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Ships and marine technology — Ship's bridge layout and associated equipment — Requirements and guidelines for centralized and integrated bridge functions

Navires et technologie maritime — Aménagement de la passerelle d'un navire et disposition de ses équipements annexes — Exigences supplémentaires et directives pour les fonctions centralisées et intégrées de la passerelle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14612 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 5, *Ships' bridge layout*.

Introduction

It has become common for maritime officers and crew to move between shipping companies and flag states, to serve on a wide range of ships. Pilots, too, increasingly guide a wide variety of ships and equipment. This International Standard therefore gives requirements and guidelines aimed at ensuring safe navigation by standardizing the bridge system and environment so that watchkeepers are provided with a consistent pattern of equipment layout regardless of the ship type or navigational system fitted on the bridge of a particular vessel.

This International Standard has the same structure as that of ISO 8468. Its requirements concentrate on centralizing and integrating key bridge functions, taking into account human factors, ergonomics and advances in technology, and are additional to the requirements specified in ISO 8468.

Functional requirements are outlined in general terms in order to prescribe the basic functionality, providing the OOW — at each defined workstation — with the best possible overview of internally presented data, easy and ergonomic operation of instruments, necessary performance and reliability in instruments and power supplies, and adequate environmental conditions on the bridge.

All information to the OOW made available from instruments, alarm systems and communication equipment has to be suited for the purpose, and presented in accordance with ergonomic principles. Too much information is stressing and may cause confusion. Too little information may reduce safety.

Information as well as control systems have to provide the needed and correct performance suited to the particular workstation and procedures. Safety aspects related to crew, cargo, ship and the environment need to be addressed in detail.

Guidelines and figures give examples, ideal and/or alternative solutions, when such are well defined. Guiding references and comments are added where applicable.

Annex B includes principle solutions of bridge layouts. It should be noted that no specific layout presents the sole solution for proper bridge fulfilling the requirements laid down in this International Standard. This International Standard is parametric, and different types of ships and operations have different optimum designs, even though basic safety requirements are equal.

This International Standard is related to the IMO Resolution on ergonomic criteria for bridge equipment and the general requirements in SOLAS, Chapter V. Based on SOLAS, Chapter IX (ISM-Code), dealing with casualties attributed to the human element, this International Standard — when conformed with — should reduce such casualties.

Ships and marine technology — Ship's bridge layout and associated equipment — Requirements and guidelines for centralized and integrated bridge functions

1 Scope

This International Standard specifies technical requirements for the enhanced functionality of ship's bridge layout and design, with the key navigational functions centralized and integrated, for the purpose of securing safe and efficient operation of the ship, berth–to–berth, regardless of the watchkeeping arrangement in place at a particular time. The requirements are generally additional to those given in ISO 8468.

Where there are physical limitations in applying this International Standard, i.e. to small ships or ships of unusual design, the general principles still apply and can be implemented as far as practicable. It is applicable to seagoing ships where bridge duty is regularly maintained.

NOTE While complying with its requirements, users of this International Standard need also to ensure compliance with such statutory requirements, rules and regulations as may be applicable to the individual ship concerned.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8468:1990, *Ship's bridge layout and associated equipment — Requirements and guidelines*

HSC Code 2000, *International Code of Safety for High-Speed Craft*

International Convention for the Safety of Life at Sea (SOLAS)

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

3.1
abnormal [operating] condition
condition created when internal technical system failures require operation of back-up systems on the bridge or occur under an irregular operating condition, or when the OOW becomes unfit to perform his duties and has not yet been replaced by another qualified officer

3.2
additional bridge function
function performed on the bridge, but not related to a primary bridge function

EXAMPLE Extended communication function, monitoring and control of ballasting and cargo operations, monitoring and control of machinery, monitoring and control of domestic systems, ship management.

3.3
AIS
automatic ship identification system

3.4
alarm
audio-visual and/or audible signal, indicating an abnormal condition

3.5
alarm transfer system
alarm that is transferred from the bridge to the master and the back-up navigator or any place(s) where assigned by the system in case of any OOW deficiency

3.6
ARPA
automatic radar plotting aid

3.7
back-up navigator
qualified officer who has been designated by the ship's master to be on call if assistance is needed on the navigation bridge

3.8
bridge
area from which the navigation and control of the ship is exercised, including the wheelhouse and bridge wings

[ISO 8468:1990, definition 3.1]

3.9
bridge arrangement
location and interrelation of workstations, instruments and equipment on the bridge

3.10
bridge configuration
shape of the bridge comprising the outer bulkheads and windows of the bridge area

3.11
bridge alarm system
integrated alarm systems comprising watch monitoring, alarm transfer and centralized alarms

3.12
bridge system
total system for the performance of bridge functions, comprising bridge personnel, technical systems, man–machine interface and procedures

3.13
bridge wing
part of the bridge, on both sides of the ship’s wheelhouse, which, in general, extends to the ship’s side

[ISO 8468:1990, definition 3.2]

3.14
catwalk
extension to a deck outside the wheelhouse wide enough to allow the safe passage of a person

NOTE Adapted from ISO 8468:1990, 3.3.

3.15
collision avoidance function
detection and plotting of ships and other moving and stationary objects; determination and execution of course and speed deviations to avoid collision

3.16
commanding view
view without obstructions which would interfere with the navigator's ability to perform his immediate task

[ISO 8468:1990, definition 3.5]

3.17
communications workstation
workstation for operation and control of equipment for distress, safety and routine communications

NOTE Adapted from ISO 8468:1990, 3.6.

3.18
conning position
conning station
place in the wheelhouse with a commanding view and which is used by navigators when monitoring and directing the ship's movements

3.19
display
means by which a device presents visual information to the navigator, including conventional instrumentation

[ISO 8468:1990, definition 3.8]

3.20
docking
manoeuvring of the ship alongside a berth, another ship or other structure and controlling the mooring operations

3.21
docking workstation
workstation from which the ship can be manoeuvred during docking, lock passage and other manoeuvres requiring a view of the ship's side

3.22
electronic navigational chart
ENC
database, standardized as to content, structure and format for use with ECDIS on the authority of government authorized hydrographic offices

NOTE The ENC contains all the chart information for safe navigation and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions), considered necessary for safe navigation.

3.23
electronic chart display and information system
ECDIS
navigation information system which, with adequate back-up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/19 of the 2000-12-05 Amendments to SOLAS by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in voyage planning and route monitoring, and, if required, additional navigation-related information

3.24
ergonomics
study and design of working environments and their components, work practices, and work procedures for the benefit of the worker's productivity, health, comfort and safety

3.25
field of vision
angular size of a scene that can be observed from a position on the ship's bridge

[ISO 8468:1990, definition 3.10]

3.26
FMEA
failure mode and effects analysis

3.27
GMDSS
global maritime distress and safety system

3.28
helmsman
person who steers the ship underway

[ISO 8468:1990, definition 3.11]

3.29
IMO
International Maritime Organisation

NOTE A specialized agency of the United Nations devoted exclusively to maritime matters.

3.30
irregular [operating] condition
condition causing an excessive operator workload

3.31
lookout
activity carried out by sight and hearing as well as by 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

3.32
manoeuvring
operation of steering systems and propulsion machinery as required to move the ship in predetermined directions or into predetermined positions or tracks

3.33
manual steering workstation
workstation from which the ship can be steered by a helmsman

3.34
master
ship's captain and the person in overall charge of the ship

3.35
monitoring
act of periodically checking equipment and environment in order to detect any changes

NOTE Adapted from ISO 8468:1990, 3.12.

3.36
navigation
process of position-finding as well as planning, recording and controlling the movement of a ship from one place to another

3.37
voyage-planning workstation
workstation at which the ship's voyage is planned

3.38
navigator
qualified officer navigating, operating bridge equipment and manoeuvring the ship

NOTE Adapted from ISO 8468:1990, 3.14.

3.39
normal [operating] condition
condition whereby all shipboard systems and equipment related to primary bridge functions operate within design limits and external conditions, i.e. weather and traffic, or the malfunction of position-fixing systems do not cause excessive operator workloads

3.40
officer of the watch
OOW
qualified officer responsible for safe navigation, operating of bridge equipment and manoeuvring of the ship

3.41
primary bridge function
function related to the determination, execution and maintenance of safe course, speed or position of the ship in relation to the waters, traffic or weather conditions

EXAMPLE Voyage planning function, navigation function, collision avoidance function, manoeuvring function, docking function, monitoring of internal safety systems, external and internal communication related to safety in bridge operation and distress situations.

3.42
primary navigation, traffic surveillance and manoeuvring workstation
workstation with commanding view used by navigators when carrying out navigation, traffic surveillance and manoeuvring functions

3.43
radar plotting
whole process of target detection, tracking, calculation of parameters and display of information

3.44
raster chart display system
RCDS
navigation information system displaying RNCs with positional information from navigation sensors to assist the mariner in route planning and route monitoring and, if required, display additional navigational-related information

3.45
raster navigational chart
RNC
facsimile of a paper chart originated by, or distributed on the authority of, a government-authorized hydrographic office

NOTE For the purposes of this International Standard, RNC is used to mean a single chart or collection of charts.

3.46
route monitoring
periodic surveillance of the ship's position, course and speed in relation to a pre-planned route and the surrounding waters

3.47
safety workstation
workstation at which monitoring displays and operating elements serving safety are concentrated

3.48
screen
device used for presenting visual information based on one or several displays

3.49
seagoing ship
ship designed, equipped and certified to go to sea

NOTE Adapted from ISO 8468:1990, 3.16.

3.50
secondary navigation workstation
back-up workstation for navigation, which may also be used by an assisting navigator when required

3.51
ship management
administrative and miscellaneous activity

3.52
SOLAS
Safety Of Life At Sea

NOTE The international conventions dealing with maritime safety.

3.53
superstructure
decked structure, not including funnels, which is on or above the freeboard deck

[ISO 8468:1990, definition 3.17]

3.54
system electronic navigational chart
SENC
database resulting from the transformation of the ENC by the ECDIS for appropriate use, updates to the ENC by appropriate means and other data added by the mariner

NOTE It is the database that is actually assessed by the ECDIS for the display generation and other navigational functions, and is the equivalent to an up-to-date paper chart. The SENC may also contain information from other sources.

3.55
system raster navigational chart
SRNC
database resulting from the transformation of the RNC by the RCDS to include updates to the RNC by appropriate means

3.56
tracking
process of observing the sequential changes in the position of a target, to establish its motion

3.57
track monitoring
observing the placement of own ship with regard to a planned track

3.58
traffic surveillance
observation of traffic of ships of an area for the purpose of determining the position and movements of own ship in that area

3.59
visibility
fields and/or distance of vision to observe objects

3.60
voyage planning
pre-determination from berth–to–berth of course, turns and speed in relation to the waters to be navigated

3.61
wheelhouse
enclosed area of the bridge

[ISO 8468:1990, definition 3.18]

3.62
workstation
combination of all job-related items, including the console with all devices, equipment and the furniture, to fulfil certain tasks

NOTE This definition of the term differs from that given in ISO 8468:1990.

4 Bridge configuration

4.1 General

The bridge configuration shall be arranged with special attention to maximizing the field of vision and audibility of sound signals at all workstations situated at the bridge and used during the watch under normal operating conditions at sea.

4.2 Field of vision

4.2.1 General requirements

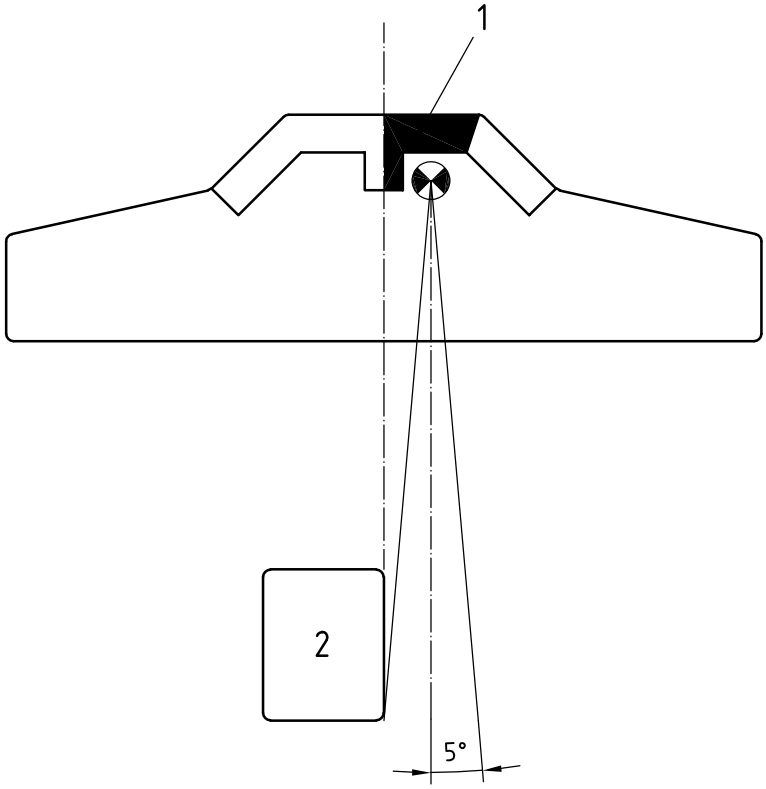
From the primary navigation, traffic surveillance and manoeuvring workstation it shall be possible to use lights in line astern of the ship as reference for steering the ship. See Figure 1 and Figure 2.

NOTE This requirement is additional to that given in ISO 8468:1990, 4.1.6.

4.2.2 Guidelines

The horizontal field of vision astern as seen from the primary navigation, traffic surveillance and manoeuvring workstation should extend over an arc from dead astern to at least 5° to each side.

Artificial means approved for this purpose may be used to achieve the proper view.



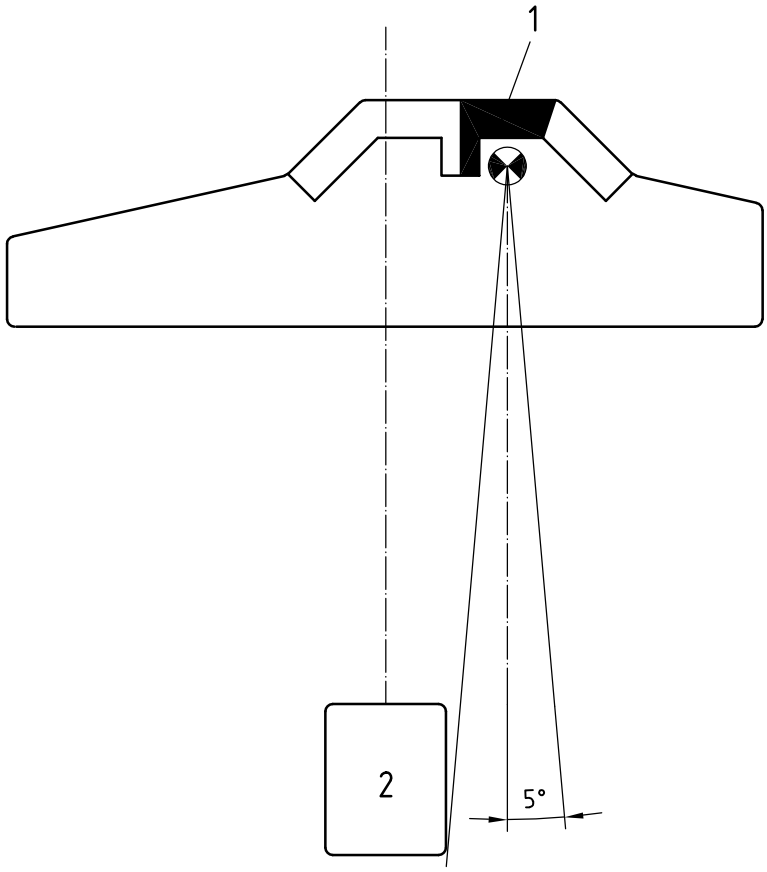
Key

1 primary navigation, traffic surveillance and manoeuvring workstation
2 funnel

Figure 1 — Field of vision astern with off-centre funnel

4.2.3 Field of vision from workstations

The primary navigation, traffic surveillance and manoeuvring workstation shall be arranged to enable efficient and effective application of the principles of bridge resource management and bridge teamwork procedures regardless of the watchkeeping arrangement in place at a particular time. All relevant instrumentation and controls shall be easily visible, audible and accessible.



Key

1 primary navigation, traffic surveillance and manoeuvring workstation

2 funnel

Figure 2 — Field of vision astern with off-centre workstation

The field of vision from navigation workstations shall be such as to enable observation of all objects which may affect the safe conning of the ship. A console, if arranged for a sitting position, shall not obstruct the view of the sea surface seen over the lower edge of the windows from a sitting position on the primary navigation, traffic surveillance and manoeuvring workstation within an arc of 10° to port and 112,5° to starboard of the bow. See Figure 3.

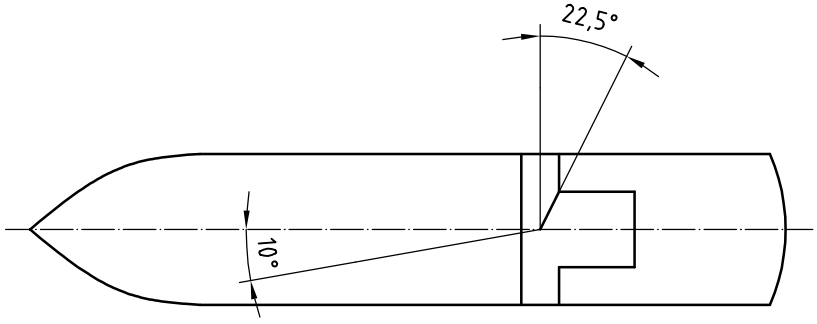


Figure 3 — Primary field of vision from a sitting position

4.2.4 Blind sectors

4.2.4.1 Requirements

Blind sectors caused by cargo, cargo gear, divisions between windows and other obstructions shall be minimized, and shall in no way hamper a safe look-out from the primary navigation, traffic surveillance and manoeuvring workstation.

NOTE This requirement revises and replaces the requirement given in ISO 8468:1990, 4.1.8.

4.2.4.2 Guidelines

The total arc of blind sectors within the required 225° field of vision (from right ahead to 112½° on each side) should not exceed 30°. Each individual blind sector should not exceed 10°.

Over an arc from dead ahead to at least 10° on each side, each blind sector should not exceed 5°. The clear sector between two blind sectors should not be less than the broadest blind sector on either side of the clear sector.

The front bulkhead windows of enclosed bridge wings and the front bulwark of open bridge wings should be in a line of sight from the sitting position at the primary navigation, traffic surveillance and manoeuvring workstation in order to avoid excessive blind sectors.

4.3 Windows

4.3.1 General requirements

The requirements for windows shall be according to ISO 8468:1990, 4.2.

4.3.2 Sound signal reception

Sound signals that are audible on open deck area shall also be audible inside the wheelhouse.

NOTE This requirement revises and replaces the requirement given in ISO 8468:1990, 4.2.4.

4.3.3 Guidelines

The ship may be fitted with a technical device receiving sound signals outside the wheelhouse and reproducing such signals inside the wheelhouse after amplification, when the bridge is totally enclosed.

5 Bridge arrangement

5.1 Watchkeeping

The bridge layout and arrangement of equipment shall enable watchkeeping personnel, regardless of the watchkeeping arrangement in place at a particular time, to have convenient and continuous access to essential information and to the controls necessary for performing watchkeeping responsibilities and for maintaining a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make full appraisal of the situation and the risk of collision, grounding and hazards to navigation.

5.2 Dedicated workstations

5.2.1 General requirements

Dedicated workstations, suitable for the safe and efficient performance of primary bridge functions under normal and abnormal conditions in the various phases of the voyage from berth–to–berth, shall be provided for the following functions:

a) navigation;

b) traffic surveillance and manoeuvring;

c) voyage planning;

d) manual steering:

   1) safety operations,

   2) docking operations,

   3) conning, and

   4) communication.

5.2.2 Primary bridge functions

The primary bridge functions listed in 5.2.1 are to be carried out at the following dedicated workstations:

— primary navigation, traffic surveillance and manoeuvring;

— secondary navigation;

— manual steering (helmsman);

— docking;

— voyage planning;

— safety;

— communications.

One workstation may be adjacent to another. See Figure 4.

5.2.3 Additional functions

Workstations providing additional bridge functionality may also be located on the bridge and may include

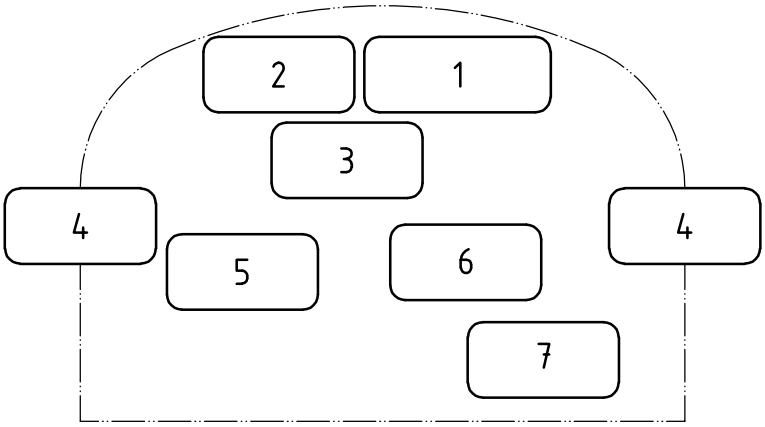
— extended communication functions,

— monitoring and control of ballasting and cargo operations,

— monitoring and control of machinery,

— monitoring and control of domestic systems, and

— ship management.



Key

1 primary navigation, traffic surveillance and manoeuvring
2 secondary navigation
3 manual steering (helmsman)
4 docking
5 voyage planning
6 safety
7 communications

Figure 4 — Interrelation of workstations

5.2.4 Primary navigation, traffic surveillance and manoeuvring workstation

The workstation for performance of primary navigation, traffic surveillance and manoeuvring functions shall be designed so that all controls and information necessary for safely operating the ship are conveniently and continuously available to watchkeeping personnel responsible for these functions, regardless of the watchkeeping arrangement in place at a particular time. As part of this workstation, a separate workstation for secondary navigation shall be installed sufficiently close by to serve as back-up workstation to allow good co-operation between two navigators.

These requirement shall be complied with in conjunction with the those of ISO 8468:1990, 5.1.4.

5.2.5 Docking workstation

The workstation for docking operations on the bridge wing shall be located to enable the navigator, together with a pilot (when present) to observe all relevant external and internal information and control the manoeuvring of the ship. It shall be possible to observe the distance between the ship's side and the wharf at the water surface.

From the workstation for docking operations it shall be possible to communicate with the primary navigation, traffic surveillance and manoeuvring workstation as well as the steering (helmsman) workstation. If the workstation for docking operations is installed on open bridge wings, talk-back facilities shall be provided to enable unhampered communication under all operating conditions.

5.2.6 Communications workstation

The communications workstation shall preferably be located on the starboard side in such a way that the operator, while operating the equipment, is looking forward.

5.2.7 Workstations for additional functions

Workstations for additional bridge functions may be located on the bridge, provided the performance of such functions does not interfere with the tasks of maintaining safe control of the ship.

5.3 Location of instruments and equipment

5.3.1 Requirements

Each workstation shall be capable of presenting basic information for its assigned function and shall contain the equipment required for maintaining a safe navigational watch, regardless of the watchkeeping arrangement in place at a particular time.

This requirement shall be complied with in conjunction with that of ISO 8468:1990, 5.2.1.

5.3.2 Guidelines

The basic additional categories of instrument information and equipment for the functions to be performed safe and efficient are the following.

a) At the navigation, traffic surveillance and manoeuvring workstation, controls and displays should enable the user to

   1) continuously monitor the automatically displayed position of the ship in relation to the route and the surrounding waters,

   2) monitor the accuracy of the electronic chart system by cross-checking the chart and radar alignment when applicable,

   3) monitor all alarm conditions on the bridge and acknowledge warnings and alarms when applicable.

b) At the manual steering (helmsman) workstation, controls and equipment should enable the helmsman to

   1) steer the ship manually by information of the ship's course, heading and rudder angle, and

   2) communicate with docking workstations.

c) At the docking workstation, controls and displays should enable the user to

   1) effect alteration of rudder angle and propulsion,

   2) monitor course, speed, rudder angle, rate-of-turn and propeller revolutions (pitch and thruster loads when applicable),

   3) make sound signals,

   4) monitor mooring lines, and

   5) effect two-way communication with mooring stations onboard and ashore, tugs, machinery spaces (and wheelhouse workstations when applicable).

d) At the voyage-planning workstation, controls and equipment should enable the user to

   1) determine the ship's position,

   2) plan the route with straight line courses and radius turns between course changes, using an appropriate chart, including an ECDIS, and taking into account weather information, tidal information and applicable literature, and

3) transfer the planned route to the workstations for navigation.

e) At the safety workstation, controls and equipment should enable the user to

1) monitor the safety state of the ship (fire, emergency, etc.),

2) handle alarm conditions and execute relevant measures,

3) organize emergency operations,

4) consult the ship's safety plans and drawings, and

5) effect internal communication.

f) At the communications workstation, controls and equipment should enable the user to transmit and receiving (external messages)

1) distress alerts,

2) search and rescue co-ordination communication,

3) on-scene communication,

4) signals for locating,

5) maritime safety information,

6) general radio communication,

7) ship to ship communication.

These guidelines are additional to those given in ISO 8468:1990, 5.2.1.

5.4 Configuration and dimensions of consoles

5.4.1 Requirements

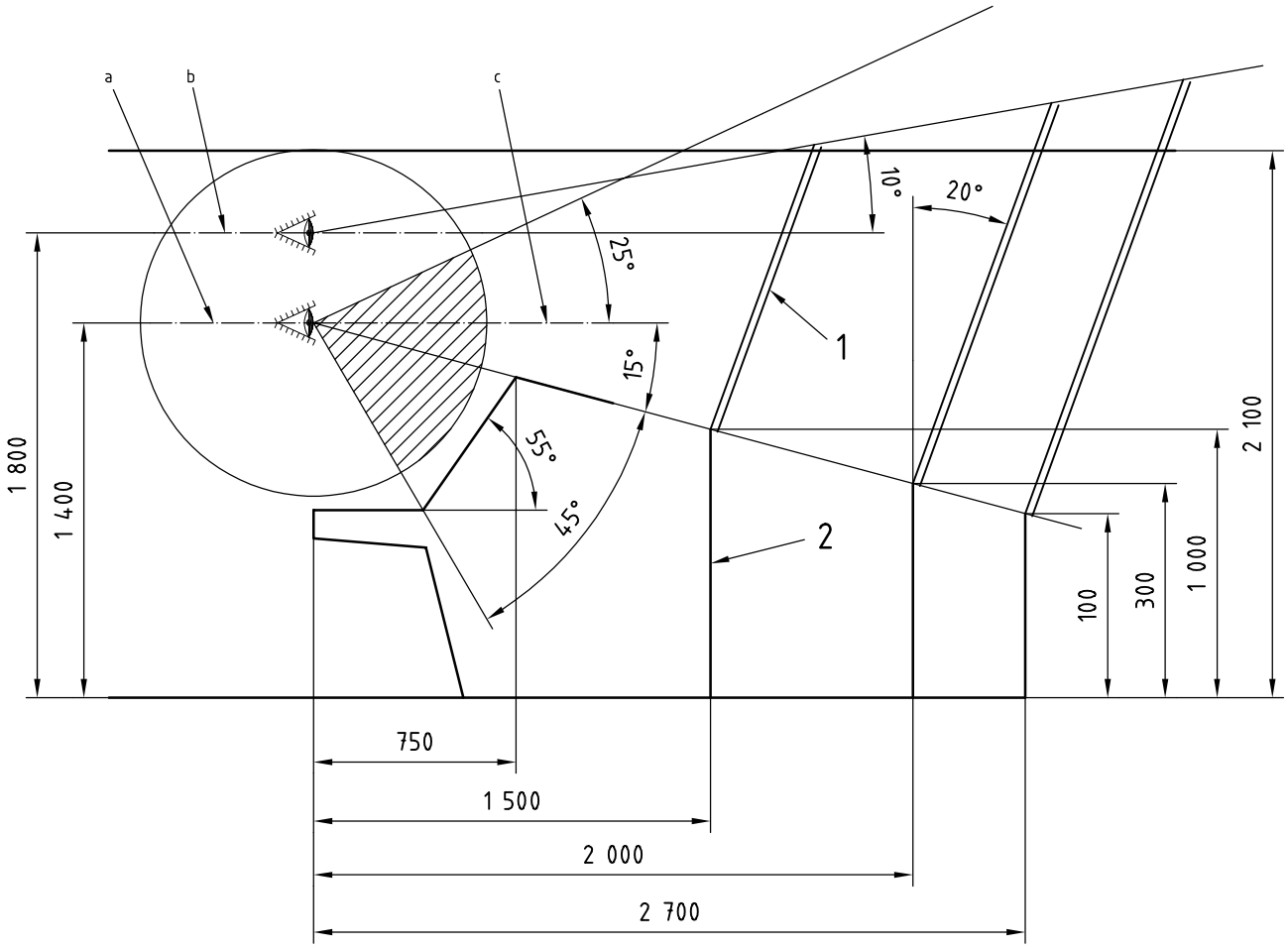
When designing the configuration of the bridge for centralized and integrated functions, the main factors to be considered are the overall view required from the navigating and manoeuvring workstations and the field of vision required from other workstations to maintain an effective lookout by sight and hearing.

All objects necessary for navigation, including other traffic and navigation marks shall be visible in any direction from inside the bridge. To achieve this visibility there shall be a field of view around the vessel of 360° obtained by the OOW moving within the confines of the wheelhouse.

5.4.2 Guidelines

The height of the console should not exceed 1200 mm in order that there shall be a line of sight from a sitting position of 350 mm behind the bottom of the console when the eye height is 1 400 mm.

Dimensions in millimetres



Key

1 window
2 bulkhead

a Standing.
b Sitting.
c Immediately readable sector.

Figure 5 — Determination of height of console and upper/lower edges of front windows

5.5 Miscellaneous

The requirements given under “miscellaneous” in ISO 8468:1990, 5.4, apply.

5.6 Bridge alarm system

5.6.1 General

The bridge alarm system is an integrated system comprising systems for watch monitoring, transfer of alarms from the bridge and a centralized alarm panel for easy identification of alarm sources and acknowledgement.

5.6.2 Watch monitoring system

A system shall be provided which will confirm the alertness of the OOW and, as appropriate, will summon back-up personnel to the bridge.

The watch monitoring system shall periodically verify that an alert OOW is present on the bridge. Its operation shall not cause undue interference with the performance of bridge functions.

The watch monitoring system shall be designed and arranged such that it cannot be operated by unauthorized personnel or in an unauthorized manner.

Any system providing periodic verification of the alertness of the OOW shall be adjustable for different operating conditions up to an interval of maximum 12 min. Only the ship's master shall have access to the component for setting the appropriate intervals.

Where a system requires manual acknowledgement by the OOW, this shall be possible at the navigation, traffic surveillance and manoeuvring workstations, and only at those other, appropriate, locations in the wheelhouse from which a proper lookout may be kept.

The watch monitoring system shall be connected to the alarm transfer specified in 5.6.3.

An alarm shall operate on the bridge in the event of a failure of the watch alarm.

5.6.3 Alarm transfer system

5.6.3.1 Requirements

Any alarm that requires response by the OOW shall be automatically transferred to the master and public rooms and — if the master deems it necessary — to the selected back-up navigator, if not acknowledged on the bridge within 30 s.

Acknowledgement and cancellation of alarms shall only be possible from the bridge.

The alarm transfer system shall be operated through a fixed installation.

The alarm transfer system shall be continuously powered and shall have an automatic changeover with an indication and alarm with a standby power supply in case of power failure.

The alarms/advance warnings (see 5.6.3.2) shall always be transferred by a fixed installation to the following areas:

— master's cabin;

— master's office;

— ship's office;

— officer's mess;

— officer's day room;

— other relevant public areas.

In addition to these locations, it shall be possible to include any of the cabins of the watch officers in the alarm transfer system by selection.

The time allowed for acknowledgement of alarms/warnings shall be as short as possible, taking into account the time required for moving from a distant position on the bridge to the device for acknowledgements.

5.6.3.2 Guidelines

A prolonged press on an acknowledgement button should be sufficient to activate the transfer alarm.

Any interval checking system should incorporate advance warning of the expiry of the interval. This indication should be adjacent to the means of acknowledgement. The advance warning time should be included in the present interval.

5.6.4 Centralized alarm system

Alarms associated with bridge equipment and bridge functions according to the IMO code for alarms shall be both audible and visual and shall be centralized such that identification and control can be achieved at the workstations for navigation. Repeater displays may be fitted on the bridge wings and at other appropriate positions on the bridge where necessary.

5.6.5 Alarm system management

Only alarms necessary for the safe operation of the ship shall be included in the centralized bridge alarm system.

It shall be possible for the OOW to instantly identify the source of the alarm and cancel the sound.

5.7 Ergonomics

Ship's bridges for centralized and integrated functions shall be designed and built in accordance with recognized ergonomic principles.

5.8 Principles of bridge layouts for centralized and integrated functions

See Annex B for examples of typical bridge layouts for periodic one-person operation.

6 Bridge equipment

6.1 General

All navigation equipment shall be in accordance with adopted IMO performance standards if applicable.

The requirements given in ISO 8468:1990, 6.1.1 to 6.1.3 apply.

6.2 Location of equipment at workstations

6.2.1 General requirements

The instruments and equipment located at the various workstations shall meet the need for safe and efficient performance of the functions according to 5.3.1.

6.2.2 Guidelines

The basic categories of instruments and equipment to be located at the various workstations include the following.

a) Workstations for navigation, traffic surveillance and manoeuvring:

   1) steering control override;

2) ECDIS;

3) watch alarm acknowledgement button;

4) central alarm panel;

5) sound reception system;

6) binoculars;

7) automatic ship identification system (AIS), if provided.

This equipment is additional to the basic instruments and equipment listed in the guidelines to ISO 8468:1990, 6.1.4 a), b) and c).

b) Workstation for manual steering (helmsman): the instruments and equipment listed in the guidelines to ISO 8468:1990, 6.1.4 d).

c) Workstation for docking:

— slave panel for central alarm system with acknowledge button.

This equipment is additional to instruments and equipment listed in the guidelines to ISO 8468:1990, 6.1.4 e).

d) Workstation for voyage planning: effective means for computation, planning and transfer of the route, which may include

— paper charts/electronic planning system,

— electronic position-fixing system,

— weather facsimile,

— nautical publications, and

— clock.

e) Workstation for safety:

1) fire alarm panels for areas;

2) remote controls for fire-extinguishing system;

3) monitoring panel and remote control for watertight doors/fire doors (open/closed);

4) emergency stop controls for air-conditioning, ventilation and refrigerating installations;

5) main station for UHF radiotelephones (walkie-talkie);

6) internal communication system (the system to include muster stations).

f) Workstation for communication: GMDSS equipment as required for the applicable sea area.

6.3 Instruments

The requirements specified in ISO 8468:1990, 6.2 apply.

6.4 Illumination and individual lighting instruments

The requirements specified in ISO 8468:1990, 6.3 apply.

6.5 Outer shape of instruments

The requirements specified in ISO 8468:1990, 6.4 apply.

6.6 Power supply

Additional equipment required to undertake a specific function should be connected, as appropriate, to a self-contained emergency source of electrical power as provided in the SOLAS convention.

7 Bridge working environment

The requirements for bridge working environment given in ISO 8468:1990 apply.

6 Failure mode and effects analysis (FMEA)

An FMEA shall be made for an integrated navigation system, if fitted, and shall be conducted in accordance with the HSC Code 2000, Annex 4.

7 Bridge operating manuals

User information, in the form of operational manuals, maintenance instructions and safety procedures, shall be provided.

Annex A
(normative)

Ship's bridge for high-speed craft

A.1 General

This annex includes special requirements for ship's bridge for high-speed craft and are additional to those contained in the body of the standard.

The general requirements concerning operating compartment layout according to the HSC Code 2000, Chapter 15, apply.

A.2 Field of vision

The operating compartment shall be suitably located to allow a view all-around of the horizon from the workstation for command and navigation.

The total arc of blind sectors from dead ahead to 22,5° above the beam on either side shall not exceed 20°, seen from a seated position at the workstation for command and navigation. Each individual blind sector shall not exceed 5°. The clear sector between two blind sectors shall not be less than 10°.

From a seated position at a workstation for command and navigation it shall be possible to

— see the bow of the craft,

— view the sea surface at a distance of one craft length (LOA) or less from the hull over an arc from dead ahead to the beam on each side,

— observe leading marks (marks in line) astern for accurate track monitoring in congested waters,

— observe the distance of the craft's forward and stern part on either side to a wharf from a position at the controls for speed and course, if separate docking workstations are not located in adequate positions.

Artificial means approved for the purpose may be used to achieve the proper view for docking operations and track monitoring, but not for traffic surveillance.

A.2.1 Workstations and location of equipment

A.2.1.1 General

The operating compartment shall not be used for any purposes other than those related to navigation and safe operation of the craft.

Each workstation in the operating compartment shall be provided with an adjustable chair and suitable safety belts.

Instruments, displays and indicators providing visual information to more than one person shall be located for easy viewing by all users concurrently or be duplicated as found necessary.

A.2.1.2 Workstation for command and navigation

For the safe command and navigation of the craft, a workstation shall be allocated where only instruments and controls necessary for navigation, traffic surveillance, manoeuvring, communication and monitoring of the safety state of the craft are located.

All the equipment to be operated at the workstation for command and navigation shall be located within reach for a seated person with safety belt fastened. Instruments and indicators to be monitored shall be easily readable from this position.

The design of the workstation for command and navigation shall allow the seating of an additional person, suitable located to assist in navigation when required and for instant take-over of essential functions, including controls for speed and course.

A.2.1.3 Docking workstation

If separate workstations for docking operations are provided, they shall be fully equipped for direct control of the propulsion and steering as well as special means for manoeuvring, if installed.

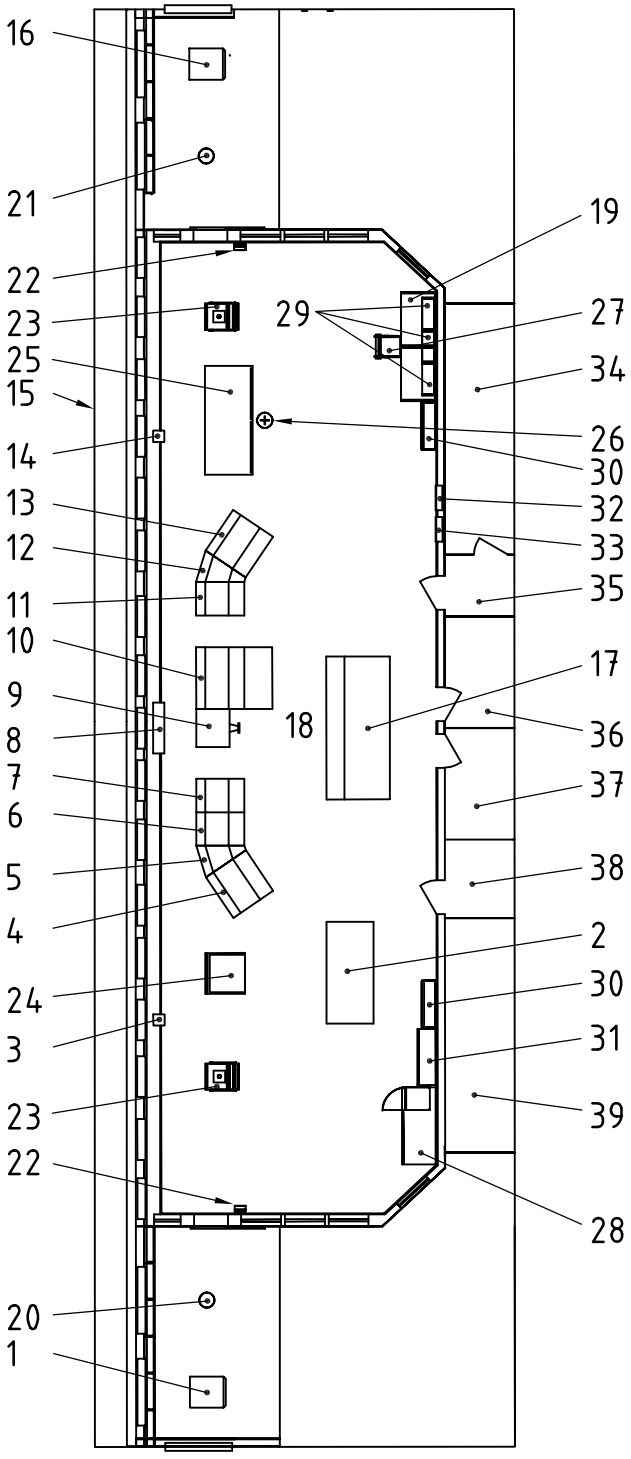
A.2.1.4 Workstation for monitoring and control of machinery

If an additional workstation for supervision of machinery is installed on the operating compartment, the location and use of this workstation shall not interfere with the field of vision required, or the functions to be performed, at the workstation for command and navigation.

Annex B
(informative)

Typical bridge layouts with centralized and integrated functions

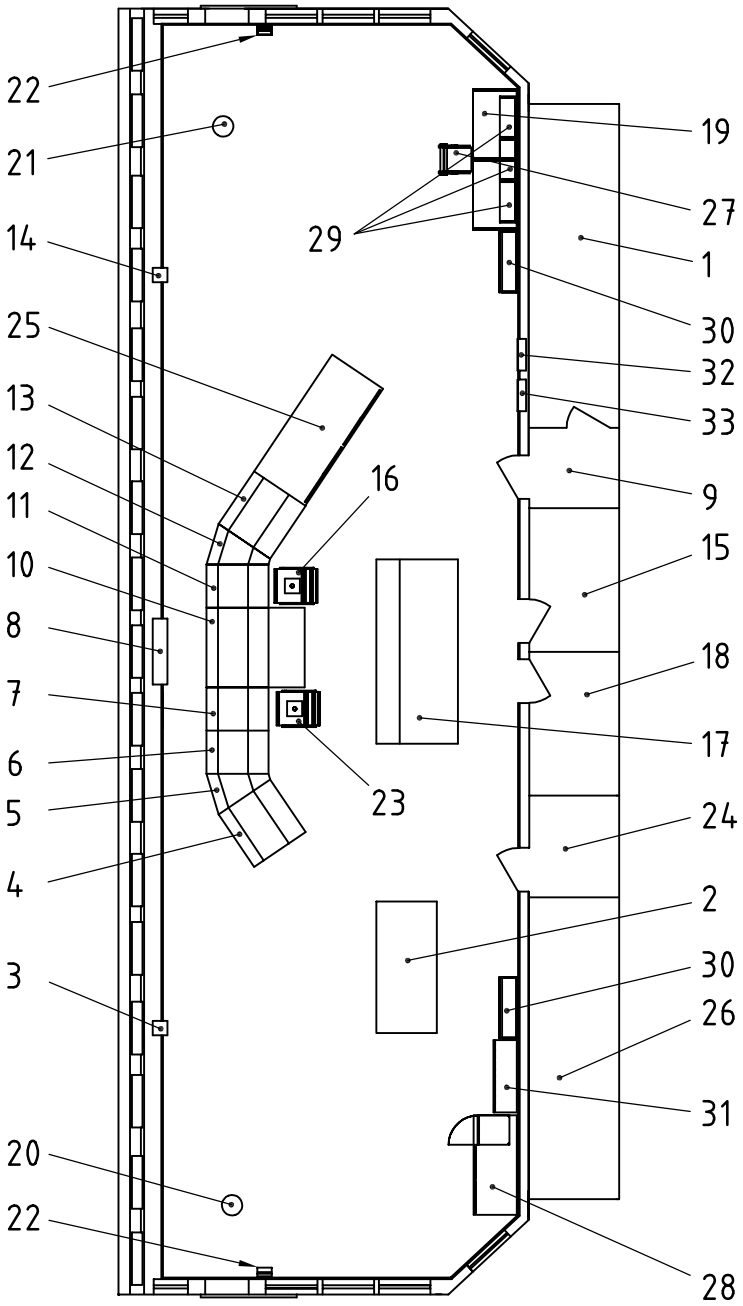
See Figures B.1 and B.2. Refer also to MSC/Circ.982 [1].



Key

1 conning station No. 4
2 radio workstation
3 conning station No. 2
4 navigation console
5 speed log display
6 radar display “X” band
7 ECDIS display
8 conning station No. 1
9 steering station
10 ship control console
11 radar display “S” band
12 echo sounder, VDR alarm
13 workstation
14 conning station No. 3
15 maintenance walkway
16 conning station No. 5
17 voyage-planning workstation
18 navigating bridge
19 desk
20 compass stand and pelorus (port)
21 compass stand and pelorus (starboard)
22 binocular box
23 chair
24 log desk
25 chart table
26 stool
27 chair
28 coffee cabinet and refrigerator
29 bookracks
30 bookcase
31 flag locker
32 emergency power panel
33 power panel
34 UNA
35 passage
36 deck w.c.
37 LKR
38 passage
39 master sea cabin

Figure B.1 — Typical ship’s bridge



Key

1 UNA
2 radio workstation
3 conning station No. 2
4 navigation console
5 speed log display
6 radar display “X” band
7 ECDIS display
8 conning station No. 1
9 passage
10 ship control console
11 radar display ‘S’ band
12 echo sounder, VDR alarm
13 workstation
14 conning station No. 3
15 deck w.c.
16 chair
17 voyage-planning workstation
18 LKR
19 desk
20 compass stand and pelorus (port)
21 compass stand and pelorus (starboard)
22 binocular box
23 chair
24 passage
25 chart table
26 master sea cabin
27 chair
28 coffee cabinet and refrigerator
29 bookracks
30 bookcase
31 flag locker
32 emergency power panel
33 power panel

Figure B.2 — Typical ship’s bridge — High-speed craft

Bibliography

[1] Maritime Safety Committee Circular 982, *Guidelines on ergonomic criteria for bridge equipment and layout*

[2] IMO Resolution A.817(19), *Performance standards for electronic chart display and information systems (ECDIS)*

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