

## PART 3

### CLOSING OF OPENINGS IN HULLS AND WATERTIGHT BULKHEADS

#### 3.1 Means of Closing Openings in Watertight Bulkheads and Operating Sliding Watertight Doors (Regulation 21)

Watertight door controls, including hydraulic piping and electric cables, should be kept as close as practicable to the bulkhead in which the doors are fitted, in order to minimise the likelihood of their being involved in any damage which the ship may sustain. The position of the watertight doors or their controls should be such that if the ship sustains damage to the extent outlined in the requirements, the operation of the watertight doors clear of the damaged portion of the ship is not impaired.

##### 3.1.2 Means of operating watertight doors

###### 3.1.2.1 *General*

The arrangement for the means of closing watertight doors should permit each door to be locked shut and released locally, from both sides of the bulkhead. Additional operational requirements apply to ships constructed before 1 February 1992 where the watertight doors, as fitted, do not comply with paragraph 30 of Section 4 of Schedule 4 in Merchant Shipping Notice MSN 1698 (M).

###### 3.1.2.2 *Electrical*

Electrical equipment and installations is covered in Part 7.

- (i) Electric motors starters, switches, junction boxes and other electrical equipment associated with watertight door systems, or their indicators, if situated below the bulkhead deck, are to be watertight in accordance with the applicable IP ratings in BS EN 60529.
- (ii) Motors and associated equipment installed in car decks are to have an IP rating appropriate to the worst case degree of flooding.
- (iii) Electrical motors, associated circuits and control components; protected to IP X7 standard.
- (iv) Door position indicators and associated circuit components; protected to IP X8 standard.
- (v) Door movement warning signals; protected to IP X6 standards.

(vi) The water pressure testing of the enclosures protected to IP X8 shall be based on the pressure that may occur at the location of the component during flooding, for a period of 36 hours.

(vii) The distribution board for main and control circuits should be installed above the bulkhead deck. The warning light on the bridge indicator should be wired into the main and emergency power supplies and continuously illuminated to show that power is available and not illuminated only when the system is activated. An indicator correctly wired in this manner and activated by a test button is acceptable.

#### *3.1.2.3 Hand gear*

The mechanism for operating sliding watertight doors by hand from above the bulkhead deck should be rapid in its action and be such as to be capable of operating the doors under unfavourable conditions. The mechanical operating gear above the bulkhead deck and, in the case of non-power operated doors, at the door itself, should consist of a crank handle or wheel and handle for all-round operation which should, in general, be permanently attached to the shafting. It is desirable that the hand gear of power operated doors fitted at the door itself should be of a similar type, but other types can be considered if the local gear is such that it could not interfere with the operation of the door from above the bulkhead deck. The lead of shafting to the door from above the bulkhead should be as direct as possible. Suitable provision should be made for lubricating the working parts of the mechanism; guards should be fitted where necessary. The hand operated gear of power operated doors should be permanently engaged unless satisfactory means are provided for engaging it from above the bulkhead deck. A suitable hand/hydraulic system for operating the watertight doors from above the bulkhead deck may be accepted.

#### *3.1.2.4 Watertight doors serving as fireproof doors*

In machinery spaces where there is a fire hazard such as with internal combustion machinery or oil fired boilers, watertight doors should be capable of being operated from outside the space in which the fire hazard is present. This may be arranged by placing the hand operated gear which is above the bulkhead deck outside the machinery space, or by fitting the hand operated gear which is at the door itself to the side of the bulkhead remote from the hazard. Alternatively, the desired object, i.e. access for fire-fighting, may be achieved by fitting a draught-excluding firescreen door to the bulkhead, capable of being closed from outside the space.

### 3.1.2.5 *Signals and communications*

- (i) Indicators and warning signals should, if electrically operated, obtain their power from the main and emergency sources provided.
- (ii) The sound signal, which is required to give warning at the door itself when power operated watertight doors are about to be closed, should precede the movement of the doors by an interval of about 10 seconds.

### 3.1.3 Controls

Where central local control facilities at navigating bridge deck is fitted, the system should be designed not only to ensure their efficient operation but also to reduce the risk of injury to personnel when passing through doorways.

### 3.1.4 The speed of closure of the watertight doors.

Whilst the required closure time of 60 seconds is a relatively short period of time to close all doors, it should be borne in mind that recent studies have shown that progressive flooding through doorways, before effective closure of the watertight doors can be completed, could have disastrous results in some ships in particular, ro-ro ferries. It follows, therefore, that prompt action must always be taken to close any watertight door which may be open when an emergency situation is imminent.

## **3.2 Examination and Approval of Operating Instructions for Watertight Doors (Regulation 22(3))**

### 3.2.1 When doors are to be kept closed

3.2.1.1 Every door of the type described in Regulation 22(3) shall, except where there is an immediate need to pass through, be kept closed whilst the ship is on a voyage-

- (i) in conditions of restricted visibility;
- (ii) within port limits or compulsory pilotage limits;
- (iii) where the depth of water is less than three times the ship's draught;  
and
- (iv) in any other conditions which the master considers potentially hazardous owing to -
  - (a) the proximity of underwater hazards having regard to the degree of reliance that can be placed on the chart of the area - (see Mariners Handbook Part 3, section 1);

- (b) the density of traffic; or
- (c) any other factor;

and if such a door is opened in such circumstances then it shall be closed immediately after passage through it has been effected.

### 3.2.2 Written instructions

3.2.2.1 All passenger ships are required to be provided with Written instructions concerning the operation of WT doors and other closing devices, including main loading doors. These instructions are required to be approved by the Secretary of State.

3.2.2.2 Whilst one of the primary purposes of the regulations is to ensure that doors in watertight bulkheads are kept closed during any voyage, they also provide for specific exceptions to this general requirement:-

- (i) certain doors to be opened provided they are so opened in accordance with procedures laid down in written operational instructions carried on board the ship; and
- (ii) any door to be opened on the express authority of the master for a specific purpose.

3.2.2.3 The above exceptions are not applicable in conditions of restricted visibility or in any potentially hazardous situation. In such circumstances the doors must be kept closed except whilst briefly opened to permit access. The Regulations do however permit the master to authorise the opening or closing of any watertight door in an emergency situation provided he is satisfied that such action is essential for the overall safety of the ship.

### 3.2.3 Design and operational principles for watertight doors

In order to appreciate the importance of the proper operation of a ship's watertight doors it is necessary to understand the basic design principle which govern the fitting of such doors. Most passenger ships are provided with internal watertight subdivision arrangements designed to withstand a specified volume of flooding in the event of the hull being breached. Whilst the effectiveness of these arrangements is dependent upon a number of factors, it is essential to ensure that any watertight door in the divisional bulkheads is closed when breaching occurs, or almost immediately afterwards. It is also essential to limit the number of access openings placed in the divisional bulkheads and also to exercise the strictest control over the operation of the watertight doors provided to close such openings.

### 3.2.4 Factors to consider

Various factors have to be taken into account when operational procedures for watertight doors and reference should be made to paragraph 3.2.6.3(iii) of these Instructions.

### 3.2.5 Examination of proposals

When examining the proposals, surveyors should pay particular attention to such matters as factor of subdivision, fire detection systems, manning (particularly in the engine room), surveillance systems and alarms for spaces involved etc. The primary aim is to achieve a situation whereby the highest practicable level of watertight integrity will be available in the event of the ship sustaining damage to the hull.

### 3.2.6 Operational instructions

3.2.6.1 The following is the recommended format for the operational instructions. It is also recommended that the instructions are drawn up in consultation with the ship's master and chief engineer and reference made to such instructions in the ship's stability information booklet.

3.2.6.2 Operational instructions should specify in what circumstances, if any, and subject to what conditions, each watertight door in the ship may be opened. Two conditions of any voyage should always be catered for, that is those applicable in potentially hazardous situations when the highest standard of watertight integrity is required and those applicable in normal conditions, that is when potentially hazardous situations are not present. Potentially hazardous situations for this purpose include those stated in paragraph 3.2.1 of these Instructions.

3.2.6.3 *Control categories to be assigned to watertight doors for the purpose of operational instructions*

(i) Every watertight door to which the regulations apply, should be given a specific number and, depending upon the need for it to be opened or kept open *in normal conditions*, assigned one of the following categories:-

(a) Type "A" - a door which may be kept open.

(b) Type "B" - a door which should be closed, but left opened for the length of time personnel are working in the adjacent compartment.

(c) Type "C" - a door which should be closed, but may be opened to permit passage through it.

(ii) The instructions must state that in *potentially hazardous situations* every watertight door must be closed except when a person is passing

through it. They must also state that *in normal conditions* the doors are to be opened or closed in accordance with the category which has been assigned to them, see preceding paragraph.

(iii) In deciding the appropriate category for each watertight door, account should be taken of the following factors:-

(a) in the case of each watertight door, other than those fitted in machinery spaces:-

(aa) whether there is a genuine need for the door to be kept open;

(bb) that whilst it may be very convenient to keep the door open for prolonged periods such an arrangement could put the safety of the ship at risk if the hull was suddenly breached; and

(cc) whether a closed door can be opened and then closed again, safely and easily;

(b) in the case of watertight doors fitted in machinery spaces:-

(aa) the need for quick and easy surveillance of machinery spaces containing main propulsion machinery, essential auxiliaries, gear boxes, thrustblocks, controllable pitch propellers equipment electrical power generating plant and fuel preparation and heating equipment; having regard to the fire risk and the critical nature of a machinery failure;

(bb) the increased risk of personnel being trapped by doors which do not have the improved facilities for local operation;

(cc) the extent to which fire detecting systems and bilge water level alarms are fitted;

(dd) whether a machinery control room is provided and the degree of remote control and remote surveillance that is possible; and

(ee) the need to delay the onset of progressive flooding.

#### 3.2.6.4 *Supervision of control procedures at sea*

The instructions should state that the operation of all those doors which are indicated on the bridge control unit should be supervised by the officer in charge of the watch by means of that unit.

#### 3.2.6.5 *Plans and particulars required to be submitted for all ships*

To enable a proper assessment of the "Operational Instructions" being proposed the following plans and information should be submitted:-

- (i) the size, type and sill height of each door;
- (ii) (for new construction only) the reason why each door is to be fitted;
- (iii) a brief outline of the method of operation of the doors;
- (iv) the category of door proposed (as specified in paragraph 3.2.6.3(i) and the reason for selecting such a category; and
- (v) the draft Operational Instructions to be issued to the master in accordance with the model shown in Appendix 9 of these Instructions.

### 3.2.7 Approval of instructions

On completion of approval, the instructions should be stamped and signed by an authorised person. The relevant file (normally CM 13/06) should be returned to Headquarters for noting and records. The form of stamp required (in cases where it is not printed on the document) is as shown in Appendix 9.

### 3.2.8 Shell doors below the margin line - opening at anchorage (Regulation 22(1))

3.2.8.1 Gangway and cargo loading doors may be opened provided that instructions, accepted by the Certifying Authority, are provided to the master. Acceptance will be considered on an individual ship arrangement basis and subject to any conditions considered necessary having due regard to the arrangement. Typical conditions, which are not to be considered exhaustive, are as follows:-

- (i) at the discretion of the master provided that the safety of the ship is not impaired taking due account of other ship movements;
- (ii) not to be opened in adverse weather where water could spill over the sill of the door coaming and into the ship;
- (iii) continuous supervision at each open door, maintaining communication with the bridge and adopting positive reporting on shell door closure; and
- (iv) recording in the official log book of the opening and closing times of each door.