is to indicate a condition that requires prompt attention to prevent an emergency condition and the main-alarm, as an emergency alarm is to indicate that immediate actions are to be taken to prevent danger to human life or to the ship.

Performance Standards, paragraph 3.3.5 reads as follows.

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).

Interpretation:

The water ingress alarm system is not to be capable of overriding the alarm of the spaces (e.g., dry spaces, cargo holds, etc.), that are neither designed nor intended to carry water ballast.

- Enabling the facility to override alarms is to be customized for each specific ship prior to the commissioning tests witnessed by a classification society surveyor pursuant to certification. Any subsequent modifications are subject to re-certification.
- A "Caution Plate", which prohibits personnel from overriding an alarm to any hold, is not an acceptable alternative to the above provisions.

Performance Standards, paragraph 3.3.7 reads as follows.

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.

Interpretation:

Fault monitoring is to address faults associated with the system, e.g. open circuit, short circuit, loss of power supplies, CPU failure.

**SC
180**
(cont)**Performance Standards, paragraph 3.3.8 reads as follows.**

3.3.8 The water level indicator 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.

Interpretation:

- The electrical power supply is to be from two separate sources, one is to be the main source of electrical power and the other is to be the emergency source, unless a continuously charged dedicated accumulator battery is fitted, having arrangement, location and endurance equivalent to that of the emergency source (18h). The battery supply may be an internal battery in the water level detector system.
- The changeover arrangement of supply from one electrical source to another need not be integrated into the water level detector system.
- Where batteries are used for the secondary power supply, failure alarms for both power supplies are to be provided.

Performance Standards, paragraph 3.4.1 reads as follows.*3.4.1 – Footnote*

With regard to testing, reference is made to IEC 60092-504 and IEC 60529. Electrical components installed in the cargo holds, ballast tanks and dry spaces should satisfy the requirements of IP 68 in accordance with IEC 60529.

Interpretation:

- IACS UR E10 may be used as an equivalent test standard to IEC 60092-504:2016.
- The range of tests is to include the following:

For alarm/monitoring panel:

- functional tests in accordance with MSC.188(79);
- electrical power supply failure test;
- power supply variation test;
- dry heat test;
- damp heat test;
- vibration test;
- eMC tests;
- insulation resistance test;
- high voltage test; and

**SC
180**

(cont)

- static and dynamic inclinations tests, if moving parts are contained.

For IS barrier unit if located in the wheelhouse:

- In addition to the certificate issued by a competent independent testing laboratory, EMC tests are also to be carried out.

For water ingress detectors:

- functional tests in accordance with MSC.188(79);
- electrical power supply failure test;
- power supply variation test;
- dry heat test;
- damp heat test;
- cold test;
- vibration test;
- enclosure class in accordance with MSC.188(79);
- insulation resistance test;
- high voltage test;
- EMC tests, (if the detector is capable of producing electromagnetic noise), and
- static and dynamic inclinations tests, (if the detectors contain moving parts).

Performance Standards, APPENDIX, paragraph 2.1.1 reads as follows.

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

Interpretation:

The test procedure is to satisfy the following criteria:

- The type tests are to be witnessed by a classification society surveyor if the tests are not carried out by a competent independent test facility.
- Type tests are to be carried out on a prototype or randomly selected item(s) which are representative of the manufactured item that is being type tested.
- Type tests are to be documented (type test reports) by the manufacture and submitted for review by classification societies.

Performance Standards, APPENDIX, paragraph 2.1.1.1 reads as follows.

2.1.1.1 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 should be the depth of the space and the hold period should be 24 h.

Interpretation:

- The submerged test period for electrical components intended to be installed in ballast tanks and cargo tanks used as ballast tanks is to be not less than 20 days.
- The submerged test period for electrical components intended to be installed in dry spaces and cargo holds not intended to be used as ballast tanks is to be not less than 24 hours.
- Where a detector and/or cable connecting device (e.g. junction box, etc.) is installed in a space adjacent to a cargo hold (e.g. lower stool, etc.) and the space is considered to be flooded under damage stability calculations, the detectors and equipment are to satisfy the requirements of IP68 for a water head equal to the hold depth for a period of 20 days or 24 hours on the basis of whether or not the cargo hold is intended to be used as a ballast tank as described in the previous bullet points.

Performance Standards, APPENDIX, paragraph 2.1.1.2 reads as follows.

2.1.1.2 Operation in cargo/water mixture for a selected range of cargoes such as iron ore dust, coal dust, grains and oils using seawater in 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.

Interpretation:

- 1 The type test required for the sensor is to be in accordance with the following:
 - .1 the test container for the cargo/water mixture is to be dimensioned so that its height and volume are such that the sensor and any filtration fitted can be totally submerged for the repeated functionality tests required by 2.1.1.2 and the static and dynamic inclination tests identified in the previous interpretation.
 - .2 the sensor and any filtration fitted that are to be submerged and are to be arranged in the container as they would be installed in accordance with the installation instructions required by 4.4.
 - .3 the pressure in the container for testing the complete detector is to be not more than 0.2 bar at the sensor and any filter arrangement. The pressure may be realised by pressurisation or by using a container of sufficient height.

**SC
180**
(cont)

- .4 the cargo/water mixture is to be pumped into the test container and suitable agitation of the mixture provided to keep the solids in suspension. The effect of pumping the cargo/water mixture into the container is not to affect the operation of the sensor and filter arrangements.
- .5 the cargo/water mixture is to be pumped into the test container to a predetermined level that submerges the detector and the operation of the alarm observed.
- .6 the test container is then to be drained and the de-activation of the alarm condition observed.
- .7 the test container and sensor with any filter arrangement are to be allowed to dry without physical intervention.
- .8 the test procedure is to be repeated consecutively ten times without cleaning any filter arrangement that may be fitted in accordance with the manufacturer's installation instructions (see also 2.1.1.2).
- .9 satisfactory alarm activation and de-activation at each of the ten consecutive tests will demonstrate satisfactory type testing.

2 The cargo/water mixture used for type testing are to be representative of the range of cargoes within the following groups and is to include the cargo with the smallest particles expected to be found from a typical representative sample:

- .1 iron ore particles and seawater;
- .2 coal particles and sea water;
- .3 grain particles and seawater; and
- .4 aggregate (sand) particles and sea water.

The smallest and largest particle size together with the density of the dry mixture is to be ascertained and recorded. The particles are to be evenly distributed throughout the mixture. Type testing with representative particles will in general qualify all types of cargoes within the four groupings shown above.

The following provides guidance on the selection of particles for testing purposes:

- .1 Iron ore particles are to mainly consist of small loose screenings of iron ore and not lumps of ore (dust with particle size < 0.1 mm).
- .2 Coal particles are to mainly consist of small loose screenings of coal and not lumps of coal (dust with particle size < 0.1 mm).
- .3 Grain particles are to mainly consist of small loose grains of free flowing grain (grain having a size > 3mm, such as wheat).
- .4 Aggregate particles are to mainly consist of small loose grains of free flowing sand and without lumps (dust with particle size < 0.1 mm)

**SC
180**
(cont)**Performance Standards, APPENDIX, paragraph 2.2.1 reads as follows.**

1.2.1 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.*

Interpretation:

For ships having keel laid on or after 1 July 2004, if sensors are not placed within a distance less than or equal to 1 corrugation space or 1 bulkhead vertical stiffener space from the centreline, sensors are to be located at both the port and starboard sides of the cargo hold.

For ships having keel laid before 1 July 2004, if sensors are not placed within a distance less than or equal to B/6 from the centreline, sensors are to be located at both the port and starboard sides of the cargo hold.

Performance Standards, APPENDIX, paragraph 3.1.1 reads as follows.

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

Interpretation:

The test procedure is to satisfy the following criteria:

- The type tests are to be witnessed by a classification society surveyor if the tests are not carried out by a competent independent test facility.
- Type tests are to be carried out on a prototype or randomly selected item(s) which are representative of the manufactured item that is being type tested.
- Type tests are to be documented (type test reports) by the manufacture and submitted for review by classification societies.

Performance Standards, APPENDIX, Section 4 reads as follows.**4 MANUALS**

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

**SC
180**
(cont)**Interpretation:**

For each ship, a copy of the manual is to be made available to the surveyor at least 24 hours prior to survey of the water level detection installation. Each classification society is to ensure that any plans required for classification purposes have been appraised/approved as appropriate.

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