

SC 156 Doors in watertight bulkheads of cargo ships and passenger ships

(June 2002)
(Rev.1
Oct 2018)

Application

This unified interpretation pertains to doors¹ located in way of the internal watertight subdivision boundaries and the external watertight boundaries necessary to ensure compliance with the relevant subdivision and damage stability regulations.

This unified interpretation does not apply to doors located in external boundaries above equilibrium or intermediate waterplanes.

The design and testing requirements for watertight doors vary according to their location relative to the 1) equilibrium waterplane or intermediate waterplane at any stage of assumed flooding and or 2) bulkhead deck or freeboard deck.

~~Members agreed that the scope of an IACS interpretation in this context shall not be limited to watertight doors covered by SOLAS. Watertight doors required by other statutory damage stability requirements, e.g. MARPOL, the IBC and IGC Codes are covered as well.~~

This UI applies to ships subject to certification under SOLAS, MARPOL, ICLL, the IBC Code and the IGC Code in accordance with SOLAS II-1/Req. 4.1 and Req.4.2 as amended by resolution MSC.421(98).

Small cargo vessels not subject to damage stability requirements are not required to comply with the full scheme¹.

Footnote:

¹ Doors in watertight bulkheads of small cargo ships, not subject to any statutory subdivision and damage stability requirements, may be hinged quick acting doors arranged to open out of the major space protected. They shall be constructed in accordance with the requirements of the classing society and have notices affixed to each side stating, "To be kept closed at sea". ~~This UI shall not apply to HSCs pending completion of revision of the HSC Code by IMO and consideration of same by the applicable IACS WPs.~~

Note:

1. This UI SC 156 is to be uniformly implemented by IACS Members and Associates from 1 January 2003.
2. Rev.1 of this Unified Interpretation is to be applied by Members on ships contracted for construction on or after 1 January 2020 (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 delivered on or after 1 January 2024.
3. The "contracted for construction" 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.

1. Definitions

For the purpose of this UI the following definitions apply:

Watertight: Capable of preventing the passage of water in any direction under a design head. The design head for any part of a structure shall be determined by reference to its location relative to the bulkhead deck or freeboard deck, as applicable, or to the most unfavourable equilibrium/intermediate waterplane, in accordance with the applicable subdivision and damage stability regulations, whichever is the greater. A watertight door is thus one that will maintain the watertight integrity of the subdivision bulkhead in which it is located.

Equilibrium Waterplane: The waterplane in still water when, taking account of flooding due to an assumed damage, the weight and buoyancy forces acting on a vessel are in balance. This relates to the final condition when no further flooding takes place or after cross flooding is completed.

Intermediate Waterplane: The waterplane in still water, which represents the instantaneous floating position of a vessel at some intermediate stage between commencement and completion of flooding when, taking account of the assumed instantaneous state of flooding, the weight and buoyancy forces acting on a vessel are in balance.

Sliding Door or Rolling Door: A door having a horizontal or vertical motion generally parallel to the plane of the door.

Hinged Door: A door having a pivoting motion about one vertical or horizontal edge.

2. Structural Design

Doors shall be of approved design and substantial construction in accordance with the requirements of the classing society and shall be of a strength equivalent to that of the subdivision bulkheads in which they are fitted.

3. Operation Mode, Location and Outfitting

Doors shall be fitted in accordance with all requirements regarding their operation mode, location and outfitting, i.e. provision of controls, means of indication, etc., as shown in Table 1 below. This table is to be read in conjunction with the following general notes: For passenger ships the watertight doors and their controls are to be located in compliance with SOLAS II-1/13.5.3 and II-1/13.7.1.2.2.

3.1 Frequency of Use whilst at sea

Normally Closed

Kept closed at sea but may be used if authorised. To be closed again after use.

Permanently Closed

The time of opening such doors in port and of closing them before the ship leaves port shall be entered in the log-book. Should such doors be accessible during the voyage, they shall be fitted with a device to prevent unauthorised opening.

Normally Open

May be left open provided it is always ready to be immediately closed.

Used

In regular use, may be left open provided it is ready to be immediately closed.

3.2 Type

Power operated, sliding or rolling ²	POS
Power operated, hinged	POH
Sliding or Rolling	S
Hinged	H

3.3 Control

3.3.1 Local

All doors, except those which are to be permanently closed at sea, are to be capable of being opened and closed by hand (and by power, where applicable³) locally, from both sides of the doors, with the ship listed to either side.

For passenger ships, the angle of list at which operation by hand is to be possible is 15 degrees or ~~20 degrees if the ship is allowed to heel up to 20 degrees~~ the maximum angle of heel during intermediate stages of flooding, whichever is the greater.

For cargo ships, the angle of list at which operation by hand is to be possible is 30 degrees.

3.3.2 Remote

Where indicated in Table 1, doors are to be capable of being remotely closed by power from the bridge⁴ for all ships, and by hand also from a position above the bulkhead deck for passenger ships as required by SOLAS II-1/13.7.1.4. Where it is necessary to start the power unit for operation of the watertight door, means to start the power unit is also to be provided at remote control stations. The operation of such remote control is to be in accordance with SOLAS II-1/13.8.1 to 13.8.3 SOLAS II-1/15.8.1 to 15.8.3. For tankers, where there is a permanent access from a pipe tunnel to the main pump room, the watertight door shall be capable of being manually closed from outside the main pump room entrance in addition to the requirements above.

3.4 Indication⁵

3.4.1 Where shown in Table 1, position indicators are to be provided at all remote operating positions⁵ as well as locally, for all ships and provided locally on both sides of the internal doors⁶ for cargo ships, to show whether the doors are open or closed and, if applicable, with all dogs/cleats fully and properly engaged.

3.4.2 The door position indicating system is to be of self-monitoring type and the means for testing of the indicating system are to be provided at the position where the indicators are fitted.

Footnotes:

² Rolling doors are technically identical to sliding doors.

³ Arrangements for passenger ships shall be in accordance with SOLAS II-1/45.7.1.4 13.7.1.4 and 13.7.1.5

⁴ Arrangements shall be in accordance with SOLAS II-1/45 13.7.1.5 for passenger ships and 13-1.2 for cargo ships

⁵ ~~Indication at all remote control positions (SOLAS II-1/15.6.4)~~

⁶ ~~refer to SOLAS II-1/25-9.3~~

⁵ Refer to SOLAS II-1/Reg.13, 13-1, 15-1 and 17-1, IEC 60092-504, IMO International Code on Alarms and Indicators 2009)

An indication (i.e. red light) should be placed locally showing that the door is in remote control mode ("doors closed mode"). Ref. also SOLAS Reg. 15-8.1. Special care should be taken in order to avoid potential danger when passing through the door. Signboard/instructions should be placed in way of the door advising how to act when the door is in "doors closed" mode.

3.4.3 A diagram showing the location of the door and an indication to show its position shall be provided at the central operating console located at the navigating bridge. A red light shall indicate the door is in the open position and a green light shall indicate the door is in the closed position. When the door is closed from this remote position, the red light shall flash when the door is in an intermediate position. This applies to passenger ships and cargo ships.

3.4.4 Signboard/instructions should be placed in way of the door advising how to act when the door is in "doors closed" mode.

3.5 Alarms⁵

3.5.1 Failure of the normal power supply of the required alarms shall be indicated by an audible and visual alarm.

3.5.2 All door types, including power-operated sliding watertight doors which are to be capable of being remotely closed are to be provided with an audible alarm, distinct from any other alarm in the area, which will sound whenever such a door is remotely closed. For passenger ships the alarm shall sound for at least 5 s but not more than 10 s before the door begins to move and shall continue sounding until the door is completely closed. In the case of remote closure by hand operation, an alarm is required to sound only while the door is actually moving. In passenger areas and areas of high ambient noise, the audible alarms are to be supplemented by visual signals at both sides of the doors.

3.5.3 All watertight doors, including sliding doors, operated by hydraulic door actuators, either a central hydraulic unit or independent for each door is to be provided with a low fluid level alarm or low gas pressure alarm, as applicable or some other means of monitoring loss of stored energy in the hydraulic accumulators. This alarm is to be both audible and visible and shall be located on the central operating console at the navigation bridge.

3.6 Notices

As shown in Table 1, doors which are normally closed at sea but not provided with means of remote closure, are to have notices fixed to both sides of the doors stating, "To be kept closed at sea". Doors which are to be permanently closed at sea are to have notices fixed to both sides stating, "Not to be opened at sea".

Footnotes:

⁵ Refer to SOLAS II-I/Reg.13, 13-1, 15-1 and 17-1, IEC 60092-504, IMO International Code on Alarms and Indicators 2009)

4. Fire Doors

Watertight doors may also serve as fire doors but need not be fire-tested notwithstanding the fire resistance of the division in which the watertight doors are fitted. However, such doors fitted above the bulkhead deck on passenger ships shall be tested to the FTP Code in accordance with the division they are fitted. If it is not practicable to ensure self-closing, means of indication on the bridge showing whether these doors are open or closed and a notice stating 'To be kept closed at sea' can be alternative of the self-closing.

Where a watertight door is located adjacent to a fire door, both doors shall be capable of independant operation, remotely if required by SOLAS II-1/13.8.1 to 13.8.3 and from both sides of each door.

~~Watertight doors may also serve as fire doors but need not be fire tested when intended for use below the bulkhead deck. Where such doors are used at locations above the bulkhead deck they shall, in addition to complying with the provisions applicable to fire doors at the same locations, also comply with means of escape provisions of SOLAS II-2/13 (2000 Amendments, MSC Res. 99 (73)).~~

~~Where a watertight door is located adjacent to a fire door, both doors shall be capable of independant operation, remotely if required by SOLAS II-1/15.8.1 to 15.8.3 and from both sides of the each door.~~

5. Testing

5.1 Doors which become immersed by an equilibrium or intermediate waterplane, are to be subjected to a hydrostatic pressure test.

5.1.1 For large doors intended for use in the watertight subdivision boundaries of cargo spaces, structural analysis may be accepted in lieu of pressure testing. Where such doors utilise gasket seals, a prototype pressure test to confirm that the compression of the gasket material is capable of accommodating any deflection, revealed by the structural analysis, is to be carried out.

5.2 Doors which are not immersed by an equilibrium or intermediate waterplane but become intermittently immersed at angles of heel in the required range of positive stability beyond the equilibrium position are to be hose tested⁶⁷.

For clarification purposes it shall be noted that even though these doors are covered by the text in this UI, in accordance with the practice of LL, SOLAS and MARPOL Conventions such hose testing usually is related to weathertight doors rather than to watertight doors.

5.3 Pressure Testing

5.3.1 The head of water used for the pressure test shall correspond at least to the head measured from the lower edge of the door opening, at the location in which the door is to be fitted in the vessel, to the bulkhead deck or freeboard deck, as applicable, or to the most unfavourable damage waterplane, if that be greater. Testing may be carried out at the factory or other shore based testing facility prior to installation in the ship.

Footnotes:

⁶⁷ Additionally, such doors may need to be pressure tested to a head as specified by a National standard or regional agreement

5.3.2 Leakage Criteria

5.3.2.1 The following acceptable leakage criteria should apply to

Doors with gaskets	No leakage
Doors with metallic sealing	Max leakage 1 liter litre/min.

5.3.2.2 Limited leakage may be accepted for pressure tests on large doors located in cargo spaces employing gasket seals or guillotine doors located in conveyor tunnels, in accordance with the following^{Z8}

$$\text{Leakage rate(litre/min)} = \frac{(P + 4.572) \cdot h^3}{6568}$$

where: P = perimeter of door opening (metres)
h = test head of water (metres)

5.3.2.3 However, in the case of doors where the water head taken for the determination of the scantling does not exceed 6.10 m, the leakage rate may be taken equal to 0.375 ~~liter~~ litre/min if this value is greater than that calculated by the above-mentioned formula.

5.3.3 For doors on passenger ships which are normally open and used at sea or which become submerged by the equilibrium or intermediate waterplane, a prototype test shall be conducted, on each side of the door, to check the satisfactory closing of the door against a force equivalent to a water height of at least 1 m above the sill on the centre line of the door⁸
⁹.

5.4 Hose Testing

5.4.1 All watertight doors shall be subject to a hose test in accordance with UR S14.2.3 after installation in a ship. Hose testing is to be carried out from each side of a door unless, for a specific application, exposure to floodwater is anticipated only from one side. Where a hose test is not practicable because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by means such as an ultrasonic leak test or an equivalent test.

Footnote:

^{Z8} Published in the ATM F 1196, Standard Specification for Sliding Watertight Door Assemblies and referenced in the Title 46 US Code of Federal Regulations 170.270 Door design, operation installation and testing

⁸⁹ Arrangements for passenger ships shall be in accordance with SOLAS Reg. II-1/45.6.2 13.5.2

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Table 1: Doors in Internal Watertight Bulkheads and External Watertight Boundaries in Cargo Ships and Passenger Ships**A. Door in Internal Watertight Bulkheads**

<u>Position relative to bulkhead or freeboard deck</u>	<u>1. Regulation</u>	<u>2. Frequency of Use while at sea</u>	<u>3. Type</u>	<u>4. Remote Closure</u>	<u>5. Remote Indication</u>	<u>6. Audible or Visual Alarm</u>	<u>7. Notice</u>	<u>8. Comments</u>
I. Passenger Ships								
<u>(1)Below</u>	<u>SOLAS II-1/13.4, 13.5.1, 13.5.2, 13.6, 13.7.1, 13.8.1, 13.8.2, 22.1, 22.3 and 22.4</u>	<u>Norm. Closed</u>	<u>POS</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes (local)</u>	<u>No</u>	<u>Certain doors may be left open, see SOLAS II-1/22.3 and IMO MSC.1/Circ.1564</u>
	<u>SOLAS II-1/13.9.1, 13.9.2, 14.2, 22.2 and 22.5</u>	<u>Perm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>Yes</u>	<u>See Notes 3 + 4 + 6</u>
<u>(2)At or above</u>	<u>SOLAS II-1/17.1 and 22.3</u>	<u>Norm. Closed</u>	<u>POS, POH</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes (local)</u>	<u>No</u>	<u>See Note 7</u>
			<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Note 1</u>
	<u>SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 23.6 and 23.8</u>		<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>Yes (remote)</u>	<u>Yes</u>	<u>Doors giving access to below Ro-Ro Deck</u>
	<u>SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 22.7 and 23.3 to 23.5</u>		<u>Perm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>Yes (remote)</u>	<u>Yes</u>

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II. Cargo Ships								
(1)Below	<u>SOLAS II-1/13-1.2 and 22.3</u> <u>MARPOL I/28.3</u> <u>ICLL66+A.320</u> <u>1988 Protocol to</u> <u>ICLL66</u> <u>IBC, and IGC</u>	<u>Used</u>	<u>POS</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u> <u>(local)</u>	<u>No</u>	
	<u>SOLAS II-1/13-1.3,</u> <u>22.3 and 24.4</u>	<u>Norm.</u> <u>Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Note 1</u>
	<u>SOLAS II-1/13-1.4,</u> <u>24.3, and 24.4</u> <u>SOLAS II-1/ 13-1.4,</u> <u>13-1.5, 22.2, 24.3</u> <u>and 24.4</u>	<u>Perm.</u> <u>Closed</u>	<u>S, H</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>Yes</u>	<u>See Notes 3 + 4</u>
(2)At or above	<u>SOLAS II-1/13-1.2</u> <u>and 22.3</u> <u>MARPOL I/28.3</u> <u>ICLL66+A.320</u> <u>1988 Protocol to</u> <u>ICLL66</u> <u>IBC, and IGC</u>	<u>Used</u>	<u>POS</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u> <u>(local)</u>	<u>No</u>	<u>See Notes 2 + 5</u>
	<u>SOLAS II-1/13-1.3,</u> <u>22.3 and 24.4</u>	<u>Norm.</u> <u>Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Note 1</u>
	<u>SOLAS II-1/13-1.4,</u> <u>13-1.5, 24.3 and</u> <u>24.4</u>	<u>Perm.</u> <u>Closed</u>	<u>S, H</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>Yes</u>	<u>See Notes 3 + 4</u>

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Notes:

1. If hinged, this door shall be of quick acting or single action type.
2. Under ICLL66, doors separating a main machinery space from a steering gear compartment may be hinged quick acting type provided the lower sill of such doors is above the Summer Load Line and the doors remain closed at sea whilst not in use.
3. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook, in case of doors in watertight bulkheads subdividing cargo spaces.
4. Doors shall be fitted with a device which prevents unauthorized opening.
5. Under MARPOL, hinged watertight doors may be acceptable in watertight bulkhead in the superstructure.
6. Passenger ships which have to comply with SOLAS II-1/14.2 require an indicator on the navigation bridge to show automatically when each door is closed and all door fastenings are secured.
7. Refer to the Explanatory Note to Regulation 17.1 of Res.MSC.429(98) regarding sliding watertight doors with a reduced pressure head and sliding semi-watertight doors.

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B. Door in External Watertight Boundaries below equilibrium or intermediate waterplane

<u>Position relative to bulkhead deck or freeboard deck</u>	<u>1. Regulation</u>	<u>2. Frequency of Use while at sea</u>	<u>3. Type</u>	<u>4. Remote Closure</u>	<u>5. Remote Indication</u>	<u>6. Audible or Visual Alarm</u>	<u>7. Notice</u>	<u>8. Comments</u>
I. Passenger Ships								
<u>(1)Below</u>	<u>SOLAS II-1/15.9, 22.6 and 22.12</u>	<u>Perm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>No</u>	<u>No</u>	<u>Yes</u>	<u>See Notes 2 + 3</u>
<u>(2)At or above</u>	<u>SOLAS II-1/17.1 and 22.3</u> <u>MSC.Circ.541</u>	<u>Norm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Note 1</u>
	<u>SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 23.6 and 23.8</u>		<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>Yes (Remote)</u>	<u>Yes</u>	<u>Doors giving access to below Ro-Ro Deck</u>
	<u>SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 23.3 and 23.5</u>	<u>Perm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>Yes (Remote)</u>	<u>Yes</u>	<u>See Notes 2 + 3</u>
II. Cargo Ships								
<u>(1)Below</u>	<u>SOLAS II-1/15.9, 15-1.2, 15-1.3, 15-1.4, 22.6, 22.12 and 24.1</u>	<u>Perm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Notes 2 + 3</u>
<u>(2)At or above</u>	<u>SOLAS II-1/15-1.2</u>	<u>Norm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Note 1</u>
	<u>SOLAS II-1/15-1.2 and 15-1.4</u>	<u>Perm. Closed</u>	<u>S, H</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>See Notes 2 +3</u>

Notes:

1. If hinged, this door shall be of quick acting or single action type.
2. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
3. Doors shall be fitted with a device which prevents unauthorized opening.

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Table 1.
Internal Doors in Watertight Bulkheads in Cargo Ships and Passenger Ships

Position relative to equilibrium or intermediate waterplane	1. Frequency of Use whilst at sea	2. Type	3. Remote Control ⁶	4. Indication locally and	5. Audible Alarm ⁶	6. Notice	7. Comments	8. Regulation
I. Passenger Ships								
A. At or below	Norm. Closed	POS	Yes	Yes	Yes	No	Certain doors may be left open, see SOLAS II 1/15.9.3	SOLAS II 1/ 15.9.1,2 & 3
	Perm. Closed	S, H	No	No	No	Yes	see Notes 1 + 4	SOLAS II 1/ 15.10.1 & 2
B. Above	Norm. open	POS	Yes	Yes	Yes	No		SOLAS II 1/ 15.9.3 SOLAS II-
	Norm. Closed	S, H	No	Yes	No	Yes	see Note 2	1/20.1 MSC/Circ.541
		S, H	No	Yes	No	Yes	Doors giving access to Ro-Ro Deck	SOLAS II 1/20-2
II. Cargo Ships								
A. At or below	Used	POS	Yes	Yes	Yes	No		SOLAS II 1/ 25-9.2
	Norm. Closed	S, H	No	Yes	No	Yes	see Notes 2 + 3 + 5	SOLAS II 1/ 25-9.3
	Perm. Closed	S, H	No	No	No	Yes	see Notes 1 + 4	SOLAS II 1/ 25-9.4 SOLAS II 1/ 25-10
B. Above	Used	POS	Yes	Yes	Yes	No		SOLAS II 1/ 25-9.2
	Norm. closed	S, H	No	Yes	No	Yes	See Notes 2 + 5	SOLAS II 1/ 25-9.3 SOLAS II 1/ 25-10

Notes:

- Doors in watertight bulkheads subdividing cargo spaces.
- If hinged, this door shall be of quick acting or single action type
- "ICLL66+A.320" or "1988 Protocol to ICLL66", SOLAS, MARPOL, IGC and IBC Codes require remotely operated watertight doors to be sliding doors.
- The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
- The use of such doors shall be authorised by the officer of the watch.
- Cables for control and power systems to power operated watertight doors and their status indication should comply with the requirements of UR E15.