財團法人驗船中心
CR CLASSIFICATION SOCIETY

# RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025

## AMENDMENT

*June 2025*

財團法人驗船中心
CR CLASSIFICATION SOCIETY

# RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025

AMENDMENT

***June 2025***

# RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025

## AMENDMENT

The following Parts have been amended and the effective dates are:

| Part | Effective date |
|---|---|
| I | 1 January, 2026 |
| II | 1 January, 2026 |
| III | 1 January, 2026 |
| IV | 1 January, 2026 |
| VI | 1 January, 2026 |
| VII | 1 January, 2026 |
| XI | 1 January, 2026 |
| XIII | 1 January, 2026 |
| XV | 1 January, 2026 |

*The Rules for the Construction and Classification of Steel Ships 2025* and this Amendment are to be consolidated and published as *January 2026 Edition*.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART I CLASSIFICATION AND SURVEY

# List of major changes in Part I from 2025 edition

| | |
|---|---|
| 1.6.4(f)(ii) | Revised |
| 1.15.1(j) & (k) | Revised |
| 1.17.2(c) | Revised |
| Table I 1-2 | Revised |
| Table I 1-6 | Revised |
| Table I 1-8 | Revised |
| Table I 1-10 | Revised |
| 2.2.1(d) | Revised |
| 2.5.1 | Revised and Renumbered |
| 2.7.1(c) | Revised |
| 2.16 | Revised |
| 3.1 | Revised |
| 3.9.1(c) | New |
| A1.2.1(c) & A1.2.3(a) | Revised |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 1
# Classification of Steel Ship

*Paragraph 1.6.4(f)(ii) has been amended as follows:*

## 1.6 Surveys of Steel Ships

1.6.4 Special Survey

(f) Continuous survey

(i) At the request of the owner, and upon approval of the proposed arrangement, a system of continuous surveys ~~for hull, machinery and cargo refrigerating machinery appliances,~~ may be undertaken~~, except for hull surveys of tankers, bulk carriers and similar types of ships,~~ where-by the Special Survey requirements are carried out in regular cycle to complete all the requirements of the particular Special Survey within a 5-year period. ~~If the continuous survey is completed beyond the 5-year period, the completion date is to be recorded to agree with the original due date of the cycle. If the continuous survey is completed prematurely but within 3 months prior to the due date, the Special Survey is to be credited to agree with the effective due date. The continuous survey can, also be adopted respectively for the hull, the machinery including the electrical equipment and the refrigerated cargo installations.~~

(ii) ~~Where some items of the machinery are opened up and examined by the recognized chief engineer as normal routine for maintenance at ports where the Surveyor is not available or at sea, the open-up inspection of the items, at the request of Owner, under certain conditions, may be dispensed with at the discretion of the Surveyor subject to a confirmatory survey at the convenient port of call where the Surveyor is available. The confirmatory survey is to be carried out within 5 months from the date of the item of the machinery which was opened up and inspected by the recognized chief engineer. If deemed necessary by the Surveyor, the individual item may be inspected again.~~

Machinery continuous survey (MCS) is to comply with the requirements in "Guidelines for Machinery Special Survey Carried Out on Continuous Survey Basis" and the following:

(1) During the MCS, when any defect or damage is found, similar machinery and equipment, or a part of them, may be required to be opened up for further examination as deemed necessary by the Surveyor, and all the defective items or failures found are to be repaired to the Surveyor's satisfaction.

(2) Survey items deemed appropriate by the Society may be delegated to overhaul inspections by the Owner (or the ship management company). In this case, the records of the overhaul inspections of the machinery and equipment concerned are to be ascertained as soon as possible. When it is regarded that satisfactory maintenance has not been carried out, an open-up inspection in the presence of the Surveyor may be required.

(iii) All items stipulated in 2.7.1 except thickness measurement are covered by a system of continuous survey for hull. The thickness measurement for the ship which adopts a system of continuous survey for hull conducted before the 4th Annual Survey cannot be credited for the Special Survey.

*Paragraphs 1.15.1(j) & (k) have been amended as follows:*

## 1.15 Sea Trials

1.15.1 In the classification survey of all ships, sea trials specified in following (a) to (j) are to be carried out in full load condition, in the calmest possible sea and weather condition and at the deep unrestricted water. However, where sea trials cannot be carried out in full load condition, sea trials may be carried out in an appropriate loaded condition. The noise measurements specified in (k) are to be carried out at either the full load condition or the ballast condition.

(a) Speed test.

(b) Astern test.

…

(i) Measurement of the torsional vibration for the shafting systems. (refer to Part IV Chapter 6 of the Rules for Steel Ships)

Where it is to be deemed as appropriate by the Society, the measurement of the torsional vibration for the shafting systems during the sea trials may be dispensed with, provided that sufficient analysis data (eg. torsional vibration analysis), that ensure there is no critical vibration within the service speed range.

(j) Measurement of the sound pressure levels of the fire alarm system (refer to 2.5 of Chapter 9 of the FSS Code), the general emergency alarm system~~, fire alarm (if not incorporated in the general emergency alarm system)~~ and the public address system (refer to 7.2 of the LSA Code)~~. (if used for sounding the general emergency alarm and/or the fire alarm)~~.

(k) Noise measurements. (~~P~~refer to Chapter 34 of Part II, as applicable)

(l) Other tests where deemed necessary by the Society.

Some sea trial tests of an individual ship may be dispensed with provided that the available data can be obtained from those of a sister ship or other adequate means and a special approval in given by the Society.

*Paragraph 1.17.2(c) has been amended as follows:*

## 1.17 Liability and Compensation

1.17.2 Article 2

(a) Classification is the appraisement given by the Society for its Client, at a certain date, following surveys by its surveyors along the lines specified in 1.17.3 and 1.17.4 hereafter on the level of compliance of a Unit to its Rules or part of them. This appraisement is represented by a class entered on the Certificates and periodically transcribed in the Society's Register.

(b) Certification is carried out by the Society along the same lines as set out in 1.17.3 and 1.17.4 hereafter and with reference to the applicable National and International Regulations or Standards.

(c) It is incumbent upon the Client to maintain the condition of the Unit after surveys, to present the Unit for surveys and to inform the Society without delay of circumstances which may affect the given appraisement or cause to modify its scope.The Client is to be responsible for the operation, maintenance, and management of the Unit, including machinery maintenance and upkeep, compliance with regulatory requirements, and ensuring the safety and seaworthiness, etc..

(d) The Client is to give to the Society all access and information necessary for the performance of the requested services.

*Table I 1-2 has been amended as follows:*

**Table I 1-2**
**List of Ship Type Notation**

| Notation | Description | Reference |
|---|---|---|
| **Barge** | Non-self-propelled barges intended to be towed or pushed | Part II and Part III Chapter 9 |
| **….** | | |
| **Fishing Vessel** | For ships which are built for the purpose of fishing. | Part III Chapter 7 |
| **Trawler** | This notation will be assigned to side fishing trawlers. | Guidelines for Classification of Fishing Vessels |
| **Stern Trawler** | This notation will be assigned to stern fishing trawlers. | Guidelines for Classification of Fishing Vessels |
| **….** | | |
| ~~**Self-Propelled Unit**~~ | ~~This notation will be assigned to units designed with means of propulsion capable of propelling the unit during long-distance ocean transits without external assistance.~~ | ~~Part III Chapter 13~~ |
| ~~**Non-Self-Propelled Unit**~~ | ~~This notation will be assigned to units that are not a self-propelled unit.~~ | ~~Part III Chapter 13~~ |
| ~~**Self-Elevating Unit**~~ | ~~This notation will be assigned to units with movable legs capable of raising its hull above the surface of the sea and lowering it back into the sea.~~ | ~~Part III Chapter 13~~ |
| **….** | | |
| **IP** | This notation will be assigned to cargo ships and highspeed cargo craft of 500 GT and upwards which carry more than 12 industrial personnel that comply with the IMO Resolution MSC.521(106) containing the new SOLAS Chapter XV and International Code of Safety for Ships Carrying Industrial Personnel (IP Code). | IMO Resolution MSC.521(106) and IP Code |

*Table I 1-6 has been amended as follows:*

**Table I 1-6**
**List of Special Equipment Notation**

| Notation | Description | Reference |
|---|---|---|
| **CCB** | This notation (**C**entralized System for **C**argo and **B**allast Water Handling) will be assigned to ships provided with centralized system for cargo and ballast water handling. | Part VIII/7.10 |
| **DPS-N** | This notation (**D**ynamic **P**ositioning **S**ystem), with N being **I**, **II** or **III**, will be assigned to ships provided with dynamic positioning system. | Part IV Chapter 10 |
| **….** | | |
| **Cyber-S** | The notation (**Cyber-S)** will be assigned to ships which comply with the requirements of the Guidelines for Cyber Security Onboard Ships. | Guidelines for Cyber Security Onboard Ships |
| **Cyber-R** | This notation (**Cyber-R)** will be assigned to ships where the applicable requirements in 3.2.12(c)(i) of Part VIII are complied with. | Part VIII/3.2.12(c)(i) |
| **Cyber-SnE** | This notation (**Cyber-SnE)** will be assigned to ships where the applicable requirements in 3.2.12(c)(ii) of Part VIII are complied with. | Part VIII/3.2.12(c)(ii) |
| ~~**SCR**~~ | ~~The notation (**SCR)** will be assigned to ships which comply with the requirements of the Guidelines for Selective Catalytic Reduction Systems.~~ | ~~Guidelines for Selective Catalytic Reduction Systems~~ |
| **CLB**(1) | The notation (**CLB)** will be assigned to ships which comply with the requirements of the Guidelines for Lithium-Ion Batteries Applied to Marine System / Equipment. | Guidelines for Lithium-Ion Batteries Applied to Marine System / Equipment |
| **ADW** | This notation will be assigned to ships intended for regular anchoring at deep and unsheltered water. | Part II/25.11 |
| ~~**Gas Fuel Ready-N**~~ **Alternative Fuel Ready-N**(1) | ~~This notation, with N being **I, II, III**, will be assigned to the ships where the applicable requirements in the Guidelines for LNG Fuel Ready Ships are complied with.~~ The notation (**Alternative Fuel Ready-N**), with alternative fuel being **LNG**, **Methanol**, **Ammonia** and/or **LPG fuel** and with N being **I**, **II** or **III**, will be assigned to ships which comply with the requirements of the Guidelines for Alternative Fuel Ready Ships. | ~~Guidelines for LNG Fuel Ready Ships~~ Guidelines for Alternative Fuel Ready Ships |
| **….** | | |
| **EHPS(N)** (1) | The notation (**E**lectric **H**ybrid **P**ower **S**ystem), with N being **PM** (**P**ower **M**anagement mode), **PB** (**P**ower **B**ackup mode) and/or **ZE** (**Z**ero **E**mission mode), will be assigned to ships which comply with the requirements of the Guidelines for Hybrid Power Propulsion System. | Guidelines for Hybrid Power Propulsion System |
| **HMPS**(1) | The notation (**H**ybrid **M**echanical **P**ropulsion **S**ystem) will be assigned to ships which comply with the requirements of the Guidelines for Hybrid Power Propulsion System. | Guidelines for Hybrid Power Propulsion System |
| **Self-Elevating Unit**(2) | This notation will be assigned to units with movable legs capable of raising its hull above the surface of the sea and lowering it back into the sea. | Part III Chapter 13 |
| **NSP**(1) | This notation will be assigned to ships that are not self-propelled ships. | Part III Chapter 8, 9 and 13 |

Note:

(1) It means that the notation, when assigned, is to be added after the classification symbol **CMS**.

(2) It means that the notation, when assigned, is to be added after the ship type notation **Mobile Offshore Unit**.

*Table I 1-8 has been amended as follows:*

**Table I 1-8**
**List of Navigation Safety Notation**

| Notation | Description | Reference |
|---|---|---|
| ~~**NAV**(1)~~ | ~~This notation will be assigned to ships when the requirements of navigation safety system in Chapters 2 and 3 of Part XIII of the Rules are complied with.~~ | ~~Part XIII Chapters 2 and 3~~ |
| ~~**NAV0**(1)~~ | ~~This notation will be assigned to ships when the requirements of navigation safety system in Chapters 2, 3, 4, 5, 6, 7, 9 and 10 of Part XIII of the Rules are complied with.~~ | ~~Part XIII Chapters 2, 3, 4, 5, 6, 7, 9 and 10~~ |
| ~~**NAV1**(1)~~ | ~~This notation will be assigned to ships when the requirements of navigation safety system in Chapters 2 to 10 of Part XIII of the Rules are complied with.~~ | ~~Part XIII Chapters 2 to 10~~ |
| **NSL**(1) | This notation will be assigned to ships when the requirements of Navigation Safety System in Chapter 1 and Chapter 2 of Part XIII of the Rules are complied with, and which have been constructed and installed under the survey of the Society. | Part XIII Chapters 1 and 2 |
| **NSLES**(1) | This notation will be assigned to ships when the requirements of Navigation Safety System in Chapters 1 to 3 of Part XIII of the Rules are complied with, and which have been constructed and installed under the survey of the Society. | Part XIII Chapters 1 to 3 |
| **NSLESD**(1) | This notation will be assigned to ships which have fulfilled the requirements of the notation **NSLES** and which are also equipped with additional equipment specified in Chapter 3 of Part XIII of the Rules on the bridge wings as well as constructed and installed under the survey of the Society. | Part XIII Chapters 1 to 3 |
| **NSLES(COS)** (1) | This notation will be assigned to ships when the requirements of Navigation Safety System in Chapters 1 to 4 of Part XIII of the Rules are complied with, and which have been constructed and installed under the survey of the Society. | Part XIII Chapters 1 to 4 |
| **NIBS**(1) | This notation will be assigned to ships equipped with an Integrated Bridge System (IBS) in compliance with IMO document SN.1/Circ.288 and found to be in compliance with Chapter 1 and Chapter 5 of Part XIII of the Rules, and which have been constructed and installed under the survey of the Society. | Part XIII Chapters 1 and 5 |

Note:

(1) Means notation, when assigned, to be added after the classification symbol **CMS**.

*Table I 1-10 has been amended as follows:*

**Table I 1-10**
**List of Environmental Protection Notation**

| Notation | Description | Reference |
|---|---|---|
| **POT** | This notation (**P**rotection of Fuel and Lubricating **O**il **T**anks) will be assigned to ships having an aggregate fuel oil capacity of 600 $m^3$ and above with fuel oil and lubricating oil tanks arranged in accordance with the requirement specified in 6.5.3 of Part VI. | Part VI/6.5.3 |
| **PP** | This notation (**P**ollution **P**revention) will be assigned to ships where the applicable requirements in Chapter 32 of Part II are complied with. | Part II Chapter 32 |
| **BWM** | This notation (**B**allast **W**ater **M**anagement) will be assigned to ships where the applicable requirements in Chapter 32 of Part II are complied with. | Part II Chapter 32 |
| **EEDI** | This notation (**E**nergy **E**fficiency **D**esign **I**ndex) will be assigned to ships where the applicable requirements in Chapter 32 of Part II are complied with. | Part II Chapter 32 |
| **SEEMP** | This notation (**S**hip **E**nergy **E**fficiency **M**anagement **P**lan) will be assigned to ships where the applicable requirements in Chapter 32 of Part II are complied with. | Part II Chapter 32 |
| **…** | | |
| **$SO_X$ Scrubber Ready-N**(1) | This notation, with **N** being **I**, **II** or **III**, will be assigned to ships where the applicable requirements in the Guidelines for $SO_X$ Scrubber Systems are complied with. | Guidelines for $SO_X$ Scrubber Systems |
| **EGR**(1) | This notation will be assigned to ships where the applicable requirements in the Guidelines for **E**xhaust **G**as **R**ecirculation Systems are complied with. | Part IV/3.7.3(i) |
| **URN** | This notation (**U**nderwater **R**adiated **N**oise) will be assigned to ships where the applicable requirements in the Guidelines for Underwater Radiated Noise are complied with. | Guidelines for Underwater Radiated Noise |

Notes:

(1) It means notation, when assigned, to be added after the classification symbol **CMS**.

# Chapter 2
# Survey Requirements of Steel Ship

*Paragraph 2.2.1(d) has been amended as follows:*

## 2.2 Bottom Surveys

2.2.1 Bottom Surveys in dry dock

At each Bottom Survey in dry dock the following requirements are to be complied with:

(a) Normally the ship is to be placed on blocks of sufficient height in a dry dock or on a slipway and cleaned, and proper staging is to be erected as may be necessary for examination. A docking survey covers an examination of elements such as shell plating including bottom and bow plating, stern frame and rudder, sea chests and valves, propellers, etc. The shell plating is to be examined for excessive corrosion, or deterioration due to chafing or contact with the ground and for any undue unfairness or buckling. Special attention is to be paid to the connection between the bilge strakes and the bilge keels. Important plate unfairness or other deterioration which do not necessitate immediate repairs are to be recorded.

…

(d) Visible parts of propeller and stern bush bearing or shaft bracket (strut) bearing, are to be examined. The wear down of the bearing or the clearance between the propeller shaft or stern tube shaft and the bearing, are to be examined. The clearance in the stern bush and the efficiency of the ~~oil~~ gland, if fitted, are to be ascertained and recorded. For controllable pitch propellers, the Surveyor is to be satisfied with the fastenings and tightness of hub and blade sealing. Dismantling need not to be carried out unless considered necessary by the Surveyor.

Survey in place for the propeller shaft and stern tube shaft is to be carried out as per requirement of 2.3.6.

…

(i) For Mobile Offshore Unit, the parts are to be examined as follows:

(i) Surface-type Units (ship or barge type units)

External surfaces of the hull, keel, stem, stern frame, rudder, nozzles, and sea strainers are to be selectively cleaned to the satisfaction of the attending Surveyor and examined together with appendages, the propeller, exposed parts of stern bearing assembly, rudder pintle and gudgeon securing arrangements, sea chest and strainers, and their fastenings.

Propeller shaft bearing, rudder bearing, and steering nozzle clearances are to be ascertained and recorded.

….

(iii) Column-Stabilized Units

External surfaces of the upper hull or platform, footings, pontoons or lower hulls, underwater areas of columns, bracing and their connections, sea chests, and propulsion units as applicable, are to be selectively cleaned and examined to the satisfaction of the attending Surveyor. Non-destructive testing may be required of areas considered to be critical by the Society or found to be suspect by the Surveyor.

*Paragraph 2.5.1 has been amended and Renumbered as follows:*

## 2.5 Annual Surveys

These requirements apply to all ships.

2.5.1 Annual surveys - hull

At each Annual Survey the weather decks, hull plating and their closing appliances together with watertight penetrations are to be generally examined as far as practicable~~, the general condition of hull and equipment is to be examined so far as can be seen~~ and placed in satisfactory condition ~~as necessary, attention being paid to the following items:~~ The survey is to include the following:

(a) Examination of weather decks, ship side plating above water line, hatch covers and coamings and watertight penetrations.

(i) Confirmation is to be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey. Exposed hatch covers are to be examined to confirm the structural integrity and capability of maintaining weathertightness. Where extensive areas of wastage of steel hatch covers are found, thickness measurements are to be carried out, and renewals or repairs made where wastage exceeds allowable margins. Where substantial corrosion is found, additional thickness measurements are to be taken to confirm the extent of substantial corrosion.

(ii) Where mechanically operated steel covers are fitted, ~~checking the satisfactory condition, as applicable,~~ examination of:

(1) Hatch covers; including plating and stiffeners;

(2) Tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels, drains, and non return valves, if fitted);

(3) Steel-to-steel contact between cover and coaming, support pads, cleats (including cross joint bolts and/or wedges)

(~~3~~4) Clamping devices, retaining bars, cleating;

(~~4~~5) Chain or rope pulleys;

(~~5~~6) Guides;

(~~6~~7) Guide rails and track wheels;

(~~7~~8) Stoppers, etc;

(~~8~~9) Wires, chains, gypsies, tensioning devices;

(~~9~~10) Hydraulic system essential to close and securing;

(~~10~~11) Safety locks and retaining devices.

(iii) Where ~~portable~~ wooden covers on portable beams~~, wooden~~ or steel pontoons covers are fitted, ~~checking the satisfactory condition, where applicable,~~ examination of:

(1) Wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;

(2) Steel pontoons;

(3) Tarpaulins;

(4) Cleats, battens and~~,~~ wedges;

(iv) Checking the satisfactory condition of hatch coaming plating and their stiffeners, ~~including close up survey~~ where applicable.

…

(vi) Examination of the weld connection between air pipes / sounding pipes and deck plating.

(vii) External examination of all air pipe heads installed on the exposed decks.

(viii) Examination of flame screens on vents to all bunker tanks.

(ix) Examination of ventilators, including closing devices, if any.

(b) Suspect Areas and Examination of Ballast Tanks

…

(c) Protection of other openings

(i) Hatchways, manholes, and scuttles in freeboard and superstructure decks.

(ii) Machinery casings, skylights, fiddley covers, companion-ways and deckhouses protecting openings in freeboard or enclosed superstructure decks.

…

(vi) Weather-tight and watertight doors and closing appliances for all of the above including proper operation of such doors.

(d) Freeing ports together with bars, shutters and hinges.

(e) Protection of the crew

Bulwark, walkways, ~~G~~guard rails, lifelines, gangways, accommodation ladders with accessory wires, winches and gears and deck houses accommodating crew.

…

(p) The Surveyor is to confirm that, for container ships which have the special equipment notation **CSP**, the onboard lashing program, together with its operation manual, is available on board, see Appendix 2 of "Guidelines for Container Securing Systems".

*Paragraph 2.7.1(c) has been amended as follows:*

## 2.7 Special Surveys

These requirements apply to all ships.

Procedures for class related services, see 2.1.4 of this Chapter.

Provision for surveys, see 2.1.5 of this Chapter. A survey planning meeting is to be held prior to the commencement of the survey, see 2.1.6(b) of this Chapter.

Concurrent crediting to both Intermediate Survey (IS) and Special Survey (SS) for surveys and thickness measurements of spaces are not acceptable.

2.7.1 Special Survey - hull

All Annual Survey requirements together with the following are to be complied with:

(a) The examinations of the hull are to be supplemented by thickness measurements and testing as required in 2.7.1(j) and 2.7.1(k), to ensure that the structural integrity remains effective. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

(b) A Bottom Survey in dry dock in accordance with the requirements of 2.2.1 of this Chapter is to be carried out as part of the Special Survey.

(c) The anchors and chain cables are to be ranged, examined and the required complement and condition verified. The chain locker holdfasts, hawse pipes and chain stoppers are to be examined and pumping arrangements of the chain locker tested.

At Special Survey No. 2 and subsequent Special Surveys, chain cables are to be gauged and renewed in cases where their mean diameter is 12% worn below the ~~requirement limits allowed by the Society~~ original required nominal diameter.

*Section 2.16 has been amended as follows:*

## 2.16 Additional Survey Requirements of High Speed Craft for FRP and Aluminum Alloys Construction

2.16.1 Annual Survey

(a) For Craft of Fiber Reinforced Plastic (FRP) Construction, in addition to the applicable requirements of 2.5 of this Part, the Annual Survey - Hull is to include the following:

(i) All accessible parts particularly liable to rapid deterioration.

~~(ii) The craft is to be placed in drydock or slipway and all applicable items of the Annual Survey - Hull are to be examined.~~

(~~iii~~ ii) The deck-to-hull connection, and superstructure and deckhouse connections are to be examined.

(~~iv~~ iii) The craft is to be thoroughly checked and sounded for any apparent delaminations.

Where it is thought a delamination is found, a 50 mm diameter plug is to be removed from the area and examined for core to skin adhesion and water permeation.

(b) For Craft of Aluminum Alloys Construction, in addition to the applicable requirements of 2.5 of this Part, the Annual Survey - Hull is to include the following:

(i) All parts liable to rapid deterioration, particularly areas adjacent to dissimilar metals which are in close proximity.

(ii) In lieu of ballast tanks and combined cargo/ballast tanks, internal structure of a randomly selected cargo space, dry or liquid, together with any other space deemed necessary by the Surveyor, with particular attention to be given to bilges and drain wells.

(c) For Craft subject to the IMO HSC Code, in addition to the applicable requirements of.2.5 of this Part, Bottom Survey in dry dock is to be a part of the Annual Survey as required by 2.2.1 of this Part.

2.16.2 Special Survey

In addition to the Annual Survey in 2.16.1 above and the applicable requirements of Special Survey in 2.7 of this Part, the Special Survey is to include the following:

(a) Requirements for Craft of Fiber Reinforced Plastic (FRP) Construction

(i) Engine foundations and their attachments to the hull are to be examined.

(ii) If considered necessary by the attending Surveyor, a minimum of five plugs, each 50 mm in diameter, are to be removed from the hull bottom and topsides from locations deemed appropriate from the attending Surveyor and examined for core to skin adhesion and water permeation.

(iii) The framing and holds, hull laminate of the tween deck, deep tanks, peaks, bilges and drain wells, and machinery spaces are to be cleaned and examined. Linings, ceiling, tanks, and portable ballast are to be removed as considered necessary by the attending Surveyor.

(iv) Where there is evidence of cracking, distortion, wetness, or delamination, destructive or nondestructive testing and removal and repair of the defect is subject to the discretion of the attending Surveyor.

(v) The hull, fastenings, and backing reinforcements in way of hull fittings and attachments are to be examined. Fastenings are to be withdrawn as considered necessary by the attending Surveyor.

(vi) The efficiency of hand pumps or other drainage arrangements for end spaces is to be tested.

(vii) Additionally for sailing and unpowered craft, where applicable, ballast-keel fastenings and all openings to the sea, including sanitary and other overboard discharges, together with the cocks and valves connected therewith, are to be examined while the craft is in drydock. Mast foundation and connection to the hull are to be examined.

(b) Requirements for Craft of Aluminum Alloys Construction

In addition to the applicable requirements of Special Survey in 2.7, particular attention is to be given to insulation material in joints of shell connections between dissimilar metals, which is to be found or made effective as necessary.

# Chapter 3
# Survey Requirements for Additional Systems and Services

*Section 3.1 has been amended as follows:*

## 3.1 General

In order to maintain ~~a Class Notation for an~~ the additional system ~~and or~~ and/or service, that system, equipment, or installation is to be surveyed in accordance with this chapter.

*Paragraph 3.9.1(c) has been added as follows:*

## 3.9 Survey for Ships other than Liquefied Gas Carriers Utilizing Gas or other Low Flash Point Fuels

3.9.1 Annual Survey

(a) General

The following is to be carried out during the survey of the fuel storage, fuel bunkering system, and fuel supply system:

(i) General

The log books are to be examined with regard to correct functioning of the gas detection systems, fuel supply/gas systems, etc. The hours per day of the prime movers, re-liquefaction plant, gas combustion unit, as applicable, or the boil-off rate are to be considered together with gas detection records.

….

(ix) Electrical bonding

Electrical bonding arrangements in hazardous areas, including bonding straps where fitted are to be examined.

(b) Fuel Storage, Bunkering and Supply Systems

The following are to be examined, so far as applicable. Insulation need not be removed, but any deterioration or evidence of dampness is to be investigated.

(i) Fuel storage

(1) External examination of storage tanks and secondary barrier if fitted and accessible.

(2) General examination of the fuel storage space.

(3) External examination of tank relief valves.

(4) Examination and testing of installed bilge alarms and means of drainage of the compartment in accordance with an approved inspection/survey plan for the liquefied gas fuel containment system.

(5) Testing of the remote and local closing of the installed main tank valve.

(6) Verification of satisfactory operation of tank monitoring system.

(ii) Fuel bunkering system

(1) Examination of bunker stations and the fuel bunkering system.

(2) Verification of satisfactory operation of the fuel bunkering control, monitoring and shutdown systems.

(iii) Fuel supply system

(1) Examination of the fuel supply system during working condition as far as practicable.

(2) Verification of satisfactory operation of the fuel supply system control, monitoring and shut-down systems.

(3) Testing of the remote and local closing of the master fuel valve for each engine compartment.

(c) Additional Requirements for Ships Using Ammonia as Fuel

The following items are to be addressed during annual survey as per the requirements in the CR "Guidelines for Ships Using Ammonia as Fuel", as applicable:

(i) Functional testing of water screens above access doors for fuel preparation room.

(ii) Functional testing of gas evacuation system for fuel preparation room.

(iii) Functional testing of alarms for monitoring and safety functions, see Table 15-1 of the CR "Guidelines for Ships Using Ammonia as Fuel".

(iv) Functional testing of eyewash and decontamination showers.

(v) Operational testing of fuel treatment or vent control systems utilizing water scrubbing or treatment systems.

(vi) Operational testing of associated exhaust aftertreatment systems.

(vii) Testing of portable gas detectors for ammonia.

(viii) Testing of fixed gas detection for ammonia.

(ix) Testing of gas detection:

(1) Where the auxiliary heat exchange circuits are likely to contain ammonia in abnormal conditions as a result of a component failure (refer to FMEA for more information), see 9.5.14 of of the CR "Guidelines for Ships Using Ammonia as Fuel".

(2) At crankcase breather, or under piston space, see 10.3.5 of the CR "Guidelines for Ships Using Ammonia as Fuel".

(3) Where the engine auxiliary systems are likely to contain ammonia in abnormal conditions as a result of a component failure (refer to FMEA for more information), see 10.3.7 of the CR "Guidelines for Ships Using Ammonia as Fuel".

(x) Examination of toxic areas and ventilation intakes including gas detection system for ammonia.

(xi) Examination of all other personnel safety and PPE specific to ammonia, see 5.11 of the CR "Guidelines for Ships Using Ammonia as Fuel".

# Appendix 1
# Loading Computer System (LCS) for Stability and Longitudinal Strength

*Paragraphs A1.2.1(c) & A1.2.3(a) have been amended as follows:*

## A1.2 Approval and Testing Requirements

A1.2.1 Approval principles

(a) The requirements of hardware is to be complied with the Rules.

(b) The software can be either type approved or case-by-case approved. The latter case is only in condition with system installation on board a specific ship. In either case, relevant requirements stated in section A1.1 are to be complied with.

(c) Approval and certification.

(i) Documentation according to A1.1.4 including preliminary test conditions in accordance with A1.2.2 is to be submitted for approval.

(ii) Final test conditions according to A1.2.2, are to be tested on board in the presence of the ~~a~~ Surveyor as described in A1.2.3.

(iii) Report ~~Certificate~~ of the loading computer system will be issued after checking of final test conditions on board.

A1.2.2 Test conditions

….

A1.2.3 Testing and certification

(a) General

(i) At least 4 of the final test conditions are to be tested on board in the presence of the ~~a CR~~ Surveyor, before the report of the loading computer system ~~certificate~~ is issued.

(ii) The results from the test conditions must not deviate significantly from the results in the approved loading manual or stability booklet. If found unacceptable, the reason for the deviation is to be clarified.

(iii) A copy of the final test conditions endorsed by a Surveyor is to be kept on board.

(iv) If the final loading manual or the final stability booklet has not been approved before delivery, testing on board may take place after these documents have been approved.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART II HULL CONSTRUCTION AND EQUIPMENT

# List of major changes in Part II from 2025 edition

| | |
|---|---|
| 12A.4.5 | Revised |
| 12A.4.6 | Revised |
| 12A.4.7 | Revised |
| 13.1.2(d) | New |
| 22.1.4(a) | Revised |
| 24.5.2(a) | Revised |
| 24.5.4(b) | Revised |
| 24.6.5 | Revised |
| 33.6.3(d)(i) | Revised |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 12A
# Helicopter Decks and Facilities

## 12A.4 Arrangements

……

*Paragraph 12A.4.5 has been amended as follows:*

12A.4.5 For applicable requirements regarding m~~M~~eans of escape, refer to 13.1.3 of Part IX of the Rules

~~(a) A helicopter deck is to be provided with both a main and an emergency means of escape and access for fire fighting and rescue personnel. These are to be located as far apart from each other as is practicable and preferably on opposite sides of the helicopter deck.~~

*Paragraph 12A.4.6 has been amended as follows:*

12A.4.6 ~~Drainage facilities~~For applicable requirements regarding fire fighting appliance, refer to 13.1.4 of Part IX of the Rules

~~(a) Drainage facilities in way of helicopter decks are to be constructed of steel and are to lead directly overboard independent of any other system and are to be designed so that drainage does not fall onto any part of the ship.~~

*Paragraph 12A.4.7 has been amended as follows:*

12A.4.7 For applicable requirements regarding drainage facilities, refer to 13.1.5 of Part IX of the Rules~~Fire-fighting appliances~~

~~(a) In close proximity to the helicopter deck, the following fire-fighting appliances are to be provided and stored near the means of access to that helicopter deck:~~

~~(i) at least two dry powder extinguishers having a total capacity of not less than 45 kg;~~

~~(ii) carbon dioxide extinguishers of a total capacity of not less than 18 kg or equivalent;~~

~~(iii) a suitable foam application system, with the requirements of IMO MSC.1/Circ.1431 consisting of monitors or foam making branch pipes capable of delivering foam to all parts of the helicopter deck in all weather conditions in which helicopters can operate. The system is to be capable of delivering a discharge rate as required in Table II 12A-4 for at least five minutes;~~

**~~Table II 12A-4~~**
**~~Foam Discharge Rates~~**

| ~~Category~~ | ~~Helicopter overall length~~ | ~~Discharge rate foam solution (l/min.)~~ |
|---|---|---|
| ~~H1~~ | ~~up to but not including 15 m~~ | ~~250~~ |
| ~~H2~~ | ~~from 15m up to but not including 24 m~~ | ~~500~~ |
| ~~H3~~ | ~~from 24m up to but not including 35 m~~ | ~~800~~ |

~~(iv) the principal agent is to be suitable for use with salt water, and a type deemed as appropriate by the Society.~~

~~(v) at least two nozzles of an approved dual-purpose type (jet/spray) and hoses sufficient to reach any part of the helicopter deck.~~

~~(vi) in lieu of the requirements of (iii) through (v), on ships having a helideck, foam firefighting appliances which comply with the provisions of the Fire Safety Systems Code.~~

~~(vii) in addition to the requirements of SOLAS Reg. II-2/10.10, two sets of fire-fighter's outfits; and~~

~~(viii) at least the following equipment is to be stored in a manner that provides for immediate use and protection from the elements:~~

~~(1) adjustable wrench;~~

~~(2) blanket, fire resistant;~~

~~(3) cutters, bolt 60 cm;~~

~~(4) hook, grab or salving;~~

~~(5) hacksaw, heavy duty complete with 6 spare blades;~~

~~(6) ladder;~~

~~(7) lift line 5 mm diameter x 15 m in length;~~

~~(8) pliers, side cutting;~~

~~(9) set of assorted screwdrivers; and~~

~~(10) harness knife complete with sheath.~~

# Chapter 13
# Bulwarks, Freeing Ports, Side Scuttles, Shell Doors and Gangways

*Paragraph 13.1.2(d) has been added as follows:*

## 13.1 Bulwarks and Guardrails

……

13.1.2 Bulwark constructions

……

(d) The section modulus at the bottom of bulwark stays is not to be less than that obtained from the following formula:

$(30+0.45L)Sh^2K \quad cm^3$

where:

S = spacing of stays, in m;
L = length of ship, in m, not to be taken as greater than 100 m;
h = height of bulwark, in m;
K = material factor.

Where the flange of the stay is not welded to the deck, such a flange is not to be considered for the section modulus.

# Chapter 22
# Scuppers and Sanitary Discharges

*Paragraph 22.1.4(a) has been amended as follows:*

## 22.1 Scuppers and Sanitary Discharges

……

22.1.4 Automatic non-return valves

(a) Non-return valves

Normally each separate discharge is to have one automatic non-return valve with positive means of closing it from a position above the freeboard deck. Where the inboard end of the discharge pipe is located at least $0.01L_f$ above the Summer Load Line, the discharge may have 2 automatic non-return valves without positive means of closing. Where that vertical distance exceeds $0.02L_f$, a single automatic non-return valve without positive means of closing may be accepted. The means for operating the positive action valve are to be readily accessible and provided with an indicator showing whether the valve is open or closed.

….

*Paragraph 24.5.2(a) has been amended as follows:*

## 24.5 Rudder Stock Couplings

24.5.2 Cone couplings with key

(a) Cone couplings without hydraulic arrangements for mounting and dismounting the coupling should have a taper c on diameter of 1:8 - 1:12, where:

$$c = \frac{d_0 - d_u}{l_c}$$

(see Fig. II 24-7A~ ~~and~~ Fig. II 24-7~~B~~C of this Chapter)

The diameters $d_0$ and $d_u$ are shown in Fig. II 24-7A and the cone length $l_c$ is defined in Fig. II 24-7~~B~~C.
The cone coupling is to be secured by a slugging nut. The nut is to be secured, e.g. by a securing plate.

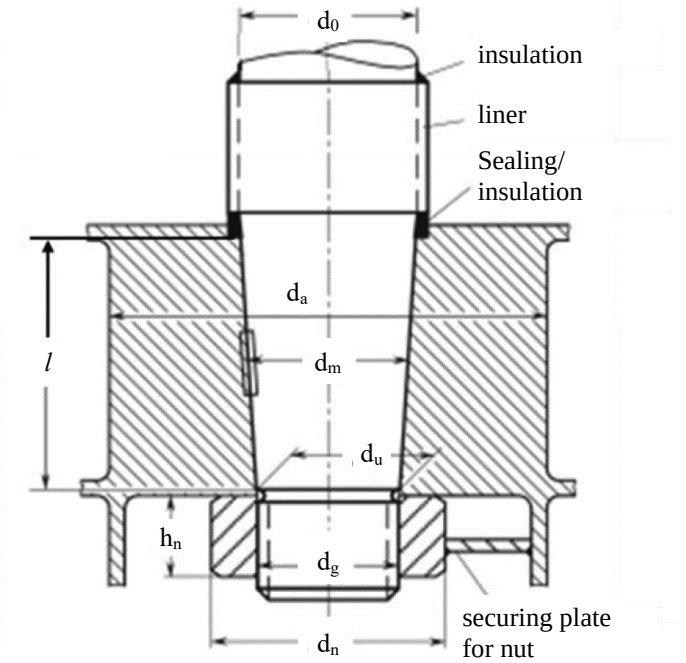



**Fig. II 24-7A**
**Cone Coupling with Key**

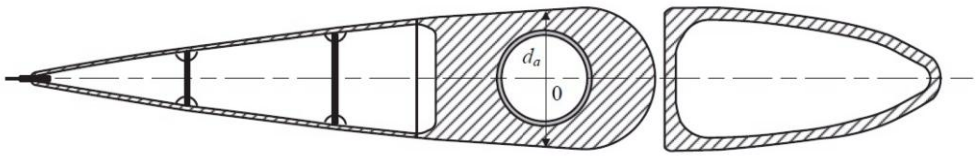



**Fig. II 24-7~~A~~B**
**Gudgeon Outer Diameter($d_a$) Measurement**

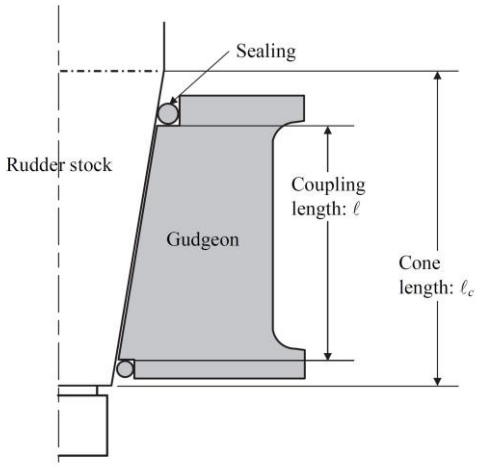



**Fig. II 24-7~~B~~C**
**Cone Length and Coupling Length**

*Paragraphs 24.5.4(b)have been amended as follows:*

24.5.4 Cone couplings with special arrangements for mounting and dismounting the couplings

(a) .....

(b) Push-up pressure
The push-up pressure, is not to be less than the greater of the two following values:

$$p_{req1} = \frac{2Q_F}{d_m^2 l \pi \mu_0} 10^3 \qquad N/mm^2$$

$$p_{req2} = \frac{6M_b}{l^2 d_m} 10^3 \qquad N/mm^2$$

where:

| | | |
|---|---|---|
| $Q_F$ | = | design yield moment of rudder stock, as defined in 24.5.2(i) of this Chapter, in Nm |
| $d_m$ | = | mean cone diameter in mm, see Fig. II 24-7A of this Chapter |
| $l$ | = | coupling length in mm |
| $\mu_0$ | = | frictional coefficient, equal to 0.15 |
| $M_b$ | = | bending moment in the cone coupling (e.g. in case of spade rudders), in Nm |

It has to be proved by the designer that the push-up pressure does not exceed the permissible surface pressure in the cone. The permissible surface pressure, in N/mm$^2$, is to be determined by the following formula:

$$p_{perm} = \frac{0.95 R_{eH}(1 - a^2)}{\sqrt{3 + a^4}} - p_b \qquad N/mm^2$$

where:

$$p_b = \frac{3.5 M_b}{d_m l^2} 10^3$$

| | | |
|---|---|---|
| $R_{eH}$ | = | minimum yield stress of the material of the gudgeon in $N/mm^2$ |
| a | = | $d_m / d_a$ |
| $d_m$ | = | diameter, in mm, see Fig. II 24-7A of this Chapter |
| $d_a$ | = | outer diameter of the gudgeon, in mm, see Fig. II 24-7A and Fig. II 24-7~~A~~B of this Chapter. (The least diameter is to be considered). |

The outer diameter of the gudgeon in mm shall not be less than 1.25 $d_0$ , with $d_0$ defined in Fig. II 24-7A.

*Paragraphs 24.6.5 have been amended as follows:*

## 24.6 Pintles

24.6.1 The minimum pintle diameter is to be as follows:

$$d_p = 0.35\sqrt{BK_p} \qquad \text{mm}$$

where:
B = The reaction force in bearing, in N.
$K_p$ = Material factor for the pintle as specified in 1.5.2(c) of this Part.

…..

24.6.5 Push-up pressure for pintle bearings

The required push-up pressure $p_{req}$ for pintle bearings, in N/mm², is to be determined by the following formula:

$$p_{req} = 0.4\frac{B_1 d_0}{d_m^2 \, l}$$

where:

$B_1$ = Supporting force in the pintle bearing, in N

$d_0$ = Pintle diameter, in mm, see Fig. II 24-7A of this Chapter

The push up length is to be calculated similarly as in 24.5.4(c) of this Chapter, using required push-up pressure and properties for the pintle bearing.

# Chapter 33
# Sloshing

*Paragraph 33.6.3(d)(i) has been amended as follows:*

## 33.6 Design Sloshing Load for Ships with Length less than 100 Meters

……

33.6.3 Deck Structures Subjected to Sloshing

(a) Strength deck plating

The thickness requirement corresponding to lateral pressure is given by:

$$t = \frac{15.8k_a s\sqrt{p}}{\sqrt{\sigma}} + t_c \qquad mm$$

where:

p = Design load for sloshing as given in 33.6.1
σ = As given in Table II 33-4.

……

(d) Simple girders

(i) The section modulus requirement for simple girders is given by:

$$Z = \frac{100S^2 bpw_k}{\sigma} \qquad cm^3$$

where:

p = Design load for sloshing as given in 33.2.2(b)
b = Loading breadth, in m
σ = Allowable stress as given in 33.6.2(b) for longitudinal girders
= 160/K for other girders.

(ii) The web area requirement (after deduction of cut-outs) at the girder ends is given by:

$$A = 0.06Sbp + 10ht_k \qquad cm^2$$

where:

p = As given in 33.6.3(d)(i)
b = As given in 33.6.3(d)(i)
h = Girder height, in m.

The web area at the middle of the span is not to be less than 0.5 A.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART III SPECIAL SERVICE AND TYPE OF SHIPS

# List of major changes in Part III from 2025 edition

| | |
|---|---|
| Chapter 7 | Revised |
| 13.1 | Revised |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

*Chapter 7 has been amended as follows:*

# Chapter 7
# Fishing ~~Ships~~Vessels

## 7.1 General

7.1.1 This Chapter applies to ships classed in accordance with the provisions in Chapter 1 of Part I and built for the purpose of fishing. In addition to the applicable requirements of the Rules, the ship is to comply with the requirements of the CR Guidelines for Classification of Fishing Vessels (hereinafter referred to as CR FS Guidelines). Unless expressly provided otherwise, CR FS Guidelines apply to fishing vessels of 24 m and over in length.

In general, the scope of classification of fishing vessels covers the requirements for hull construction and equipment, materials and welding, machinery installations, electrical installations, refrigerated systems and relevant systems.

Apart from the scope of classification, the statutory requirements, such as stability, watertight integrity, associated seaworthiness, fire safety (including detection, protection, extinction and fighting), protection of the crew, life-saving appliances, crew accommodation, and etc., are to comply with the provisions of the Cape Town Agreement of 2012 on the Implementation of the Provisions of the 1993 Protocol relating to the Torremolinos International Convention for the Safety of Fishing Vessels, or the requirements specified by the National Authority.

For fishing vessels of 24 m in length and over but less than 45 m, it may be referred to the Safety Regulations for Fishing Vessels of 24 metres in length and above 2010(IMO) to supplement the requirements not included in the Cape Town Agreement of 2012.

Where the scope of classification and statutory overlapped each other, compliance with those statutory requirements could be deemed as meeting the corresponding requirements of the Rules.

For fishing vessels of less than 24 m in length

(a) For fishing vessels of 12 m and over but less than 24 m in length, it may be referred to the Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels, 2005(IMO).

(b) For fishing vessels of less than 12 m in length, it may be referred to the Safety Recommendations for Decked Fishing Vessels of Less than 12 metres in Length and Undecked Fishing Vessels, approved in 2010(IMO).

~~7.1.2 Except where the following modifications are required or are permissible, the requirements for the construction of general ships given in Part II are to be applied.~~

~~7.1.3 Definitions~~

~~(a) Where the freeboard assignment is not required for a fishing vessel, the draft d for determining the hull scantling and the definition of the length of ship L is to be taken as 90% of the depth of ship D, unless otherwise specially noted and subject to special consideration by the Society.~~

~~(b) Position 1, Position 2 and $L_1$ used in 7.4 of this Chapter are as defined in 17.1.2 of Part II and 1.2.10 of Part II respectively, for fishing vessels for which the assignment of freeboard is not required where $L_1$ may be substituted by L.~~

## 7.2 Class Notations

7.2.1 In general, ships complying with the requirements of CR FS Guidelines will be eligible for one of the following class notations:

(a) **Fishing Vessel.** This notation will be assigned to fishing vessels.

(b) **Trawler**. This notation will be assigned to side fishing trawlers.

(c) **Stern Trawler.** This notation will be assigned to stern fishing trawlers.

## ~~7.2 Decks~~

~~7.2.1 The thickness of unsheathed upper strength deck plating for vessels up to 90 meters in length is to be not less than that given by the following formula:~~

~~0.064L + 3.7 mm~~

~~Where the beam spacing differs from 2L + 480 mm the thickness is to be modified at the rate of 0.5 mm for every 100 mm of difference.~~

~~7.2.2 The thickness of the unsheathed upper strength deck plating at 0.1L from ends needs not exceed the following formula:~~

~~0.025L + 4.7 mm~~

~~7.2.3 The thickness of the unsheathed forecastle and bridge deck plating for ships up to 60 meters in length is to be not less than that given by the following formula:~~

~~0.05L + 3.5 mm~~

~~7.2.4 The thickness of the unsheathed poop deck plating for ships up to 70 meters in length is to be not less than that given by the following formula:~~

~~0.05L + 3.0 mm~~

~~But in no case to be less than 4.5 mm.~~

~~7.2.5 Where steel upper and superstructure deck is sheathed with wood planking, the thickness of steel deck plating may be 1 mm less, but in no case to be less than 4.5 mm.~~

7.2.6 The thickness of the wood plank on the weather deck is to be as required by 11.6 of Part II (the Rules 1997) except that for ships of 50 meters and under in length the thickness of the wood plank on the exposed superstructure deck may be of 50 mm. In way of the wood plank with excessive wear during fishing operations the thickness of the wood plank is to be increased in thickness or double wood planks to be fitted.

7.2.7 The trawl ramp of the stern trawler is to be of sufficient strength. The thickness is recommended to be not less than 12 mm. The thickness of sides of the trawl ramp is not to be less than 10% in excess that of the shell plating at ends. Doubling plates or other equivalent means are to be fitted in way of the trawl ramp which is subject to excessive wear.

## 7.3 Shell Plating and Bulwarks

7.3.1 In way of gallows of side trawlers the upper part of the shell plating is to be strengthened by doubling plates or other equivalent means.

7.3.2 The garbage opening is to be reinforced by inserted plates or doubling plates.

7.3.3 The thickness of the bulwark is to be not less than 5 mm for ships less than 30 meters in length and 6 mm for ships of 30 meters and over in length. In way of gallows and shrouds the thickness is to be suitably increased.

## 7.4 Weather Deck Hatchways and Openings

7.4.1 The height of the coaming above the upper surface of the wood deck for hatchways and openings closed by portable covers secured weathertight by tarpaulins and battening devices is not to be less than:

600 mm on upper deck
300 mm on superstructure deck

7.4.2 The thickness of the coaming plate of weather deck hatchways is to be not less than 7 mm in ships not exceeding 30 m in length and 11 mm in ships of 75 m in length and above. The thickness at the intermediate length is obtained by interpolation.

7.4.3 The finished thickness of wood hatch covers may be of 50 mm when the unsupported span is less than 1.0 m.

7.4.4 The height of the coaming of the companionway above the upper surface of the wood deck is to be not less than 450 mm in position 1 and 230 mm in position 2.

7.4.5 The height of the sill above the deck of doors in the exposed machinery casing is not to be less than:

600 mm on upper deck
300 mm on superstructure deck

7.4.6 The thickness of the steel ventilator coaming plate is to be not less than that obtained by the following formula but the thickness needs not exceed 8 mm and is not to be less than 6 mm:

$$3.0 + \frac{\phi}{32} \text{ mm}$$

where:

~~$\phi$ = External diameter of the ventilator coaming, in mm.~~

## ~~7.5 Equipment~~

~~7.5.1 The equipment may be based on the "Equipment Number", with 10% less than that determined by 25.2 of Part II.~~

*Section 13.1 has been amended as follows:*

# Chapter 13
# Mobile Offshore Unit

## 13.1 General

This Chapter applies to units classed in accordance with the provisions in Chapter 1 of Part I and built for the purpose of ocean service.

Units complying with the requirements of this Chapter are to be assigned a notation of "**Mobile Offshore Unit**" and a notation of unit type,~~"**Self-Propelled Unit**", "**Non-Self-Propelled Unit**" **or**~~ "**Self-Elevating Unit**", as defined in 13.1.1.

Alternatives equivalent to the Rules may be accepted subject to the discretion of the Society.

13.1.1 Definitions

(a) General

For the purpose of this Chapter, the terms have the following meaning unless stated otherwise.

(i) Unit

A mobile offshore structure or vessel, whether designed for operation afloat or supported on sea bed.

(ii) Self-Propelled Unit

A unit designed with means of propulsion capable of propelling the unit during long distance ocean transits without external assistance.

(iii) Non-Self-Propelled Unit

A unit that is not a self-propelled unit. Units with machinery used exclusively for positioning, unassisted short field moves as allowed by the Flag Administration and/or Coastal State and to provide assistance during towing operations may be considered non-self-propelled units.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART IV MACHINERY INSTALLATIONS－CONSTRUCTION AND SHAFTING

# List of major changes in Part IV from 2025 edition

| | |
|---|---|
| Table IV 2-2 | Revised |
| 3.4.3(b) | Revised |
| Table IV 3-3 | Revised |
| 3.4.10 | New |
| Table IV 3-3B | New |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 3
# Diesel Engines

*Table IV 2-2 has been amended as follows:*

**2.9 Tests and Inspections**

……

**Table IV 2-2**
**Hydraulic Pressure Tests on Turbine Parts**

| Parts to be Tested | Test Pressure | Remarks |
|---|---|---|
| Turbine casings(1) | 1.5 W | At least 0.2 |
| H.P. turbine steam chests | 1.5 W | |
| Steam receiver pipes | See Note (2) | |
| Steam, maneuvering and control valve chests, and steam strainers | 2 W | |
| Cooling water spaces | 1.5 W | At least 0.4 |
| Condensers and heat exchangers | See Part V | |
| Group-I and -II pipes and fittings | See Part VI | |
| Where: W = Maximum working pressure for the respective parts, in MPa. | | |

Notes:
(1) Test pressure for exhaust gas turbine casings, see Table IV 3-3A.
(2) Same test pressure as the casing which it is connected.

*Paragraph 3.4.3(b) has been amended as follows:*

**3.4 Construction**

……

3.4.3 Crankcase explosion relief valves

(a) Crankcases are to be provided with lightweight spring loaded relief valves or other quick-acting and self-closing devices able to lift rapidly in order to prevent any considerable excessive pressure within the crankcase in the event of internal explosion and to close automatically after the passage of the explosion wave in order to prevent any inrush of external air. Relief valves are to be so designed that the discharge from valves is shielded by flame trap to minimize the possibility of danger and damage arising from the emission of flame, and the operation of the valves is to be actuated by an excessive pressure as low as possible with 0.02 MPa to be the maximum.

(b) Generally, in large engines at least one relief valve is to be fitted to each cylinder crankcase and separate gear or chain case for camshaft or similar drive, when the gross volume of such space is 0.6 $m^3$ and above. In small engines where there is free communication between all cylinder crankcases, relief valves are to be provided in numbers not less than those given in Table IV 3-3A. Where only 2 relief valves are required, they are to be located at or near each end of the crankcase. In V-type cylinder arrangement engines, half the number of cylinders may generally be taken in using this table. In engines having a cylinder of less than 200 mm bore or having a crankcase volume of less than 0.6 $m^3$, relief valves may be omitted.

*Table IV 3-3 has been amended as follows:*

**Table IV 3-3A**
**Crankcase Explosion Relief Valves**

| Cylinder Bore D (mm) | No. of Cylinders per Engine | Min. Number of Explosion Relief Valves per Engine |
|---|---|---|
| 200 ≤ D < 250 | ≤ 8<br>> 8 | 2<br>3 |
| 250 ≤ D < 300 | Any number | One for each alternate cylinder, See Note |
| 300 ≤ D | Any number | One per cylinder |

Note: For engines having 3, 5, 7, 9 etc. cylinders, the number of explosion relief valves is not to be less than 2, 3, 4, 5 etc. respectively.

(c) The minimum free area of crankcase explosion relief valves is to be determined as follows:

$$A = \frac{CV}{Z}$$

where:

A = Minimum free area of each explosion relief valve, in cm2, but not less than 45 cm2.
V = Total gross volume of crankcase compartment, in m3. The volume of stationary parts within the crankcase may be deducted.
Z = Number of explosion relief valves fitted to each engine, which is to be not less than given in Table IV 3-3A.
C = 115 for engines with a free communication crankcase, and
50 for crosshead type engines with a diaphragm fitted between the cylinder and a crankcase.

……

*Paragraph 3.4.10 has been added as follows:*

3.4.10 Alarms and safeguards for emergency reciprocating internal combustion engines

(a) Field of application

These requirements apply to diesel reciprocating internal combustion engines, which use distillate marine fuels covered by ISO 8217:2017, required to be immediately available in an emergency and capable of being controlled remotely or automatically operated.

(b) Information to be submitted

Information demonstrating compliance with these requirements is to be submitted to the Society. The information is to include instructions to test the alarm and safety systems.

(c) Alarms and safeguards

(i) Alarms and safeguards are to be fitted in accordance with Table IV 3-3B.

(ii) The safety and alarm systems are to be designed to "fail safe". The characteristics of the "fail safe" operation are to be evaluated on the basis not only of the system and its associated machinery, but also the complete installation, as well as the ship.

(iii) Regardless of the engine output, if shutdowns additional to those specified in Table IV 3-3B are provided except for the overspeed shutdown, they are to be automatically overridden when the engine is in automatic or remote control mode during navigation.

(iv) The alarm system is to function in accordance with IACS UR M29, with additional requirements that grouped alarms are to be arranged on the bridge.

(v) In addition to the fuel oil control from outside the space, a local means of engine shutdown is to be provided.

(vi) Local indications of at least those parameters listed in Table IV 3-3B are to be provided within the same space as the diesel reciprocating internal combustion engines and are to remain operational in the event of failure of the alarm and safety systems.

*Table IV 3-3B has been added as follows:*

**Table IV 3-3B**
**Monitoring and Alarms for Emergency Reciprocating Internal Combustion Engine**

| Parameter | Alarm activation | Shutdown with alarm |
|---|---|---|
| Fuel oil leakage from high pressure pipes (fuel injection pipes and common rails) | X | |
| Lubricating oil temperature(1) | High | |
| Lubricating oil pressure | Low | |
| Activation of oil mist detection arrangements (or activation of the temperature monitoring systems or equivalent devices of:<br>- the engine main and crank bearing oil outlet; or<br>- the engine main and crank bearing)(2) | X | |
| Pressure or flow of cooling water(1) | Low | |
| Temperature of cooling water (or cooling air) | High | |
| Overspeed activated(1) | | X |

Note:

(1) for engines having a power of more than 220 kW.

(2) for engines having a power of more than 2250 kW or a cylinder bore of more than 300 mm.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART VI PIPING AND PUMPING SYSTEMS

# List of major changes in Part VI from 2025 edition

| | |
|---|---|
| 3.5.9 | Revised |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 3
# Hull Piping Systems

*Paragraph 3.5.9 has been amended as follows:*

## 3.5 Hull Piping Systems

……

3.5.7 Where bilge or ballast pipes pass through a deep tank they are to be led through pipe tunnels or made of heavy steel with expansion bends and in one length if practicable or with welded joints. When tunnels are not employed, the bilge pipes are to be provided with non-return valves of approved type on the suction end. The pipes and the non-return valves if fitted, are to be tested to the same pressure as that to which the tank is tested.

3.5.8 Bilge suction pipes are to be efficiently protected when carried through cargo holds or coal bunkers.

~~3.5.9 Bilge pipes are not to be carried through the double bottom tank. If so carried they are to be of ample strength and tested to the maximum pressure the tank is subjected to.~~

3.5.9 Bilge pipes are not to pass through double bottom compartments. If such arrangement is unavoidable, the parts of bilge pipes passing through double bottom compartments are to have sufficient thickness, as per column D of Table VI 2-3 for steel pipes.

3.5.10 The open ends of bilge suction pipes are to be sufficiently high above the bottom of the bilge or the well to permit a full flow of water and to facilitate cleaning.

3.5.11 In ships of 4,000 gross tonnage and above other than oil tankers and in oil tankers of 150 gross tonnage and above, no ballast water is to be carried in any fuel oil tank.

3.5.12 Discharge connections of bilge discharge pipelines are to comply with the requirement in Chapter 6 of this Part.

MENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART VII ELECTRICAL INSTALLATIONS

# List of major changes in Part VII from 2025 edition

| | |
|---|---|
| 1.2.1~1.2.2 | Revised and Renumbered |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 1
# General

*Paragraph 1.2.1~1.2.2 have been amended and renumbered as follows:*

## 1.2 Drawings and Data

1.2.1 The shipbuilder or manufacturer is to submit the following drawings and data for approval before the work commences:

(a) For propulsion machineries, generators and essential motors of 375 kW and over:

Complete rating, seating arrangements, assembly, shaft, stator and rotor details, electric propulsion coupling details, mass, main dimensions, main materials used, and data for calculation of critical speed.

(b) For generators below 375 kW:

Complete rating, seating arrangements, type of enclosure and dimensional outline.

(c) For essential motors of 75 kW and above but below 375 kW:

Complete rating, seating arrangements, type of enclosure and dimensional outline.

(d) For switchboards:

Arrangements and details, front view, installation arrangements and wiring diagram.

(e) For wiring:

All wiring plans and circuit diagrams including load distribution, wire size, type of cable, maximum temperature rise of conductor and voltage drop, type of insulation, rating or setting of circuit breaker, rating of fuse and switch, and interrupting capacity of circuit breaker and fuse.

(f) For arrangement:

General arrangement of electric equipment including details of the main cable runs.

(g) For electric propulsion system, including the following:

(i) One-line diagrams of propulsion control system for power supply, circuit protection, alarm, monitoring, safety and emergency shutdown systems including list of alarm and monitoring points.

(ii) Plans showing the location of propulsion controls and its monitoring stations.

(iii) Arrangements and details of the propulsion control console or panel including schematic diagram of the system therein.

(iv) Arrangements and details of the semiconductor converter enclosure for propulsion system, including data for semiconductor converter, cooling system with its interlocking arrangement.

(v) Harmonic distortion calculation.

1.2.2 The shipbuilder is to submit the following specification and data for approval before the work commences:

(a) Specifications and list of electrical equipment.

(b) Load analysis and protective device coordination study.

(i) This protective device coordination study is to be an organized time-current study of all protective devices, taken in series, from the utilization equipment to the source, under various conditions of short circuit. The time-current study is to indicate settings of long-time delay tripping, short-time delay tripping, and instantaneous tripping, as applicable. Where an overcurrent relay is provided in series and adjacent to the circuit protective devices, the operating and time-current characteristics of the relay are to be considered for coordination. Typical thermal withstanding capacity curves of the generators are to be included, as appropriate.

(ii) An electric-plant load analysis is to cover all operating conditions of the ship, such as conditions in normal sea going, cargo handling, harbor maneuver, emergency, and dynamic positioning operations.

(c) Calculations of short circuit currents at main, emergency and sub-switchboards including those fed from transformers.

(i) Maximum calculated short circuit current values, both symmetrical and asymmetrical values, available at the main and emergency switchboards and the downstream distribution boards.

(ii) Rated breaking and making capacities of the protective devices.

~~(d) Drawings and data of electric propulsion system, including the following:~~

~~(i) One line diagrams of propulsion control system for power supply, circuit protection, alarm, monitoring, safety and emergency shutdown systems including list of alarm and monitoring points.~~

~~(ii) Plans showing the location of propulsion controls and its monitoring stations.~~

~~(iii) Arrangements and details of the propulsion control console or panel including schematic diagram of the system therein.~~

~~(iv) Arrangements and details of the semiconductor converter enclosure for propulsion system, including data for semiconductor converter, cooling system with its interlocking arrangement.~~

~~(v) Harmonic distortion calculation~~

(d~~e~~) For tankers, ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk, drawings indicating hazardous areas and the list of electrical equipment installed in the hazardous areas.

(e~~f~~) Maintenance schedule of batteries.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART XI MATERIALS

# List of major changes in Part XI from 2025 edition

| | |
|---|---|
| 3.1.1(b)(ii) | Revised |
| Table XI 3-5 | Revised |
| 4.1.2(c) | Revised |
| 4.4 | Revised |
| 4.4.1 | Revised |
| Table XI 4-5 | Revised |
| 4.4.3 | Revised |
| Table XI 4-6 | Revised |
| Table XI 4-7 | New |
| 4.4.4 | New |
| 4.4.5 | New |
| 4.4.6 | New |
| 4.4.4 | Revised and Renumbered |
| 4.4.5 & Table XI 4-7 | Deleted |
| 4.5.4 | Revised |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 3
# Rolled Steels for Hull Construction

*Paragraph 3.1.1(b)(ii) has been amended as follows:*

## 3.1 General

3.1.1 Application

(a) Scope

This Chapter gives the requirements for weldable normal, higher and extra high strength hot rolled steels, such as plates, wide flats, sections, structural pipes and bars, intended for use in hull construction.

(b) Thickness

(i) The requirements of this Chapter are primarily intended to apply to rolled steel products not exceeding the thickness limits given in Table XI 3-1 of this Chapter.

(ii) ~~Steel plates supplied in EH47 strength grades~~ YP47 steels (minimum yield point of ~~stress~~ 460 N/mm$^2$)

This chapter gives the requirements for steel plates in thickness greater than 50 mm and not greater than 100 mm intended for hatch coamings and upper decks of container ships. For YP47 steels outside scope of the said thickness range, special consideration is to be given by the Society.

(iii) Brittle crack arrest steels

The thickness range of brittle crack arrest steels is over 50 mm and not greater than 100 mm as specified in Table XI 3-5.

*Table XI 3-5 has been amended as follows:*

## 3.3 Chemical Composition

**Table XI 3-5**
**Requirement of Brittle Crack Arrest Properties for Brittle Crack Arrest Steels**

| Suffix to the steel grade(1) | Thickness range (mm) | Brittle crack arrest properties(2)(6) | |
|---|---|---|---|
| | | Brittle Crack Arrest Toughness $K_{ca}$ at -10°C (N/mm$^{3/2}$) (3) | Crack Arrest Temperature CAT (°C)(4) |
| BCA1 | 50 < t ≤ 100 | 6,000 min. | -10 or below |
| BCA2 | 80 < t ≤ 100(7) | 8,000 min. | (5) |

Notes:

(1) Suffix "BCA1" or "BCA2" is to be affixed to the steel grade designation (e.g. EH40-BCA1, EH47-BCA1, EH47-BCA2, etc.).

(2) Brittle crack arrest properties for brittle crack arrest steels are to be verified by either the brittle crack arrest toughness $K_{ca}$ or Crack Arrest Temperature (CAT).

(3) $K_{ca}$ value is to be obtained by the brittle crack arrest test specified in Annex 3 of IACS UR W31.

(4) CAT is to be obtained by the test method specified in Annex 4 of IACS UR W31.

(5) Criterion of CAT for brittle crack arrest steels corresponding to $K_{ca}$=8,000 N/mm$^{3/2}$ is to be approved by the Society

(6) Where small-scale ~~alternative~~ tests are used for product testing (batch release testing), these test methods are to be approved by the Society in accordance with Annex 5 of IACS UR W31.

(7) Lower thicknesses may be approved at the discretion of the Society.

# Chapter 4
# Rolled Steels for Boilers, Pressure Vessels and Low Temperature Service

*Paragraph 4.1.2(c) has been amended as follows:*

## 4.1 General

4.1.1 This chapter gives the requirements for hot rolled steels intended for use in welded constructions of boilers, pressure vessels, hull structures exposed to low temperature, storage tanks and process pressure vessels for liquefied gases.

4.1.2 The requirements of this chapter in applying to the steel plates are limited in thickness as follows:

(a) Rolled steels for boilers and pressure vessels to be used at high temperature.
- (i) Grades 1-410, 1-450 and 1-480 : Up to 200 mm
- (ii) Grades 2-450, and 2-480 : Up to 150 mm

(b) Rolled steels for pressure vessels to be used at atmospheric temperature.
- (i) Grade 0-235 : Up to 200 mm
- (ii) Grade 0-315 : Up to 100 mm
- (iii) Grades 0-355, 0-410, 0-450 and 0-490 : Up to 75 mm

(c) Rolled steels for low temperature service.
- (i) All Grades : Up to 50~~40~~ mm

(d) Any requirement regarding steel plates over the above limited thickness is left to the discretion of the Society.

4.1.3 Steels having characteristics differing from the requirements in this chapter may be accepted subject to compliance with the requirements of 1.1.2 and 1.1.3 of this Part.

4.1.4 Steels are to be manufactured at works which have been approved by the Society for the type and grade of steel which is being supplied in compliance with the requirements given in 1.2 of this Part.

*Section 4.4 has been amended as follows:*

## 4.4 Rolled Steels for Low Temperature Service

The requirements are to apply to the rolled steels not exceeding 50 mm in thickness intended for tanks and ship's hull structures adjacent to tanks of liquefied gas carriers or ships using low-flashpoint fuels, and other parts such as hull structures of refrigerated cargo carrier which are exposed to low temperature (hereinafter referred to as "the steels" in 4.4). Any requirement regarding the steels over 50 mm in thickness is left to the discretion of the Society.
Steels having characteristics differing from those specified in 4.4 are to comply with requirements in 1.1.2 and 1.1.3 of this Part.

The requirements provided in Chapter 1 are applicable except where specified in 4.4.

The steels are classified into 10 grades as given in Table XI 4-5

*Paragraph 4.4.1 has been amended as follows:*

4.4.1 Deoxidation practice and c~~C~~hemical composition

(a) The deoxidation practice and chemical composition of each grade are to comply with the requirements given in Table XI 4-5. When deemed necessary, chemical elements other than those given in the table may be added to the option of the manufacturer.~~The steels are to be of fully killed and fine grain treated with aluminum, niobium or vanadium grain refining elements contained either singly or in any combination. The chemical composition of the steels is to be in compliance with the requirements given in Table XI 4-5.~~

(b) Notwithstanding the requirement given in (a) above, when heat treatment has been conducted according to TMCP, the chemical composition of steels specified in Table XI 4-5 may be modified subject to the approval by the Society.~~When the steels are supplied in TMCP condition as defined in 3.4.2 of this Part, variations in the specified chemical composition may be allowed subject to the approval of the Society.~~

*Table XI 4-5 has been amended as follows:*

**Table XI 4-5**
**Grade and Chemical Composition ~~of Rolled Steels for Low Temperature Service~~**

| Grade | Deoxidation | Chemical Composition (%) | | | | | | Carbon Equivalent (%) |
|---|---|---|---|---|---|---|---|---|
| | | C | Si | Mn | P | S | Ni | |
| 3-235A | Fully killed | 0.16 max. | 0.10 ~ 0.50 | 0.70 ~ 1.60 | 0.030 max. | 0.025 max. | – | 0.41 max. |
| 3-235B | Aluminum treated fine grain | 0.14 max. | | | | | | |
| 3-265 | | | | | | | | |
| 3-325 | | | | | | | | |
| 3-360 | | | | | | | | |
| 4-295 | | | 0.30 max. | 0.70 max. | 0.025 max. | 0.025 max. | 2.10 ~ 2.50 | – |
| 4-315 | | | | | | | 3.20 ~ 3.75 | |
| 4-420 | | 0.12 max. | | 1.50 max. | | | 4.50 ~ 5.50 | |
| 4-520 | | 0.10 max. | | 0.90 max. | | | 8.50 ~ 9.50 | |
| 4-590 | | | | | | | | |

| ~~Material Grade~~ | ~~Chemical Composition (%) (1)~~ | | | | | | ~~Carbon Equivalent (3)~~ |
|---|---|---|---|---|---|---|---|
| | ~~C~~ | ~~Si~~ | ~~Mn~~ | ~~P~~ | ~~S~~ | ~~Ni~~ | ~~(%)~~ |
| ~~3-235~~ | ~~0.14 max. (2)~~ | ~~0.10 ~ 0.50~~ | ~~0.70 ~ 1.60~~ | ~~0.030 max. (2)~~ | ~~0.025 max. (2)~~ | ~~–~~ | ~~0.41 max.~~ |
| ~~3-325~~ | | | | | | | |
| ~~3-365~~ | | | | | | | |
| ~~4-295~~ | ~~0.14 max.~~ | ~~0.15 ~ 0.30~~ | ~~0.70 max.~~ | ~~0.025 max.~~ | ~~0.025 max.~~ | ~~2.10 ~ 2.50~~ | ~~–~~ |
| ~~4-315~~ | | | | | | ~~3.20 ~ 3.75~~ | |
| ~~4-420~~ | ~~0.12 max.~~ | | ~~0.90 max.~~ | | | ~~4.50 ~ 5.50~~ | |
| ~~4-520~~ | ~~0.10 max.~~ | | | | | ~~8.50 ~ 9.50~~ | |

~~Notes:~~

~~(1) The grain refining elements and residual elements are to comply with the manufacturing specifications approved by the Society.~~

~~(2) Where the design temperature of Grades 3-235, 3-325 and 3-365 is not lower than –40°C, the maximum contents of C, P and S may be extended to 0.18%, 0.035% and 0.035% respectively.~~

~~(3) Carbon equivalent is to be calculated from the formula given in Note 2 of Table XI 3-4.~~

*Paragraph 4.4.3 has been amended as follows:*

4.4.3 Mechanical properties

(a) The mechanical properties of the steels are to be in compliance with the requirements given in Table XI 4-6.

(b) Where deemed necessary by the Society, other tests on notch toughness may be required.

(c) For steels to which the requirement in 17.12 of the CR LGC Guidelines is applicable, the specified value of the maximum yield point or proof stress may be set after obtaining verification by the Society.

*Table XI 4-6 has been amended as follows:*

**Table XI 4-6**
**Heat Treatment and Mechanical Properties ~~and Test Requirements of Rolled Steels for Low-Temperature Service~~**

| Grade | Heat treatment | Tensile Test | | | Impact Test[4][5] | | | No. of Test Specimens |
|---|---|---|---|---|---|---|---|---|
| | | Tensile Strength (N/mm$^2$) | Yield point or proof stress min. (N/mm$^2$) | Elongation[3] $L = 5.65\sqrt{A}$ min. (%) | Testing temperature (°C) | Minimum mean absorbed energy (J) L | Minimum mean absorbed energy (J) T | |
| 3-235A | Normalized, quenched and tempered or TMCP[1] | 400 ~ 510 | 235 | 20 | –40 | 41 | 27 | [6] |
| 3-235B | | | | | –50 | | | |
| 3-265 | | 420 ~ 540 | 265 | | –60 | | | |
| 3-325 | | 440 ~ 560 | 325 | | | | | |
| 3-360 | | 490 ~ 610 | 360 | 19 | | | | |
| 4-295 | Normalized, normalized and tempered, quenched and tempered or TMCP[2] | 420 ~ 570 | 295 | | –70 | | | |
| 4-315 | | 440 ~ 590 | 315 | | –95 | | | |
| 4-420 | | 540 ~ 690 | 420 | | –110 | | | |
| 4-520 | Double normalized and tempered, quenched and tempered or TMCP[2] | 690 ~ 830 | 520 | 18 | –196 | | | |
| 4-590 | | | 590 | | –196 | | | |

| Material Grade | Heat Treatment | Tensile Test | | | Impact Test | | No. of Test Specimens |
|---|---|---|---|---|---|---|---|
| | | Tensile Strength ($N/mm^2$) | Yield Stress min. ($N/mm^2$) | Elongation on $L = 5.65\sqrt{A}$ min. (%) | Test Temperature (2) (°C) | Absorbed Energy min.(3) Average of 3 Test Specimens (J) | |
| 3-235 | Normalized or TMCP | 400 – 490 | 235 | 20 | –50 | 41 (27) | (4) |
| 3-325 | Quenched and Tempered or TMCP | 450 – 540 | 325 | | –60 | | |
| 3-365 | | 490 – 590 | 365 | 19 | –60 | | |
| 4-295 | Normalized or Quenched and Tempered (1) | 420 – 570 | 295 | 19 | –70 | | |
| 4-315 | | 440 – 590 | 315 | | –95 | | |
| 4-420 | | 540 – 690 | 420 | | –110 | | |
| 4-520 | Double Normalized and Tempered (1) | 690 – 835 | 520 | 18 | –196 | | |

Notes:

(1) Controlled rolling may be used as the heat treatment procedure in cases where deemed appropriate by the Society. Heat treatment may be conducted according to TMCP subject to the special approval of the Society.

(2) If it is deemed appropriate by the Society, the intermediate heat treatment (the intermediate heat treatment is an operation of cooling from a dual phase composed of austenite and ferrite intended for improving toughness which is carried out prior to tempering) may be applied. For Grades 3-235, 3-325 and 3-365 steels intended to be applied in a higher design temperature, the impact test may be carried out at a temperature 5°C below design temperature or –20°C whichever is lower.

(3) The specified value for T2B test specimen other than those of proportional-size type is to be in compliance with the requirements given in Table XI 4-7. The values shown in parentheses are applicable to the test specimens taken with their principal axes perpendicular to the final direction of rolling.

(4) L (or T) indicates that the longitudinal axis of the test specimen is arranged parallel (or transverse) to the final direction of rolling.

(5) Refer to 1.5.2.

(6~~4~~) Number of test specimens:

(a) For plates:

One set of test specimens including one tensile and three impacts of Type N1 is to be taken from each plate which is rolled directly from one slab or ingot and is simultaneously heat treated in the same furnace including continuous furnace. When TMCP is used as heat treatment, one test sample is to be taken from each plate which is rolled directly from one slab or ingot. ~~one end of each piece of same heat~~.

(b) For steels other than plates:

One set of test specimens including one tensile and three impacts of Type N1 is to be taken from each batch of every 10 tons and fraction thereof. The material in each batch is to be of the same section size, from the same cast and in the same heat condition.

*Table XI 4-7 has been added as follows:*

**Table XI 4-7**
**Minimum Elongation for T2B Specimen (%)**

| Grade | Thickness t (mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | t≤5 | 5<t≤10 | 10<t≤15 | 15<t≤20 | 20<t≤25 | 25<t≤30 | 30<t≤35 | 35<t≤40 | 40<t≤45 | 45<t≤50 |
| 3-235A<br>3-235B<br>3-265 | 13 | 14 | 15 | 16 | 17 | 18 | 18 | 19 | 19 | 20 |
| 3-325 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 19 | 20 |
| 3-360 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 18 | 19 |
| 4-295<br>4-315<br>4-420 | 12 | 13 | 14 | 15 | 16 | 17 | 17 | 18 | 18 | 19 |
| 4-520<br>4-590 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 17 | 18 |

*Paragraph 4.4.4 has been added as follows:*

4.4.4 Additional tests before rejection

Where the tensile test from the first piece selected fails to meet the requirements, additional test may be conducted according to the requirements given in 1.5 of this Part.

*Paragraph 4.4.5 has been added as follows:*

4.4.5 Repair of defects

Surface defects may be removed by local grinding, provided that the thickness is not reduced from nominal thickness to a degree that exceeds the minus tolerance as the requirement in 4.6.2 of this Chapter under any circumstances.

*Paragraph 4.4.6 has been added as follows:*

4.4.6 Marking

(a) Steels which have satisfactorily complied with the required test are to be marked with identification mark in accordance with the requirements in 1.7 of this Part.

(b) For steels to which the requirement in 4.4.3(c) is applicable, the specified value of the maximum yield point or proof stress and "U" are to be suffixied to the grade mark. (e.g. 3-360U)

*Paragraph 4.4.4 has been amended and renumbered as follows:*

4.4.7~~4~~ Equivalent materials

The rolled steels for hull construction of Grades D, E, DH32/36/40, EH32/36/40 and FH32/36/40 specified in Chapter 3 of this Part are also applicable for the low temperature service, provided that:

(a) The steels are killed and fine grain treated, heat-treated by normalized or quenched and tempered or produced by TMCP.

(b) The test specimens are taken in the frequency complying with the requirements of Note 6~~4~~ in Table XI 4-6.

(c) Minimum average absorbed energy of impact tests is not to be less than 41J (27J for transverse test specimens) at the test temperature of respective grade specified in Table XI 3-~~8~~11 of this Part.

(d) The "Z" grade steel plates and wide flats of 15 mm and over in thickness are to comply with the requirements of through thickness tensile tests as given in 3.8 of this Part.

(e) The steels are proven in compliance with the following requirements during manufacturing approval tests:

(i) Drop-weight tests in accordance with an accepted standard (e.g. ASTM E208) have been achieved that there is no break performance at –5°C.

(ii) The percentage of fibrous fracture in the impact test specimens after testing is not to be less than 50%.

The steels complying with the above requirements are to be affixed with a mark "–L" to the material grade designation, e.g. D-L, EH36-L, etc.

*Paragraph 4.4.5 & Table XI 4-7 have been deleted as follows:*

~~4.4.5 Design temperature~~

~~The applicable design temperatures for each grade of rolled steels for low temperature service depending on the thickness are given in Table XI 4-7.~~

**~~Table XI 4-7~~**
**~~Applicable Design Temperature of Rolled Steels for Low Temperature Service~~**

| ~~Grade~~ | ~~D, DH32/36/40~~ | ~~E, EH32/36/40~~ | ~~FH32/36/40~~ | ~~3-235~~ | ~~3-325, 3-365~~ | ~~4-295~~ | ~~4-315~~ | ~~4-420~~ | ~~4-520~~ |
|---|---|---|---|---|---|---|---|---|---|
| ~~Thickness t (mm)~~ | ~~Applicable Design Temperature (°C)~~ | | | | | | | | |
| ~~t ≤ 25~~ | ~~-15~~ | ~~-35~~ | ~~-55~~ | ~~-45~~ | ~~-55~~ | ~~-65~~ | ~~-90~~ | ~~-105~~ | ~~-165~~ |
| ~~25 < t ≤ 30~~ | ~~-10~~ | ~~-30~~ | ~~-50~~ | ~~-40~~ | ~~-50~~ | ~~-60~~ | ~~-85~~ | ~~-100~~ | |
| ~~30 < t ≤ 35~~ | ~~-5~~ | ~~-25~~ | ~~-45~~ | ~~-35~~ | ~~-45~~ | ~~-55~~ | ~~-80~~ | ~~-95~~ | |
| ~~35 < t ≤ 40~~ | ~~0~~ | ~~-20~~ | ~~-40~~ | ~~-30~~ | ~~-40~~ | ~~-50~~ | ~~-75~~ | ~~-90~~ | |

## 4.5 Test Specimens

*Paragraph 4.5.4 has been amended as follows:*

4.5.4 Impact test specimens

~~The test specimens are to be taken in accordance with the requirements in 3.5.4 of this Part. For plates intended for use in the construction of liquefied gas cargo tanks and associated process pressure vessels as specified in 4.4 above, their principal axes are to be perpendicular to the final direction of rolling~~.

(a) The test specimens are to be taken according to 3.5.5(b)(i)(2)

(b) For steel plates, the test specimens are to be taken with their longitudinal axis normal (T direction) to the final direction of rolling; for other steels than steel plates, they are to be taken with their longitudinal axis parallel (L direction) to the final direction of rolling.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART XIII NAVIGATIONAL SAFETY SYSTEMS

# List of major changes in Part XIII from 2025 edition

| | |
|---|---|
| Chapter 1~10 | Deleted |
| Chapter 1 | New |
| Chapter 2 | New |
| Chapter 3 | New |
| Chapter 4 | New |
| Chapter 5 | New |
| Appendix 1 | New |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

*Chapter 1~10 have been deleted as follows:*

# ~~Chapter 1 General~~

## ~~1.1 The Classification Concept~~

~~1.1.1 General~~

~~The text in paragraph 1.1 describes the concept with regard to objectives and safety philosophy on which the Rules for Navigational Safety Systems are based. Consequently, the contents of this paragraph are not to be understood as rule requirements.~~

~~1.1.2 Objectives of the Rules for Navigational Safety Systems~~

~~(a) The main objectives of the Rules for Navigational Safety Systems are to reduce the risk of failures in bridge operation causing collisions, groundings and heavy weather damages and to minimize the consequences to vessel and complement should an accident occur.~~

~~(b) The Rules for Navigational Safety Systems aim at setting forth requirements to regulate shipboard factors affecting safety and efficiency in bridge operations and, in this context, at:~~

~~(i) Including relevant requirements and recommendations established by the International Maritime Organization (IMO).~~

~~(ii) Including relevant international standards and specific requirements issued by governmental maritime authorities within the subjects of the Rules or indicating the points in which they differ.~~

~~1.1.3 Safety philosophy~~

~~(a) In order to achieve optimum safety and efficiency in bridge operation, the Rules for Navigational Safety Systems address the "total bridge system". The total bridge system is considered to comprise four essential parts:~~

~~(i) The "technical system", which is to deduce and present information as well as enable the proper setting of course and speed.~~

~~(ii) The "human operator", who is to evaluate available information, decide on the actions to be taken and execute the decisions.~~

~~(iii) The "man/machine interface", which is to safeguard that the technical system is designed with due regard to human abilities.~~

~~(iv) The "procedures", which are to ensure that the total bridge system performs satisfactorily under different operating conditions.~~

~~(b) The "main elements" of the various parts of the bridge system are considered to comprise:~~

~~(i) Qualifications, capacity and quality of the human operator in relation to the functions to be carried out.~~

(ii) Specification, automation level and condition of the technical system in relation to information needs, workloads and reliability.

(iii) Physical abilities and information processing capacity of the human operator in relation to working conditions and the technical systems he is to operate.

(iv) Tasks to be performed and technical aids available under various operating conditions as basis for establishing working routines and operating procedures.

(c) With the exception of "operator quality", the elements mentioned in (b) form the basis for the Rules for Navigational Safety Systems set forth. It is believed that improvements within these elements can also have a positive effect on operator quality (personality, responsibility) which in the context of classification is considered to be a matter of selection of personnel.

## 1.2 Scope of Classification and Rule Requirements

### 1.2.1 General

(a) Classification of bridge systems verifies in compliance with the rules developed for the safe performance of bridge functions. The classification concept involves affirmation through a set of voluntary class notations that given rules, requirements, specifications and so forth have been fulfilled for bridge design, instrumentation, components and procedures.

(b) The rule requirements are established to regulate the factors affecting the safe performance of any part of the bridge system and to ensure a consistent level of system reliability in various modes of operation under different operating conditions.

(c) The Rules for Navigational Safety Systems take into consideration that the modes of operation will vary in accordance with the condition of internal technical systems and the availability of relevant external systems, and that operating conditions can be influenced by the waters to be navigated, traffic and weather conditions.

### 1.2.2 Scope of Classification

(a) Safe performance of the bridge system is qualified by its ability to determine, execute and maintain the right course and speed of the vessel in relation to the waters, that traffic and the weather. This ability is threatened by:

(i) Internal bridge system failure.

(ii) Loss of manoeuvrability (steering/propulsion).

(iii) Loss of external information.

(b) The main concern of the Rules for Navigational Safety Systems is to prevent internal bridge system failures and, in this context, to address all parts of the system as defined in 1.1.3(a).

(c) The required reliability of propulsion and steering systems for preventing loss of manoeuvrability is addressed by the mandatory classification rules. The concern of the Rules of Navigational Safety Systems in this context is to safeguard that:

(i) The implications of failure in propulsion and steering systems are taken into consideration in the design of the bridge system, and that system degradation is brought to the attention of the watch officer by relevant warnings.

(ii) The emergency steering system in the steering gear compartment is properly arranged for safe and efficient operation.

(d) With regard to loss of external information, the concern of the Rules for Navigational Safety Systems is to safeguard that:

(i) The vessel borne part of an external navigation or communication system detects loss of information caused by failure in the external system.

(e) The technical reliability of any system to be operated from the bridge serving functions additional to those related to the safe navigation of the vessel, such as machinery systems, cargo and ballasting systems, safety monitoring systems, etc., is addressed in other Parts of the Rules. The concern of the Rules for Navigational Safety Systems in this context is:

(i) The location of workstations for additional bridge functions.

(ii) The working conditions for performance of additional functions if they are the responsibility of the officer of the watch.

(iii) The man/machine interface of a technical system serving additional bridge functions if the system is to be operated by the officer of the watch.

(iv) The integration of any system included in a local network for performance of main bridge functions.

1.2.3 Scope of Rule requirements

The requirements set forth in each of the chapters of the Rules for Navigational Safety Systems reflect different sets of factors affecting the performance of the total bridge system and are intended to regulate the following areas:

(a) "Design of workplace", based on analysis of functions to be performed under various operating conditions and the technical aids to be installed.

(b) "Bridge working environment", based on factors affecting the performance of human operators.

(c) "Range of instrumentation", based on information needs and efficient performance of navigational tasks.

(d) "Equipment reliability" applicable to all types of bridge equipment, based on common requirements to ensure their suitability under various environmental conditions.

(e) "Specific requirements" to different types of bridge equipment, based on the facilities required for the performance of their specific functions.

(f) "Man/machine interface", based on the analysis of human limitations and compliance with ergonomic principles.

(g) "Qualifications", based on the competence required for mastering rational navigational methods and relevant technical systems installed on board the vessel.

(h) "Operating procedures", based on the work organization needed to make the bridge system function under different operating conditions.

(i) Information on the vessel's manoeuvring "characteristics", based on the manoeuvre commonly used in various operational situations.

(j) "Tests and trials" for new vessels, based on the need to ensure that technical systems perform in accordance with their specifications before being relied upon and used in practical operation.

(k) "Reporting system" from vessels in service on bridge instrument failures, based on the information needed to detect their factual reliability level.

(l) "Survey schemes" for vessels in service, based on the follow-up and testing required to safeguard that bridge systems maintain their reliability.

1.2.4 Structure of the Rules for Navigational Safety Systems

(a) The Rules for Navigational Safety Systems are structured to establish functional requirements to the greatest possible extent, and to give guidance as to how functional requirements can be met by technical solutions or other remedies that safeguard the performance of the function.

(b) A functional requirements is as far as possible expressed without entering into quantification. The functional requirements have a principle status and will only be adjusted if the functions to be carried out on the bridge are altered.

## 1.3 Definitions

1.3.1 Bridge system: The total system for the performance of bridge functions, comprising bridge personnel, technical systems, man/machine interface and procedures.

1.3.2 Bridge: The area from which the navigation and control of the vessel are exercised, comprising the wheelhouse and the bridge wings.

1.3.3 Wheelhouse: Enclosed area of the bridge.

1.3.4 Bridge wing: The part of the bridge on each side of the wheelhouse which extends to the vessel's side.

1.3.5 Catwalk: Arrangement outside the wheelhouse allowing a person safe access to windows along the front bulkhead(s).

1.3.6 Superstructure: Decked structure, not including funnels, which is on or above the freeboard deck.

1.3.7 Primary bridge functions: Functions related to determination, execution and maintenance of safe course, speed and position of the vessel in relation to the waters, traffic and weather conditions. Such functions are:

(a) Route planning functions.

(b) Navigation functions.

(c) Collision avoidance functions.

(d) Manoeuvring functions.

(e) Docking functions.

(f) Monitoring of internal safety systems.

(g) External and internal communication related to safety in bridge operation and distress situations.

~~1.3.8 Additional bridge functions: Functions performed on the bridge while the vessel is under way, but not related to primary bridge functions. Examples of such functions are:~~

~~(a) General communication functions.~~

~~(b) Cargo monitoring and planning functions.~~

~~(c) Extended monitoring and control of machinery.~~

~~(d) Monitoring and control of domestic systems.~~

~~1.3.9 Workstation: Position at which one or several tasks constituting a particular activity are carried out.~~

~~1.3.10 Conning position: Place on the bridge with a commanding view, providing the necessary information and equipment for a conning officer (pilot) to carry out his functions.~~

~~1.3.11 Conning information display: A display which clearly presents the state and/or value of all sensor inputs relevant to navigation and manoeuvring as well as all corresponding orders to steering and propulsion systems.~~

~~1.3.12 Commanding view: View without obstructions which could interfere with the navigator's ability to perform his immediate tasks.~~

~~1.3.13 Field of vision: Angular size of a scene that can be observed from a position on the vessel's bridge.~~

~~1.3.14 Navigation: Determination of position and course of the vessel; execution of course alterations.~~

~~1.3.15 Monitoring: Act of constantly checking information from instrument displays and environment in order to detect any irregularities.~~

~~1.3.16 Route planning: Pre-determination of course and speed in relation to the waters to be navigated.~~

~~1.3.17 Route monitoring: Continuous surveillance of the vessel's sailing (position and course) in relation to a pre-planned route and the waters.~~

~~1.3.18 Collision avoidance functions: Detection and plotting of other vessels and moving objects; determination and execution of course and speed deviations to avoid collision.~~

~~1.3.19 Manoeuvring: Operation of steering systems and propulsion machinery as required to move the vessel into predetermined directions, positions or tracks.~~

~~1.3.20 Docking: Manoeuvring the vessel alongside a berth and controlling the mooring operations.~~

~~1.3.21 Display: Means by which a device presents visual information to the navigator.~~

~~1.3.22 Screen: A device used for presenting visual information based on one or several displays.~~

~~1.3.23 Electronic chart display and information system (ECDIS): means a 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 1974 SOLAS Convention, and be accepted as meeting the chart carriage requirements of SOLAS Chapter V, as amended by Res. MSC.282(86), by displaying selected information from a system electronic nautical chart (SENC).~~

~~1.3.24 Electronic navigational chart (ENC): means the database, standardized as to content, structure and format, issued for use with ECDIS on the authority of government-authorized hydrographic offices. The ENC contains all the chart information necessary for safe navigation, and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions) which may be considered necessary for safe navigation.~~

~~1.3.25 System electronic navigational chart (SENC): means a database resulting from the transformation of the ENC by ECDIS for appropriate use, updates to the ENC by appropriate means, and other data added by the mariner. It is this database that is actually accessed by 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.~~

~~1.3.26 Ergonomics: Application of the human factors implication in the analysis and design of the workplace and equipment.~~

~~1.3.27 Officer of the watch: Person responsible for the safety of navigation and bridge operations until relieved by another qualified officer.~~

~~1.3.28 Helmsman: Person who steers the vessel under way.~~

~~1.3.29 Ocean area: Waters that encompass navigation beyond the outer limits of coastal waters. Ocean areas do not restrict the freedom of course setting in any direction for a distance equivalent to 30 minutes of sailing with the relevant vessel speed.~~

~~1.3.30 Coastal waters: Waters that encompass navigation along a coast at a distance less than the equivalence of 30 minutes of sailing with the relevant vessel speed. The other side of the course line allows freedom of course setting in any direction for a distance equivalent to at least 30 minutes of sailing with the relevant speed.~~

~~1.3.31 Narrow waters: Waters that do not allow the freedom of course setting to any side of the course line for a distance equivalent to 30 minutes of sailing with the relevant vessel speed.~~

~~1.3.32 Normal operating conditions: When all vesselboard 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.~~

~~1.3.33 Irregular operating conditions: When external conditions cause excessive operator workloads.~~

~~1.3.34 Abnormal operating conditions: When internal technical system failures require operation of back-up systems on the bridge or when they occur during an irregular operating condition, or when the officer of the watch becomes unfit to perform his duties and has not yet been replaced by another qualified officer.~~

## ~~1.4 Class Notations~~

~~1.4.1 General~~

~~(a) In order to offer classification to meet the individual needs of vessel owners, the Rules for Navigational Safety Systems are divided into three Class Notations. Two Class Notations represent minimum requirements within bridge design, instrumentation and procedures, where **NAV** covers basic bridge design and **NAV0**, in addition, includes instrumentation and bridge procedures.~~

(b) The third Class Notation **NAV1** extends the basic requirements for bridge design and instrumentation and, in addition, required information on the manoeuvring characteristics of the vessel and an operational safety manual for safe watch-keeping and command of the vessel.

1.4.2 Contents of Class Notations and extensions

(a) **NAV** covers bridge design, comprising the following main areas:

(i) Mandatory and additional workstations.

(ii) Field of vision from workstations.

(iii) Location of instruments and equipment.

(iv) Bridge working environment.

(v) Range of instrumentation.

(vi) Instrument and system performance, functionality and reliability.

(vii) Alarm management, including watch monitoring and alarm transfer system.

(b) **NAV0** covers bridge design, instrumentation and bridge procedures, comprising the following main areas:

(i) **NAV.**

(ii) Range of instrumentation.

(iii) Instrument and system performance, functionality and reliability.

(iv) Equipment installation.

(v) Monitoring and alarm transfer system.

(vi) Procedures for single-man watch keeping.

(vii) Bridge navigation watch alarm system.

(c) **NAV1** covers:

(i) **NAV0.**

(ii) Extensions within the following areas of **NAV0:**

(1) Design of one-man workstation.

(2) Field of vision astern.

(3) Range of instrumentation.

(4) Instrument performance.

(5) Automation level.

(6) Qualifications.

(iii) Information on the manoeuvring characteristics of the vessel comprising the following main items:

(1) Speed at different settings.

(2) Steering ability.

(3) Turning ability.

(4) Stopping ability.

(iv) Operational safety manual comprising the following main items:

(1) Bridge organization and responsibilities.

(2) Watch-keeping procedures.

(3) System fall-back procedures.

(4) Accident and emergency procedures.

1.4.3 Documentation of compliance

(a) The Class Notations **NAV**, **NAV0** and **NAV1** imply that the vessel is built and equipped in compliance with the relevant parts of Rules for Navigational Safety Systems.

(b) Vessels satisfying the requirements for Class Notation **NAV** will have the following text entered in the Appendix to the Classification Certificate:

The Class Notation denotes that the bridge arrangement has been based on relevant functional requirements and designed in accordance with established principles of ergonomics for reduced workload and improved operational conditions.

(c) Vessels satisfying the requirements for Class Notation **NAV0** will have the following text entered in the Appendix to the Classification Certificate in addition to the text for **NAV**:

The notation also denotes that the vessel complies with a certain standard regarding range of instrumentation, reliability and performance, and that IMO's Circ. 566 Provisional guidelines in the conduct of trials in which the officer of the navigation watch acts as the sole look-out in periods of darkness.

(d) Vessel satisfying the requirements for Class Notation **NAV1** will have the following text entered in the Appendix to the Classification Certificate in addition to the text for **NAV0**:

Furthermore, the bridge is equipped with an automatic navigation and track-keeping system, incorporating grounding avoidance functions and facilitating one-man bridge operation from pilot station to pilot station under normal operating conditions. In addition, the Notation denotes that the vessel has extensive documentation of its manoeuvring characteristics and is provided with an operational safety manual describing procedures for normal and abnormal operating conditions and emergency situations.

1.4.4 Class assignment

(a) The vessel will be assigned Class Notation **NAV** when the relevant requirements given in Chapter 2 and 3 are complied with.

(b) The vessel will be assigned Class Notation **NAV0** when the relevant requirements given in Chapter 2 to 7 are complied with.

(c) The vessel will be assigned Class Notation **NAV1** when the relevant requirements given in Chapter 2 to 8 are complied with.

(d) Before the vessel can operate with single-man watch keeping, the relevant requirements in Chapter 9 are to be complied with.

(e) The text in (d) will be entered in the Appendix to the Classification Certificate if the relevant requirements in Chapter 9 are not complied with at the delivery of the vessel.

## 1.5 Documentation to be Submitted for Approval

1.5.1 Class Notation **NAV**

Bridge design and the layout and location of instruments and equipment are to be documented. Specifically, the drawings are to show:

(a) Bridge configuration and dimensions, including inclination and dimensions of windows and the shape and size of divisions between windows.

(b) Bridge layout, including the configuration and location of workstations and location of toilet.

(c) Horizontal and vertical fields of vision from the various workstations (in light draught condition).

(d) Blind sectors caused by divisions between windows and obstructions outside the wheelhouse within the required field of vision from the various workstations.

(e) Configuration of consoles.

(f) Location of instruments and equipment in consoles and elsewhere on the bridge.

(g) Location of equipment not located on the bridge if related to primary bridge functions.

(h) Details such as configuration of bridge wings and height of front bulwark with windscreens, entrances, type of doors to wheelhouse and flooring in wheelhouse.

1.5.2 Class Notation **NAV0**

(a) Documentation as required for Class Notation **NAV**.

(b) A list of all navigational and manoeuvring equipment with identification of manufacturer, type, model and type approval is to be submitted.

(c) All information on design and performance relevant to documenting compliance with the Rules for Navigational Safety Systems is to be submitted for each type of equipment of the categories specified in Chapter 6 intended to the installed on the vessel.

(d) The following documentation is to be submitted to verify compliance with arrangements for preventing accidents caused by sudden operator disability:

(i) Drawings and descriptions for the monitoring and alarm transfer system.

(ii) Procedures for single-man watch keeping.

(e) For vessels not built to Class Notation **CAU**, drawings and descriptions are to specify:

(i) Electric power supply.

(ii) Monitoring of electric power generating plant.

(f) A test program specifying detailed test procedures for primary bridge instruments in compliance with the requirements for on-board testing set forth in Chapter 10 is to be submitted for approval.

(g) The consequences of failures in an integrated navigational system in relation to its functional objectives are to be documented.

1.5.3 Class Notation **NAV1**

(a) Documentation is to be submitted as required for Class Notation **NAV0**.

(b) A detailed program for test and trials of the automatic navigation and track-keeping system, which includes sailing along a planned route, is to be submitted.

(c) A test program for manoeuvring trials is to be submitted.

~~(d) A manoeuvring booklet containing the methods and results of manoeuvring trials is to be submitted for documenting the manoeuvring characteristics of the vessel.~~

~~(e) An operational safety manual with procedures for normal and abnormal operating conditions and in emergency is to be submitted.~~

## ~~1.6 Documentation to be Submitted for Information~~

### ~~1.6.1 Class Notation **NAV0** and **NAV1**~~

~~(a) Operating/technical manuals for the equipment serving primary bridge functions are to be submitted for information.~~

~~(b) Drawings showing the antenna arrangement for satellite communication systems, radars, VHF equipment and other antenna arrangements, are to be provided for the purpose of evaluating the transmitting/receiving conditions and interference aspects for bridge systems and equipment.~~

~~(c) A general arrangement drawing showing the bridge configuration and its location, superstructures and funnel(s) on the vessel are to be submitted for information.~~

## ~~1.7 Functional Tests~~

### ~~1.7.1 Class Notation **NAV0**~~

~~(a) Tests which give evidence of the satisfactory operation of instruments and integrated navigation systems in accordance with the Rules are to be carried out. Failure modes are to be tested as realistically as possible.~~

### ~~1.7.2 Class Notation **NAV1**~~

~~(a) Tests required for Class Notation **NAV0** are to be carried out.~~

~~(b) Tests in accordance with an approved test program to give evidence of the functioning of the automatic navigation and track keeping system are to be carried out.~~

~~(c) Tests required to establish information on the vessel's manoeuvring characteristics as specified in Chapter 8 are to be carried out.~~

# ~~Chapter 2 –~~
# ~~Design of Workplace~~

## ~~2.1 – General~~

~~2.1.1 – Application~~

~~(a) Vessels requesting Class Notation **NAV** are to comply with the requirements in 2.1 to 2.8.~~

~~(b) Vessels requesting Class Notation **NAV0** are to comply with the requirements in 2.1 to 2.9.~~

~~(c) Vessels requesting Class Notation **NAV1** are to comply with the requirements in 2.1 to 2.10.~~

~~2.1.2 – General requirements~~

~~(a) The bridge design is to enable the officer of the watch to perform navigational duties unassisted at all times during normal operating conditions. He is to be able to maintain a proper look-out 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 other hazards to navigation.~~

~~(b) The safe control and command of the vessel while under way are to be allocated to a certain area of the bridge where only instruments, equipment and controls necessary for the performance of primary bridge functions are to be located.~~

~~(c) From the area allocated safe control and command of the vessel while under way, the navigator is to have easy access to additional information for monitoring the safety state of the vessel.~~

~~(d) Workstations for the safe and efficient performance of primary bridge functions under normal and abnormal operating conditions in the various phases of the voyage from port to port are to be provided. Such workstations are to include:~~

~~(i) Workstation for navigation.~~

~~(ii) Workstation for traffic surveillance/manoeuvring.~~

~~(iii) Workstation for route planning.~~

~~(iv) Workstations for manual steering.~~

~~(v) Workstation for safety operations.~~

~~(vi) Workstations for docking operations.~~

~~(vii) Workstations for conning.~~

~~(e) Workstations for additional 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 vessel. Workstations for additional functions may include:~~

~~(i) Workstation for extended communication functions.~~

~~(ii) Workstation for monitoring/control of ballasting and cargo operation.~~

~~(iii) Workstation for extended monitoring of machinery.~~

~~(iv) Workstation for remote control of mooring winches, windlass, accommodation ladder, hatches and side ports.~~

~~(v) Miscellaneous.~~

(f) The various workstations are to provide the field of vision specified in 2.6 and be equipped for the safe performance of the relevant tasks in accordance with the requirements set forth in 2.8.

## 2.2 Workstations for Primary Bridge Functions

### 2.2.1 General

(a) The individual workstations allocated primary bridge functions are to be designed for easy control by one person and located to allow close cooperation between the various workstations when manned for individual operations, as well as provide sufficient room for unobstructed passage between different workstation areas.

(b) The design and location of workstations are to enable the vessel to be navigated and manoeuvred safely and efficiently by one navigator in ocean areas and coastal waters, as well as by two navigators in close cooperation when the workload exceeds the capacity of one person, and when under pilot age.

### 2.2.2 Workstations for navigation and traffic surveillance/manoeuvring

The workstations for navigation and traffic surveillance/manoeuvring and the sitting of instruments pertinent to these stations are to be sufficiently close together to enable a single navigator to carry out all functions and retrieve all necessary information from one working position, without however being restricted to a specific location.

### 2.2.3 Workstations for conning

(a) Workstations for conning of the vessel are to be arranged to enable two extra navigators (pilots) to assist in navigating and manoeuvring the vessel in pilot age waters without interfering with the tasks of the bridge personnel.

(b) A main workstation for conning is to enable a pilot to observe all relevant external and internal information for determination and maintenance of safe course and speed of the vessel in narrow waters, harbour areas and during canal passages.

(c) If the view in the center line is obstructed by large masts, cranes, etc., an additional conning position providing a commanding view is to be located on the starboard side as close to the centre line as possible, but no more than 5 m from the centre line.

(d) The workstation for conning is to be located sufficiently close to:

(i) The forward centre window in order to optimize the view of the sea surface close to the sides of the vessel.

(ii) The workstation for navigation and traffic surveillance and manoeuvring to allow good cooperation between the navigators, each at their workstation.

### 2.2.4 Workstation for route planning

(a) The workstation for route planning is to enable the navigator to plan the intended voyage without interfering with the actual navigation or manoeuvring of the vessel.

(b) The workstation for route planning is to be spacious enough to facilitate the use of two charts concurrently, and adequately equipped for efficient route planning.

### 2.2.5 Workstations for manual steering

(a) The main workstation for manual steering is to enable a helmsman to execute and maintain course orders, both by compass readings and external visual means.

(b) The main workstation for manual steering is to preferably be located on the vessel's centreline. If the workstation is located off the centre line, special steering references for use by day and by night are to be provided, e.g. sighting marks forward.

(c) A back up workstation for manual steering in case of bridge steering system failure is to be provided in the steering gear compartment, enabling the operator to execute wheel over orders and maintain the course in accordance with orders received from the bridge.

2.2.6 Workstation for safety operations

(a) The workstation for safety operations is to enable monitoring of the safety state of the vessel as well as planning and management of emergency operations, and is to incorporate facilities for storage and use of relevant drawings and safety plans and be equipped for internal communication.

(b) The location and configuration of the workstation for safety operations and its instrumentation are to:

(i) enable a single person to carry out the relevant functions at the workstation without interfering with the tasks to be performed at the workstation for traffic surveillance/manoeuvring;

(ii) enable a person at the workstation to observe the workstation for traffic surveillance/manoeuvring and maintain the field of vision for proper look-out; and

(iii) enable the navigator at the workstation for traffic surveillance/manoeuvring to observe information related to the safety state of the vessel which are not located at the traffic surveillance workstation.

2.2.7 Workstations for docking operations

The workstations for safe docking of the vessel are to enable the navigator together with a pilot to observe all relevant external and internal information and control the manoeuvring of the vessel.

## 2.3 Additional Workstations

2.3.1 General

(a) In order to maintain the safety level in bridge operation, also when other functions than those related to primary bridge functions are performed by the officer of the watch, the following requirements are to be met:

(i) Each additional function is to be designated a separate workstation (separate workstation may be adjacent).

(ii) From workstations for additional functions, it is to be possible to monitor the workstation for traffic surveillance / manoeuvring, including the vessel's course and rudder angle, and to maintain the field of vision for efficient look-out.

(iii) The workload at workstations for additional functions is not to prevent the officer of the watch from maintaining a proper look-out.

(iv) In situations where primary functions may require the immediate attention of the officer of the watch, nothing is to prevent him abandoning a workstation for additional functions.

(v) It is to be possible to operate workstations for additional functions without interfering with the operation of workstations for primary functions.

(b) Other functions than those related to navigation and manoeuvring may be performed on the bridge by other personnel than the officer of the watch, provided the following requirements can be met:

(i) The location or the configuration of a workstation for other functions is not to influence the performance of primary bridge functions.

(ii) The tasks to be carried out at workstations for other functions are not in any way to affect the performance of primary bridge functions, neither by use of light, noise disturbance nor visual distraction.

2.3.2 Workstation for communications

(a) Where other internal or external communications equipment than that related to navigation is installed on the bridge, it is to be sited and used in such a manner so as not to interfere with the vessel's navigation. Such equipment, which may be for distress and safety communications or for general communications, in referred to as "additional communications equipment".

(b) Additional communications equipment to be installed on the bridge is to be located in a communications workstation. Those parts of such communications equipment not fitted with operating controls and read out facilities and which, by reason of their size or for other practical considerations, cannot be mounted in this workstation, may be mounted outside the bridge area. Equipment for distress and safety communications is to be installed in accordance with the requirements of the International Convention for the Safety of Life at Sea, 1974 (SOLAS 1974).

(c) It is to be possible for a navigator to operate the additional communications equipment located on the bridge simply and efficiently.

(d) Communications equipment on the bridge is to be so arranged that whenever the situation does not permit the navigator to operate the additional communications equipment, he is to be relieved of this task.

(e) It is to be possible to perform radio telephone public correspondence communications without these communications being audible to the navigator.

(f) Equipment on the bridge for reception of written communications (e.g. telex, telefax) is to have the means to prevent unauthorized access to incoming communications.

(g) Where the noise level produced by a piece of communications equipment to be located on the bridge exceeds the requirements of IMO Resolution A.468 (XII), special sound-reducing measures are to be taken so that the resulting noise level on the bridge fulfills the relevant requirements of this resolution.

## 2.4 Communication between Workstations

2.4.1 General

Under all operating conditions, it is to be possible for persons at a workstation to communicate with persons at other workstations of relevance for the function to be performed.

## 2.5 Passageways and Clear Deckhead Height

2.5.1 General

(a) There are to be a clear route across the wheelhouse from bridge wing to bridge wing for two persons to pass each other. The width of the passageway is to be 1200 mm and not less than 700 mm at any single point of obstruction.

(b) There are to be no obstructions between the points of entry to the bridge from lower decks and the clear route referred to above. This passageway is to be at least 700 mm wide.

(c) The distance between separate workstation areas is to be sufficient to allow unobstructed passage for persons not working at the stations. The width of such passageways is not to be less than 700 mm including persons sitting or standing at their workstations.

(d) The distance from the bridge front bulkhead, or from any console and installation placed against the front bulkhead to any console or installation placed away from the bridge front, is to be sufficient for one person to pass a stationary person. The width of this passageway is not to be less than 800 mm.

(e) The clear deckhead height in the wheelhouse is to take into account the installation of overhead panels and instruments as well as the height of door openings required for easy entrance of the wheel house. The following clear heights for unobstructed passage are to be provided:

(i) The lower edge of deck head-mounted equipment in open areas and passageways, as well as the upper edge of door openings to bridge wing sand other open deck areas is to be at least 2100mm above the deck.

(ii) The lower edge of entrances and doors to the wheelhouse from adjacent passageways is not to be less than 2000 mm.

(f) It is to be possible to secure bridge wing doors in the open position, and it is to be possible to open doors with one hand. Vessels with fully enclosed bridge wings are at least to have one door, providing direct access to the adjacent area outside the wheelhouse.

## 2.6 Bridge Configuration

2.6.1 General

(a) When designing the configuration of the bridge, the main factors to be considered are the overall view required from the inside of the bridge and the field of vision required form each workstation.

(b) The view through windows is not to be obstructed by glare caused by internal light sources.

2.6.2 Field of vision

(a) In order to obtain sufficient field of vision for safe navigation and manoeuvring of the vessel, every effort is to be made to place the bridge above all other decked superstructures.

(b) It is to be possible to watch the area immediately in front of the bridge superstructure from the inside of the wheelhouse.

(c) The vessel's side is always to be visible from the workstation for docking operations, especially where tugs or pilot boats come alongside and where the vessel touches the jetty.

(d) It is to be possible to observe all objects of interest for the navigation, such as vessels and lighthouses, in any direction from inside the wheelhouse.

(e) The vertical view from the workstations for navigation and traffic surveillance/manoeuvring is to enable the navigator to detect and monitor objects visually on the sea surface up to the horizon within the required horizontal field of vision when the vessel is pitching and rolling.

~~(f) In order to observe small objects of interest for navigation and to be able to perform manoeuvre timely to avoid critical situations, the operator at the workstations for navigation and traffic surveillance/ manoeuvring is to have optimum view of the sea surface close to the vessel seen from a sitting position.~~

~~(g) The forward view over the lower edge of the windows and the general view through other windows seen from a sitting position at the workstations for navigation and traffic surveillance/manoeuvring are not to be obstructed by the height of consoles located between the operator and the windows.~~

~~(h) At the workstations for navigation and traffic surveillance/ manoeuvring, the field of vision is to enable the navigator to comply with IMO's International Regulations for Preventing Collisions at Sea.~~

~~(i) From any conning position, the horizontal field of vision is to enable the conning officer to keep proper look-out in compliance with IMO's International Regulations for Preventing Collisions at Sea.~~

~~(j) From the main conning positions, the vertical field of vision is to enable the conning officer to determine the vessel's exact heading and position relative to a narrow channel ahead as well as observe the relative nearness of the two sides of the channel.~~

~~(k) At the workstations for docking operations, the field of vision is to enable the operator to manoeuvre the vessel safely alongside a berth and control the mooring of the vessel.~~

~~(l) At the workstation for manual steering, the field of vision is to enable the helmsman to steer the vessel safely in narrow channels.~~

~~(m) At a workstation for performance of additional bridge functions, the field of vision is to enable the officer of the watch to maintain a proper look-out.~~

~~2.6.3 Blind sectors~~

~~(a) Blind sectors caused by cargo, cargo gear, divisions between windows and other obstructions are to be as few and as small as possible, and in no way hamper a safe look-out from the workstations for navigation and traffic surveillance/manoeuvring.~~

~~(b) Divisions between windows are to be kept to a minimum and not placed in front of any workstation. If stiffeners between windows are to be covered, this is not to cause further obstruction of the field of vision from any position inside the wheelhouse.~~

~~2.6.4 Clear view through windows~~

~~A clear view through bridge windows is to be provided at all times regardless of weather conditions.~~

~~2.6.5 Sound signal reception~~

~~Sound signals that are audible on open deck are also to be audible inside the wheelhouse.~~

## ~~2.7 Console Configuration~~

~~2.7.1 General~~

~~(a) The console configuration is to enable the navigator to use all instruments and controls necessary for navigating and manoeuvring, both in a standing and a sitting position.~~

~~(b) The front chart table is to be large enough to accommodate all nautical chart sizes in common use internationally, and appropriate lighting of the chart is not to cause glare in bridge windows.~~

## ~~2.8 Instrument Location~~

~~2.8.1 General~~

~~Bridge equipment is to be located in workstations enabling the navigator to take into consideration pertinent information and execute actions in accordance with the functions to be performed.~~

~~2.8.2 Workstation for traffic surveillance/manoeuvring~~

~~(a) The workstation for traffic surveillance/manoeuvring is to enable the following tasks to be performed:~~

~~(i) Monitor the traffic by sight and hearing.~~

~~(ii) Analyze the traffic situation.~~

~~(iii) Decide on collision avoidance manoeuvre.~~

~~(iv) Alter course.~~

~~(v) Change speed.~~

~~(vi) Carry out a change of operational steering mode.~~

~~(vii) Effect internal and external communications related to manoeuvring.~~

~~(viii) Operate docking aid systems~~

~~(ix) Monitor time, course, speed, track, propeller revolutions, thrust indicator (if equipped with thrusters), pitch indicator (if equipped with pitch propeller), rudder order, rudder angle and rate of turn.~~

~~(x) Monitor all alarm conditions on the bridge.~~

~~(b) Instruments and equipment which are to be operated by the navigator at the workstation for traffic surveillance/manoeuvring and considered essential for safe and efficient performance of his tasks, are to be within reach from a sitting position at the workstation.~~

~~(c) Instruments, indicators and displays providing information considered essential for the safe and efficient performance of tasks at the workstation for traffic surveillance/manoeuvring are to be easily readable from this workstation.~~

~~(d) Means to be used at intervals for securing safe course and speed in the waters to be navigated and for safety of bridge operation are to be easily accessible from the workstation for traffic surveillance/manoeuvring.~~

~~2.8.3 Workstation for navigation~~

~~(a) The workstation for navigation is to enable the following tasks to be performed:~~

~~(i) Determine and plot the vessel's position, course, track and speed.~~

~~(ii) Effect internal and external communications related to navigation.~~

~~(iii) Monitor time, course, speed and track, propeller revolutions, pitch indicator and rudder angle.~~

~~(b) Instruments and equipment which are to be operated by the navigator at the workstation for navigation are to be within reach of the workstation for traffic surveillance / manoeuvring.~~

~~(c) Instruments, indicators and displays providing information considered essential for the safe and efficient performance of tasks at the workstation for navigation are to be easily readable from the workstation.~~

~~(d) Means to be used at intervals for securing safe course and speed in relation to other vessels and safety of bridge operation are to be easily accessible from the workstation for navigation.~~

~~2.8.4 Workstation for route planning~~

~~The workstation for route planning is to enable the following tasks to be performed:~~

~~(a) Determine the vessel's position.~~

~~(b) Plan the forthcoming voyage on the basis of available information from charts and literature.~~

~~(c) Specify the detailed route by waypoints, courses and turns into the appropriate charts.~~

~~(d) Estimate time of arrival at various waypoints.~~

~~2.8.5 Workstations for manual steering~~

~~(a) The main workstation for manual steering is to enable the following tasks to be performed:~~

~~(i) Manual steering.~~

~~(ii) Two-way communication with workstation for docking operations.~~

~~(b) Instruments, indicators and displays providing information considered essential for the safe and efficient performance of the steering functions are to be easily readable from the workstation for manual steering.~~

~~(c) The back-up workstation for manual steering in the steering gear compartment is to enable the following tasks to be performed:~~

~~(i) Change rudder angle by direct control of the steering gear.~~

~~(ii) Monitor rudder angle and course.~~

~~(iii) Effect two-way communication with the bridge.~~

~~(d) Equipment and information essential for the safe conduct of the steering functions are to be available from the position at the steering controls.~~

~~2.8.6 Workstation for safety operations~~

~~(a) The workstation for safety operations is to enable the following tasks to be performed:~~

~~(i) Monitor the safety state of the vessel (fire, emergency, etc.).~~

~~(ii) Monitor and operate distress systems.~~

~~(iii) Take action on alarms and execute relevant measures.~~

~~(iv) Organize emergency operations.~~

~~(v) Consult the vessel's safety plans and drawings.~~

~~(b) Information displays, alarm panels, controls and equipment enabling early detection and efficient action in abnormal internal conditions and distress situations are to be easily accessible from the workstation for safety operations.~~

~~2.8.7 Workstations for docking operations~~

(a) The workstation for docking operations is to enable the following tasks to be performed:

(i) Control the vessel's heading and speed by having orders effected.

(ii) Monitor the heading of the vessel, rudder angle and propeller revolutions (pitch and thruster effects) when relevant.

(iii) Release sound signals.

(iv) Monitor the relevant mooring stations on board and ashore.

(v) Control the mooring operations by having orders effected.

(b) Equipment essential for the safe performance of docking operations is to be available from a specific position providing the required field of vision.

(c) Information essential for safe conduct of the docking operations is to be easily readable from the workstation for docking operations.

## 2.9 Design Requirements for Class Notation NAV0

2.9.1 General

This paragraph contains design requirements which replace rules or are added to the requirements in 2.1 to 2.8.

2.9.2 Instrument location

External sounds received through the sound reception system are to be audible at the required volume from the workstation for navigation and traffic surveillance/manoeuvring.

## 2.10 Design Requirements for Class Notation NAV1

2.10.1 General

This paragraph contains design requirements which replace, or are added, to the requirements in 2.1 to 2.9.

2.10.2 Design of workplace

The workstation for navigation and traffic surveillance/manoeuvring is to be designed for one-man operation only, and a separate workstation for navigation is to be installed sufficiently close by to serve as back-up and to allow good cooperation between two navigators each at their workstation.

2.10.3 Bridge configuration

From the workstation designed for one-man operation only, it is to be possible to use lights in line astern of the vessel as a visual reference for steering the vessel.

2.10.4 Instrument location

(a) The workstation designed for one-man operation only, is to enable performance of the tasks specified in 2.8.2(a) (workstation for traffic surveillance/manoeuvring) and the following tasks related to navigation:

(i) Monitor the vessel's performance in relation to the waters and the preplanned route on the electronic chart display.

(ii) Carry out changes of input data to the navigational system.

(iii) Monitor the performance of the automatic navigation in narrow waters by means of radar.

~~(b) The instruments used for monitoring and control of the navigation systems at the workstation designed for one-man operation only, are to be within reach of the navigator and the information on the display(s) is to be easily readable from the same position.~~

~~(c) The workstation for docking operations is to enable the following tasks to be performed:~~

~~(i) Effect alteration of rudder angle and propulsion.~~

~~(ii) Monitor course, speed, rudder angle, rate of turn and propeller revolutions (and indicators for pitch and thrusters, when relevant).~~

~~(iii) Acknowledge watch monitoring alarms.~~

~~(iv) Release sound signals.~~

~~(v) Monitor the mooring lines from the vessel to the bollards on the wharf.~~

~~(vi) Effect two-way communication with mooring stations on board and ashore.~~

~~(vii) Effect two-way communication with wheelhouse workstations for manual steering and manoeuvring.~~

~~(viii) Effect two-way communication with machinery space and department offices.~~

~~(d) The instruments/equipment which are to be used by the docking officer at the workstation for docking operations are to be within reach.~~

~~(e) Indicators and displays providing information essential for the safe and efficient performance of docking operations are to be easily readable from the workstation.~~

# ~~Chapter 3 –~~
# ~~Bridge Working Environment~~

## ~~3.1 – Requirements for Bridge Working Environment~~

~~3.1.1 – Application~~

~~Vessels requesting Class Notation **NAV**, **NAV0** or **NAV1** are to comply with the Rules in this Section.~~

~~3.1.2 – General~~

~~(a) Throughout the various design stages of the vessel, care is to be taken to achieve a good working environment for bridge personnel.~~

~~(b) Toilet facilities are to be provided on/or adjacent to the bridge.~~

~~(c) Refreshment facilities and other amenities provided for the bridge personnel are to include means for preventing damage to bridge equipment and injury to personnel resulting from the use of such facilities and amenities.~~

~~3.1.3 – Vibration~~

~~Uncomfortable levels of vibration causing both short and long term effects is to be avoided in the bridge area.~~

~~3.1.4 – Lighting~~

~~(a) An adequate level of lighting facilitating the performance of all bridge tasks at sea and in port, daytime and night time, is to be provided.~~

~~(b) Care is to be taken to avoid glare and stray image reflections on window and deck-head surfaces.~~

~~(c) A satisfactory degree of flexibility within the lighting system is to enable the bridge personnel to adjust lighting intensity and direction as required in the different areas of the bridge and at individual instruments and controls.~~

~~(d) During hours of darkness, it is to be possible to discern control devices and read displayed information.~~

~~3.1.5 – Temperature~~

~~(a) The wheelhouse is to be equipped with an adequate temperature control system.~~

~~(b) The temperature gradient from floor level up to 2 m is to be within the range of ±1°C and not exceed ±4°C.~~

~~3.1.6 – Ventilation~~

~~A sufficient range of air movement is to be available to the bridge personnel.~~

~~3.1.7 – Surfaces~~

~~(a) The bridge surface finishes are to be considered an integral part of the structure, layout and environment design ad all surfaces are to be glare-free.~~

~~(b) Wheelhouse, bridge wing and upper bridge decks are to have a non-slip surface when wet or dry.~~

~~(c) All surfaces are to be robust enough to withstand the daily wear of the vesselboard environment.~~

~~3.1.8 Colours~~

~~(a) Colours are to be chosen to give a calm overall impression and minimize reflection.~~

~~(b) Colour coding of functions and signals are to be in accordance with "ISO 2412 Vesselbuilding: Colours of indicator lights".~~

~~3.1.9 Safety of personnel~~

~~(a) The bridge area is to be free of physical hazards to bridge personnel.~~

~~(b) Hand or grab rails are to be fitted to enable personnel to move or stand safely in bad weather. Protection of stairway openings is to be given special consideration.~~

~~(c) All safety equipment on the bridge is to be clearly marked and easily accessible and have its stowage position clearly indicated.~~

# ~~Chapter 4 –~~
# ~~Equipment Carriage Requirements~~

## ~~4.1 – General~~

### ~~4.1.1 – General~~

~~(a) Vessels requesting Class Notation **NAV0** are to comply with the requirement in 4.1 and 4.2 of this Part. Vessels requesting Class Notation **NAV1** are, in addition, to comply with the requirements in 4.3.~~

~~(b) The equipment listed in this chapter is to comply with the relevant requirements laid down in Chapters 5, 6 and 7.~~

## ~~4.2 – Equipment Carriage Requirements for Class Notation NAV0~~

### ~~4.2.1 – Course information systems~~

~~(a) The vessel is to be equipped with means having the capability to determine the vessel's heading in relation to geographic (true) North.~~

~~(b) The course information of the vessel is to be continuously available for visual information and for integration into the relevant equipment.~~

~~(c) The vessel is to be equipped with means for taking optical bearings in all directions from the bridge.~~

### ~~4.2.2 – Steering systems~~

~~The vessel is to be equipped with means for manual and automatic steering of the vessel.~~

### ~~4.2.3 – Speed measuring system~~

~~(a) The vessel is to be equipped with means for measuring speed and distance through the water.~~

~~(b) Vessels above 50,000 GT are to carry a speed measuring system fulfilling the requirements of (a) and are also to be capable of measuring speed in the forward, and athwart-vessel directions.~~

### ~~4.2.4 – Depth measuring system~~

~~The vessel is to be equipped with means for measuring the water depth under the keel. The system is to include a separate digital display unit for installation in a deckhead console.~~

### ~~4.2.5 – Radar systems~~

~~The vessel is to be provided with two separate and independent radar systems. At least one of the radars is to operate on X-band.~~

### ~~4.2.6 – Traffic surveillance systems~~

~~The vessel is to be equipped with means for automatic detection and tracking of other vessels. The equipment is to provide continuous, accurate and rapid situation evaluation and release a visual and audible warning if a tracked target poses danger of collision.~~

~~4.2.7 Position-fixing systems~~

~~The vessel is to be equipped with means for utilizing position-fixing systems applicable for the waters she is to navigate.~~

~~4.2.8 Watch-monitoring and alarm transfer system~~

~~The vessel is to be equipped with a technical device to monitor the alertness of the officer of the watch and warn other bridge personnel if disability occurs.~~

~~4.2.9 Internal communication systems~~

~~The vessel is to be equipped with telephone systems enabling inter-communication between living quarters and the different working areas, both under normal and abnormal operating conditions.~~

~~4.2.10 Nautical safety radio communication systems~~

~~The vessel is to be equipped with means for nautical safety communication with authorities and other vessels as well as means for communication with tugboats and mooring station aboard and ashore.~~

~~4.2.11 Sound reception system~~

~~The vessel is to be equipped with a technical device receiving sound signals outside the wheelhouse and reproducing such signals inside the wheelhouse.~~

~~4.2.12 Automatic identification system (AIS)~~

~~The vessel is to be equipped with an automatic identification system (AIS) in accordance with the requirements given in SOLAS Regulation V/19.2.4, as amended by Res. MSC.99(73).~~

~~4.2.13 Voyage date recorder (VDR)~~

~~The vessel is to be equipped with a voyage data recorder (VDR) in accordance with the requirements given in SOLAS Regulation V/20, as amended by Res. MSC.99(73).~~

~~4.2.14 Long-range identification and tracking of vessels (LRIT)~~

~~The vessel is to be equipped with a long-range identification and tracking (LRIT) system in accordance with the requirements given in SOLAS Regulation V/19-1, as amended by Res. MSC.202(81).~~

~~4.2.15 Bridge Navigational Watch Alarm System (BNWAS)~~

~~The vessel is to be equipped with a Bridge Navigational Watch Alarm System (BNWAS) in accordance with the requirements given in SOLAS Regulation V/19, as amended by Res. MSC.282(86).~~

## ~~4.3 Additional Equipment Carriage Requirements for Class Notation NAV1~~

~~4.3.1 General~~

~~In addition to the equipment carriage requirements in subsection 4.2, vessels requesting Class Notation **NAV1** are to comply with the following equipment requirements:~~

~~4.3.2 Steering systems~~

~~In order to provide bridge personnel with manoeuvring information, the vessel is to be equipped with means for indicating the rate of turn.~~

~~4.3.3 Course information systems~~

~~The course information of the vessel is to be continuously available for visual information and for integration into the relevant equipment.~~

~~4.3.4 Speed measuring systems~~

~~The vessel is to be equipped with means for measuring speed and distance and provide the traffic surveillance system with input of speed through the water.~~

~~4.3.5 Electronic chart display and information system (ECDIS)~~

~~The vessel is to be equipped with an Electronic Chart Display and Information System (ECDIS) which continuously displays the vessel's position and the preplanned route.~~

~~4.3.6 Automatic navigation and track-keeping system (ANTS)~~

~~The vessel is to be equipped with an Automatic Navigation and Track-keeping System which automatically can keep the vessel along a safe pre-planned track.~~

~~4.3.7 Conning information display~~

~~The bridge is to be equipped with a conning display which continuously presents sensor input values and corresponding orders during the vessel's voyage at sea and when manoeuvring in port.~~

~~4.3.8 Central alarm panel~~

~~The bridge is to be equipped with a central alarm panel for instruments and systems related to primary bridge functions.~~

# ~~Chapter 5 –~~
# ~~General Bridge Equipment Requirements~~

## ~~5.1 General~~

### ~~5.1.1 Application~~

~~Vessels requesting Class Notation **NAV0** or **NAV1** are to comply with the requirements in this chapter.~~

## ~~5.2 Environmental Condition~~

~~Instruments and equipment are to function in accordance with their specifications in the environment they are installed and under the conditions they are being used.~~

## ~~5.3 Location and Installation of Equipment~~

### ~~5.3.1 Installation~~

~~(a) All instruments, panels, etc., are to be permanently mounted in consoles or at other appropriate places, taking into account both operational and environmental conditions. All other items, such as safety equipment, tools, lights, pencils etc. to be used by bridge personnel, are to be stored in designated places.~~

~~(b) Any equipment installation and arrangement is, unless otherwise specified, to follow the instructions and recommendations detailed by the manufacturer.~~

~~(c) Radar antennas are to be installed to enable detection of targets within 360°. Blind sectors occurring in one radar system are not to occur in the other system.~~

### ~~5.3.2 Interference~~

~~(a) When siting equipment which is to be used in an exposed position, special care is to be taken to ensure that the siting does not impair the performance of the equipment.~~

~~(b) The antennas for radars, position-fixing receivers and VHF communication system are to be installed in such a manner that interference is avoided and designed efficiency is not substantially impaired.~~

~~(c) Transmitting and receiving antenna cables are to be widely separated.~~

### ~~5.3.3 Radiation hazard~~

~~(a) Antenna units are to be sited so as not to constitute a hazard to personnel working in the vicinity.~~

~~(b) Satcom or radar antenna units are required to have a warning label, detailing safe distances, posted in the vicinity or on the equipment.~~

~~(c) Radar and satcom systems are required to have relevant human risk warnings and instructions in operator handbooks.~~

~~5.3.4 Vibration and shock isolation~~

~~(a) Above deck equipment is to be sited so as to prevent the installation from being affected by vibration.~~

~~(b) The antenna system and instrument installation are to withstand vibration to an extent which includes known standards for vibration environment according to the vessel's construction, speed trim and the sea state.~~

~~(c) Antenna systems including active elements are to be provided with a mount design configurated to withstand potential shock damage.~~

~~5.3.5 Temperature protection~~

~~(a) Instruments to be installed are to be located away from excessive heat sources, such as a heating vent or equipment heat exhaust.~~

~~(b) Instruments to be fitted into a bridge instrument console are to be protected from excessive heat by conduction or, if necessary, by forced air flow.~~

~~5.3.6 Humidity protection~~

~~Equipment which is not specifically designed for outdoor installation is not to be installed near a doorway, open window or hatch opening, due to the flow of humid salt air which may cause internal corrosion.~~

~~5.3.7 Compass safe distance~~

~~When equipment is being installed, care is to be taken to ensure that the accuracy of the vessel's magnetic compasses is adequately safeguarded.~~

## ~~5.4 Electrical Power Supply, Alarms, Performance Confirmation and Failure Protection~~

~~5.4.1 Electrical power supply~~

~~(a) Bridge equipment is to be connected to electric power supplies as specified in the International Convention for the Safety of Life at Sea.~~

~~(b) In addition to the equipment listed in (a), the emergency source of electrical power is to be provided for the Global Positioning System (GPS) and the electronic chart display and information system when installed.~~

~~(c) Equipment essential for the performance of primary bridge functions is, unless powered from a battery source, to be provided with an uninterruptible power supply (UPS) with a capacity to keep the equipment running during a black-out period of at least 60 s, and be automatically reinstated upon recovery from a black-out lasting from 60 s up to 30 minutes. The equipment regarded essential for the performance of primary bridge functions in this context is:~~

~~(i) gyro compass (at least one)~~

~~(ii) radar or ARPA (at least one including antenna)~~

~~(iii) position fixing system - GPS or GLONASS~~

~~(iv) ECDIS.~~

~~5.4.2 Alarms~~

(a) Means are to be provided to release both audible and visual alarms in the case of degraded system performance for primary bridge equipment.

(b) An acknowledged alarm is to be clearly distinguishable from an unacknowledged alarm.

(c) In colour graphic systems, it is not be regarded acceptable to distinguish between unacknowledged and acknowledged alarms by means of colour only.

(d) If an alarm channel in a computer based system is blocked manually, this is to be clearly indicated by a visual signal.

(e) When forced ventilation or cooling of equipment is required for high temperature protection, an alarm is to be released in case of failure in the ventilation or cooling system.

5.4.3 Performance confirmation

Essential equipment for performance of bridge functions is to provide the capability to perform self test of major functions, either automatically or manually initiated.

5.4.4 Failure protection

Bridge equipment is to be protected against failure in externally connected equipment.

## 5.5 Computer-based Systems and Software Quality

5.5.1 Computer based systems

(a) When failure in computer-based systems can affect safe navigation and manoeuvring of the vessel, the requirements of (b), (c) and (d) are to be fulfilled.

(b) When a computer-based system forms part of a navigation or manoeuvring system, a FMEA (Failure Mode & Effect Analysis) for the total system performance is to be carried out.

(c) If integrated computer-based systems are used for automatic operation of the vessel's speed and course according to input parameters from programmed routing, electronic position-fixed and traffic detection devices, a system failure is not to cause a critical situation for the vessel.

(d) The switch-over function to a redundant system is to be simple to execute.

(e) A redundant programmable electronic system (PES) is not to be considered required if an easily accessible and easily operated back-up system is provided.

(f) Adequate filtering of analogue and digital input signals is to be provided.

(g) Software and data necessary to ensure satisfactory performance of the computer system is to be stored in a non-volatile memory (e.g. ROM), or a volatile memory with an uninterruptible power supply.

(h) Access to the computer's operating system is to be highly restricted, and any alteration of system software after final inspection and testing on board is to be subject to approval in advance by the Society.

(i) Each computer system is to be functionally tested in the presence of a Surveyor if no other arrangement has been made.

(j) The functional test is to be based on an approved test program and is to cover failure simulation of internal faults, as well as faults external to the computer system.

5.5.2 Software quality

(a) The relevant software quality attributes are:

(i) reliability

(ii) safeguard against error and misuse

(iii) fault detection

(iv) fault correction

(v) fail-safe.

(b) Critical software is to be developed and tested according to well documented software development methodology. Software requirement specification, design description, coding and implementation are to be given consideration, as follows:

(i) Software requirement specification

This specification is to clearly and precisely describe the requirements for the software and is, as a minimum, to contain the following:

(1) Input data description, including the required error tolerance capabilities of the software.

(2) Requirements for the individual functions to be performed by the software, including accuracy requirements and requirements for recovery from computation failures, hardware faults, device error, etc.

(3) Requirements for the self-testing and diagnostic capabilities of the software.

(4) Requirements for outputs, including presentation and accuracy.

(5) Requirements for user operation (man and machine interface).

The requirements are to be explicitly itemized so that they may easily be traced back to the software design description.

(ii) Software design description

The program structure and organization are to be described and a standard design representation technique established and followed. The design is to be organized in a "top-down" fashion, that is in a hierarchical tree structure, each level of the tree representing lower levels of detail description of the processing. Tasks performed at each level are to be clearly described. The programs are to be organized as small, well arranged modules and their interaction is to be standardized and kept to a minimum. The software design description is, as a minimum, to contain the following:

(1) Description of the total program structure, using a standard design representation technique.

(2) Description of inputs, outputs, processing and limitation of each module.

(3) Memory map giving a total overview of the location of the programs, e.g. located in main memory, sub-module, intelligent terminal or printer, etc., and the programming languages used to develop the programmes.

(4) Description of priority of program modules.

(5) Description of the convention used.

# ~~Chapter 6 –~~
# ~~Specific Requirements for Different Types of Bridge Equipment~~

## ~~6.1 General~~

### ~~6.1.1 Application~~

~~(a) Vessels requesting Class Notation **NAV0** are to comply with the requirements in 6.1 to 6.12.~~

~~(b) Vessels requesting Class Notation **NAV1** are to comply with the requirements in 6.1 to 6.16.~~

## ~~6.2 Course Information Systems~~

### ~~6.2.1 General~~

~~(a) The gyro compass system is to comply with IMO's Res. A.424(XI), "Performance Standard for Gyro Compasses".~~

~~(b) The gyro compass system is to perform according to specifications for the latitudes where the vessel is to operate and at the speed it will achieve.~~

~~(c) Means are to be provided for correction of errors induced by speed and latitude.~~

## ~~6.3 Steering Systems~~

### ~~6.3.1 General~~

~~(a) The autopilot is to comply with IMO's Res. A.342(IX), "Performance Standard for Automatic pilots".~~

~~(b) The off-course alarm is not to be released when setting new course reference.~~

~~(c) The manual override control is to enable instant take-over from the autopilot as well as from the manual steering station.~~

~~(d) The rate-of-turn indicator is to comply with IMO's Res. A.526(13), "Performance Standards for Rate-Of-Turn Indicators".~~

~~(e) The maximum value on the scale of the rate-of-turn indicator is to be in accordance with the vessel's manoeuvring characteristics and the maximum preset rate-of-turn value of the autopilot.~~

## ~~6.4 Speed Measuring Systems~~

### ~~6.4.1 General~~

~~The speed log is to comply with IMO's Res. A.824(19), "Performance Standards for Devices to Indicate Speed and Distance" as amended by MSC.96(72).~~

## ~~6.5 Depth Measuring Systems~~

~~6.5.1 General~~

~~The echo sounder is to comply with IMO's Res. A.224 (VII) "Performance Standards for Echo-Sounding Equipment".~~

## ~~6.6 Radar Systems~~

~~6.6.1 General~~

~~(a) The radar installation is to comply with IMO's Res. A.477(XII), "Performance Standard for Navigational Radar Equipment" as amended by MSC.192(79).~~

~~(b) The radar display is to have an effective diameter of at least 250 mm.~~

~~(c) The radar is to have facilities which enable the operator to monitor the vessel's track along a coastline continuously.~~

~~(d) Inter-switching facilities are to be provided to improve the flexibility and availability of the overall radar installation.~~

~~(e) If a radar inter-switch unit is fitted, it is to be possible to bypass this unit in a simple way in case of failure in the inter-switch.~~

## ~~6.7 Traffic Surveillance Systems~~

~~6.7.1 General~~

~~The traffic surveillance system is to have automatic target acquisition and comply with IMO's Res. A.823(19), "Performance Standards for Automatic Radar Plotting Aids" as amended by MSC.192(79).~~

## ~~6.8 Position-fixing Systems~~

~~6.8.1 General~~

~~(a) The equipment is to be able to display the vessel's real time position continuously.~~

~~(b) The equipment is to display the vessel's real time position in geographic coordinates.~~

~~(c) The equipment is not to display data to a greater resolution than is feasible by the measurement with which it is associated.~~

~~(d) The equipment is to automatically select the best transmitter configuration available.~~

~~(e) The equipment is to be provided with effective means for preventing noise and interference.~~

~~(f) Equipment that needs input from vessel-borne sensors to perform in accordance with specifications is to have facilities for manual input of data in case of sensor failure. The equipment is to indicate if the system is in manual input mode.~~

(g) Equipment that includes an active antenna element (pre-amplifier) is to provide means to indicate loss of amplifier function or loss of antenna connection.

(h) The equipment is to provide a digital output format to interface relevant external systems.

(i) The Global Position System (GPS) receiver is to comply with IMO's Res. A.819(19) "Performance Standards for Vessel borne Global Positioning System (GPS) Receiver Equipment" as amended by MSC.112(73).

(j) The Loran-C and Chayka Receivers are to comply with IMO's Res. A.818 (19) "Performance Standards for Vessel born Loran-C and Chayka Receivers".

(k) The Decca Navigator Receivers are to comply with IMO's Res. A816 (19) "Performance standards for Vessel born Decca Navigator Receivers".

6.8.2 Accuracy

(a) The accuracy of a position fix involves both fixed and random errors and can only be described in terms of probability. The 95% probability figure ($2d_{rms}$) is to be used to describe the accuracy of the position fix derived by the position fixing equipment.

(b) The equipment is to provide position fixes within the accuracy standard to which the radio navigation system is designed.

(c) The equipment is to be provided with either automatic or manual means for correction of known position errors in the waters the vessel is to navigate.

6.8.3 Monitoring

(a) The equipment is to be provided with either automatic or manual self-test of major functions.

(b) The equipment is to monitor the quality of both the received signals and the computed position.

(c) The equipment is to release both a visual and an audible alarm when the alarm threshold is exceeded.

6.8.4 Integrated positioning system

(a) The system is to enable automatic selection of the best position systems to use, regardless of the vessel's location.

(b) When on automatic sensor selection, the equipment is to have the ability to automatically compensate for world-wide integral error models, including adjustment for both seasonal and diurnal conditions.

(c) The equipment is to enable each sensor interface to operate equivalent to that of a self-contained single mode receiver without degradation in performance.

## 6.9 Watch Monitoring and Alarm Transfer Systems

6.9.1 General

~~(a) Unattended bridge and danger to navigation caused by operator disability, traffic or improper course-keeping in relation to planned route are to be monitored.~~

~~(b) Alarms and warnings are to be released and automatically transferred to specific locations in order to alert another qualified navigator if the monitoring system indicates that the bridge is unmanned or that proper action is not being taken to avoid the danger of collision or grounding.~~

~~(c) The watch monitoring and alarm transfer system are to comply with requirements laid down by the vessel's state of register.~~

~~6.9.2 Operator fitness check system~~

~~(a) The monitoring system for the detection of operator disability is to verify that the bridge is manned and indicate that the officer of the watch is alert.~~

~~(b) The monitoring system for detection of operator disability is not to cause undue interference with the performance of primary bridge functions.~~

~~(c) Any interval checking system is to be so designed to prevent mal-operation.~~

~~6.9.3 Traffic monitoring~~

~~(a) In order to safeguard against the risk of collision, a collision warning system is to enable detection of floating objects which may come into a collision course and release an alarm in accordance with procedures found appropriate for the waters to be navigated.~~

~~(b) A traffic monitoring system providing the capability of automatic acquisition is, in sufficient time for the navigator to take proper action, to identify targets which may represent danger of collision should their present course be altered at a closer range. This device may be a separate unit or it may be an integral part of an ARPA which has the required capability.~~

~~6.9.4 Position monitoring~~

~~In order to safeguard against the risk of grounding, a position-monitoring system is to enable detection of cross-track error in relation to the pre-planned route and release an alarm at a time to danger of grounding which allows for proper and effective action to be taken by the back-up officer.~~

~~6.9.5 Alarm and warning transfer system~~

~~(a) Alarms/warnings which are not acknowledged are to be transferred from the bridge to alert the master and an appointed back-up navigator if required.~~

~~(b) Whether a wireless transfer system or fixed installation is adopted in accordance with (a), the alarms/warnings are always to be transferred by a fixed installation to the following areas:~~

~~(i) Captain's cabin.~~

~~(ii) Captain's office.~~

~~(iii) Officers' office.~~

~~(iv) Officers' mess.~~

~~(v) Officers' day room.~~

~~(vi) Other relevant public areas.~~

(c) In addition to the locations listed in (b), it is to be possible to include any of the cabins of the watch officers in the fixed alarm transfer system by selection.

(d) Acknowledgment of alarms/warnings is only to be possible from the bridge.

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

(f) The main alarm system is to be continuously powered and is to have an automatic change-over to a stand-by power supply in case of loss of normal power supply.

## 6.10 Internal Communication Systems

### 6.10.1 Battery-less telephone systems

(a) To secure internal communications independent of electrical power supply, a battery-less telephone system is to be provided for two-way communication between wheelhouse and:

(i) Engine control room

(ii) Steering gear room

(iii) Captain's living quarters

(iv) Chief engineer's living quarters

(v) Radio room (when located outside bridge area).

(b) In the steering gear room, facilities are to be provided to avoid noise interference when using the battery-less telephone.

### 6.10.2 Automatic telephone systems

(a) The automatic telephone network is to provide two-way communication between the bridge, all workstations and all relevant spaces.

(b) The telephone network is to be designed for a minimum capacity of two simultaneous calls.

(c) The wheelhouse is to be fitted with two independent user extensions.

(d) The telephones in the wheelhouse and engine control room are to have priority function over any other extension.

(e) A reference list of extensions is to be permanently posted within reach of each telephone.

(f) The automatic telephone network is to function during black-out.

(g) Incoming calls on an adjacent telephone are to be distinguishable by lights and/or different chimes.

### 6.10.3 Public address systems

(a) The public address (PA) system is to enable point-to-point loud hailing intercom between the bridge and all relevant areas.

(b) The PA control module is to be suitable for flush panel mounting in workstation consoles.

(c) Outdoor substations are to be mounted in a watertight housing.

(d) Each substation panel is to be equipped with an activation light to indicate communication readiness. The talk-back speaker systems are to have volume control.

(e) The amplifier units are to be protected against failure in intercom network or in substation equipment.

(f) The public address system is to work during blackout.

## 6.11 Nautical Communication Systems

6.11.1 VHF system

(a) The VHF system is to comply with the 1988 amendments to the 1974 SOLAS Convention concerning Radio communications for the Global Maritime Distress and Safety System.

(b) Within the bridge area, provisions are to be made for the installation of at least two VHF radio telephone stations.

6.11.2 UHF system

(a) To assist in safety and navigation, the bridge is to be provided with at least four portable UHF transceivers operating in the 457-467 MHz band.

(b) The equipment is to include microphone, loudspeaker and chargeable batteries.

(c) The capacity of the battery is to be sufficient to operate the equipment continuously for at least 5 hours.

(d) A minimum of two charger units providing relevant capacity are to be installed in an easily accessible location.

## 6.12 Sound Reception System

6.12.1 General

The sound reception system is to be capable of receiving sound signals in the frequency range 70-700 Hz outside the wheelhouse.

## 6.13 Electronic Chart Display and Information System (ECDIS)

6.13.1 General

The electronic chart display and information system is to comply with IMO's Res. A817(19) "Performance Standard for Electronic Chart Display and Information System (ECDIS)" as amended by MSC.232(82).

## ~~6.14 Automatic Navigation and Track-keeping System (ANTS)~~

~~6.14.1 General~~

~~(a) By integrating a position-fixing system, an electronic chart display and information system (ECDIS) and an automatic steering system, the ANTS are to be able to perform automatic steering of the vessel along a route preplanned in straight and curved lines.~~

~~(b) It is to be possible to adjust the displayed chart for geographical inaccuracies.~~

~~(c) If the quality of the filtered position input to ECDIS is not accepted by the system, this is considered a malfunction condition of the ANTS and is to be indicated by both a visual warning on the display and an audible alarm.~~

~~(d) An alarm is to be activated if malfunction of the ANTS occurs. The alarm is to be included in the alarm and warning transfer system specified in 6.9.5.~~

~~(e) Malfunction of the ANTS is to result in the least critical of any new condition (fail-safe).~~

~~6.14.2 Course alteration warnings~~

~~(a) In order to warn the navigator about a forthcoming course alteration, the ANTS is to be able to give a warning at a present time before the wheel-over point.~~

~~(b) In order to warn the navigator before the alteration of course is executed, the ANTS is to request acknowledgment of course alteration.~~

~~6.14.3 Additional requirements for the course information system~~

~~The accuracy of the vessel's heading used within the ANTS is to be a value that has been corrected for any errors typical to the source of the heading input.~~

~~6.14.4 Additional requirements for the steering system~~

~~(a) The steering system is to be able to perform automatic track-keeping of the vessel within the limits set on both sides of the preplanned track.~~

~~(b) When performing track-keeping in the turns, the steering system is to be able to steer in accordance with the preplanned turn radius.~~

~~(c) The steering system is to provide the capability to steer the vessel along a route consisting of straight and curved lines by both automatic and manual input of turn orders.~~

6.14.5 Additional requirements for the speed measuring system

The speed input is to be provided with sufficient accuracy to safeguard the quality of position-fixing by dead reckoning.

6.14.6 Additional requirements for the position-fixing systems

(a) The ANTS is to be provided with the most accurate position of the vessel.

(b) The quality of the integrated position-fixing system is to be monitored. If the quality of the position-fixing system is lower than an acceptable limit, a warning is to appear.

## 6.15 Conning Information Display

6.15.1 General requirements

(a) The conning information display is to comply with the requirements in Chapter 7.

(b) All information required for the efficient monitoring of automatic performance of primary functions are to be easily accessible.

(c) The layout of the display is to be designed for easy reading of the manoeuvring state of the vessel.

## 6.16 Bridge Navigational Watch Alarm System (BNWAS)

6.16.1 General

The purpose of a bridge navigational watch alarm system (BNWAS) is to monitor bridge activity and detect operator disability which could lead to marine accidents. The system monitors the awareness of the Officer of the Watch (OOW) and automatically alerts the Master or another qualified OOW if for any reason the OOW becomes incapable of performing the OOW's duties. This purpose is achieved by a series of indications and alarms to alert first the OOW and, if he is not responding, then to alert the Master or another qualified OOW. Additionally, the BNWAS may provide the OOW with a means of calling for immediate assistance if required. The BNWAS is to be operational whenever the vessel's heading or track control system is engaged, unless inhibited by the Master.

6.16.2 Operational requirements

(a) The BNWAS is to incorporate the following operational modes:

(i) Manual ON (In operation constantly)

(ii) Manual OFF (Does not operate under any circumstances)

(b) Operational sequence of indications and alarms

(i) Once operational, the alarm system is to remain dormant for a period of between 3 and 12 min (Td).

(ii) At the end of this dormant period, the alarm system is to initiate a visual indication on the bridge.

(iii) If not reset, the BNWAS is additionally to sound a first stage audible alarm on the bridge 15 s after the visual indication is initiated.

(iv) If not reset, the BNWAS is additionally to sound a second stage remote audible alarm in the back-up officer's and/or Master's location 15 s after the first stage audible alarm is initiated.

(v) If not reset, the BNWAS is additionally to sound a third stage remote audible alarm at the locations of further crew members capable of taking corrective actions 90 s after the second stage remote audible alarm is initiated.

(vi) In vessels other than passenger vessels, the second or third stage remote audible alarms may sound in all the above locations at the same time. If the second stage audible alarm is sounded in this way, the third stage alarm may be omitted.

(vii) In larger vessels, the delay between the second and third stage alarms may be set to a longer value on installation, up to a maximum of 3 min, to allow sufficient time for the back-up officer and/or Master to reach the bridge.

(c) Reset function

(i) It is not to be possible to initiate the reset function or cancel any audible alarm from any device, equipment or system not physically located in areas of the bridge providing proper look out.

(ii) The reset function is, by a single operator action, to cancel the visual indication and all audible alarms and initiate a further dormant period. If the reset function is activated before the end of the dormant period, the period is to be re-initiated to run for its full duration from the time of the reset.

(iii) To initiate the reset function, an input representing a single operator action by the OOW is required. This input may be generated by reset devices forming an integral part of the BNWAS or by external inputs from other equipment capable of registering physical activity and mental alertness of the OOW.

(iv) A continuous activation of any reset device is not to prolong the dormant period or cause a suppression of the sequence of indications and alarms.

(d) Emergency call facility

Means may be provided on the bridge to immediately activate the second, and subsequently third, stage remote audible alarms by means of an "Emergency Call" push button or similar.

6.16.3 Accuracy

The alarm system is to be capable of achieving the timings stated in section 6.16.2(b) with an accuracy of 5 % or 5 s, whichever is less, under all environmental conditions.

6.16.4 Security

The means of selecting the Operational Mode and the duration of the Dormant Period (Td) is to be security protected so that access to these controls is to be restricted to the Master only.

6.16.5 Malfunction

If a malfunction of, or power supply failure to, the BNWAS is detected, this is to be indicated. Means are to be provided to allow the repeat of this indication on a central alarm panel if fitted.

6.16.6 Operational controls

(a) A protected means of selecting the operational mode of the BNWAS.

(b) A protected means of selecting the duration of the dormant period of the BNWAS.

(c) A means of activating the "Emergency Call" function if this facility is incorporated within the BNWAS.

(d) Reset facilities

Means of activating the reset function is only to be available in positions on the bridge giving proper look out and preferably adjacent to visual indications. Means of activating the reset function is to be easily accessible from the conning position, the workstation for navigating and manoeuvring, the workstation for monitoring and the bridge wings.

~~6.16.7 The operational mode of the equipment is to be indicated to the OOW.~~

~~6.16.8 Visual indications~~

~~The visual indication initiated at the end of the dormant period is to take the form of a flashing indication. Flashing indications are to be visible from all operational positions on the bridge where the OOW may reasonably be expected to be stationed. The colour of the indication(s) is to be chosen so as not to impair night vision and dimming facilities (although not to extinction) are to be incorporated.~~

~~6.16.9 First stage bridge audible alarm~~

~~The first stage audible alarm which sounds on the bridge at the end of the visual indication period is to have its own characteristic tone or modulation intended to alert, but not to startle, the OOW. This alarm is to be audible from all operational positions on the bridge where the OOW may reasonably be expected to be stationed. This function may be engineered using one or more sounding devices. Tone/modulation characteristics and volume level are to be selectable during commissioning of the system.~~

~~6.16.10 The remote audible alarm which sounds in the locations of the Master, officers and further crew members capable of taking corrective action at the end of the bridge audible alarm period is to be easily identifiable by its sound and is to indicate urgency. The volume of this alarm is to be sufficient for it to be heard throughout the locations above and to wake sleeping persons.~~

~~6.16.11 design and installation~~

~~(a) General~~

~~The equipment is to comply with IMO resolutions A.694(17) and A.813(19), their associated international standards and MSC/Circ.982 regarding Guidelines for Ergonomic Criteria for Bridge Equipment and Layout.~~

~~(b) System physical integrity~~

~~All items of equipment forming part of the BNWAS are to be tamper-proof so that no member of the crew may interfere with the system's operation.~~

~~(c) Reset devices~~

~~Reset devices are to be designed and installed so as to minimize the possibility of their operation by any means other than activation by the OOW. Reset devices are all to be of a uniform design and are to be illuminated for identification at night.~~

~~(d) Alternative reset arrangements may be incorporated to initiate the reset function from other equipment on the bridge capable of registering operator actions in positions giving proper look out.~~

~~(e) Power supply~~

~~The BNWAS is to be powered from the vessel's main power supply. The malfunction indication and all elements of the Emergency Call facility, if incorporated, are to be powered from a battery maintained supply.~~

~~6.16.12Interfacing~~

~~(a) Inputs~~

~~Inputs are to be available for additional reset devices or for connection to bridge equipment capable of generating a reset signal by contacts, equivalent circuits or serial data.~~

~~(b) Outputs~~

~~Outputs are to be available for connection of additional bridge visual indications and audible alarms and remote audible alarms as shown in Fig. XIII 6-1.~~

## ~~6.17 Central Alarm Panel~~

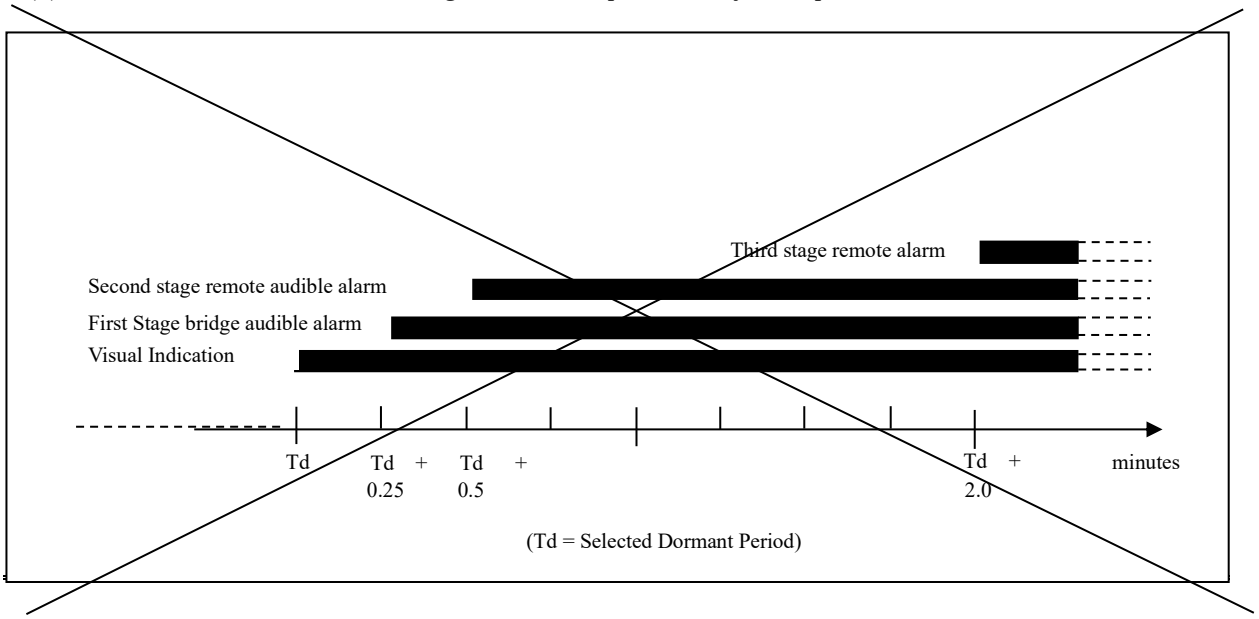
~~6.17.1 General requirements~~

~~(a) Alarms and warnings to be emitted by instruments and systems for performance of primary bridge functions are to be centralized in one common panel on the bridge for easy identification and acknowledgement of the individual alarms.~~

~~(b) The alarm panel is to provide the capability of emitting both a visual and an audible warning for the individual instruments.~~

~~(c) Acknowledgement of an alarm at either the instrument or the alarm panel is to cancel the audible warning at both sources.~~

~~(d) Cancellation of the visual warning on the alarm panel is only to be possible at the instrument.~~




**~~Fig. XIII 6-1~~**
**~~Alarm Sequence without Acknowledgements~~**

# ~~Chapter 7 –~~
# ~~Man/Machine Interface~~

## ~~7.1 General Requirements~~

### ~~7.1.1 Application~~

~~(a) Vessels requesting Class Notation **NAV0** or **NAV1** are to comply with the requirements in this chapter.~~

~~(b) All instruments are to be logically grouped according to their functions within each workstation. Their location and design are to give consideration to the physical capabilities of the human operator and comply with accepted ergonomic principles.~~

~~(c) The amount of information to be presented for conducting the various tasks as well as the methods of displaying the information needed are to give consideration to the capabilities of the human operator to percept and process the information made available.~~

## ~~7.2 Instrument Location and Design~~

### ~~7.2.1 General~~

~~(a) Instruments or displays providing visual information to more than one person is to be located for easy viewing by all users concurrently. If this is not possible, the instruments or displays are to be duplicated.~~

~~(b) The method of presentation is to ensure that the instrument data is clearly visible to the observer at a practicable distance in the light conditions normally experienced on the bridge by day and by night. All menus and displays are to provide a self-explanatory interface to the user.~~

~~(c) The operation of a control is not to obscure indicator elements where observation of these elements is necessary for adjustments to be made.~~

### ~~7.2.2 Location~~

~~(a) Instruments are to be readable from the operating position of the workstation they are providing information to.~~

~~(b) Instruments operated or fitted in connection with controls are to be readable from a distance of at least 1000 mm. All other instruments are to be readable from a distance of at least 2000 mm.~~

~~(c) Each instrument is to be placed with its face normal to the navigator's line of sight, or to the mean value if the navigator's line of sight varies through an angle.~~

~~(d) Controls or combined controls/indicators are to be visually and tactually distinguishable from elements which only indicate.~~

~~(e) Instruments are to be designed to facilitate console installation and mounting in a group with instruments of other makes.~~

~~7.2.3 Design~~

~~(a) All instruments are to be designed to permit easy and accurate reading by day and by night.~~

~~(b) Instrument letter type is to be of simple, clear-cut design.~~

~~(c) The purpose of each control and indicator is either to be clearly illustrated by symbols where standard symbols have been internationally adopted or indicated by a label in English.~~

~~(d) Operational controls are to be easily accessible and easy to identify.~~

~~(e) The shape of mechanical controls is to indicate the method of operation of the control.~~

~~(f) The position/function allocation and purpose of control elements, as well as the function and layout of indicator elements, are to be logically coordinated.~~

~~(g) The presentation of graphic or mimic diagrams is to be in accordance with ergonomic principles and easy to understand and operate. The status of the information displayed is to be clearly indicated.~~

~~(h) Mal-operation of a computer-based bridge instrument is not to cause any loss of data, damage of programmes or malfunction of the system.~~

## ~~7.3 Illumination and Individual Lighting of Instruments~~

~~7.3.1 General~~

~~All illumination and lighting of instruments, keyboards and controls are to be adjustable down to zero, except the lighting of warning and alarm indicators and the control of dimmers, which are to remain readable.~~

~~7.3.2 Illumination~~

~~(a) To avoid unnecessary light sources in the front area of the bridge, only instruments necessary for the safe navigation and manoeuvring of the vessel are to be located in this area.~~

~~(b) Instruments are to be designed and fitted to minimize glare or reflection and prevent being obscured by strong light.~~

~~(c) All information is to be presented on a background of high contrast, emitting as little light as possible by night.~~

~~(d) Indicator lights and the illumination of all instruments are to be designed and fitted to avoid unnecessary glare or reflection, or the instruments being obscured by strong light.~~

~~(e) Operator keyboards and other functional controls are to be illuminated to ensure ease of operation in darkness.~~

~~(f) Means for adjusting the display and keyboard brightness are to be provided.~~

~~(g) Warning and alarm indicators are to be designed to show no light in normal position (indication of a safe situation). Means are to be provided to test the lamps.~~

~~(h) Each instrument is to be fitted with an individual light adjustment. In addition, groups of instruments normally in use simultaneously may be equipped with common light adjustment.~~

~~(i) Colour coding of functions and signals is to be in accordance with ISO 2412 "Vesselbuilding: Colours of indicator lights".~~

## ~~7.4 Requirements for the Man/Machine- Dialogue of Computer Based Systems~~

~~7.4.1 General~~

~~The man/machine-dialogue of a computer based system is to enable the operator to perform his tasks as intended in an efficient and user-friendly manner.~~

# ~~Chapter 8 –~~
# ~~Vessel Manoeuvring Information~~

## ~~8.1 General~~

~~8.1.1 Application~~

~~Vessels requesting Class Notation **NAV1** are to comply with the requirements in this chapter.~~

~~8.1.2 General~~

~~(a) Information about the vessel's manoeuvring characteristics enabling the navigator to safely carry out manoeuvring functions is to be available on the bridge.~~

~~(b) This chapter deals with:~~

~~(i) manoeuvring information to be provided; and~~

~~(ii) presentation of the manoeuvring information.~~

~~(c) The manoeuvring information to be provided is to be presented by means of:~~

~~(i) pilot card;~~

~~(ii) wheelhouse poster; and~~

~~(iii) manoeuvring booklet.~~

~~(d) The method of identifying the manoeuvring characteristics of the vessel are subject to approval. These results of individual tests, trials and estimations are to be submitted for information.~~

~~8.1.3 Manoeuvring information~~

~~(a) Before being assigned Class Notation **NAV1**, the information on the manoeuvrability of the vessel is to be established for at least one loading condition.~~

~~(b) Information on the manoeuvrability of the vessel not covered by the original data is to be complied as experience is gained in manoeuvring the vessel under different operating conditions.~~

~~(c) Additional information compiled on the manoeuvring characteristics is to be registered in the manoeuvring booklet and the wheelhouse poster when applicable.~~

~~8.1.4 Sister vessels~~

~~(a) For vessels built in series according to identical drawings, only one vessel in the series has to undertake the complete trial program according to these Rules. The other vessels of the series can adopt the information from these trials provided a reduced trial programme is satisfactory completed.~~

(b) A sister vessel is at least to make the following trials:

(i) speed trial at full speed ahead;

(ii) stopping trial from full speed ahead; and

(iii) turning circle trials at full speed ahead to both port and starboard.

(c) All information which is duplicated from a sister vessel is to be marked with a statement to this effect together with the identification of the sister vessel.

## 8.2 Provision of Manoeuvring Information

8.2.1 General

Information regarding the vessel's manoeuvring characteristics is to be provided to give the navigator the best presumption in selecting the correct speed and rudder angle relative to the prevailing conditions and intended manoeuvre.

8.2.2 Speed ability

Information about speed ability in terms of the actual speed potential of the vessel at various engine settings is to be provided. Trials are to be performed at three engine settings identifying the percentage used for the maximum continuous rating (MCR) of power:

(a) at full speed ahead

(b) at half speed ahead

(c) at slow speed ahead

8.2.3 Stopping ability

Information about the vessel's stopping abilities is to be provided. Trials are to be made from an initial full speed ahead and with application of the following astern powers:

(a) constant full astern power

(b) with propulsion and engine stopped.

8.2.4 Turning ability

Information about the vessel's turning ability at full speed, from full speed with engines stopped and when accelerating from rest to full speed ahead is to be provided. Turning trial runs are to be made to port and to starboard.

(a) Using maximum rudder angle without changing engine control settings form initial full speed ahead.

(b) From an initial full speed ahead and then stopping the engine at the start of the turn (coasting turn).

(c) From initial standstill with propeller stopped and applying half speed ahead using maximum rudder simultaneously (accelerated turning trial).

~~8.2.5 Course change ability~~

~~Information about the vessel's initial turning ability at various rudder angles is to be provided for full and slow speed situations. Zigzag trials are to be made to port and to starboard for rudder angles equal to 10° and 20° for conventional rudder systems.~~

~~8.2.6 Low speed steering abilities~~

~~Information about the lowest constant engine revolutions or lowest pitch control setting at which the vessel can safely be steered in ballast and loaded conditions is to be provided.~~

~~8.2.7 Course stability~~

~~Information about the course stability of the vessel is to be provided. A pullout trial is to be made to port and starboard. A spiral trial is to be made if the pullout trial indicates that the vessel is unstable.~~

~~8.2.8 Auxiliary manoeuvring device trial~~

~~(a) Information about the performance and effect of auxiliary devices installed in order to improve the manoeuvring abilities of the vessel is to be provided.~~

~~(b) The ability to turn by means of thrusters is to be determined.~~

~~(c) The forward speed at which the device ceases to be effective is to be determined.~~

~~(d) When applicable, the ability to move sideways is to be determined. Depending on the device configuration, the trial is to be made with at least one unit at maximum output and the others adjusted to give practically pure sidling.~~

~~8.2.9 Man-overboard rescue manoeuvre~~

~~Information about the performance of an effective man-overboard rescue manoeuvre is to be provided. Manoeuvring test to establish the most effective manoeuvre procedure in case of man over board is to be carried out.~~

## ~~8.3 Presentation of Manoeuvring Information~~

~~8.3.1 Pilot card~~

~~(a) A pilot card is to provide the pilot with information on the current condition of the vessel with regard to its loading condition, propulsion and manoeuvring equipment and other relevant equipment.~~

~~(b) A pilot card form is to be available on the bridge at each port call.~~

~~8.3.2 Wheelhouse poster~~

~~(a) A summary of manoeuvring information on the vessel is to be worked out in the format of a wheelhouse poster.~~

~~(b) The wheelhouse poster is to be permanently displayed in the wheelhouse. It is to contain general particulars and detailed information describing the manoeuvring characteristics of the vessel, and be of sufficient size to ensure ease of use.~~

~~(c) The wheelhouse poster is to be marked with a warning that the manoeuvring performance of the vessel may differ from that shown on the poster due to environmental, hull and loading conditions.~~

~~8.3.3 Manoeuvring booklet~~

~~The manoeuvring booklet is to be available on board and is to contain details of the vessel's manoeuvring characteristics and other relevant data. The manoeuvring booklet is to include the information shown on the wheelhouse poster together with other available manoeuvring information. Most of the manoeuvring information in the booklet can be estimated, based on the data obtained from the trials specified in this chapter. The information in the booklet may be supplemented in the course of the vessel's life.~~

# ~~Chapter 9 –~~
# ~~Qualifications and Operational Procedures~~

## ~~9.1 – General~~

~~9.1.1 – Application~~

~~(a) Vessels requesting Class Notation **NAV0** are to comply with the requirements in 9.1, 9.2.1, 9.2.2 and 9.3.1 to 9.3.6.~~

~~(b) Vessels requesting Class Notation **NAV1** are to comply with all the requirements in this chapter.~~

~~9.1.2 – Responsibilities of vessel owners and vessel operators.~~

~~(a) The vessel owner or the vessel operator is to submit for approval copies of the instructions and procedures established to comply with the requirements in this chapter with regard to:~~

~~(i) – Responsibilities and duties of relevant personnel on board.~~

~~(ii) – Qualification.~~

~~(iii) – Bridge procedures.~~

~~(iv) – Operational safety procedures.~~

~~The approval is limited to ensure that relevant requirements in this chapter are included in the instructions and procedures.~~

~~(b) For vessels requesting Class Notation **NAV0**, instructions and procedures documenting compliance with the requirements in 9.1, 9.2.1, 9.2.2 and 9.3.1 to 9.3.6 are to be submitted for approval.~~

~~(c) For vessels requesting Class Notation **NAV1**, instructions and procedures documenting compliance with the requirements in 9.1, 9.2 and 9.3 are to be contained in the operational safety manual to be submitted for approval in accordance with the requirements in 9.4.~~

~~9.1.3 – Responsibilities of the master~~

~~(a) The master is to ensure that watch keeping arrangements are adequate for maintaining a safe navigational watch.~~

~~(b) Before assigning a navigational officer of the vessel the responsibility of single man watch keeping, the master is to ascertain that the officer is qualified.~~

~~(c) The master is to ensure that the officer of the watch only acts as a sole look out when, in that officer's judgement, the workload is well within his capacity to maintain a proper look out and full control of the prevailing situation.~~

~~(d) The master is to designate individuals who are to provide assistance when needed by the officer of the navigational watch acting as sole look out.~~

~~(e) The master is to ensure that the manning of the bridge watch is in accordance with national regulations in the country of registration and for the waters the vessel is navigating.~~

9.1.4 Responsibilities of the officer in charge of single-man watch-keeping

(a) Under the master's general direction, the officers of the watch are to be responsible for navigating the vessel safely during their periods of duty and carry out bridge operations in accordance with established procedures.

(b) The officer of the watch is carefully to assess that the workloads is well within his capacity to maintain full control of the functions to be performed and the operational situation.

(c) The officer is immediately to summon assistance to the bridge in case of abnormal operational conditions including situations causing excessive workloads.

## 9.2 Qualifications

9.2.1 Assumptions

It is assumed that masters and officers in charge of a navigational watch meet the relevant mandatory minimum requirements for certification as specified in the Annex of the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers, 1978, as amended 2010, Chapter II, Regulations II/1 to II/3, as well as meet the knowledge requirements set forth in this chapter for officers in charge of single-man watch-keeping applicable for the relevant Class Notation.

9.2.2 Knowledge requirements for Class Notation **NAV0**

An officer assigned single man watch keeping is to have watch keeping experience and proper knowledge of the specific instruments and equipment to be used.

9.2.3 Knowledge requirements for Class Notation **NAV1**

An officer being assigned single-man watch-keeping in narrow waters is to have watch-keeping experience from such waters and proper knowledge of methods for the planning and performance of navigation in narrow waters in various operational modes.

9.2.4 Documentation of qualifications

Officers to be assigned the responsibility of single-man watch-keeping in narrow waters are to be able to document that they are properly qualified to carry out the bridge functions and operate the equipment and systems installed on the bridge.

## 9.3 Bridge Procedures

9.3.1 Assumptions

It is assumed that the bridge personnel is to observe the basic principles in keeping a navigational watch as set forth in the Annex of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended 2010, Chapter VIII, Regulation VIII/2.

9.3.2 General

(a) The basic principles referred to 9.3.1, including but not limited to the following, is to be taken into account on all vessels:

(i) Watch arrangements

(ii) Fitness for duty

(iii) Taking over the watch

(iv) Performing the navigational watch

(v) Look-out (notwithstanding the words "in daylight" in paragraph 15) of Section A-VIII/2 of STCW Code

(vi) Watch-keeping under different conditions and in different areas

(vii) Protection of the marine environment.

(b) Operational procedures for single man watch keeping are to be established to ensure that the bridge is manned at all times and that another qualified officer can attend the bridge within a specified response time.

9.3.3 Back-up navigator

(a) When single man watch keeping is applied, another fully qualified officer is to be appointed as back up officer.

(b) Procedures are to be established which ensure that the back up officer is able to hear alarm and communication calls from the bridge.

9.3.4 Response time

(a) The total response time from alarm is sounded to the appearance of the back up officer on the bridge is to be set in relation to the time to danger of collision or grounding, taking into account all relevant factors necessary to allow proper and effective action to be taken.

(b) Based on the actual time to danger, calculation of the response time is to take into account the time lapsed in acknowledging the alarm, proceeding to the bridge, evaluating the situation and taking proper and effective action in due time to avoid danger.

9.3.5 Testing of equipment

Procedures are to be established for testing the watch monitoring and alarm transfer system.

9.3.6 Route planning

Procedures are to be established for route planning incorporating the use of parallel index and constant radius turn techniques.

9.3.7 Navigation in narrow waters

(a) Procedures are to be established for efficient visual monitoring of the automatic navigation and track keeping as well as for the keeping of a proper look out.

(b) Procedures for active monitoring of the vessel's position in relation to the preplanned route by another method than that used by the automatic navigation system are to be established.

## 9.4 Operational Safety Standard

9.4.1 General

(a) The purpose of the operational safety standard is to regulate conditions that will affect the safety of watch-keeping and command, and to provide a useful aid for managing abnormal operating conditions and emergency situations.

(b) A manual which presents and describes procedures, routines, duties and responsibilities of relevant personnel for normal and abnormal operating conditions is to be developed and implemented on board the vessel.

9.4.2 Operational safety manual

(a) Procedures and routines for normal operating conditions are to be established to reduce the probability of undesired and hazardous events to occur.

(b) Adequate contingency and emergency procedures are to be established to increase the ability to counteract and handle an abnormal operating situation.

(c) The operational safety manual is to cover the following conditions and situations:

(i) Normal conditions requiring daily routines and duties and situations which, to some degree, require precautionary procedures and/or action for a continued controlled operation.

(ii) Accident situations, i.e. casualties affecting course and speed, which do not represent imminent danger for the complement.

(iii) Abnormal situation arisen due to threats against the vessel and/or her complement put forward by the environmental conditions.

(iv) Emergency situations, i.e. situations where the vessel and/or her complement are threatened by a grave and imminent danger.

(v) Miscellaneous situations not covered by the previous items.

(d) The contents of the operational safety manual are to include the requirements of 9.1.2, 9.1.3 and 9.1.4 as well as the requirements of 9.2 and 9.3.

# ~~Chapter 10 –~~
# ~~Bridge Equipment Tests~~

## ~~10.1 General~~

~~10.1.1 Application~~

~~Vessels requesting Class Notation **NAV0** or **NAV1** are to comply with the requirements in this chapter.~~

## ~~10.2 On-board Testing of Bridge Equipment~~

~~10.2.1 General~~

~~(a) After installation of equipment in vessels requesting Class Notation **NAV0** or **NAV1**, on-board testing of the equipment is to be performed in order to ascertain that the equipment, as installed, operates satisfactory.~~

~~(b) It is to be noted that reliable figures for all aspects of equipment performance/accuracy cannot be established by the on-board testing required for classification.~~

~~Therefore, to ensure that equipment performance is in accordance with specifications, vessel owners are advised to choose equipment that is type approved.~~

~~10.2.2 Test program~~

~~(a) A detailed program for the on-board testing of this equipment is to be submitted for approval at the earliest possible stage before sea trials.~~

~~(b) The test program is to be in accordance with the requirements for on-board testing set forth in 10.2.3 to 10.2.14, and is to specify in detail the tests to be performed for each type of equipment.~~

~~10.2.3 General requirements for the testing of all types of bridge equipment~~

~~(a) Prior to testing, all equipment is to be checked and calibrated by a representative of the manufacturer or the equipment supplier.~~

~~(b) Prior to testing, all equipment, etc., necessary for the observation and recording of test results is to be made available. Charts for the area where the sea trials are to take place must be available. Large-scale charts for the area where the vessel is berthed must be available.~~

~~(c) Equipment and systems are to be subject to the tests required to ascertain that all controls, indicators, displays, etc., operate in accordance with their specifications and meet Rule requirements.~~

~~(d) Failure conditions are to be simulated on equipment and systems.~~

~~(e) The instruments for performance of primary bridge functions are to be tested at black-out for a period of up to and over 30 seconds. At least one of the tests is to be carried out at sea.~~

~~(f) A demonstration including start-up of the individual systems and change-over from normal conditions to failure conditions is to be carried out.~~

(g) Tests, additional to the approved test program, may be required carried out by the Surveyor.

(h) If the vessel is not assigned the additional Class Notation **CAU**, tests of the remote control system for propulsion machinery as well as black-out tests, are to be carried out.

10.2.4 Gyro compass

(a) The settle point error of the master compass and the alignment with the vessel's centreline are to be determined. The true heading is to be taken to be the bearing (direction) of the quay at which the vessel is berthed.

(b) The bearing repeaters' alignment with the vessel's centre line is to be checked. A bearing diopter must be available.

(c) The divergence between No. 1 master compass and the gyro repeaters is to be checked. After switching to No. 2 master compass, the divergence with the gyro repeaters is to be checked again.

(d) The monitoring functions of the compass system are to be tested.

(e) The performance of the gyro compass system is to be tested.

(f) The means for correcting errors caused by speed and latitude are to be tested.

10.2.5 Automatic steering system

(a) The course keeping performance of the autopilot is to be tested at full sea speed. Adaptive autopilots are also to be tested at reduced speed.

(b) The performance of the autopilot is to be checked for a change in course of 10 degrees and 90 degrees to both sides. The overshoot angle is to be observed.

(c) The off course alarm is to be tested.

(d) The rate of turn or radius function is to be tested.

(e) Change of operational steering mode is to be tested.

(f) The override function is to be tested in all steering modes.

10.2.6 Rudder indicator(s)
The rudder indicator(s) on the bridge is(are) to be checked against the indicator on the rudder stock.

10.2.7 Rate of turn indicator
The rate of turn indicator is to be tested by measuring the number of degrees turned in 60 seconds at a constant rate of turn.

10.2.8 Speed log
The speed log is to be checked for accuracy and, if necessary, calibrated.

~~10.2.9 Echo sounder~~

~~(a) Function testing of the echo sounder is to be carried out. Depth is to be measured at a fixed position for exact comparison of accuracy and at full speed ahead on all range scales available.~~

~~(b) The depth warning/alarm is to be tested.~~

~~10.2.10 Radar system~~

~~(a) Function testing of the radar is to be carried out. The various ranges, presentation modes and the basic radar functions are to be tested.~~

~~(b) The accuracy of bearing of the radars is to be tested by the reading of at least four fixed positions on the display at a known position of the vessel.~~

~~(c) The accuracy of range measurement is to be tested by measuring the distance to at least two fixed positions at each range while the vessel is in a known position.~~

~~(d) The "heading marker" is to be checked against a visible target dead ahead and adjusted if necessary.~~

~~(e) Failure mode by disconnecting a fuse is to be observed.~~

~~(f) Inter-switching facilities, including bypass function, are to be tested.~~

~~(g) Performance monitors are to be checked.~~

~~(h) Self-check programs are to be run.~~

~~10.2.11 ARPA system~~

~~(a) The equipment is to be function-tested whilst the vessel keeps steady speed and course.~~

~~(b) When manoeuvring the vessel, the normal functioning of the system, including automatic acquisition, is to be checked.~~

~~(c) Indication on the display of the bearing and distance to the object, as well as the heading of own vessel, is to be tested.~~

~~(d) The trial manoeuvre function of the ARPA is to be tested.~~

~~(e) Tests are to be carried out to verify that the system gives warning when the limits of CPA and TCPA are exceed and that a warning is given when the object enters the guard ring.~~

~~(f) Input from speed sensors is to be checked.~~

~~10.2.12 Electronic position-fixing systems~~

~~(a) All electronic position-fixing fitted systems are to be function-tested.~~

(b) The accuracy of the electronic position-fixing systems is to be checked.

10.2.13 Watch monitoring and alarm transfer system

(a) The off-track monitoring system is to be tested. It is to be checked that the off-track alarm is transferred to the places specified if it is not acknowledged within the pre-set limit.

(b) The traffic-monitoring function of the ARPA (guard zones and CPA/TCPA) is to be tested. It is to be checked that the warning is transferred if not acknowledged within the pre-set limit.

(c) The watch monitoring (dead-man) alarm system is to be tested and the transfer of alarms checked.

(d) The off-heading monitoring system is to be tested. It is to be checked that the off-course alarm from the heading control system and compass deviation alarm from the compass monitor is transferred to the places specified if it is not acknowledged within the pre-set limit.

(e) It is to be checked that the wheel-over-point approach alarm from the ECDIS is transferred to the places specified if it is not acknowledged within the pre-set limit.

10.2.14 Internal communication systems

The automatic telephone system and internal communication system between workstations are to be tested. The priority function for the telephones in the wheel house and engine control room over the other extensions is to be tested.

10.2.15 Nautical communication system

VHF/UHF systems are to be tested.

10.2.16 Sound reception system

The sound reception system is to be tested by measuring the sound level outside and inside the wheelhouse.

10.2.17 Computer system(s)

(a) The tests can be combined with tests specified for the different primary functions. Failure conditions, especially power failure in the computer system as well as the computer equipment, are to be simulated as realistically as possible. Manual restart and, if relevant, automatic restart and automatic back-up are to be tested. Successive power breaks are to be simulated.

(b) If the computer system is used to carry out secondary functions, testing of the system is to be carried out with all primary functions in operation and with maximum load from both primary and secondary functions.

10.2.18 Electronic chart display and information system (ECDIS)

The accuracy, functionality and the alarm/warning functions of the electronic chart display system are to be tested. Performance of automatic functions, such as positioning of the vessel by means of dead reckoning and GPS, plotting of the track and updating of the data base, is to be included in the tests together with the following operations:

(a) Route planning

(b) Altering of the route while underway

(c) Positioning by bearings and ranges

~~(d) Scale changes and zooming functions.~~

~~(e) Manual adjustment of the vessel's position on the screen.~~

~~10.2.19 Automatic navigation and track-keeping system~~

~~The electronic chart display and information system is included in the testing of the automatic navigation and track-keeping system if such system is installed. The performance of the automatic track-keeping system, including alarm/warning functions, is to be tested along a preplanned route consisting of different courses. The route is to consist of at least six course changes and include a course change not less than 135° at minimum radius turn to each side as well as a turn of approximately 90° at a radius of not less than 2 nautical miles. The track keeping in a turn during essential speed reduction is to be tested. The alarm and warning functions of the track keeping system are to be tested. Failure conditions are to be simulated to verify conclusions of approved FMEA (Failure Mode & Effect Analysis).~~

~~10.2.20 Conning display~~

~~The performance of the conning display is to be tested as well as the accuracy and readability of the data displayed.~~

~~10.2.21 Bridge watch surveillance system~~

~~The functionality and time settings of the surveillance system shall be tested.~~

*Chapter 1 has been added as follows:*

# Chapter 1
# General

## 1.1 Introduction

### 1.1.1 Application

(a) This Part specifies the requirements for bridge design and layout, as well as the functionality of navigation equipment and systems intended to improve and optimize the working environment in the bridge area, and to enhance the navigation capabilities and safety of ships. Additionally, this Part includes requirements for ships fitted with an integrated bridge system for navigational purposes.

(b) This Part applies to ships possessing valid SOLAS certificates, and having a bridge so designed and equipped as to enhance the safety and efficiency of navigation.

(c) This Part requires that the design and layout of navigation equipment is to be based on sound ergonomic principles. Refer to IMO MSC/Circ.982.

### 1.1.2 Objectives

(a) The main objectives of the Rules for Navigational Safety Systems are to reduce the risk of failures in bridge operation causing collisions, groundings and heavy weather damages and to minimize the consequences to ship and complement should an accident occur.

(b) The Rules for Navigational Safety Systems aim at setting forth requirements to regulate shipboard factors affecting safety and efficiency in bridge operations.

## 1.2 International Conventions and Governmental Regulations

### 1.2.1 Regulations

Convention on the International Regulations for Preventing Collisions at Sea, and all other relevant regulations relating to radio and safety of navigation required by Chapters IV (Radiocommunications) and V (Safety of navigation) of 1974 SOLAS, as amended, are to be complied with. Valid statutory certificates issued by the Administration are to be maintained onboard the ship and made available to the Surveyor upon request.

### 1.2.2 Governmental maritime authorities

Ship owners or other interested parties are encouraged to consult the Administration and relevant National Authorities concerning required manning levels on the bridge and any additional requirements which may be imposed by them.

## 1.3 Class Notations

Upon request, the following optional class notations are offered for ships where the navigational bridge design, design and arrangement of navigational equipment and bridge operational procedures are developed based on accepted IMO Resolutions to aid in improving their level of safety and to reduce the risk of grounding, collision and weather damage, according to the level of compliance.

In order to meet the individual needs of ship owners, the Rules of Navigational Safety System are divided into five types of class notations, named **NSL**, **NSLES**, **NSLESD**, **NSLES(COS)** and **NIBS** respectively. The main purpose and scope of each notation are described below.

1.3.1 Notation **NSL** (Navigational Safety Layout)

The notation **NSL** will be assigned to ships having navigational equipment layout and constructed in accordance with sound ergonomic principles and its navigating bridge equipped to comply with the requirements of Chapter 1 (as applicable) and Chapter 2 (Navigational Safety Layout) of this Part, and have been constructed and installed under the survey of the Society.

1.3.2 Notation **NSLES** (Navigational Safety Layout and Equipment/Systems)

The notation **NSLES** will be assigned to ships having navigational bridge equipped in accordance with the requirements specified in Chapters 1 to 3 (Navigational Safety Layout and Equipment/Systems) of this Part, and which have been constructed and installed under the survey of the Society.

1.3.3 Notation **NSLESD**

The notation **NSLESD** will be assigned to ships which have fulfilled the requirements of the notation **NSLES** and which are also equipped with additional equipment specified in this Part on the bridge wings (Docking Workstation) as well as constructed and installed under the survey of the Society.

1.3.4 Notation **NSLES (COS)** (Navigational Safety Layout and Equipment/Systems for Coastal and Offshore Services)

The notation **NSLES (COS)** will be assigned to ships having its navigational bridges equipped in accordance with the requirements specified in Chapters 1 through 4 (Navigational Safety Layout and Equipment/Systems for Coastal and Offshore Services) of this Part and which have been constructed and installed under the survey of the Society.

1.3.5 Notation **NIBS**

The notation **NIBS** will be assigned to ships equipped with an Integrated Bridge System (IBS) in compliance with IMO document SN.1/Circ.288 and found to be in compliance with Chapter 1 and Chapter 5 of this Part and which have been constructed and installed under the survey of the Society.

## 1.4 Definitions

1.4.1 The following terms are used in this Part:

(a) Acquisition - The selection of those target ships requiring a tracking procedure and the initiation of their tracking.

(b) Back-up Navigator - Any individual, generally an officer, designated by the ship master to be on call if assistance is needed on the navigation bridge.

(c) Bridge - That area from which the navigation and control of the ship is exercised, including the wheelhouse and bridge wings.

(d) Bridge Wing Workstation - Workstation from which the ship can be maneuvered, and operated during unmooring and mooring, lock passage, taking or dropping the pilot, etc.

(e) Closest Point of Approach (CPA) - The shortest target ship-own ship calculated distance that will occur if there is no change in course and speed data.

(f) Catwalk - Extension of a deck that is wide enough to allow the passage of a man.

(g) Commanding View - View without obstructions which would interfere with the ability to perform immediate navigation tasks.

(h) Conning Position - Place on the bridge with a commanding view and which is used by navigators and pilots, when monitoring, maneuvering and controlling a ship.

(i) Cross Track Alarm – Comparison of the ship's position with the track (control error).

(j) Electronic Chart Display and Information System (ECDIS) - A system which displays hydrographic information and the ship's position along a pre-planned route.

(k) Ergonomics - The 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. Application of the human factor in the analysis and design of equipment and working environment.

(l) Field of Vision (FOV) - Angular size of a scene that can be observed from a given position.

(m) Heading – The horizontal direction in which the longitudinal axis of a ship actually points or heads at any instant, expressed in angular units from a referenced direction.

(n) Integrated Bridge System (IBS) - A combination of interconnected systems allowing centralized access to sensor information or command/control from workstations, with the aim of increasing safe and efficient ship's management. For the purpose of this Part, the integrated bridge system pertains only to aspects dealing with navigational, monitoring/alarming and communication functions as covered in this Part.

(o) 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. Also, the person performing these tasks.

(p) Manual Steering Workstation - Workstation from which the ship can be steered by a helmsman.

(q) Navigation and Traffic Surveillance/Maneuvering Workstation (also called Main Workstation) - Main workstation at which the ship's course, speed and position in relation to the waters and traffic can be controlled and monitored, and where communication relevant to navigation can be performed. It is generally conceived for working in seated or standing position with optimum visibility and with an integrated presentation of information and operating equipment. It is to be possible from this location, in particular when a fast action is required.

(r) Normal Sailing Conditions - A condition wherein 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.

(s) Off Heading Alarm - An alarm that monitors the comparison of heading and preset heading (control error).

(t) Officer of the Watch - The person responsible for safe navigating, operation of bridge equipment and maneuvering of the ship.

(u) Operating/Technical Manual - Manuals or operational instructions for equipment/systems installed on the bridge for the use of bridge personnel.

(v) Position Monitor - Comparison of the position source in use with a second independent position sensor or source.

(w) Primary Bridge Navigational Equipment/Systems - For the purpose of this Part, equipment/systems essential for the performance of primary bridge navigational functions such as gyro compass, radar, position-fixing system and electronic chart system.

(x) Radar Plotting - The process of target detection, tracking calculation, calculation of relative and true motion, course, speed and display of information.

(y) Route Planning Workstation - Workstation at which ship's operations are planned (i.e., route planning, deck log, etc.) and where determining and documenting all ship's operation takes place.

(z) TCPA - Time to Closest Point of Approach.

(aa) Track - The intended or desired direction of travel of a ship.

(ab) Tracking - The process of observing the sequential changes in the position of a target, to establish its motion.

(ac) Way-point - Any of the various intermediate points on a route.

## 1.5 Documentation to be Submitted for Approval/Information

Relevant plans and data are to be submitted for approval and/or information as follows. The configuration and arrangement drawings submitted for approval are to be shown to scale. All symbols and abbreviations used are to come with a clarification. Plans should generally be submitted electronically to the Society. However, hard copies will also be accepted.

### 1.5.1 Notation **NSL**

(a) Arrangements of windows, including dimensions and angles of inclination, dimensions of frames, height above deck surface of upper and lower edges, type of glass, and details of clear view arrangements (wipers, fresh water wash systems, de-icing/ de-misting systems, and sunscreens).

(b) Fields of vision from the bridge workstations, including any blind sectors caused by obstructions outside of the wheelhouse.

(c) Location and arrangement of workstations, including dimensions of consoles, layout of instrumentation and controls, handrails, and seating.

(d) Clearances between floor and ceiling, or between floor and the underside of ceiling mounted instruments, throughout the wheelhouse.

(e) Arrangements for the general illumination of the bridge and the individual illumination of workstation instruments and controls.

(f) Details of wheelhouse ventilation and heating systems.

(g) Details of internal communication systems operable from the bridge.

(h) Arrangements/details of exterior catwalk in front of bridge windows.

(i) Details of non-slip flooring. Refer to 2.7.5(b) of this Part.

(j) Details of wheelhouse doors, including hold-back arrangements. Refer to 2.7.8 of this Part.

(k) Location of toilet. Refer to 2.7.7 of this Part.

(l) Arrangements for drainage of bridge decks. Refer to 2.7.6 of this Part.

(m) Arrangements/details of the measures to minimize hazards to personnel. Refer to 2.7.10 of this Part.

1.5.2 Notation **NSLES**

(a) Documentation as required for the **NSL** notation.

(b) List of Equipment

A list of navigational equipment. This is to include the manufacturer's name and model number for each item, along with copies of relevant type approval certificates.

(c) Alarms and display

A complete operational description of the relevant monitoring systems including a list of alarms and displays. This may be accomplished by means of simplified block diagrams of navigation equipment, internal communications systems and watch monitoring and alarm transfer systems, and central alarm panel (where provided) including a list of alarms.

(d) One line diagram

A simplified one-line diagram of the relevant systems described in 3.8 through 3.11 of this Part. This is to include power supplies to the bridge equipment, circuit protection ratings and settings, cable sizes, rating of connected loads, detailed description and interactions.

(e) Operation manuals

Operation/technical manuals for the installed navigational equipment/systems as shown in 3.13 of this Part. A single copy only is to be submitted for information.

(f) Sea trial-test plan

Sea trial test schedule. One copy only is to be submitted. Refer to 3.14 of this Part.

1.5.3 Notation **NSLESD**

(a) Documentation as required for the **NSLES** notation.

(b) The above-mentioned documentation covers the functions and navigation equipment of bridge wings (Docking Workstation).

1.5.4 Notation **NSLES(COS)**

(a) Documentation as required for the **NSLESD** notation.

(b) Documentation denoting vertical and horizontal field of visions from bridge and bridge workstations.

(c) Documentation from the navigational equipment suppliers related to the compliance of the Human Machine Interface (HMI) requirements contained in 4.5.4 of this Part.

(d) FMEA or an equivalent and acceptable national/international standard for bridge operation during maneuvering the ship is to be carried out and the report to be submitted for consideration. A failure mode effect analysis (FMEA) showing how a single failure of an equipment or system will impact the bridge operation during maneuvering or transit. IEC standard 60812 may be used as reference document for conductance of the FMEA.

(e) Maneuvering data booklet including the results of all maneuvering trials, identifying the mode of equipment and applied corrections.

1.5.5 Notation **NIBS**

(a) Documentation as required for the **NSLESD** notation

(b) Workstation details

Details and arrangements of the workstations and systems as described in Chapter 5 of this Part.

(c) Program for sea trials

In addition to 1.5.2(f), the sea trial program is to include test details of the electronic chart display and information systems (ECDIS) and integrated bridge system (IBS).

*Chapter 2 has been added as follows:*

# Chapter 2
# Requirements for Notation NSL (Navigational Safety Layout)

## 2.1 General

Ships complying with this Chapter, will be assigned the **NSL** (Navigational Safety Layout) notation.

## 2.2 Equipment Design and Construction

Following requirements are applicable to navigational equipment required in this Part:

### 2.2.1 General

The design of navigational equipment is to be based on sound ergonomic principles in accordance with the Guidelines on ergonomic criteria for bridge equipment and layout (MSC/Circ.982). Its construction is to be of robust, durable and flame retardant material incorporating the required degree of enclosure protection (i.e., IP 20 for bridge installation and IP 56 for open deck installation). The requirements in 3.3 of this Part are applicable to navigational related equipment required in this Part.

### 2.2.2 Fault isolation

Circuits are to be designed to permit the isolation of a fault while maintaining functionality of the remaining circuits or sub-components (i.e., using printed circuit cards, or modules, etc.) and are to allow the easy and safe replacement of the faulted portion of the circuit.

### 2.2.3 Replacement of components

Replaceable components are to be designed and arranged so that it will not be possible to connect them incorrectly or use incorrect replacements.

### 2.2.4 Self-support

Workstations, panels, cabinets, etc., are to be secured to a solid foundation with sides and back suitably protected. They are to be self-supported or be braced to the bulkhead or the ceiling. If braced to the bulkhead or the ceiling, means of bracing is to be flexible to allow deflection of the deck without buckling the assembly structure.

### 2.2.5 Configuration of devices

Alarms, displays and control devices are to be arranged in a functional and logical manner to allow the operator an easy and clear means of identification of each of the components or systems included therein. Grouping of like system alarms, displays, and devices, and the use of labels and color schemes are some of the methods to achieve this goal. Precautions are to be taken to prevent the inadvertent operation of controls that may lead to critical situations, i.e., care in the identification and location of switches, activation controls, and handles, the use of recessed or covered switches and controls, and arrangement for sequential operation.

### 2.2.6 Instruments and controls

Instruments and controls are to be designed to permit easy and correct reading by day and night and so fitted as to minimize glare or reflection or being obscured by strong light. The following is applicable:

(a) Digital readout

Digital readout is not to be used where the reading changes rapidly so as to preclude the operator from reading its changing value (i.e., numbers change is effected by snap action rather than by continuous movement).

(b) Circular scale

For an index moving relative to a circular scale, the index is to move clockwise (or the scale is to move counterclockwise) for increasing readings.

(c) Linear scale

For an index moving relative to a linear scale, the index is to be horizontal or vertical and the pointer is to move to the right or upwards for increasing readings. Deviation from this norm will be considered for special applications such as for water depth measurements.

(d) Distinction

Controls or combined controls/indicators are to be visually and tactually distinguishable from elements that only indicate (i.e., rectangular buttons may be used for control elements and round lights for indicator elements).

(e) Mechanical control

The shape of mechanical controls is to assist in indicating the mode of operation of the control. Rotary finite-position controls (e.g., stepped switches) are to have toggles or levers, whereas rotary continuous-position controls (rheostats) are to have knobs or wheels except the steering control.

(f) Light contrast

Instruments providing information are to be presented on background of high contrast, emitting as little light as possible by night. They are to be designed to show a light text on a dark nonreflecting background at night.

(g) Illumination and lighting

All instruments and controls are to be provided with means of illumination. Such illumination is to be adjustable to zero, except for the illumination of alarms and dimmer controls. Such items are to remain visible at all times. For the illumination of displays and alarms, red light (wavelength 620 nm or higher) is to be used.

## 2.3 Bridge Arrangement and Working Environment

### 2.3.1 Fields of vision

(a) General

The requirements specified in Appendix 1 - Navigation Bridge Visibility are to be complied with.

### 2.3.2 Control of ship

(a) General

The relevant workstations are to be designed and positioned so that navigational and traffic surveillance/ maneuvering, docking and other tasks may be performed by the officer of the watch in cooperation with other persons manning individual workstations.

Workstations used for navigating and traffic surveillance/maneuvering, manual steering, voyage planning and communication are not to cover a working area with an axis longer than 15 m.

Further, where workstations are widely separated, talkback facilities are to be provided so that unhampered communications between workstations can be achieved under all operating conditions.

(b) Conning position

An adequate conning position is to be provided in close proximity to the forward center window and is to be arranged so as to enable the navigator(s) to view the area immediately in front of the bridge superstructure and observe all relevant information required to maintain a safe course and speed of the ship in narrow waters, harbor areas and during final passages without interfering with the tasks of the bridge personnel. The rudder, propeller, thrust, pitch and operational mode indicators, or other means to determine and display rudder angle, propeller revolutions, direction of thrust and, if applicable, the force and direction of lateral thrust and the pitch and operational mode, are all to be readable from the conning position(s).

However, if the view in the center-line is obstructed by large masts, cranes, etc., two additional conning positions giving a clear view ahead are to be provided, one on the port side and one on the starboard side of the center-line, no more than 5 m apart from each other.

(c) Navigation and traffic surveillance/maneuvering workstation

The navigation and traffic surveillance/maneuvering workstation is to be arranged so as to enable the officer of the watch to carry out the required tasks and to provide him with all necessary information so that he can carry out his functions from a seated or standing working position but without being restricted to a specific location. In addition, this workstation is to be designed, arranged and located within an area having sufficient space for not less than two operators, but which would allow the workstation to be operated efficiently by one operator.

(d) Route planning workstation

The route planning workstation is to enable the navigator to plan the intended voyage without interfering with the actual navigation or maneuvering of the ship.

(e) Monitoring workstation

From the monitoring workstation, it is to be possible to see and hear the persons at the navigation and traffic surveillance/maneuvering workstation and steering workstations.

(f) Manual steering workstation

The workstation for manual steering is preferably to be located on the ship's centerline. If the workstation for manual steering is located off the centerline, special steering references are to be provided (e.g., sighting marks forward). If the view ahead is obstructed by large masts, cranes, etc., the steering workstation is to be located a distance to starboard of the centerline, sufficient to obtain a clear view ahead.

(g) Docking workstations

The workstations for ship docking are to enable the navigator, together with a pilot, to observe all relevant external and internal operations which will affect the safe docking of the ship. Talkback facilities are to be provided between the docking workstations and the wheelhouse when the distance from the wing extremity to the wheelhouse centerline is greater than 10 m.

## 2.4 Routes and Working Clearances

2.4.1 Across wheelhouse

A clear route across the wheelhouse from bridge wing to bridge wing is to be provided and its width is to be at least 1.2 m. However, the width may be reduced to not less than 700 mm at any single point of obstruction subject to the following:

(a) There is to be clear visibility for individuals on either side of the obstruction to see each other as they approach the area of reduced width.

(b) The length of the obstruction along the passageway is not to exceed 1 m.

(c) There is sufficient room on either side of the obstruction to allow one individual to step aside and allow another individual to pass through (i.e., at least 1.2 m).

(d) The above actions will not interfere with any crew member at a station required to be continuously manned.

(e) The attending Surveyor is satisfied that two individuals traveling in opposite directions can pass through the area of reduced width with only a very brief pause by one of the two.

2.4.2 From lower decks

There are to be no obstructions between the points of entry to the bridge wings and wheelhouse from lower decks and the clear route required in 2.4.1 above.

2.4.3 Between workstations

The distance between adjacent workstations is to be sufficient to allow unobstructed passage. To this end, the free passageway is to be at least 0.7 m in width. The workstation operating area is to be part of the workstation and not of the passageway.

2.4.4 Front passage

The distance from the front bulkhead, or from any workstation and installations placed against the front bulkhead, to any workstation or installations placed away from the bridge front is to be sufficient for two persons to pass each other. This distance is preferably to be 1 m but in no case less than 0.8 m.

## 2.5 Clear Height

The clear ceiling height in the wheelhouse is to be designed with regard to the installation of overhead panels and instruments. To this end, the clear height between the bridge deck surface covering and the underside of the deck head beams is to be at least 2.25 m. The lower edge of deckhead mounted equipment is to be at least 2.1 m above the deck in open areas, passageways and at standing workstations.

## 2.6 Workstations

2.6.1 General

Instruments providing visual information to more than one person on duty are to be located for easy viewing by all users concurrently, or if this is not possible, the instruments are to be duplicated. Instruments displaying information to more than one workstation may be located above the front windows if dimensions allow; such instruments are those denoting the ship's heading, wind, water depth, speed, rate of turn, rudder angle, propeller revolutions (r/min), propeller pitch and time. Configuration and dimensions as outlined in 2.6.2 and 2.6.3 below do not apply to radar consoles.

2.6.2 Configuration

In general, workstations are to be divided into two parts if possible:

(a) Vertical Part: Instruments dealing with information/presentation of data are to be placed in the vertical part.

(b) Horizontal Part: Controls of the relevant equipment are to be placed in the horizontal part.

2.6.3 Dimensions

(a) Height: The height of workstations is not to interfere with the navigating bridge window's view requirements found in 26.6 and 26.7 of Chapter 26 of Part II of the Rules.

(b) Width: Based on sound ergonomic principles, the width of workstations designed for single person operation is not to exceed 1.6 m.

(c) Chart Table: The chart table is to be large enough to accommodate all chart sizes normally used internationally for marine traffic. The dimensions of the chart table are to be as follows: width, not less than 1.2 m; depth, not less than 0.85 m; height, not less than 0.9 m and not more than 1 m.

Additionally, the chart table is to be provided with 10 mm openings in front and back of the table to accommodate charts which are larger than the table

2.6.4 Instruments and controls

(a) General: Instruments and controls are to be grouped according to their main functions; these are: navigating and traffic surveillance/maneuvering, and communication.

(b) Line of sight: Each instrument and control is to be placed with its face normal to the navigator's line of sight, or to the mean value if the navigator's line of sight varies through an angle.

(c) Glare: To avoid glare, all instruments and controls are to be positioned relative to the operator considering the surrounding light sources.

(d) Transparent covers: Transparent covers fitted over instrument(s) are to minimize reflections.

(e) Symbols/labels: The purpose of each control is to be clearly illustrated by symbols where standard symbols have been internationally adopted or indicated by a label in English.

## 2.7 Environment Function

2.7.1 Lighting and illumination

(a) General: A satisfactory level of lighting is to be provided to enable personnel to complete required bridge tasks at sea and port in both daytime and night. To this end, individual task areas are to have a greater luminance than the general lighting level.

(b) Lighting in dark hours: Relevant equipment fitted on the bridge is to be able to be discerned during hours of darkness. This is to be achieved via internally or externally located lighting. Red light is to be used to maintain dark adaptation whenever possible in areas or on items of equipment, other than the chart table, requiring illumination in the operational mode (see also 2.2.6(g) of this Chapter). This is to include instruments and controls on the bridge wings.

Additionally, in order to prevent red lights in the wheelhouse from being mistaken for navigation lights by another ship, indirect low level red lighting is to be fitted at deck level, especially for internal doors and staircases.

2.7.2 Heating ventilating and air conditioning (HVAC) system

An adequate HVAC system is to be provided in order to maintain the temperature of the wheelhouse within the range of 14°C to 30°C.

2.7.3 Sound signals

Fixed sound signals are to be placed as high as practicable and if possible, forward of the bridge. External sound signals from ships and fog signals that are audible on open deck, are to be also audible inside the wheelhouse; to this end, a

sound reception system (of a recommended frequency range of 70 to 700 Hz) is to be provided to reproduce such signals inside the wheelhouse (the opening of doors or windows is generally not to be accepted as an equivalent solution).

2.7.4 Noise levels

(a) The noise level on the bridge is not to interfere with verbal communication, mask audible alarms or be uncomfortable to the bridge personnel. In this respect, the ambient noise level on the bridge in calm weather is not to exceed 65 dB(A).

(b) The noise of ventilation fans, engine intake fans and other noise sources are to be dampened from the bridge operational area by suitable siting of the fans and associated housing.

2.7.5 Surfaces

(a) Glare-free: All prepared surfaces are to be glare-free.

(b) Non-slip: The flooring throughout the bridge is to be provided with non-slip surfaces, effective in both wet and dry conditions.

2.7.6 Drainage

Bridge decks outside, including the wings, are to be provided with means for drainage.

2.7.7 Toilet facilities

Toilet facilities are to be provided on or adjacent to the bridge, on the same level.

2.7.8 Doors

Doors to the bridge wings are to be capable of being operated with one hand. Means are to be provided to hold the doors open.

2.7.9 Refreshment facilities

Refreshment facilities and other amenities provided for the bridge personnel are to include means for preventing damage to bridge equipment and injury to personnel resulting from the use of such facilities and amenities.

2.7.10 Safety of personnel

(a) Sharp edges and protuberances: There are to be no sharp edges or protuberances which could cause injury to personnel.

(b) Handrails or grab rails: Sufficient handrails or grab rails are to be fitted to enable personnel to move or stand safely in bad weather.

(c) Seat securing: Where provisions for seating is made in the wheelhouse, means for securing same are to be provided, having regard to storm conditions.

## 2.8 Tests and Sea Trials

During sea trials, navigational equipment and systems are to be tested to the satisfaction of the attending Surveyor in accordance with a test program.

*Chapter 3 has been added as follows:*

# Chapter 3
# Requirements for Notation NSLES (Navigational Safety Layout and Equipment/Systems) and Notation NSLESD (with Docking Workstation)

## 3.1 General

Ships complying with Chapters 1 to 3 of this Part will be assigned the notation **NSLES** (Navigational Safety Layout and Equipment/Systems) or **NSLESD**. The equipment required for **NSLES** and **NSLESD** notations are listed below respectively.

## 3.2 Navigational Equipment for NSLES and NSLESD Notations

3.2.1 Workstation for navigation and traffic surveillance/maneuvering (See Note 1)

(a) Main functions to be performed:

(i) Observation of all ships and objects
(ii) Deciding on collision avoidance actions
(iii) Checking ship's own signal
(iv) Checking own course and speed
(v) Keeping and/or changing own course and speed (track keeping)
(vi) Checking own position
(vii) Handling own internal communication on board
(viii) Handling communication ship/ ship, and ship/ shore (VHF)
(ix) Recognizing dangerous situations
(x) Releasing alarms
(xi) Perception of group alarms with aids for decision-making
(xii) Observation of weather and seaway
(xiii) Acknowledging watch check alertness alarm
(xiv) Keeping deck log (a dictaphone may be used)
(xv) Sounding signals

(b) Equipment (See Note 3)

N1. Gyro compass heading indicator – For **NIBS** notation, two independent gyro compasses are to be provided on the bridge (See 5.8.1 of this Part). See note 2.
N2. Magnetic compass heading indicator
N3. Course reminder (set course) indicator
N4. Rudder pump selector switch
N5. Steering mode selector switch
N6. Steering position indicator
N7. Rudder angle indicator
N8. Pitch indicator – for controllable-pitch propeller
N9. Rate-of-turn indicator and controller – for ships 50,000 GT or greater. See 3.8.2.(d) and 3.8.2.(e) of this Chapter.

N10. Speed and distance indicator – for **NIBS** notation, the speed measuring system is to be independent of the position fixing systems. See 5.8.2 of this Part.

N11. Depth water indicators with adjustment controls. See also 3.8.4 of this Chapter.

N12. 9 GHz radar – for ships 3000 GT and above, an additional independent radar together with a change-over switch is to be provided. See 3.8.5(b) of this Chapter.

N13. Automatic traffic surveillance system including ARPA. See 3.8.6 of this Chapter – for **NIBS** notation. See 5.8.3 of this Part.

N14. Position fixing equipment/system including automatic visual position indicator – two types of receivers are to be provided. One of the systems is to be GPS or equivalent, and the other: Decca, Loran-C, GLONASS, or other means. See 3.8.7 of this Chapter.

N15. Officer of the watch check alertness acknowledgment device (BNWAS)

N16. Back-up navigator call alarm device – two-way communication wireless portable device to be provided. See 3.8.8.(b) (iii) of this Chapter.

N17. Facilities for use of navigation charts – this may be separated from the navigation and traffic surveillance/maneuvering workstation.

N18. Ship's automatic identification system (AIS). See 3.8.10 of this Chapter.

N19. Propulsion engines/thrusters controls including emergency stops – the requirements of PART VIII of the Rules is to be met.

N20. Propulsion engine revolution – if reduction geared engine.

N21. Propeller revolutions indicator.

N22. Wind direction and velocity indicator.

N23. Air and water temperature indicator.

N24. Telephone system. See 3.10 of this Chapter.

N25. Radio communication equipment. See 3.11 of this Chapter.

N26. NAVTEX automatic receiver and recorder – for navigational and meteorological warning purpose. To comply with IMO Res. A.617(15).

N27. Signal transmitter for:

(1) whistle

(2) automatic device for fog signal

(3) general alarm

(4) Morse signaling light

N28. Search light controls – e.g., searchlight on/off switch.

N29. Controls for windscreen wiper, washer, heater

N30. Night vision equipment – portable night vision binoculars are acceptable.

N31. Sound reception system – if required, See 2.7.3 of this Part.

N32. Workstation lighting control device

N33. HVAC (Heating Ventilating and Air Conditioning) controls

N34. Clock

N35. Group alarms and reset controls, See also 3.2.2(b) M17 of this Chapter.

3.2.2 Workstation for monitoring (See Note 1)

(a) Main functions to be performed:

(i) Observation of all ships and objects

(ii) Recognizing dangerous situations

(iii) Handling own internal communication on board

(iv) Handling communication ship/ ship, and ship/shore

(v) Perception of group alarms with aids for decision-making

(vi) Releasing alarms

(vii) Observation of weather and seaway

(viii) Acknowledging watch check alertness alarm

(ix) Keeping deck log

(x) When workstation is occupied by an additional navigator, provides assistance to navigator at the navigation and traffic surveillance/maneuvering workstation.

(xi) When workstation is occupied by a pilot, advises to ship's command.

(b) Equipment (See Note 3)

M1. Gyro compass heading indicator – For **NIBS** notation, two independent gyro compasses are to be provided on the bridge (See 5.8.1 of this Part). See Note 2.

M2. Rudder angle indicator

M3. Pitch indicator – for controllable-pitch propeller

M4. Rate-of-turn indicator

For ships 50,000 GT or greater. See 3.8.2(d) and 3.8.2(e) of this Chapter.

M5. Speed and distance indicator – For **NIBS** notation, the speed measuring system is to be independent of the Position fixing systems. See 5.8.2 of this Part.

M6. Depth water indicators, See also 3.8.4 of this Chapter.

M7. Radar – For ships 3,000 GT and above, an additional independent radar together with a change-over switch is to be provided. See 3.8.5(b) of this Chapter.

M8. Officer of the watch check alertness acknowledgment device

M9. Propulsion engines/thrusters emergency stops

M10. Propeller revolutions indicator

M11. Telephone system, See 3.10 of this Chapter.

M12. Radio communication equipment, See 3.11 of this Chapter.

M13. Signal transmitter for whistle

M14. Controls for windscreen wiper, washer, heater

M15. Workstation lighting control device

M16. Clock

M17. Required alarms and reset controls

In addition to the alarms/indicators which may be required by the various IMO Resolutions referenced in this Part and the Administration, the following conditions are to be alarmed at the monitoring workstation:

(1) Off-heading

(2) Off-track

(3) Planned route deviation

(4) Pre-warning of approach-waypoint, and closest point of approach

(5) Off-preset water depth

(6) Gyro compass failure

(7) Failure of alarms prescribed in 3.8.8 (a) of this Chapter

(8) Failure of power supply to distribution panel serving relevant equipment

(Alarming of the above conditions at the monitoring workstation is not a substitute for alarming at the required relevant workstations.)

3.2.3 Workstation for manual steering (See Note 1)

(a) Main functions to be performed:

(i) Steering ship according to rudder angle orders

(ii) Steering ship according to course instruction
(iii) Steering ship following landmark/ sea marks
(iv) Acknowledging watch check-alertness alarm

(b) Equipment (See Note 3)

S1. Gyro compass heading indicator (repeater) – For **NIBS** notation, two independent gyro compasses are to be provided on the bridge (See 5.8.1 of this Part). See Note 2.
S2. Magnetic compass heading indicator
S3. Course reminder (set course) indicator
S4. Manual steering with override and selector control switches including steering wheel/steering lever
S5. Rudder angle indicator
S6. Rate-of-turn indicator – for ships 50,000 GT or greater
S7. Watch check-alertness acknowledgment device
S8. Telephone system, See 3.10 of this Chapter.
S9. Controls for windscreen wiper, washer, heater

3.2.4 Additional navigational equipment on docking workstation for **NSLESD** notation

(a) Main functions to be performed:

(i) Giving instructions, performing and controlling change of course
(ii) Giving instructions, performing and controlling change of speed
(iii) Giving instructions, performing and controlling change of thruster
(iv) Handling communication with maneuvering stations
(v) Handling communication with tugs, pilot boat
(vi) Watching water surface along ship's side
(vii) Releasing signals
(viii) Acknowledging watch check-alertness alarm

(b) Equipment (See Note 3)

D1. Gyro compass heading indicator – For **NIBS** notation, two independent gyro compasses are to be provided on the bridge (See 5.8.1 of this Part). See Note 2.
D2. Steering position selector switch
D3. Rudder controls
D4. Rudder angle indicator
D5. Pitch indicator – For controllable-pitch propeller
D6. Rate-of-turn indicator – for ships 50,000 GT or greater
D7. Propulsion engines/thrusters controls
D8. Propulsion engine revolution – if reduction geared engine
D9. Propeller revolutions indicator
D10. Lateral thrust and lateral movement of ship, indicator – if thrusters are fitted
D11. Longitudinal movement of ship, indicator
D12. Wind direction and velocity indicator
D13. Depth water indicators, See also 3.8.4 of this Chapter.
D14. Officer of the watch check-alertness acknowledgment device
D15. Whistle controls
D16. Search light and Morse lamp controls
D17. Telephone system, See 3.10 of this Chapter.

D18. Radio communication equipment, See 3.11 of this Chapter.

D19. Workstation lighting control device

Notes:

1. As the navigation and traffic surveillance/maneuvering, monitoring and manual steering workstations are functionally interrelated and usually installed in close proximity from each other, considerations will be given to the omission of duplicate required equipment at each of the aforementioned workstations.
2. Master gyrocompass may be located in the electrical/instrumentation room and the gyrocompass repeaters on the bridge to meet this requirement.
3. N – Navigation and traffic surveillance/maneuvering; M – Monitoring; S – Manual Steering; D – Docking Workstation.

## 3.3 Documentation, Type Approval and Performance Standards of Navigational Equipment

### 3.3.1 Documentation

The manufacturer or assembler of the relevant navigational equipment required in this Part is to provide documented evidence indicating that the equipment meets the criteria specified in 3.3.2 and 3.3.3 below.

### 3.3.2 Type-approved equipment

Navigational equipment is to be type approved to the satisfaction of the Administration in conformity with appropriate performance standards specified in respective IMO Resolutions and Circulars.

### 3.3.3 IMO's performance standards

In general, relevant navigational equipment is to comply with IMO Res. A.694(17) and those found in 3.8 of this Chapter and Chapter 5 of this Part.

## 3.4 Manual Mode of Operation

Navigational systems intended for automatic operation are to be fitted with manual mode provision to enable the officer of the watch to take the appropriate action in the event of failure of the automatic system. For automatic systems for which this is not possible, an alternative system is to be provided as specified in 3.8 of this Chapter.

## 3.5 Alarm Systems

### 3.5.1 Characteristics

Alarm systems are to be of the self-monitoring type and designed so that a fault in the alarm system is to cause it to fail to the alarmed condition. Additionally, they are not to react to normal transient conditions or spurious signals. Alarms are to be both audible and visual and are to flash when first activated.

### 3.5.2 Audible alarm circuits

A fault in the visual alarm circuits is not to affect the operation of the audible alarm circuits.

3.5.3 Acknowledgment

Alarms are to be acknowledged by manually changing the flashing display of the incoming alarm to a steady display and by silencing the audible signal; the steady state light display is to remain activated until the fault condition is rectified. Alarming of other faults that may occur during the acknowledgment process is not to be suppressed by such action and is to be alarmed and displayed accordingly.

3.5.4 Disconnection and resumption of functions

Alarm circuits may be temporarily disabled for maintenance purposes or during initial start-up of machinery provided that such action is clearly indicated to the officer of the watch. However, such alarm is to be automatically re-activated after a preset time period has elapsed.

3.5.5 Built-in testing

Alarm systems are to be provided with effective means for testing all audible and visual alarms and indicating lamps without disrupting the normal equipment or system operation.

## 3.6 Computerized Equipment

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

## 3.7 Power Supply

3.7.1 Sources

Electrically operated systems and equipment covered in Chapters 3 and 5 of this Part are to be connected to distribution panels placed in an accessible position on, or adjacent to but at the same level of the bridge; each item of equipment is to be individually connected to its distribution panel. 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 power. The power supplies to the distribution panels are to be arranged with automatic changeover facilities between the two sources.

3.7.2 Emergency service

The ship's emergency source of power is to be of sufficient capacity to supply the navigational related loads required in this Part, in addition to other electrical loads as required in 11.3 and 11.4 of Part VII of the Rules.

3.7.3 Loss of power

Following a loss of power which has lasted for 45 seconds or less, navigational equipment/systems essential for the performance of primary bridge navigational functions (those are: gyro compass, radar, position-fixing system and electronic chart system) are to be automatically reinstated to their pre-powerloss configuration upon recovery from blackout, and all others are to be readily reinstated within five minutes, with minimum operator intervention, by virtue of the emergency source of power and, where necessary, by an uninterruptible power source. Loss of power to the distribution panels is to activate an alarm.

## 3.8 Navigational Systems

In general, navigational equipment/systems installed onboard ships are to be so arranged that failure of one piece of navigational equipment will not reduce the ship’s ability to perform the functions specified in 3.8.1 through 3.8.9 below.

3.8.1 Heading Information System

The ship is to be provided with continuous heading information at the appropriate workstations and at the main steering position. To this end, a magnetic compass and a gyro compass having the capability to determine the ship's heading in relation to the geographic (true) North are to be provided. The magnetic compass and the gyro compass are to comply

with IMO's Res. A.382(X) and IMO's Res. A.424(XI) respectively. In addition, a pelorus or compass bearing repeater, or other means to take bearings over an arc of the horizon of 360 degrees, and a gyro compass heading repeater is to be provided. The following is to be complied with:

(a) In order to ensure the availability of heading information, the ship is to be fitted with an independent gyro compass.

(b) Means for taking optical bearings is to be made available onboard the ship.

(c) Means are to be provided for correction of errors induced by speed and latitude.

(d) When the position of the ship cannot be received, the heading of the ship is to be maintained and such condition is to be alarmed.

3.8.2 Steering system

Means for manual and automatic steering of the ship are to be provided. The steering system is to comply with the following:

(a) The automatic pilot with an on/off indicator is to comply with IMO Res. A.342(IX), as amended by Annex 3 to MSC.64(67).

(b) The automatic pilot equipment is to be monitored by an off-heading alarm, which is to activate, when the actual heading deviates from a pre-set heading beyond a preset limit, in the wheelhouse. This alarm is to be derived from a system independent from the automatic steering system. The off-heading alarm is not to be released when setting a new course reference.

The off-heading alarm may receive input from the gyro compass, provided the compass is independent of the automatic steering gear. The magnetic compass may be used as a signal input, provided that same is used as a back-up to the gyro compass.

A heading control system is to work together with a track control system, adjusting its heading for drift. The heading control system is to comply with IMO Res. MSC.64(67), Annex 3 and the track control system is to comply with IMO Res. MSC.74(69), Annex 2.

(c) An overriding control device is to be provided at the navigation and traffic surveillance/maneuvering workstation. The override control is to enable instant take-over from the autopilot as well as from the manual steering station.

(d) For ships of 50,000 GT and above, a rate of turn indicator is to be provided. The rate-of-turn indicator is to comply with IMO Res. A.526(13).

(e) For ships of 50,000 GT and above, a track controller, or other means to automatically perform turns with a preset radius or rate of turn is to be provided.

3.8.3 Speed measuring system

The ship is to be fitted with the means for measuring speed and distance through the water. Ships above 50,000 GT are also to be capable of measuring speed in the forward, and athwartship directions. The speed log is to comply with IMO Res.MSC.96 (72), Annex14 as amended by IMO Res.334(90).

3.8.4 Depth measuring system

The ship is to be fitted with an echo sounder or equivalent for measuring the water depth under the keel. An alarm is to be initiated when the water depth beneath the ship is less than the predetermined value.The echo sounder is to comply with IMO Res. MSC.74(69), Annex 4.

3.8.5 Radar system

A 9 GHz radar or other means is to be provided in order to determine and display the range and bearing of search and rescue transponders and of other surface craft, obstructions, buoys, shorelines and navigational marks to assist in navigation and in collision avoidance. The radar installation is to comply with IMO Res.A.477(XII) as amended by Annex 4 to MSC.64(67) and the following:

(a) All ships less than 150 gross tonnage, a radar reflector or other means is to be provided so that the ship can be detected by another ship navigating by radar at both 9 and 3 GHZ (see SOLAS V/19.2.1.7). The radar reflector is to comply with IMO Res. 164(78).

(b) For ships 3,000 GT and above, a second radar, independent of the 9 GHz radar, is to be provided. Additionally, a change-over switch between these radar together with the means to bypass the switch is to be provided.

3.8.6 Automatic traffic surveillance system

The ship is to be fitted with an automatic traffic surveillance system to plot automatically the range and bearing of other ship's ability to determine collision risk. This traffic surveillance system is to comply with IMO Res.A.823(19). The ARPA function may be independent or built into the radar equipment. The following is also to be complied with:

(a) The system is to be based on the assumption that all floating objects may come into a collision course with own ship if the object's course is changed by 45° with its speed maintained. An alarm is to be given to the navigator at a time which is to be adjustable in the range of 6 to 30 minutes, having regard to the danger, time to closest point of approach (TCPA). The system as a whole is to feature the following capability:

(i) true motion and relative motion modes,

(ii) daylight-visible display,

(iii) guard zone system, featuring adjustable parameters, notably alarm set for CPA and TCPA,

(iv) simulator function showing the likely effects of a course or speed change in relation to tracked targets, and

(v) incorporated self-checking properties.

(b) For ships 3,000 GT and above, automatic acquisition and tracking of 20 radar targets and means to simulate a trial maneuver is to be provided. Additionally, a heading or track controller or other means to automatically control and keep to a heading and/or track is to be provided.

(c) For ships 10,000 GT and above, means to automatically control and keep the ship in a straight track is to be provided.

3.8.7 Position fixing system

The ship is to be fitted with at least two types of automatic position fixing systems for the waters she is to navigate. These systems are to be capable of automatically and continually determining and displaying the ship's position. One of the systems is to be GPS or equivalent, and the other a Decca, LORAN-C, GLONASS, or other means. The positioning equipment/system is to comply with IMO Res. A.819(19) and the following:

(a) Means for manually inputting required data in case of sensor failure, and the means to indicate the system's mode of operation i.e., manual or automatic, are to be provided.

(b) A means to self-test the major functions of the system is to be provided.

(c) Decca receivers are to comply with IMO Res. A.816(19); Loran-C receivers are to comply with IMO Res. A.818(19); GLONASS receivers are to comply with IMO Res. MSC.113(73), Annex 26.

3.8.8 Bridge Navigational Watch Alarm System (BNWAS)

Means to monitor the alertness of the officer of the watch and alarm other bridge personnel if disability occurs is to be provided. The BNWASs are to comply with IMO Res. 128(75). Additionally, conditions of danger to navigation caused by traffic or improper course-keeping in relation to planned route are to be monitored and such adverse conditions are to be alarmed at the bridge and at the locations specified herein.

(a) Officer of the watch alertness-check system

(i) General: A system is to be provided to monitor the alertness of the officer of the watch present on the bridge. This system is not to cause undue interference with the performance of bridge functions and it is to be designed and arranged that it cannot be operated in a unauthorized manner (i.e. bypassed). The system is to be connected to the alarm transfer system described in 3.8.8(b) below.

(ii) Periodic verification: The system used for periodic verification of the watch alertness system is to be adjustable up to 12 minute intervals, and it is to be arranged so that only the ship's master has access for enabling and disabling it (i.e., removing the fuses or keeping the acknowledgment button permanently depressed) and for setting the appropriate intervals for a periodic verification.

(iii) Acknowledgment of alertness-check alarm: The system is to provide for the acknowledgment by the officer of the watch at the navigation and traffic surveillance/maneuvering workstation and at the monitoring workstation.

(iv) System failure alarm: An alarm is to operate on the bridge and at the spaces described in 3.8.8(b)(ii) of this Chapter, in the event of a failure of the alertness-check alarm system.

(b) Alarm transfer system

(i) General: A fixed alarm transfer system is to be provided and connected to all ship navigating officers' cabins and public rooms.

(ii) Transfer of alarms: Alarms of 3.2.2(b) M17 (1) to (8) are to be automatically transferred to the master's cabin if not acknowledged at the bridge within 30 seconds. Additionally, a selector switch is to be provided in the event the master deems it necessary to also transfer the aforementioned alarms to the selected back-up navigator's cabins and public rooms.

(iii) Back-up navigator call-alarm: Provisions are to be made at the bridge to activate the back-up navigator call-alarm. This alarm is to be audible in all the spaces described in 3.8.8(b)(ii). The fixed installation required under 3.8.8(b)(i) may serve this purpose.

(iv) Portable communication device: A wireless portable device allowing two-way communication with the officer of the watch is to be provided for use by the back-up navigator when attending locations not connected to the fixed installation.

3.8.9 Route Planning

The ship is to carry official charts sufficient to enable route planning and monitoring for the intended voyage.

An Electronic Chart Display and Information System (ECDIS) is also accepted as meeting the chart carriage requirement. The ECDIS is to comply with IMO Res. MSC.232(82). Ships engaged on international voyages are to comply with carriage requirements for ECDIS as specified in SOLAS V/ Reg.19 Para 2.10.

However, where the charting function is partially or fully effected via electronic charts, a back-up means is to be provided. In addition, an alarm is to be given in case of deviation from the planned route, which is to be adjustable having regard to the time to danger of grounding.

3.8.10 Ship's automatic identification system

A ship's automatic identification system (AIS) is to be fitted onboard the ship to provide automatically to appropriately fitted shore stations, other ships and aircraft, needed navigational related information such as ship's identity, type, position, course, speed, navigational status, etc., and other safety related information, and to automatically receive such

information from similarly fitted ships and to monitor and track ships and to exchange data with shore based facilities. The automatic identification system (AIS) is to comply with IMO Res. MSC.74 (69), Annex 3.

## 3.9 Propulsion Engine/Thruster Controls

Means for controlling the propulsion engines/thrusters are to be provided at the wheelhouse and they are to be in compliance with the requirements of Part VIII of the Rules.

## 3.10 Telephone System

The ship is to be fitted with an automatic telephone system, which is to comply with the following. In addition, a backup telephone system (e.g., sound powered telephone, etc.) that can operate independently of the power supply from the ship's main or emergency system is to be installed.

3.10.1 Both automatic and backup telephone systems are to enable two-way communication between the bridge and:

(a) Navigating officer's cabins and public rooms (Only an automatic telephone system is required)

(b) Captain's and chief engineer's accommodations

(c) Radio room (when located outside the bridge area)

(d) Steering gear compartment

(e) Local control position of propulsion machinery / thruster

(f) Engine control room

(g) Fire control station

(h) Cargo control room, if provided

(i) Emergency generator room

3.10.2 The automatic telephone network is to be designed to carry at least 4 simultaneous calls.

3.10.3 The automatic telephones on the bridge and propulsion machinery control room are to have priority function over any other extension. A list of all relevant telephone extensions is to be permanently posted and clearly displayed adjacent to each telephone.

3.10.4 The backup telephone system is to be independent of the automatic telephone system and both telephone systems are not to be affected by a failure of either system.

## 3.11 Nautical Radio Communication System

The ship is to be fitted with means for nautical radio communication with other ships as well as means for communication with tugboats and mooring stations aboard and ashore.

## 3.12 Workstations - Required Equipment

As a minimum, in addition to alarms/indicators invoked in the various IMO Resolutions referenced in this Part, the equipment listed in 3.2.1, 3.2.2 and 3.2.3 of this Chapter is to be fitted at the various workstations to enable the officer of the watch and other operators to carry out the required tasks.

## 3.13 Operation/Technical Manual

An operation/technical manual which is consistent with the information and criteria upon which the notations **NSLES** and **NSLESD** are based is to be placed onboard the ship for the guidance of the operating personnel. The operation/technical manual is to give clear guidance to the ship's personnel about the ship's capability, limitation and procedures to follow when navigating the ship with the required manning on the bridge. The operating/technical manual is to include the following, as a minimum.

3.13.1 Ship's name and Ship ID number.

3.13.2 Simplified diagrams of the systems described in 3.7 through 3.11 of this Chapter.

3.13.3 Ship's navigating and maneuvering capabilities (i.e., particulars of propulsion machinery and steering system, ship's speed, ship's stopping ability, ship's turning ability, etc.).

3.13.4 Navigational procedures including transfer of alarms to the back-up navigator, and details of the routines, duties and responsibilities of each of the relevant personnel associated with the bridge operation of the ship.

3.13.5 Periodical testing procedures for relevant navigational equipment/systems.

The operating/technical manual is to be submitted to the Society for review solely to ensure the presence of the above information which is to be consistent with the ship's design information and navigational capabilities. The operation of the ship is not a condition of the assigned class notations.

Any modifications made to the approved bridge layout, field of views and navigational equipment/systems are to be approved by the Society. The operating/technical manual is to be updated accordingly, and submitted to the Society for review.

## 3.14 Tests and Sea Trials

During sea trials, navigational equipment and systems are to be tested to the satisfaction of the attending Surveyor in accordance with a test program. The test program is to include the following test details:

3.14.1 Applicable to all relevant navigational equipment

(a) Prior to testing, all relevant navigational equipment/systems are to be satisfactorily checked, calibrated and operated by the representative of the manufacturer or the equipment supplier who is to issue an affidavit to such effect for the review of the attending Surveyor.

(b) Automatic resumption of primary bridge navigational equipment/systems functions are to be demonstrated following a blackout simulation of a period of 45 seconds. Similarly, resumption of all other relevant non-primary bridge navigational equipment/systems functions are to be satisfactorily effected following a blackout simulation period of 5 minutes. See 3.7.3 of this Chapter.

3.14.2 Specific equipment or system

Test details for the following equipment or systems:

(a) Course information system

(b) Automatic steering system

(c) Speed measuring system

(d) Depth measuring system

(e) Radar system

(f) Automatic traffic surveillance system

(g) Position-fixing system

(h) Bridge Navigational Watch Alarm System

(i) Route planning system

(j) Ship's automatic identification system

(k) Telephone System

(l) Sound reception in bridge, if fitted

(m) Radio communication system

*Chapter 4 has been added as follows:*

# Chapter 4
# Requirements for Notation NSLES (COS) (Navigational Safety Layout and Equipment/Systems for Coastal and Offshore Services

## 4.1 General

Ship complying with the Chapter 1 through 4 of this Part, will be assigned the Notation **NSLES (COS)** (Navigational Safety Layout and Equipment/Systems for Coastal and Offshore Services).

### 4.1.1 Objective

This notation improves and optimizes the work environment within the bridge area to assist the bridge Officer of the Watch (OOW)/ Navigator/ Captain/ Pilot to more easily navigate the ship in coastal and restricted waters reducing the chances of potential risk of collision, grounding or weather damage.

## 4.2 Plans and Data for Approval and/or Information

Plans and data as listed in 1.5.4 of this Part are to be submitted for approval and/or information.

### 4.2.1 Documentation and standards for navigational equipment

The manufacturer or assembler of the relevant navigational equipment is to provide documented evidence indicating that the equipment meets the criteria specified in 3.3.2 and 3.3.3 of this Part.

## 4.3 Navigation Bridge Design and Layout

This section outlines various requirements for the navigation bridge and wheelhouse design, including field of vision, blind sectors, bridge windows, bridge configurations, wheelhouse arrangement, workstation configuration and location of equipment within workstations.

### 4.3.1 Visibility from bridge

These requirements apply to ships where visibility procedures are to be established as prescribed in the Convention on the International Regulations for Preventing Collisions at Sea, as amended (1972, Rules 5, 6, 7 and 8.) with respect to maintaining safe speed, posting of lookouts and watches and use of sound signals and collision avoidance using radar and plotting devices.

(a) Field of view around ship

It is to be possible to observe all objects necessary for navigation, such as ships and lighthouses, in any direction from inside the bridge. There is to be a 360° field of view for an observer moving within the bridge. See Fig. XIII 4-1.

If the ship is unable to satisfy the requirements of a 360° field of view around the ship for an observer moving within the wheelhouse an alternative equivalent means may be acceptable such as cameras covering any obstructed views or blind sectors. Alternatively, other technologies such as sensors may also be considered provided they are shown to be equally effective.

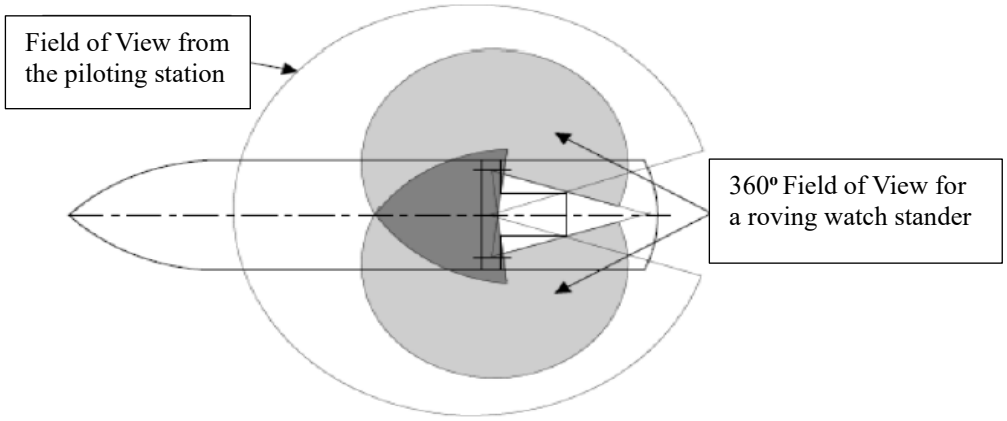



**Fig. XIII 4-1**
**Field of View Around Ship**

(b) Navigating and maneuvering workstation field of view – vertical view

Above the horizontal plane, a vertical angle of view of not less than 5° above a horizontal line, extending from height of eye of 1,800 mm in forward direction, is to be provided irrespective of any special equipment, helicopter decks or other obstructions outside of the wheelhouse.

Below the horizontal plane, any elevated structure/equipment or cargo obstructing the sea surface close to the ship in excess of 1,000 m within the 180º sector forward of the athwart ship is to be considered as a blind sector and necessary calculations are to be conducted based on a height of eye of 1,800 mm.

Note：

If the Administration satisfied that a 1,800 mm height of eye is unreasonable and impractical, it may be reduced, but not to less than 1,600 mm. Refer to regulation 22 of Chapter V (Safety of navigation) of 1974 SOLAS.

(c) Navigating and maneuvering workstation field of view – obstruction of sea surface

While standing at the workstation in the conning position during navigation and maneuvering of the ship, a person is to be able to observe all objects, the shoreline and water surface to a distance at least 500 m from the hull within the sectors from 10º on either side of the bow to 90° on both sides, under all conditions of draught, trim and with deck cargo. See Fig. XIII 4-2.

If the ship is unable to satisfy the above requirements, an alternative means may be acceptable such as camera covering any obstructed views or blind sectors.

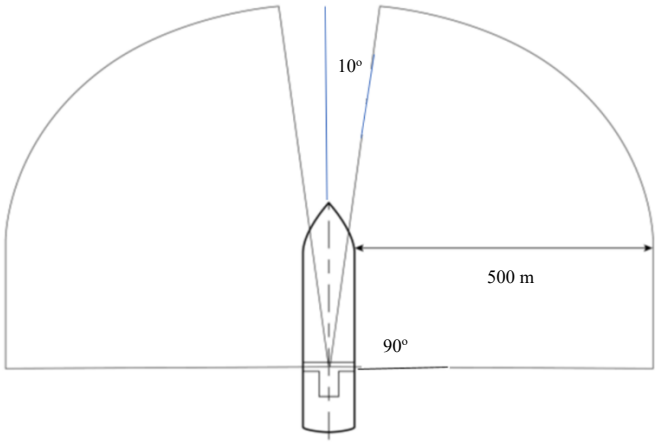



**Fig. XIII 4-2**
**Vision of Sea Surface**

(d) Navigating and maneuvering workstation field of view – horizontal view astern

Leading lights and markers are to be provided for visual reference at the stern of the ship while navigating and maneuvering from the workstation to help to avoid grounding and provides a view the sea surface in close vicinity of the ship stern. A horizontal field of vision of the ship stern is to extend over an arc from right astern to at least 5° on each side. No blind sectors are to occur within this 10° field of vision sector.

(e) Navigating and maneuvering workstation field of view – vertical view astern

The lower edge of the navigation bridge aft windows is to be kept as close to the bridge deck as practical so the vertical view through the window from the workstation during navigating and maneuvering enables a view of the sea surface in all conditions at a distance not more than 2,000 m abaft the stern.

The upper edge of the navigation bridge aft windows is to be kept as close to the overhead deck as practical, and the upper edge of the window(s) is not to be less than 2,000 mm above bridge deck surface.

The maximum height from deck to the lower edge of the window(s) is to be 1,000 mm or at the least the lower part of the window is to allow a clear view of the sea surfaces aft of the ship while viewing from the navigating and maneuvering workstation. Only the superstructure or deck may be concealed when viewed from normal operating position at this workstation.

(f) Navigating and maneuvering workstation field of view – vertical view from the docking workstation

During ship maneuvering, while standing at a docking workstation (e.g. console from the bridge wing), the navigator is to be capable to observe the parallel ship's side, both forward and aft of the ship (height of eye 1,600 mm). The total length of the visibility of the ship's side is to be not less than $L_{OA}/2$ of the ship. See Fig. XIII 4-3.

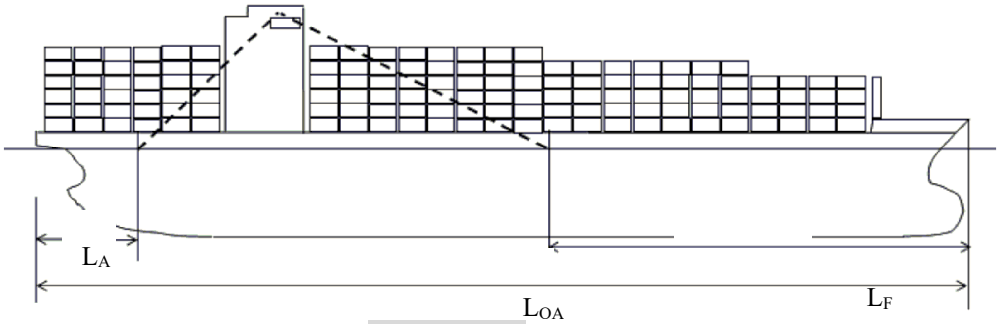



**Fig. XIII 4-3**
**View from Docking Station ($L_A$+$L_F$) ≥ 1/2 $L_{OA}$**

(g) Navigating and maneuvering workstation field of view – main steering position

From the main steering position (i.e., workstation for manual steering) the horizontal field of view is to extend over an arc from direct forward to at least 60° on each side of the ship. See Fig. XIII 4-4.

The helmsman is to be able to observe the vertical steering references in the fore ship while maneuvering the ship from the main working position.

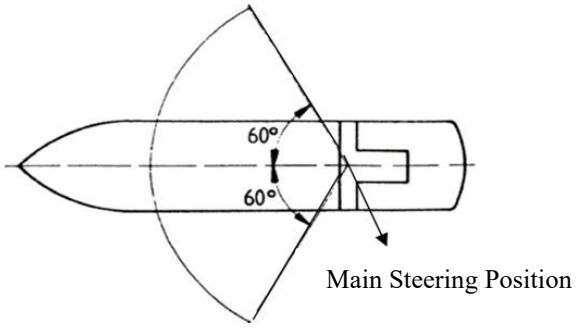



**Fig. XIII 4-4**
**Horizontal Field of View from Main Steering Position**

(h) Navigating and maneuvering workstation field of view – GMDSS and additional functions

Workstations used for carrying out various functions such as safety monitoring, GMDSS (Global Maritime Distress and Safety System) and other bridge functions e.g. chart table/voyage planning, communication etc. are to have horizontal field of vision extending a 90° arc on port bow covering through forward to 22.5° abaft the starboard beam. See Fig. XIII 4-5.

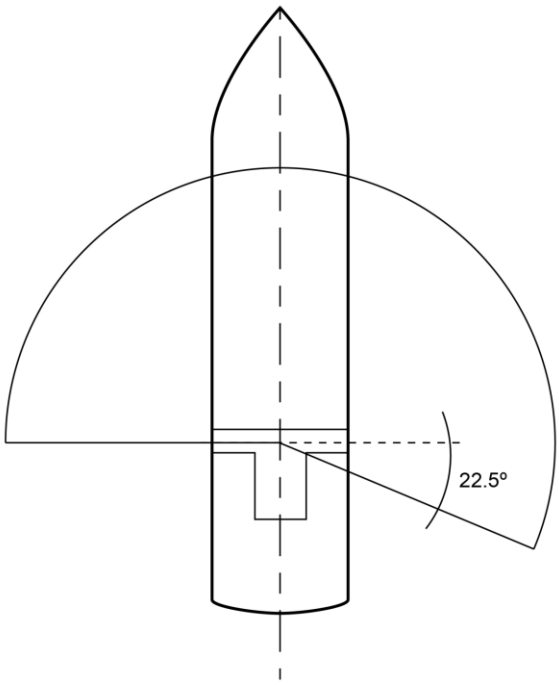



**Fig. XIII 4-5**
**Horizontal Field of Vision from GMDSS Workstation and Additional Workstations**

(I) Navigating and maneuvering workstation field of view – blind sectors

(i) If needed, the blind sectors from the front bulkhead and bridge wings bulwark are to be reduced to maintain the required field of vision while monitoring, navigating and maneuvering the ship from different workstations.

(ii) The obstruction of the view of the sea surface from the GMDSS (Global Maritime Distress and Safety System) workstations and additional bridge functions caused by each individual blind sector are not to exceed 10°.

4.3.2 Bridge windows

Following are the detailed design requirements for the bridge windows in addition to those given in 2.3.1(a) of this Part.

(a) Height of lower edge of front windows

The height of the lower edge of the front windows is to allow a forward view over the bow, from which a person seated at the workstations to monitor, navigate, and maneuver by maintaining the line of sight. In no case, the lower window edge is to present an obstruction from the forward to 90° on each side view. The height of the lower edge of front windows above the deck are to be kept as low as possible and it is to be kept not more than 1,000 mm above the deck.

For arrangements where the navigator is normally positioned further back from the bridge-front bulkhead, the same eye height is to be used to determine the height of the lower edge of the front windows.

(b) Breadth of the windows

The width of the bridge windows is to be kept as wide as practicable to maintain an unimpeded view at all times. A minimum width of 1,200 mm within the field of vision is to be maintained from the workstations.

In exception, the width of a window may be less than 1,200 mm only where necessary to avoid obstructions from the field of vision of workstations caused by the divisions/stiffeners of windows.

(c) Windows of enclosed bridge wings

A ship with enclosed bridge wings may be provided either

(i) Vertical side windows where one side window can be opened to view the ship's side at the water surface level provided there is no other window providing a downward view in the deck or

(ii) Inclined side windows where the bridge wing deck does not extend to the full width of the ship.

Alternative solutions may be accepted subject to the Society approval, including installation of a camera system (with backup system) covering an adequate area.

(d) Window Framing

Divisions/frames between windows are to be kept to a minimum. No frames, including the centerline, are to be installed immediately forward of any workstation. The frames between front windows are not to exceed 150 mm in width. If stiffeners between windows are to be covered, coverings are not to cause further obstructions of the field of view from any position inside the wheelhouse. If stiffeners are used, frames are not to exceed 100 mm in width and 120 mm in depth. Horizontally sliding windows are not to be used.

(e) Windows with clear view arrangements

At all times, regardless of the weather conditions, all front windows in the navigation bridge are to be provided with a clear view to maintain a clear field of vision for monitoring, navigating, and maneuvering the ship. The following systems or components or equivalent are to be provided:

(i) Sunscreens with minimum color distortion; sunscreens are to be readily removable and not permanently installed.

(ii) Heavy-duty wipers, preferably provided with an interval function, and freshwater wash systems. Wipers are to be capable of operating independently of each other.

(iii) De-icing and de-misting systems on all applicable windows.

(iv) A fixed catwalk with guardrails fitted in front of bridge windows for manual cleaning of windows in the event of failure of the above systems.

(v) Where heated glass panels are installed in bridge windows, they are to be in accordance with ISO 3434.

(f) Enclosed bridge wing windows with clear view arrangements

Heavy-duty wipers with freshwater wash systems are to be provided in the front and rear windows to maintain a clear field of vision from the workstations during navigation, maneuvering and docking.

Similar wipers may be installed on the side windows (fixed type) located at the bridge wings. All wipers are to be capable of operating independently of each other.

4.3.3 Bridge design and configuration

(a) Bridge wing

(i) The height of the bridge wing bulwark is not to exceed 1,000 mm to reduce the blind sectors for a clear field of vision from the workstations. A handrail of not less than 1,200 mm height is to be fitted on top of the bulwark where the opening between bulwark and handrail is not less than 120 mm.

(ii) Where wind deflectors are fitted at the front side of bridge wing, the length of the deflector is not to obstruct an arc of more than 10º as seen from the operating position of workstations.

(b) Clear heights of ceiling and entrances

(i) The bridge ceiling clearance height between the bridge deck surface covering and the underside of the deck head beams is to be at least 2.25 m. The lower edge of deckhead mounted equipment is to be at least 2.1 m above the deck in open areas, passageways and at standing workstations.

(ii) The height of entrances and doors to the wheelhouse from adjacent passageways is not to be less than 2.0 m.

(c) Doors and other accesses

(i) All wheelhouse doors are to be operable with one hand. Bridge wing doors are not to be self-closing. Means are to be provided to hold the bridge wing doors open.

(ii) Ship having enclosed bridge wings are required to have at least one direct access route from the adjacent bridge deck area.

(iii) Convenient access from the bridge deck to the compass deck is to be provided from the vicinity of the wheelhouse.

(d) Visibility of area in front of bridge

The navigator is to be able to view the area immediately in front of the bridge superstructure from the wheelhouse. There is to be a close approach access to at least one front window. If this requirement is met by combining "an adequate conning position" (See 2.3.2(b) of this Part), a second close approach access, besides the access to the position described above, is to be provided, or the width of the total access is to be sufficient to accommodate two persons.

This defined position is not to affect the view of the helmsman to right ahead, as the helm is normally positioned on the centerline.

4.3.4 Bridge arrangement and workstation configuration

(a) General

(i) The design of navigational equipment is to be based on sound ergonomic principles. Construction is to be of robust, durable, and flame-retardant material incorporating the required degree of enclosure protection (Refer to Table VII 1-2 of Chapter 1 of Part VII of the Rules). Replaceable components for navigational equipment are to be designed and arranged so that it will not be possible to connect them incorrectly or install incorrect replacements.

(ii) Alarms, displays and control devices are to be arranged in a functional and logical manner to allow the operator an easy and clear means of identification of each of the components or systems included therein. The color schemes of system alarms, displays, and devices are to be in accordance with international standards. Precautions are to be taken to prevent the inadvertent operation of controls that may lead to critical situations. Care is to be taken in the identification and location of switches, activation controls, and handles, the use of recessed or covered switches and controls, and arrangement for sequential operation.

(iii) The layout of the bridge, including location and layout of the individual workstations is to be such that the field of view required for each function is available from the workstation. Fig. XIII 4-6, “Typical Bridge Arrangement " presents a typical bridge layout.

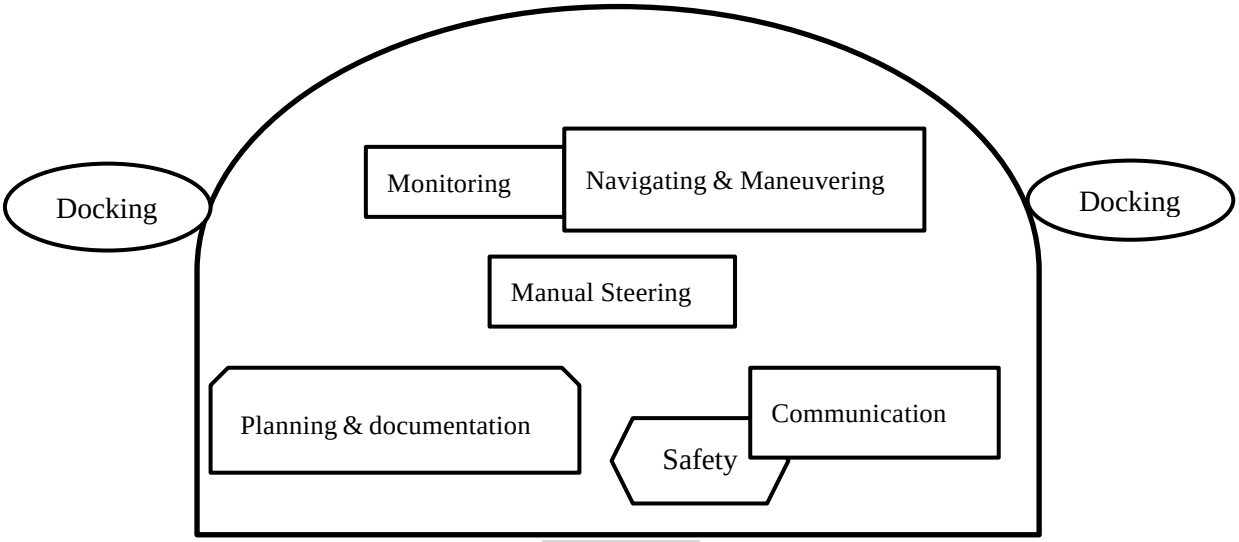



**Fig. XIII 4-6**
**Typical Bridge Arrangement**

(b) General requirements for workstations

General requirements for workstations are provided in 2.3.2(a) of this Part.

Workstations for navigation planning and/or safety may not be required upon approval by the Society on a case-by-case basis.

Alternative systems may be accepted on special purpose ship in lieu of the manual steering workstation where exceptional means of steering (e.g. multiple azipods or azimuthing thrusters) require a specific expertise for operation. The following requirements are to be complied with:

(i) A manual steering device is to be provided at the navigation and maneuvering workstation and at least one other workstation

(ii) The above steering devices are to be independent at two workstations and be able to be operated by personnel other than the bridge officer without interfering with other navigational equipment.

The design and details of the manual steering system are to be submitted to the Society for approval.

(c) Workstations with additional functions

(i) The workstations for additional functions may be installed on the bridge provided the functionality of these additional workstations does not interfere with the primary bridge functions e.g. navigating, maneuvering, monitoring, manual steering, voyage planning, and communication. The workstations for additional functions may include:

(1) dynamic positioning

(2) monitoring and control of machinery

(3) extended communication functions

(4) monitoring and control of ballasting and cargo operations

(5) monitoring and control of hull openings

(6) monitoring and control of domestic systems

(ii) The dimensions of the workstations for additional functionality are not to obstruct the required field of visions of the sea surface from the workstations for monitoring, navigating, and maneuvering for safe operation of the ship.

(iii) The primary function of the navigation bridge is to navigate, monitor, maneuver, communicate and provide other functions essential for the safe operation of the ship. Other workstations such as those for machinery, cargo operation, or hull opening are to be considered as effective and supportive integrated bridge resource management.

(iv) The requirements mentioned in above (ii) and (iii) may be exempted from any specific type of ship e.g. a dynamic positioned ship which has a dedicated workstation in the wheelhouse for an industrial mission. Such ships may have a congested bridge and cannot meet the requirements of distance, visibility etc. Alternative designs may be considered for special types of ship on a case by case basis upon submission to the Society.

(d) Passageways in the bridge wings

The following requirements are in addition to those given in 2.4.1, 2.4.3 and 2.4.4 of this Part:

The distance between bulwarks, bulkheads and consoles in the bridge wings are to be as small as possible but it is to be wide enough for one person to pass the console comfortably. The passageway width is preferably to be at least 600 mm.

Note:

The Panama Canal Commission (ACP) requires a minimum of 1 m clearance between any consoles and adjacent bulkheads/bulwarks. ACP has the authority to provide any relaxation upon request.

(e) Workstation configuration

(i) The console is to be designed so that from the normal working position, the total required left-to-right viewing angle is not to exceed 190°. This angle is to be reduced whenever possible through appropriate control-display layout.

(ii) The requirements of IMO Resolution A.694(17) is to be applied to design such equipment.

(iii) The workstation in the bridge from where the navigator is to maneuver the ship through water traffic by monitoring, navigating, and communicating based on the displayed course, speed, and position of the ship, is required to be located with optimum surrounding visibility whether the navigator is in a seated or standing position. All integrated information related to navigation, propulsion and other machinery systems is to be displayed and readily available at or near this location. In all situations, the navigator is to be able to maneuver and control the ship easily from this workstation.

(iv) The upper leg room of the console is to have a minimum of 450 mm in depth and the lower leg room a minimum of 600 mm in depth. Alternatively, the different dimensions of minimum depth requirements may be accepted in case by case basis based on the acceptable justifications and supporting documentation.

(v) The top of the consoles of workstation for navigating, monitoring, and maneuvering is not to exceed a height of 1,300 mm and in no case the height of the workstations is not to interfere with the navigating bridge window's view requirements as given in above paragraphs 4.3.2 (a) & (b).

(vi) The top of the consoles of workstations other than navigating, monitoring, and maneuvering which are intended to be operated by the bridge navigating officers is not to exceed 1,300 mm. If any of these workstations impede the horizontal field of vision of the navigating, monitoring, and maneuvering workstation then the console height is not to exceed 1,200 mm.

(vii) Chairs at workstations designed for a sitting position are to be adjustable in height and capable of being arrested on the floor, and capable of rotating with the footrest being arrested. Chairs are to be capable of being moved out of the operating area, if needed.

4.3.5 Provision of maneuvering information display

The ship's maneuvering characteristics and relevant information are to be tested, recorded, and displayed as per the Resolution A.601(15).

## 4.4 Bridge Equipment

The **NSLES (COS)** notation necessitates the equipment as specified in 3.2 of this Part. Some equipment needs to carry out additional functions and are required to comply with additional requirements. These requirements are provided below:

4.4.1 General

Basic bridge equipment:

(a) Computerized equipment

(b) Power supply

(c) Navigational system

(i) Propulsion Fixing System

(ii) Bridge Navigational Watch Alarm System

(iii) Route Planning

(iv) Ship's Automatic Identification System

(v) Propulsion Engine/Thruster Controls

(vi) Telephone System

(vii) Nautical Radio Communication

(d) Weather information system

(i) Sound Reception System

(ii) Public Address System

4.4.2 Requirements

The design and installation of the bridge equipment is to meet the following additional requirements:

(a) Computerized equipment

For installed automation systems and related computerized equipment, the ship is to comply with 3.6 of this Part and Chapter 3 of Part VIII of the Rules. The principal consideration in every case is that the crew has the systems, facilities, or functions necessary to satisfy ship navigation or piloting safety requirements, with fallback capabilities for the possible cases in which primary automation functions fail. In addition, the following requirements are applicable:

(i) Automated systems' False Alarm Rate (FAR) is to be kept as low as reasonably possible. Checks are to be performed for validity of the interface and input data, and for user clarity for safety, even in the presence of false alarms, and documented with the system.

(ii) Network connections and remote access to primary essential systems are to comply with the ship's Cybersecurity Risk Management System, if implemented, or in the ship's Safety Management System (SMS). Refer to CR - Guidelines on Cybersecurity Onboard Ships, in accordance with IMO Resolution MSC.428(98) and IMO MSC-FAL.1/Circ.3.

(iii) Software development life cycle is to be in compliance with Chapter 3 of Part VIII of the Rules and CR Guidelines on Cybersecurity Onboard Ships for internally developed, safety-critical software. A failure modes and effects (FMEA) is recommended for these systems, though not strictly necessary, to inform cybersecurity-related safety procedures in the SMS.

(iv) Software maintenance and updates are to be in compliance with Management of Change (MoC) procedures in a Software Development Life Cycle (SDLC).

(b) Power supply

The ship is to be fitted with means for electrical power supply in accordnace with the requirements listed in 3.7 of this Part along with the following:

(i) Essential equipment such as radar, ECDIS installed at workstation for navigating and maneuvering, GPS, conning display, bridge alert management system, watch monitoring system, speed log etc. are to be provided with a transitional source of power such as a UPS or battery to provide a minimum of

10 minutes of power. Any UPSs supplying power to bridge equipment are to be capable to bypass automatically.

(ii) A minimum of one telephone system is to be supplied by a transitional emergency power source capable of operating for a minimum of 30 minutes. Alternatively, a sound power telephone system or portable self-contained two-way voice communication device is acceptable.

(c) Navigational system

In general, navigational equipment/systems installed onboard Ship are to be so arranged that failure of one piece of navigational equipment will not reduce the ship's ability to perform the functions specified in 3.8, 3.2 and 5.8 of this Part along with following requirements:

The ship is to be provided two ECDIS (Electronic Chart Display and Information System) and both are to be separate and independent from each other. Both ECDIS are to have separate power source and network i.e. fully separate interfaces to be provided. An interconnection between both ECDIS is to be provided to exchange data and also to be interfaced to the radar systems. Radar installations are to have a bi-directional interface so that voyage plan can be transferred to and displayed on the radar screens. Also, the voyage planning terminal is to be interfaced with the ECDIS.

The ship is to be equipped with a centralized bridge workstation that complies with 5.4 of this Part.

Navigation system is to be equipped with a communication system in compliance with MSC Res.302(87).

The ship is to be equipped with a conning information display in compliance with the 5.7 of this Part.

Job aids and trainings are to be provided of navigational systems equipment which include grounding avoidance system courses.

(i) Heading Control and Information System

For a heading control and information system, the ship is to be in compliance with 3.8.1 and 3.8.2(b) of this Part along with the following:

(1) The ship is to be equipped with one additional gyro compass (2 total).

(2) A gyro repeater is to be provided at all steering control position.

(3) Continuous heading information is to be provided to repeaters, radar systems, heading control and track control systems.

(4) ECDIS Failure of the selected compass system is to automatically trigger the backup system without disruption to rudder control.

(5) Heading is to be maintained if one compass fails. The two compass systems are to be arranged for continuous performance with a minimum of one autonomous compass.

(ii) Steering System

The ship is to have means for manual and automatic steering and to comply with 3.8.2 and 3.8.5 of this Part and Chapter 4 of Part IV of the Rules along with the following additional requirements:

(1) Rate of turn indicators and rudder angle indicators are required and is to be in accordance with the turning ability of the ship while proceeding at normal seagoing speeds.

(2) The ship is required to be equipped with a minimum of two independent rudder angle indicating systems.

(iii) Speed Measuring System

The ship is to have a speed measuring system in compliance with 3.8.3 and 3.2.1(b) N10 of this Part along with the following:

(1) Speed indicators are to be provided in different locations i.e. positions required for safe conning, monitoring, navigating, maneuvering, and docking operations of the ship.

(2) Ship is to be fitted with a speed measuring system capable of providing speed over ground in longitudinal and transversal directions.

(3) The speed measuring system is to provide continuous radar and denote speed through water and speed over ground out simultaneously.

(4) The speed measuring system components are to be easily accessible for maintenance while the ship is afloat.

(iv) Radar System

The ship is to be fitted with a radar system in compliance with 3.8.5 of this Part and MSC. Res.192(79).

(v) Bridge Navigational Watch Alarm System (BNWAS)

The ship is to be fitted with means to monitor the alertness of the officer of the watch and alarm other bridge personnel as per the requirements listed in 3.8.8 of this Part in association with the following:

(1) Approved motion sensors or initiating operation of various navigation equipment may be considered in addition to reset devices if the ship's flag administration does not prohibit its use. External devices such as Radar, which can act as reset devices, are to be in position where proper lookout can be performed by the officer of watch.

(2) Sensors approved for intrusion and holdup alarm systems in accordance with EN 50131 may be used and are to comply with the following:

a) Timer resets if a forearm moves 0.5 to 1 m/s at the working positions.

b) Tampering or failure of the motion sensor deactivates the timer reset function.

c) Timer does not reset due to moving objects, warm surfaces or shifting sunlight.

d) Proper masking of sensor coverage is to be prepared inside the motion sensor enclosure when masking is needed.

(3) Wireless portable devices may be used to sound the alarm to reach the assigned individual to attend bridge.

(4) The second and third stage remote audible alarms are not to be acknowledged by the motion detection system and activation of the motion detection function is to only reset the first state audible alarm on the bridge.

(5) Emergency calls are to be activated by a single operator action and appropriate protective safety measures are to be taken to prevent activation of any emergency call by mistake.

(6) Unacknowledged alarms are to be transferred and means to immediately trigger an emergency call is required.

(vi) Ship's Automatic Identification System (AIS)

The ship is to be fitted with an Automatic Identification System as per the requirements listed in 3.8.10 of this Part.

The Automatic Identification System is to be capable of supporting interconnection with the radar systems listed in 4.4.2(c)(iv) and the route planning requirements listed in 3.8.9 of this Part.

(d) Propulsion engine/thruster controls

The ship is to be fitted with means for propulsion engine/thruster controls in compliance with 3.9 of this Part and Chapter 2 of Part VIII of the Rules.

In addition, control of propulsion and steering including thrusters (if fitted) are to be provided in the workstations from where docking operations are conducted.

(e) Telephone system

The ship is to be fitted with a means for telephone system in compliance with 3.10 of this Part, 2.5 of Part VII of the Rules, and the following:

(i) The automatic telephone network is to be designed to carry at least 4 simultaneous calls.

(ii) Incoming calls are to be distinguishable by lights and/or different ring tones.

(iii) All applicable locations are to be provided with a transceiver readily available for portable two-way voice communication equipment to be used for compliance with the back-up telephone requirements.

(iv) Areas with an ambient noise level above 75 dB(A) are to possess or utilize noisy environment mitigations such as noise-cancelling headphones.

(v) The bridge is to have a minimum of 4 portable ultra-high frequency (UHF) transceivers that operate in the 457 to 467 MHz band and which have the capacity to operate continuously for a minimum of 5 hours.

The battery charger is to be located within the wheelhouse and capable of re-charging all UHF transceivers.

(vi) A communication system for mooring operations is to be provided between the wheelhouse, bridge wings, and mooring stations on board that support hands free two-way voice transmission.

If portable UHF transceivers are used for mooring operations, then the total of the number of transceivers provided are to be not less than 2 times the number of mooring stations onboard. However, the total numbers of transceivers are to include the above mentioned 4 portable transceivers required for the bridge. Battery chargers that are able to re-charge all transceivers simultaneously are to be installed in the wheelhouse.

(f) Nautical radio communication

The ship is to be fitted with means for nautical radio communication in compliance with 3.11 of this Part along with the following:

(i) The wheelhouse is to be equipped with two fixed and independent Very High Frequency (VHF) transceivers.

(ii) Means of radio communication on the bridge wings to communicate with other Ships is to be provided.

(iii) Antennas for the nautical radio communication system are to be located to minimize damage or malfunction of the equipment. These are to be located with warning labels of safe distance with information pertaining to human risk warnings.

(g) Internal communication

The ship is to be equipped with two independent and separate internal communication systems. The officer of the watch is to be capable of calling the crew members from accommodation, open deck or any noisy area as needed.

(h) Weather surveillance system

The ship is to have a weather surveillance system installed that is equipped with an anemometer that displays the relative wind speed and direction in a presentation mode in accordance with international standards. The system is to provide information about wind speed, direction, air humidity, barometric pressure, and air temperature that can be displayed on a weather information system.

(i) Wind speed sensors are to operate at a minimum range of 0-100 knots with an accuracy and resolution of 2.5 knots or higher.

(ii) The wind direction sensor is to cover an azimuth of 360° with an accuracy and resolution no less than 5°.

(iii) The weather sensors are to be located to minimize air flow distortion from the ship's structure.

(iv) The sensor is not to be located at the same height adjacent to a large radar mast or similar structure. In the event the sensor is located in this manner then two sensors shall be installed, one on each side of the ship. The processing unit shall be able to weigh the output of the two sensors in proportion to the relative wind direction.

(v) Relative humidity is to be measured within 0-100% with an accuracy rate of 5% or higher.

(vi) Air temperature is to be measured within -15°C to 55°C with an accuracy rate of ±0.5°C (with >10 knots wind speed and sunlight) or higher.

(vii) Pertinent humidity and temperature measurements are to be displayed with a resolution not inferior to the accuracy.

(viii) Barometric pressure is to be measured with accuracy better than 5 mbar (500 Pa) with a minimum resolution of 2 mbar.

(ix) The system is to be capable of receiving reliable weather information relevant to the ship's area of operation and displayed in a user-friendly manner.

(x) The forecasts received by the system are to last a minimum of 5 days in time steps not exceeding 6 hours with a minimum geographical resolution of 60 km × 60 km.

(i) Sound reception system

The ship is to have a sound reception system that complies with 2.7.3 and 2.7.4 of this Part and comply with the following:

(i) The sound reception system is to have the capability of sound detection along with wind and mechanical noise suppression with the audio band range of 70-700 Hz. The system performance is to have microphones in a position so that ambient noise does not exceed 65 dB(A).

(ii) The system is to be capable of muting noise up to 75 dB(A) to manage severe weather ambient noise in increments no greater than 3 dB(A).

(iii) The system is to include filters to minimize background noise other than ship whistles and be able to determine the direction of the sound (port, starboard, forward or abaft) within ±5°.

(iv) The system is to display sound direction results clearly for the duration of the signal plus 2 seconds with day and night distinction on a minimum of 2 meters.

(v) The system microphones are to be arranged to minimize noise and be capable of being muted during the ship's whistle and while the outdoor PA-system is in use.

(vi) The volume of the system's loudspeaker is to be adjustable within the wheelhouse with a labeled volume control marked of the position where the sound level in the wheelhouse is at the same level of the outdoor listening post.

(j) Public address system

A public address system on the bridge is to be suitable for flush mounting in the workstation consoles. Every station is to have means of visualizing its state of readiness. A reference list of all public access areas is to be permanently posted.

4.4.3 FMEA (failure mode effect analysis)

The FMEA required to be submitted as per 1.5.4 (d) of this Part shall include the following:

(a) Ship details and Class Notations

(b) List of all equipment (main and standby)

(c) A description of each equipment and associated failure mode with its failure causes relative to operational modes of the item

(d) A description of the failure of each mode on other items or equipment

(e) The analysis is to show how a single failure in a component or sub-system including their integration will grow and how essential systems will operate during failure to avoid any collision or grounding. Accordingly, a step by step sequential operating process is to be provided for crew use in the Bridge Operations Manual. This will outline the action to be taken by the crew when a failure occurs.

(f) After FMEA is carried out, any corrective action, if required, is to be taken based on the results of the findings

(g) An updated FMEA is to be conducted and a summary report including the FMEA test program is to be submitted for information and kept on board.

## 4.5 Human Element

4.5.1 General

The ambient environment in which tasks are performed has a significant influence on human performance and ship equipment. So, throughout the various design stages of the ship care shall be taken to achieve a good working

environment for bridge personnel including vibration, noise, lighting, device and instrument illumination, and heating, ventilation and air conditioning (HVAC).

4.5.2 Environmental condition

(a) Vibration

Uncomfortable levels of vibration causing short and/or long term effects on human body shall be avoided in the bridge area. Vibration Criteria should be of 5.0 mm/s (179 $mm/s^2$). See Table II 34-2 in Chapter 34 of Part II of the Rules.

(b) Noise

Uncomfortable levels of noise, and noise which may affect safe and efficient bridge operation, shall be avoided in the bridge area. The noise level (sound pressure) for the wheelhouse workplace should not exceed 65 dB(A) while the ship is underway and with all normal bridge equipment in operation (measured in good weather conditions). See also Table II 34-1 in Chapter 34 of Part II of the Rules.

(c) Climate control system

The bridge shall be equipped with a temperature control and ventilation system or a heating, ventilation, and air conditioning (HVAC) system that allows regulation of the temperature and humidity in the wheelhouse enabling bridge personnel to maintain the workplace thermal environment within the range of the human comfort zone.

The ventilation system shall ensure a sufficient exchange rate and air movement inside the wheelhouse. The temperature gradient from floor level up to 2 m is to be within the range of ±1°C and not exceed ±4°C.

(d) Lighting

(i) General

An adequate level of lighting shall be provided, facilitating the performance of all bridge tasks at sea and in port, during daytime and night-time. The lighting shall comprise both general lighting and task related lighting to ensure that illumination is compatible with individual operations and tasks.

(ii) Illumination levels

The lighting system shall enable the bridge personnel to adjust the illumination level as required in different areas of the bridge and by the needs of individual tasks. During hours of darkness; the lighting provided to discern control devices and read labels and markings shall preserve the night vision of the OOW. It shall be possible to dim down the illumination intensity to nearly zero.

The illuminance level and light color recommendations for the bridge area are as follows:

| Place | Environment | Color and illumination |
|---|---|---|
| (1) Wheelhouse | Day, general | White, at least 200 lux |
| | Night, when underway | Red, variable up to 20 lux |
| (2) Workstations | Day | White, at least 300 lux |
| | Night | Red, variable up to 20 lux |
| (3) Chart table | Day | White, variable 100-1000 lux |
| | Night | White filtered, variable up to 20 lux |
| (4) Open staircase inside wheelhouse | Day | White, at least 200 lux |
| | Night | Red, variable up to 20 lux |
| (5) Toilet | Day | White, at least 200 lux |
| | Night | Red, variable up to 20 lux |

(iii) Specular reflections and glare

(1) Care shall be taken to avoid glare and stray image reflections on windows and deckhead surfaces. High brightness contrast between work areas and surroundings shall be avoided.

(2) The bridge surface finishes shall have a dull, matt coating and colours with low reflection range in order to reduce specular reflections and glare to a minimum. Ceiling, bulkheads and consoles are of special importance.

(3) Lighting sources located in adjacent rooms and corridors shall be prevented from illuminating the wheelhouse at night time.

(4) It shall be avoided that glaring lights from deck lights and searchlights are dazzling the operator at the workstations.

4.5.3 Personnel safety

(a) General

To achieve personal safety for bridge personnel, the bridge is to be designed to offer protection from injury during normal weather conditions as well as rough weather conditions. The following projects address improving personnel safety on the bridge.

(b) Bridge physical hazards

The bridge area is to be free of physical hazards to bridge personnel. There are to be no trip hazards on the bridge deck such as curled up carpet edges, loose gratings or equipment.

(c) Securing equipment

Means are to be provided for securing portable equipment such as chairs and tables.

Where integrated bridge systems are provided that present a centralized position from which piloting, navigation and communications can be performed, a permanent seat is to be provided for the persons on watch duty. This seat may be moveable on tracks.

(d) Safety equipment accessibility

All safety equipment on the bridge is to be clearly marked, easily accessible and have its stowage position clearly indicated.

(e) Radiation hazard

All equipment posing a radiation hazard is to be protected and located in areas that do not present hazards to personnel.

(f) Emergency lighting

Emergency lighting is to be provided for the bridge control center, stairways and exits.

(g) Redundant lighting circuits

Bridge control center lighting is to be provided from two separate circuits so that in the event of loss of one circuit, lighting on the bridge is not interrupted.

(h) Handrails and grab rails

Sufficient handrails or grab rails are to be fitted to enable personnel to move or stand safely during inclement weather. Protection of stairway openings are to be given special consideration.

(i) Bridge finishes

The surface finishes on the bridge are to be considered an integral part of the structure, layout and environmental design.

(j) Non-slip surfaces

Wheelhouse, bridge wings and upper bridge decks are to have non-slip surfaces.

(k) Robust surfaces

All surfaces of deckheads, bulkheads, doors and floors are to be robust enough to withstand the daily wear of the at-sea environment. All surfaces are to be capable of withstanding a temperature range of -20℃ to +70℃, seawater, oils and solvents common to ships and ultra-violet light.

(l) Electrical circuit fault isolation

Circuits for equipment on the bridge are to be designed to allow isolation of a fault without having to take other circuits out of service and to allow safe and easy replacement.

(m) Grounding of metal on the bridge

All metal parts on the bridge not intended to carry electricity are to be effectively grounded.

(n) Component replacement safeguards

Replaceable components on the bridge are to be designed and arranged so that it is not possible to connect or replace them incorrectly.

4.5.4 Human machine interface

(a) General

Equipment and systems should be designed as simple as possible, reliable, easy to operate and in line with the prevailing ergonomic principles.

(b) Design within physical and perceptual limits

Equipment design is to take into account the ability of humans to exert force, reach for and manipulate objects and sense the physical environment.

(i) Controls are to be placed within easy reach and adjacent to related displays.

(ii) The display viewed from the nominal position shall be easy to read, be directly in front of the viewer without being obscured, bright and large enough to be seen under the expected surrounding environment.

(iii) The physical environment is to be controlled so that ambient conditions do not interfere with visual or audible signals.

(iv) Controls are to be designed to prevent inadvertent operation.

(v) The bridge is to be arranged so that objects can be easily and readily reached and manipulated.

(c) Limit memory requirements

Human memory is limited in capacity, is often unreliable and can be affected significantly by factors such as fatigue, stress, and physical health. Equipment and controls are to:

(i) Provide an efficient means of calling up the display of important or changing information.

(ii) Avoid having to scroll through several displays to access frequently used or critical information – It is to be possible to display time critical information immediately.

(iii) Avoid the need to cross-reference between information displays.

(iv) Clearly identify all controls and displays.

(v) Use simple and memorable codes that are easily distinguishable.

(vi) Perform rapid information updating in a timely manner to bridge personnel.

(vii) Provide obvious, ongoing display of automated system status (e.g., to indicate when automatic processes have been manually overridden, disabled, or failed).

(d) Facilitate human attention

The following measures are to be considered to mitigate possible human errors due to distraction, complacency, habituation, and high workload:

(i) Navigation equipment designers/ vendors/ shipyards are to submit documentation to ensure the following:

(1) Frequently used and important displays (e.g., navigation, helm control, radar) are located in a central viewing area.

(2) Alarms are not so frequent that they cease to attract attention.

(3) Meaningful information groupings are used to enable bridge personnel to easily cope with a large amount of information.

(ii) The owners/shipyards are to prepare appropriate document indicating the following:

(1) Avoidance of any distractions or unnecessary requirements to perform meaningless tasks (during a watch).

(2) Avoidance of unnecessary tasks that compete for attention such as paperwork that is not related to standing watch.

(3) Definition of clear task priorities.

(e) Standardize display characteristics

The vendors or equipment suppliers are to provide documentation denoting the following:

(i) Colors are to be consistent and have the same meaning across all displays.

(ii) Each icon or symbol represents only one object or function and is easily discriminated from all other icons and symbols.

(iii) Computer display and panel display information layouts are spatially compatible with one another.

(iv) The typeface is readable and have true ascenders and descenders. The font is to possess uniform stroke width and uniform aspect ratio.

(v) When abbreviations or acronyms are used, they are to be meaningful, in common usage and kept to a minimum.

(vi) The units of parameter being measured (voltage, mass, pressure, length, speed, temperature etc.) are clearly displayed.

(f) Standardized control requirements

(i) Controls requiring frequent adjustments or accurate settings are to be designed and placed as per the Industry Standard.

(ii) The most important and frequently used controls are to have the most favorable position with respect to ease of reaching and grasping (particularly rotary controls and those requiring fine settings). Keys for emergency functions are to have a prominent position and be distinctively marked.

(iii) The arrangement of functionally similar or identical controls are to be consistent from workstation to workstation and panel to panel throughout the bridge.

(iv) If more than one person controls the action of a bridge (or related) system, all relevant information is to be simultaneously available to the person responsible for coordinating the task.

(v) All the effects of an action or command on the process are to be simultaneously observable on associated displays. If equipment of system response time is slow, feedback is to be provided indicating the action has been initiated and is progressing (e.g., rudder position and rate of turn indicators)

(vi) When possible, all necessary information is to be provided simultaneously (e.g., in parallel rather than sequentially) when needed to enable a diagnosis or a control decision.

The above requirements are to be complied with as per the industry standard.

(g) Standardized prioritize alarms and audible indicators

An alarm is a visual and/or audible signal typically indicating an abnormal situation demanding human attention and response. An audible indication is usually a display of status or ship condition (e.g., tones that indicate a telephone or radio call is incoming or that an equipment function has failed).

Alarms and audible indicators are to be clearly coded. All alarms are to be prioritized to allow quick assessment of the importance of simultaneous alarms. Prioritization schemes include:

(i) Sequencing alarms in a way that enables the development of abnormal events to be better understood.

(ii) Separation of critical alarm information from information or status indications.

(iii) Use of dedicated computerized alarm displays.

(iv) Provision of distinct audible indicators (separate from alarms) that indicate automatic or semi-automatic actions of the system (e.g., transitioning from autopilot to manual steering). If a failure by the persons on watch duty to notice the occurrence of an audible indicator can lead to unsafe conditions (e.g., failure to notice that the ship's gyro has failed or low lube oil pressure in the steering gear) then that condition is to be considered an alarm condition and is not to be considered as a simple audible indication.

The above requirements are to be complied with as per the industry standard.

(h) Acknowledging alarms

Critical alarms are not to be dismissed until the initiating condition is resolved. The device is to be conveniently located and readable for acknowledgement. It may be possible to silence an audible alarm only when that action does not cause a loss of alarm information (e.g., visual display of the alarmed parameters).

(i) Alarm requirements

(i) Alarms are to have a unique code (audible signal) if a unique type of response is required.

(ii) Color is not to be the only means of distinguishing between alarm and non-alarm conditions.

(iii) Labeling and other information is to be associated with the alarm indicator for the equipment or condition about which the alarm was triggered.

## 4.6 Survey Requirements

### 4.6.1 New construction

For a new construction vessel, navigational equipment and systems are to be tested to the satisfaction of the attending Surveyor in accordance with Chapter 3 in Part I of the Rules, MSC 137 (76) and the following:

Review of approved layout and arrangement drawings of equipment specified in this section as described in 4.3, 4.4 and 4.5.

(a) Tests and sea trials

During sea trials, navigational equipment and systems are to be tested to the satisfaction of the attending Surveyor in accordance with a test program as per 3.14 of this Part, MSC 137(76) and the following:

(i) Automatic resumption of primary bridge navigational equipment/systems functions are to be demonstrated following a blackout simulation for a period of 10 minutes.

(ii) Review of approved sea trials as listed in 3.14 of this Part.

(iii) The operating/technical manual as described in 3.14 of this Part is to be used for verification of the testing program for relevant navigational equipment/systems and is to be retained on board.

Note: Suitable means such as navigation system power cut-off to verify appropriate operation without total ship's blackout is acceptable.

*Chapter 5 has been added as follows:*

# Chapter 5
# Requirements for Notation NIBS (Navigational Integrated Bridge System)

## 5.1 General

The following requirements are applicable to ship which is fitted with the navigational equipment/systems, as required in this Part, so arranged to form an integrated bridge system (IBS). Ships complying with this Chapter, will be assigned the notation **NIBS** (Navigational Integrated Bridge System). Equipment required for this Notation is listed below.

## 5.2 Navigational Equipment for NIBS Notation

5.2.1 Workstation/panel for centralized bridge

(a) Main functions to be performed

(i) Main function for the Navigation and Traffic Surveillance/maneuvering workstation – See 3.2.1(a) of this Part.

(ii) Main function for monitoring workstation – See 3.2.2(a) of this Part.

(b) Equipment

(i) Equipment required for the Navigation and Traffic Surveillance / maneuvering workstation – See 3.2.1(b) of this Part.

(ii) Equipment required for monitoring workstation – See 3.2.2(b) of this Part.

(iii) Central alarm panel – See 5.5.

(iv) ECDIS (Electronic Chart Display and Information System) – See 5.8.4.

5.2.2 Panel for conning information

(a) Main functions to be performed to allow the navigator the easy reading of the maneuvering state of the ship from the conning position.

(b) Equipment

Display panel - This panel may be included within the centralized bridge station – See 5.7 of this Chapter.

5.2.3 Workstation/panel for manual steering

(a) Main functions to be performed

Main function for Manual steering workstation – See 3.2.3(a) of this Part.

(b) Equipment

Equipment required for the manual steering workstation – See 3.2.3(b) of this Part.

5.2.4 Workstation/panel for docking (bridge wings)

(a) Main functions to be performed

Main function for docking workstation – See 3.2.4(a) of this Part.

(b) Equipment

Equipment required for the docking workstation – See 3.2.4(b) of this Part.

5.2.5 Workstation/panel for route planning

(a) Main functions to be performed

(i) Determination of favorable course and optimum speed, taking into account weather conditions, current, etc. and route planning

(ii) Giving instructions as to the course and speed

(iii) Calculation of tidal data

(iv) Handling nautical records, documents, publications

(v) Handling weather reports

(vi) Determination of documentation of position in case of conventional operation

(vii) Control of rate and error of chronometer, deviation, radio deviation, documentation of same

(viii) Keeping deck log

(ix) External communication for planning operation using the chart

(b) Equipment

(i) ECDIS including navigation planning station

(ii) Route planning devices

(iii) Chart table

(iv) Position-fixing receiver

(v) Retaining device for drawing triangles, dividers, magnifying lens, pencils, etc.

(vi) Weather chart plotter

(vii) Main clock

(viii) Chronometer with receiving facility for time signals - Chronometer is not required, if official universal time is obtained by other means.

(ix) Radio direction finder - Radio direction finder is not required, if the ship is provided with other radionavigation equipment suitable for use throughout its intended voyages.

(x) Log, including distance indicator, course plotter

(xi) Officer of the watch checkalertness acknowledgment device

(xii) Barograph

(xiii) Command printer

(xiv) Telephone system – See 3.10 of this Part.

## 5.3 Integrated Bridge System (IBS)

An integrated bridge system (IBS) is to be provided and is to comply with IMO SN.1/Circ.288. The integrated navigation system is to be so arranged that failure of one sub-system does not affect any other sub-system. In case of failure of the integrated navigation system it is to be possible to operate the primary bridge navigational equipment/systems functions separately.

5.3.1 Dimmer Control

An individual dimmer control is acceptable in lieu of a single central dimming functionality called for by the Guidelines (IMO SN.1/Circ.288) provided the number of the individual dimmer control switches is minimized as far as practicable.

## 5.4 Centralized Bridge Workstation

A centralized bridge workstation is to be provided to enable the navigator to perform the necessary navigational, monitoring/alarming and communication functions as required in this Part. The equipment required in the navigation and traffic surveillance/maneuvering workstation and monitoring workstation, specified in Chapter 3 of this Part, is to be integrated within the centralized bridge workstation. See also 5.2.1(b) for the required equipment to be included on this workstation.

## 5.5 Central Alarm Panel

The centralized bridge workstation is to be fitted with a central alarm panel for instruments and systems related to the functions specified in 5.3 for easy identification and acknowledgment of the individual alarms. Acknowledgment of an alarm at either the equipment fitted on the required workstation or the central alarm panel is to cancel the audible warning at both sources. Cancellation of the visual warning on the central alarm panel is to only be possible at the pertinent workstation.

5.5.1 In addition to required navigational alarms and those alarm conditions listed in item M17, (1) through (8), of 3.2.2 of this Part, the following alarm conditions are to be alarmed at the central alarm panel:

(a) Position fixing inaccurate/lost.

(b) Loss of heading input.

(c) Loss of log input.

(d) Gyro compass mis-match.

(e) Integrated bridge system (IBS) failure.

## 5.6 Route Planning Workstation

The route planning workstation is to enable the navigator to plan the intended voyage without interfering with the actual navigation or maneuvering of the ship. It is to be large enough to facilitate the use of two charts concurrently, and adequately fitted for efficient route planning. See 5.2.5 (b) for the required equipment to be included on this workstation.

## 5.7 Conning Information Display

A conning information display is to be provided on the bridge and which is to be observable from the conning position(s) and designed for easy reading of the maneuvering state of the ship. The information on continuous display is to be restricted to information relevant to the actual phase of the voyage. This display may be included on the centralized bridge workstation. See also 2.3.2(b) of this Part.

## 5.8 Navigational System Requirements

Requirements contained herein are in addition to or modified those in 3.8 of this Part.

5.8.1 Course information system

Notwithstanding 3.8.1 of this Part, the heading information system is to include a magnetic compass and two independent gyro compasses.

5.8.2 Speed measuring system

In addition to 3.8.3 of this Part, the speed measuring system is to be independent of the position-fixing systems.

5.8.3 Automatic track-keeping system

In addition to 3.8.6 of this Part, the automatic track-keeping system is to automatically enable the ship to keep along a pre-planned track and the ship's position is to be monitored continuously. When the ship's position cannot be received, the current heading or rate of turn is to be maintained until manually altered by the officer of the watch, and such condition is to be alarmed. The ship's position is to be crosschecked by dead-reckoning based upon speed over ground provided by the ship's log.

5.8.4 Electronic Chart Display and Information System (ECDIS)

Relevant equipment associated with the ECDIS (Electronic Chart Display and Information System) is to be installed on the centralized bridge workstation and at the route planning workstation. The ECDIS is to comply with IMO Res.MSC.232 (82) or IMO Res. A.817 (XIX), as amended by Annex 5 to MSC.64 (67) and Annex 4 to MSC.86 (70).

## 5.9 Operation/Technical Manual

In addition to 3.13 of this Part, the operation/technical manual is to include the following:

5.9.1 Simplified diagrams of the electronic chart display and information systems (ECDIS) and integrated bridge system (IBS).

5.9.2 Periodical testing procedures for electronic chart display and information systems (ECDIS) and integrated bridge system (IBS).

## 5.10 Workstations - Required Equipment

In addition to 3.12 of this Part, the equipment specified in 5.2 is to be fitted on the bridge.

## 5.11 Tests and Sea Trials

The sea trial program is to include test details of the electronic chart display and information systems (ECDIS) and integrated bridge system (IBS).

*Appendix 1 has been added as follows:*

# Appendix 1
# Navigation Bridge Visibility

## A1.1 General

Navigation bridge visibility is to comply with the requirements specified in Chapter 26 of Part II of the Rules.

## A1.2 Offshore Operations Bridge Visibility

All offshore service vessels are to be provided with an unobstructed as possible and practical view abaft from the Offshore Operations Control Area towards the cargo or work decks and machinery or specialist equipment. On offshore service vessels it is necessary to control both, the station keeping as well as cargo loading/unloading operations. On anchor handling and/or towing vessels it is necessary to control the heading, position, speed as well as deck machinery engaged for towing and/or anchor handling operations. On other types of offshore service vessels it may be necessary to control the station keeping as well as the specific service equipment installed on work deck. Where direct visual observation of machinery and equipment is unavoidably obstructed, a CCTV system suitable for use in the marine environment would be considered acceptable.

### A1.2.1 Field of vision

The view of the cargo or work deck area, including loading/unloading ports on offshore service vessels, as well as view of the sea surface in close vicinity of the vessel shall not be obstructed. From the Offshore Operations Control Area, the horizontal field of vision should extend over an arc from right astern to at least 60° on each side of the vessel.

### A1.2.2 Aft windows arrangements

Aft windows and their arrangements are to meet the following requirements:

(a) Framing

Framing between navigation bridge aft windows is to be kept to a minimum to meet the structural strength and stiffness requirements, and is not to be installed immediately in front of any main commanding and/or maneuvering and controlling positions.

(b) Inclination angle

The bridge aft windows are to be inclined from a vertical plane top out, at an angle of not less than 5° and not more than 15°, see Fig. XIII A1-1.

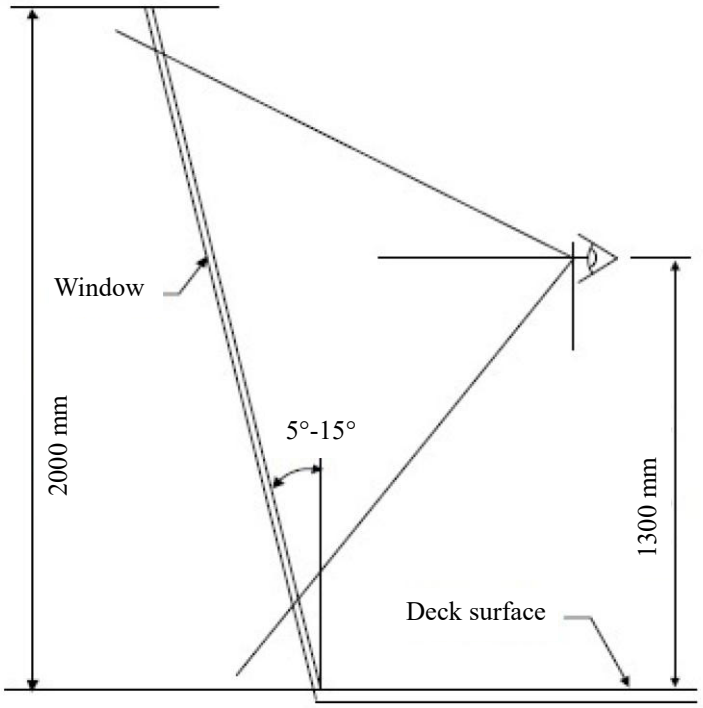



**Fig. XIII A1-1**
**Aft Window**

(c) Glass

Polarized and tinted windows are not to be fitted.

(d) Clear view

At all times, regardless of the weather conditions, at least two of the above aft windows are to provide a clear view, as described above. The following, or equivalent, is to be provided as well:

(i) Sunscreens

Sunscreens are to be with minimum color distortion; are to be readily removable and are not to be permanently installed.

(ii) Wipers and fresh water wash systems

Heavy-duty wipers provided with an interval function and fresh water wash systems, being capable of operating independently of each other.

(iii) De-icing and de-misting systems

De-icing and de-misting systems are to be provided.

(iv) Fixed catwalk

A fixed catwalk with guardrails, fitted aft of the bridge windows is to be provided, enabling manual cleaning of windows in the event of failure of the above systems.

(e) Impact protection for windows

Suitable protection of the aft windows against impact from any cargo being lifted onboard the ship is recommended.

(f) Lower and upper edge

The lower edge of the navigation bridge aft windows is to be kept as close to the bridge deck as practical. The upper edge of the navigation bridge aft windows is to be kept as close to the overhead deck as practical.

## A1.3 Side Windows Arrangement

A1.3.1 Side windows for offshore service vessel are constructed to meet the following requirements:

(a) To be arranged to minimize blind sectors such as funnels etc. which unavoidably restricts a 360° view of the sea surface from the wheelhouse.

(b) Where windows are installed on bridge wings aligned with ship sides they are to provide the horizontal field of vision as well as visibility of ship's sides as required in A1.1.1(b) above.

(c) where windows are installed on bridge wings not aligned with ship sides then a fixed catwalk with guardrails is to be installed to enable fulfilling this requirement.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2025"

# PART XV HULL CONSTRUCTION AND EQUIPMENT FOR SHIPS LESS THAN 90 M IN LENGTH

# List of major changes in Part XV from 2025 edition

| | |
|---|---|
| 11.7.1 | Revised |
| 24.8.3(a) | Revised |
| 24.8.3(d) | Revised |
| 24.8.4(b) | Revised |
| 24.9.2(b) | Revised |

Rules for the Construction and Classification of Steel Ships 2025 have been partly amended as follows:

# Chapter 11
# Deck Girders and Pillars

*Paragraph 11.7.1 has been amended as follows:*

## 11.7 Scantlings of Pillars

11.7.1 Sectional area of pillars

The sectional area of pillars is not to be less than that obtained from the following formula:

$$\frac{0.223wK}{2.72 - \frac{l}{k_0\sqrt{K}}} \qquad cm^2$$

where:

K = Material factor as specified in 1.4.1(b)(i) & 1.4.1(d) of this Part.

*l* = Distance (m) from the top of inner bottom, deck or other structures on which the pillars are based to the underside of beam or girder supported by the pillars (See Fig. XV 11-2 of this Chapter)

$k_0$ = $\sqrt{\frac{I}{A}}$

Where:

I = The least moment of inertia ($cm^4$) of the pillar

A = Sectional area ($cm^2$) of the pillar

w = Deck load (kN) supported by pillars as specified in 11.7.2 of this Chapter

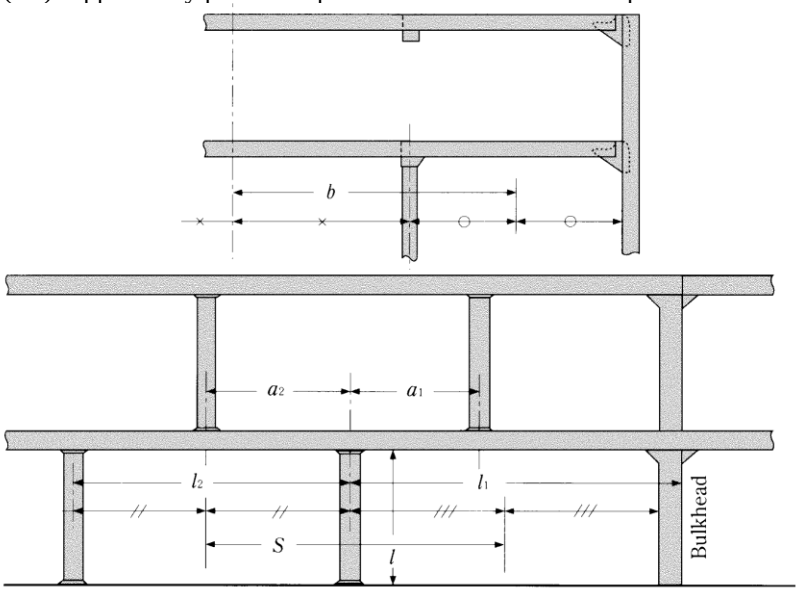



**Fig. XV 11-2**
**Measurement of S, b, *l*, etc**

# Chapter 24
# Rudders

## 24.8 Rudder Stock Couplings

24.8.3 Cone couplings with key

*Paragraph 24.8.3(a) has been amended as follows:*

(a) Cone couplings without hydraulic arrangements for mounting and dismounting the coupling should have a taper c on diameter of 1:8 ~ 1:12, where:

$$c = \frac{d_0 - d_u}{l_c}$$ (see Fig. XV 24-7A~ ~~and~~ Fig. XV 24-7~~B~~C)

The diameters $d_0$ and $d_u$ are shown if Fig. XV 24-7A and the cone length $l_c$ is defined in Fig. XV 24-7~~B~~C.
The cone coupling is to be secured by a slugging nut. The nut is to be secured, e.g. by a securing plate.

(b) The cone shapes are to fit exactly. The coupling length $l$ is to be, in general, not less than $1.5d_0$.

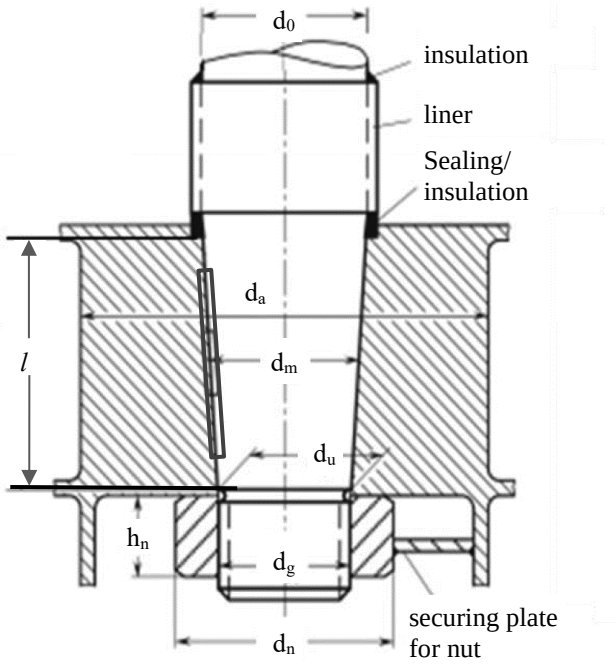



**Fig. XV 24-7A**
**Cone Coupling with Key**

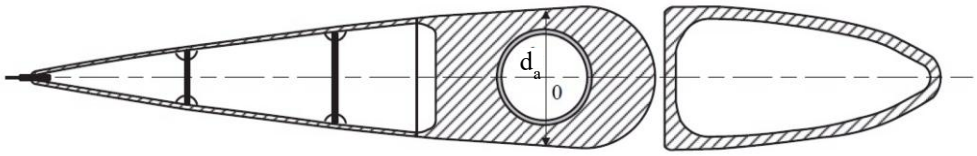



**Fig. XV 24-7~~A~~B**
**Gudgeon Outer Diameter($d_a$) Measurement**

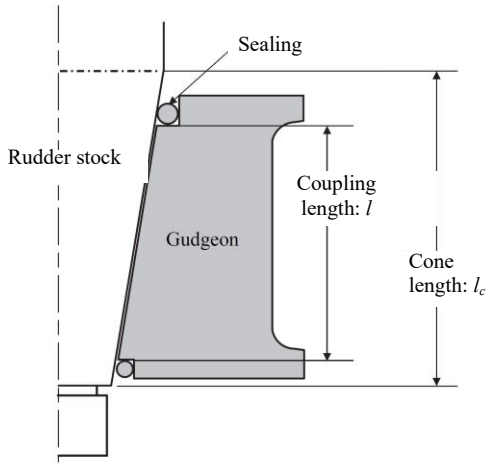



**Fig. XV 24-7~~B~~C**
**Cone Length and Coupling Length**

*Paragraph 24.8.3(d) has been amended as follows:*

(d) Dimensions of the slugging nut
The dimensions of the slugging nut are to be as follows (see Fig. XV 24-7A of this Chapter):
External thread diameter: $d_g \geq 0.65\ d_o$
Height: $h_n \geq 0.6\ d_g$
Outer diameter of nut: $d_n \geq 1.2\ d_u$ or $1.5\ d_g$, whichever is greater.

*Paragraph 24.8.4(b) has been amended as follows:*

24.8.4 Cone couplings with special arrangements for mounting and dismounting the couplings

(a) .....

(b) Push-up pressure
The push-up pressure, is not to be less than the greater of the two following values:

$$p_{req1} = \frac{2Q_F}{d_m^2\, l\, \pi\mu_0} 10^3 \qquad N/mm^2$$

$$p_{req2} = \frac{6M_b}{l^2 d_m} 10^3 \qquad N/mm^2$$

where:

$Q_F$ = Design yield moment of rudder stock, as defined in 24.8.3(c) above, in N-m.

$d_m$ = Mean cone diameter in mm, see Fig. XV 24-7A of this Chapter.

$l$ = Cone length in mm.

$\mu_0$ = Frictional coefficient, equal to 0.15.

$M_b$ = Bending moment in the cone coupling (e.g. in case of spade rudders), in N-m.

It has to be proved by the designer that the push-up pressure does not exceed the permissible surface pressure in the cone. The permissible surface pressure, in N/mm², is to be determined by the following formula:

$$p_{perm} = \frac{0.95R_{eH}(1 - a^2)}{\sqrt{3 + a^4}} - p_b \qquad N/mm^2$$

where:

$P_b$ = $\frac{3.5M_b}{d_m l^2} 10^3$

$R_{eH}$ = Minimum yield stress of the material of the gudgeon in N/mm².

$a$ = $d_m / d_a$

$d_m$ = Mean cone diameter in mm, see Fig. XV 24-7A of this Chapter.

$d_a$ = Outer diameter of the gudgeon, in mm, see Fig. XV 24-7A and Fig. XV 24-7~~A~~B of this Chapter. (The least diameter is to be considered.)

The outer diameter of the gudgeon in mm shall not be less than 1.25 $d_0$ , with $d_0$ defined in Fig. XV 24-7A.

*Paragraph 24.9.2(b) has been amended as follows:*

## 24.9 Pintles

24.9.2 Couplings

(a) .....

(b) Push-up pressure for pintle bearings

The required push-up pressure $p_{req}$ for pintle bearings, in N/mm², is to be determined by the following formula:

$$p_{req} = 0.4 \frac{Bd_0}{d_m^2 l}$$

where:

B = As defined in 24.9.1 above.

$d_m$, $l$ = As defined in 24.8.4(b) above.

$d_0$ = Pintle diameter, in mm, see Fig. XV 24-7A of this Chapter

The push up length is to be calculated similarly as in 24.8.4(c), using required push-up pressure and properties for the pintle bearing.

Tel: *+886 2 25062711*
Fax: *+886 2 25074722*
E-mail: *cr.tp@crclass.org*
Website: *http://www.crclass.org*