

# **Requirements concerning NAVIGATION**

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N1 One man bridge operated (OMBO) ships

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## Part A – General

### Preamble

It is technologically possible to operate the bridge with an officer of the navigational watch alone, acting as the sole lookout. However, the design, performance and maintenance of the equipment can have considerable effects on the safety of one man bridge operation.

The aim of these rules is to provide technical requirements for the functionality of the bridge design and layout, the range of equipment to be installed, its performance and reliability.

The composition and qualification of the personnel on watch remain the responsibility of the shipping companies and national authorities. ◀

### 1. Application

1.1 The following requirements apply to the classification of sea-going ships for the assignment of an optional class notation for one man bridge operation and are intended to cover all the normal sailing conditions as authorized by the relevant National Authority.

1.2 These requirements may be applied to new and existing ships. ◀

### 2. Operational Assumptions

The requirements are framed on the following assumptions:

2.1 Plans for emergencies are specified and the conditions under which a one man watch is permitted are clearly defined in an operations manual, which is acceptable to the Administration with which the ship is registered.

2.2 The manning of the bridge watch is in accordance with the National Regulations in the country of registration and for the waters in which the ship is operating.

2.3 The requirements of the International Convention on Standards of Training Certification and Watchkeeping for seafarers (STCW) and other applicable statutory regulations are complied with. ◀

### 3. Regulations, Guidelines, Standards

3.1 IMO – The requirements are based on the understanding that the applicable regulations and guidelines issued by the International Maritime Organization are complied with and, in particular:

3.1.1 Regulation 12, chapter V of the 1974 "International Convention for the Safety of Life at Sea" (SOLAS) and applicable amendments;

3.1.2 the international Regulations for Preventing Collisions at Sea and all other relevant Regulations relating to Radiotelegraphy, Radiotelephony and Safety of Navigation required by Chapters IV and V of SOLAS 1974, as amended;

3.1.3 the Provisional Guidelines for the Conduct of Trials in which the Officer of the Navigational Watch acts as the sole Lookout in Periods of Darkness (MSC Circular 566 of 2 July 1991); ▶

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3.1.4 IMO Assembly Resolution A708 on Navigation Bridge Visibility and Functions;

3.1.5 the Performance Standards for navigational equipment applicable to:

- magnetic compasses (Resolution A382),
- gyro-compasses (Resolution A424),
- radar equipment (Resolutions A222, A278, A477),
- ARPA (Resolution A422),
- speed and distance measuring equipment (Resolution A478)
- echo sounding equipment (Resolution A224),
- radio direction finder (Resolution A223),
- electronic navigational aids – general requirements (Resolution A574),
- VHF Radio installation (Resolution A609),
- automatic pilots (Resolution A342),
- rate-of-turn indicators (Resolution A526).

3.2 IEC, ISO Standards – The requirements and guidelines of the following international standards are applicable:

- ISO 8468 "*Ships bridge layout and associated equipment – Requirements and guidelines*";
- IEC 872: ARPA – Operational and performance requirements – Methods of testing and required test results;
- IEC 936: Shipborne radar – Operational and performance requirements – Methods of testing and required test results;
- IEC 1023: Marine speed and distance measuring equipment (SDME) – Operational and performance requirements – Methods of testing and required test results;
- IEC Document 18 (Central Office) 534: Special features – Control and instrumentation.

3.3 National Authorities – Additional requirements may be imposed by the National Authority with whom the ship is registered and/or by the administration within whose territorial jurisdiction it is intended to operate.

3.4 IACS – The requirements of UR E10 'Unified environmental test specification for testing procedure for electrical control and instrumentation equipment, marine computers and peripherals covered by classification' are applicable. ◀

#### 4. Definitions

Terms used in the requirements are defined below:

- Acquisition: the selection of those target ships requiring a tracking procedure and the initiation of their tracking.
- Alarm: a visual and audible signal indicating an abnormal situation.
- ARPA: automatic radar plotting aid.
- Back-up navigator: any individual, generally an officer, who has been designated by the ship master to be on call if assistance is needed on the navigation bridge.
- Bridge: that area from which the navigation and control of the ship is exercised, including the wheelhouse and bridge wings.
- Bridge wings: those parts of the bridge on both sides of the ship's wheelhouse which, in general, extend to the ship's side.
- CPA: closest point of approach, i.e. the shortest target ship-own ship calculated distance that will occur in case of no change in course and speed data.
- Display: means by which a device presents visual information to the navigator, including conventional instrumentation.
- Ergonomics: application of the human factor in the analysis and design of equipment, work and working environment.
- Field of vision: angular size of a scene that can be observed from a position on the ship's bridge.
- Lookout: activity carried out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision. ▶

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- Navigation: all tasks relevant for deciding, executing and maintaining course and speed in relation to waters and traffic.
- Navigator: person navigating, operating bridge equipment and manoeuvring the ship.
- Normal conditions: when all systems and equipment related to navigation operate within design limits, and environmental conditions such as weather and traffic do not cause excessive workload to the officer of the watch.
- Officer of the watch: person responsible for safe navigating, operating of bridge equipment and manoeuvring of the ship.
- OMBO: one man bridge operation.
- OMBO ship: one man bridge operated ship.
- Radar plotting: the whole process of target detection, tracking, calculation of parameters and display of information.
- Sea-going ship: ship navigating on the high seas, i.e. areas along coasts and from coast to coast.
- TCPA: time to closest point of approach.
- Tracking: is the process of observing the sequential changes in the position of a target, to establish its motion.
- Watch alarm: alarm that is transferred from the bridge to the master and the back-up navigator in case of any officer of the watch deficiency (absence, lack of alertness, no response to another alarm/warning, etc.).
- Wheelhouse: enclosed area of the bridge.
- Workstation: position at which one, or several tasks constituting a particular activity are carried out.



## Part B – Technical Requirements

### 1. Bridge Layout

1.1 The bridge configuration, the arrangement of consoles and equipment location shall enable the officer of the watch to perform navigational duties and other functions allocated to the bridge as well as maintain a proper lookout from a convenient position on the bridge, hereafter referred to as a 'workstation'.

1.2 A workstation for navigation and traffic surveillance/manoeuvring shall be arranged to enable efficient operation by one person under normal operating conditions. All relevant instrumentation and controls shall be easily visible, audible and accessible from the workstation.

1.3 For the purpose of performing duties related to navigation, traffic surveillance and manoeuvring, the field of vision from a workstation shall be such as to enable observation of all objects which may affect the safe conning of the ship. The field of vision from a workstation shall be in accordance with the guidelines on navigation bridge visibility, as specified in IMO Resolution A708 as it applies to new ships.

For other functions, other workstations may be arranged singularly or in combination, provided the field of vision complies with the foregoing.

1.4 The bridge layout design and workstations are to enable the ship to be navigated and manoeuvred safely by two navigators in cooperation.

1.5 External sound signals from ships and fog signals that are audible on the open deck, shall also be audible inside the wheelhouse; a transmitting device shall be provided to reproduce such signals inside the wheelhouse (recommended frequency range: 70 to 700 Hz).

1.6 The requirements and guidelines of ISO Standard 8468 should be regarded as a basic reference for the design of the bridge layout.



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**2. Bridge Instrumentation and Controls****2.1 Functions to be ensured**

The instrumentation and controls at the workstation for navigation and traffic surveillance/manoeuvring shall be arranged to enable the officer of the watch to:

- 2.1.1 determine and plot the ship's position, course, track and speed;
- 2.1.2 analyse the traffic situation;
- 2.1.3 decide on collision avoidance manoeuvres;
- 2.1.4 alter course;
- 2.1.5 change speed;
- 2.1.6 effect internal and external communications related to navigation and manoeuvring, radio communication on the VHF;
- 2.1.7 give sound signals;
- 2.1.8 hear sound signals;
- 2.1.9 monitor course, speed, track, propeller revolutions (pitch), rudder angle and depth of water;
- 2.1.10 record navigational data (may be manually recorded from data available at the workstation).

**2.2 Equipment to be fitted**

2.2.1 Irrespective of their size, gross tonnage and date of construction, all OMBO ships are in any case to be equipped with the instrumentation and controls described under 2.3 to 2.5 hereafter.

**2.3 Safety of navigation: Collision-Grounding**

2.3.1 The ship is to be equipped with an ARPA system including, or associated with, a collision avoidance system, meeting the requirements of IMO Resolution A422(XI). The ARPA function may be independent or built into the radar equipment.

The system is to be based on the assumption that all floating objects may come onto a collision course with own ship if the object's course is changed up to 45° with its speed maintained. A warning shall be given to the navigator at a time which shall be adjustable in the range of 6 to 30 minutes, having regard to the time to danger (TCPA).

The whole equipment is to feature the following capability:

- true motion and relative motion modes,
- daylight-visible display,
- automatic acquisition and tracking of 20 radar targets,
- guard zone system, featuring adjustable parameters, notably warning and alarm set for CPA and TCPA,
- simulator function showing the likely effects of a course or speed change in relation to tracked targets,
- incorporated self-checking properties.

2.3.2 An automatic pilot is to be provided and monitored by an off-course alarm addressed to the navigator, in case of malfunction. This alarm shall be derived from a system independent from the automatic steering system. An overriding control device shall be provided at the navigating and manoeuvring workstation.



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Alternatively, track piloting equipment may be considered.

2.3.3 The navigator is to be given an alarm in case of deviation from the planned route. This alarm is to be adjustable having regard to the time to danger of grounding.

2.3.4 Pre-warning is to be given at the approach of a way-point.

2.3.5 An alarm is to be initiated when the water depth beneath the ship is less than a predetermined value.

## 2.4 Position fixing

2.4.1 Ships are to be provided with position fixing systems appropriate to the intended service areas.

2.4.2 At least 2 independent radars shall be provided. One of them shall operate within the X-band.

2.4.3 A gyro compass system is to be provided.

2.4.4 A speed log system is to be provided.

2.4.5 An echo sounding system is to be provided.

## 2.5 Controls – Communication

2.5.1 A propulsion plant remote control system is to be provided on the bridge.

2.5.2 A whistle control device is to be provided.

2.5.3 A window wipe and wash control device is to be provided.

2.5.4 A main workstation console lighting control device is to be provided.

2.5.5 Steering pump selector/control switches are to be provided.

2.5.6 An internal communication system is to be provided.

2.5.7 A V.H.F. radiotelephone installation is to be provided.

2.5.8 The systems or controls under 2.5.1 to 2.5.7 are to be fitted within the reach of the officer of the watch when seated or standing at the main navigating and manoeuvring workstation.

2.5.9 A wheelhouse heating/cooling control device is to be provided.

2.5.10 A NAVTEX automatic receiver and recorder is to be provided. ◀

## 3. Prevention of Accidents caused by Operator's Unfitness

### 3.1 Bridge safety system

3.1.1 A vigilance system is to be provided to indicate that an alert officer of the navigational watch is present on the bridge.

3.1.2 Any system used for verification of the officer of the navigational watch's alertness shall not cause undue interference with the performance of bridge functions.

3.1.3 The system shall be so designed and arranged that it could not be operated in an unauthorized manner, as far as practicable. ▶

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3.1.4 Any system used for periodic verification of the officer of the navigational watch's alertness shall be adjustable up to 12 minute intervals and constructed, fitted and arranged so that only the ship's master has access to the component for setting the appropriate intervals.

3.1.5 The system shall provide for the acknowledgement by the officer of the navigational watch at the navigating and traffic surveillance/manoeuvring workstation and other appropriate locations in the bridge from where a proper lookout may be kept.

3.1.6 Such a system shall be connected to the alarm transfer system described in 3.2.

3.1.7 An alarm is to operate on the bridge in the event of a failure of the bridge safety systems.

3.1.8 The requirements of 3.1.1 to 3.1.7 do not prevent the Classification Societies from accepting any technical systems that adequately verify or help maintain the alertness of the officer of the watch at intervals up to 12 minutes.

### 3.2 Alarm/warning transfer system – communications

3.2.1 Any alarm/warning that requires bridge operator response shall be automatically transferred to the master and, if he deems it necessary, to the selected back-up navigator and to the public rooms, if not acknowledged on the bridge within 30 seconds. Such transfer is to be carried out through the systems required by 3.2.3 and 3.2.7 where applicable.

3.2.2 Acknowledgment of alarms/warnings shall only be possible from the bridge.

3.2.3 The alarm/warning transfer shall be operated through a fixed installation.

3.2.4 Provision is to be made on the bridge for the operation of a navigation officer call-alarm to be clearly audible in the spaces of 3.2.1.

3.2.5 The alarm transfer system shall be continuously powered and shall have an automatic changeover to a standby power supply in case of loss of normal power supply.

3.2.6 At all times, including during blackout, the officer of the watch shall have access to facilities enabling two way speech communication with another qualified officer.

The bridge is to have priority over the communication system.

Note: The automatic telephone network is acceptable for this purpose, provided that it is automatically supplied during black-out situation and that it is available in the locations specified in 3.2.1.

3.2.7 If, depending on the shipboard work organization, the back-up navigator may attend locations not connected to the fixed installation(s) described in 3.2.1, he shall be provided with a wireless portable device enabling both the alarm/warning transfer and two way speech communication with the officer of the watch. ◀

## 4. Equipment Design and Reliability

### 4.1 Environmental conditions

4.1.1 Shipborne navigational equipment specified in IMO Publication 978-88-04E 'PERFORMANCE STANDARDS FOR NAVIGATIONAL EQUIPMENT' shall be capable of continuous operation under the conditions of various sea states, vibration, humidity, temperature and electromagnetic interference likely to be experienced in the ship in which it is installed.

4.1.2 Equipment which has been additionally specified in these Rules is to comply with the environmental conditions specified in IACS UR E10. ▶

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4.1.3 Documentary evidence in the form of Certification and/or test results are to be submitted to the satisfaction of the Classification Society. Where acceptable evidence is not available, the requirements of IACS UR E10 should be complied with.

## 4.2 Design – reliability

### 4.2.1 Power supply

Local distribution panels shall be arranged for all items of electrically operated navigational equipment. These panels are to be supplied by two exclusive circuits, one fed from the main source of electrical power and one fed from an emergency source of electrical power. Each item of navigational equipment is to be individually connected to its distribution panel. The power supplies to the distribution panels shall be arranged with automatic changeover facilities between the two sources. Failure of the main power supply to the distribution panels shall initiate an audible and visual alarm.

### 4.2.2 Loss of power

Following a loss of power which has lasted for 30 seconds or less, all primary functions are to be readily reinstated.

Following a loss of power which has lasted for more than 30 seconds, as many as practical primary functions shall be readily reinstated.

4.2.3 Where computerized equipment are interconnected through a computer network, failure of the network should not prevent individual equipment from performing their individual functions.

## 4.3 Ergonomical recommendations

### 4.3.1 Lighting

The lighting required on the bridge should be designed so as not to impair the night vision of the officer on watch. Lighting used in areas and at items of equipment requiring illumination whilst the ship is navigating is to be such that night vision adaptation is not impaired, e.g. red lighting. Such lighting is to be arranged so that it cannot be mistaken for a navigation light by another ship. It is to be noted that red lighting is not to be fitted over chart tables so that possible confusion in colour discrimination is avoided.

### 4.3.2 Noise levels

The noise level on the bridge should not interfere with verbal communication, mask audible alarms or be uncomfortable to bridge personnel.

### 4.3.3 Vibration level

The vibration level on the bridge should not be uncomfortable to the bridge personnel.

### 4.3.4 Wheelhouse space heating/cooling

Unless justified, wheelhouse spaces are to be provided with heating and air cooling systems. System controls are to be readily available to the officer of the watch.

### 4.3.5 Navigator's safety

There are to be no sharp edges or protuberances on the surfaces of the instruments and equipment installed on the bridge which could cause injury to the navigator.

Sufficient hand-rails or equivalent thereto are to be fitted inside the wheelhouse or around instruments and equipment in the wheelhouse for safety in bad weather.

Adequate means are to be made for anti-slip of the floor, whether it be dry or wet.



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Doors to the bridge wings are to be easy to open and close. Means are to be provided to hold the doors open at any position.

Where provision for seating is made in the wheelhouse, means for securing are to be provided, having regard to storm conditions. ◀

**5. Tests and Surveys**

5.1 Testing of the equipment after installation onboard

5.1.1 After fitting onboard, the installations are to be submitted to the tests deemed necessary to demonstrate correct operation. Some tests may be carried out at the quayside, while others are to be effected at sea trials.

5.1.2 On-board tests and sea trials are to be carried out in accordance with the test procedures submitted in advance to the Society for approval. Tests and trials are to be performed under the supervision of the Surveyors.

5.2 Surveys

5.2.1 Periodical surveys are to be carried out to the Surveyor's satisfaction, in order to verify that the equipment and arrangements required for the class notation are being maintained in good working order. ◀◀

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