PART I. SURVEY REGULATIONS

1. GENERAL

1.1 APPLICATION

1.1.1 The Rules for the Equipment of Sea-Going Ships apply to:

.1 sea-going: passenger ships, tankers, ships, intended for carriage of dangerous cargoes, as well as tugs, irrespective of the power of main engines and gross tonnage;

.2 all self-propelled ships not specified in 1.1.1.1, with the largest length of the hull 24 m and more, with the main engines power 55 kW and upwards;

.3 all ships not specified in 1.1.1.1 and 1.1.1.2, of 80 gross tonnage and upwards, or ships fitted out with machinery and equipment of total prime movers power output 100 kW and upwards;

.4 ships of mixed (sea-river) navigation of all types and purposes, including chemical and gas carriers, except for ships to which the rules of classification and construction of mixed navigation ships are used, namely, in addition to displacement cargo ships (self-propelled and non-self-propelled, including bulk, bunkers, water reservoirs, oil-recovery, including bilge oily waters, supply ships) and tugs, including push tugs, to which the Rules are applied in accordance with the provisions of the Rules for the Classification and Construction of Mixed Navigation Ships;

.5 passenger sea-going and mixed (sea-river) navigation ships engaged in domestic voyages (sea cabotage) these Regulations apply depending on the sign of the navigation area restriction in the ship's class notation in accordance with 2.2.5.1.5 of Part I "Classification" of the Rules for the classification and construction of ships, taking into account the classification of passenger ships in accordance with European Council Directive 98/18 / EC of 17 March 1998 on rules and regulations on safety of internal (sea cabotage) navigation of passenger ships, as amended by Directives 2002/25 / EC of 05.03. 2002, 2002/84 / EC of 05.11.2002, 2003/24 / EC of 14 April 2003 and 2003/75 / EC of 29.07.2003 and with application to ships:

- with signs **A, A-R1, A-R2, A-R2-RSN** (Class **A)** – requirements of the Rules for ships, respectively, of an unrestricted area of navigation and with signs of restricted areas of navigation **R1, R2** and **R2-RSN** with separately stipulated additional requirements depending on the sign;
- with sign **B-R3-RSN** (Class **B)** – requirements of the Rules for ships with signs of restricted area of navigation **R3-RSN** with separately stipulated additional requirements for the sign **B-R3-RSN**;

- with sign **C-R3-RSN (**Class **C)** – requirements of the Rules for ships with signs of restricted area of navigation **R3-RSN** with separately stipulated additional requirements for the sign **C-R3-RSN**;
- with sign **D-R3** (Class **D)** – requirements of the Rules for ships with signs of restricted area of navigation **R3** with separately stipulated additional requirements for the sign **D-R3**.

When confirming compliance with the requirements of the EU Directive for passenger sea and mixed (sea - river) navigation vessels engaged in domestic voyages, where it is clearly specified in the parts of these Rules, including taking into account 2.6.1 "Confirmation of compliance in accordance with Council of Europe directives" of the General Provisions on Technical Supervision Activities, these Rules apply to new and existing vessels, subject to the definitions of these terms in accordance with 2.6.1.2 of 2.6.1 "Confirmation of compliance in accordance with Council of Europe directives" of General provisions on technical supervision activities. Other requirements of these Rules shall apply in accordance with the sign assigned to ship as specified above in this paragraph.

Even if necessary, in accordance with the requirements of the IMO resolution for existing vessels, vessels built up to 2 years after the date of IMO adoption of such a resolution shall not comply with this resolution if they comply with the previous applicable resolution(s), if any.

When these vessels perform international voyages, as well as to vessels, to which according to 2.6.1.1.2 of the General Provisions on Technical Supervision Activities, the said Directive does not apply, the requirements of these Rules shall be applied without regard to the requirements for vessels with signs in accordance with 2.2.5.1 .5 of Part I "Classification" of the Rules for the Classification and Construction of Ships;

.6 to vessels specified in the note to 1.3.1.1 of Part I "Classification" of the Rules for the Classification and Construction of Ships.

For small vessels, according to the definition of this term in accordance with the Rules for the Classification and Construction of Ships, these Rules are applied in accordance with the provisions of 1.1, Part VIII "Radio and Navigation Equipment" and 1.1.4 of Part IX of the Lifesaving appliances of the Rules for the Classification and Construction of Small Crafts.

For ships of inland navigation, according to the definitions of this term in accordance with the Rules for the Classification and Construction of Ships, these Rules shall be applied in accordance with the references to them in the Rules for the Classification and Construction of Inland Navigation Ships.

1.1.2 Rules may be applied with the consent of the Register for ships not specified in 1.1.1.

1.1.3 Confirmation of compliance of a passenger ship with the sign **A**, **A-R1**, **A-R2**, **A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN** and **D-R3** in the ship class notation with the provisions of Council Directive 98/18 / EC of 17 March 1998 on safety rules and standards on passenger vessels of inland navigation shall be

carried out in accordance with the requirements of 2.6.1 "Confirmation of compliance under the Council of Europe Directive" of the General Provisions on the technical supervision activities with application to the vessel of these Rules and the individual requirements specified in Parts II "Lifesaving appliances", III "Signal means", IV "Radio equipment" and V "Navigation equipment" of the Rules, depending on the sign, both for a new or existing vessel, subject to the definitions of these terms in accordance with 2.6.1.2 of the General Provisions on Technical Supervision Activities.

1.1.4 These Rules apply to vessels in construction, as well as vessels in operation, if this is stipulated in the text of the Rules.

For the application of these Rules the cargo ship is any ship which is not a passenger ship, if the text of the Rules does not specify the type (purpose) of the vessel.

1.2 DEFINITIONS AND EXPLANATIONS

The definitions and explanations concerning the general terminology are given in 1.1, Part I, "Classification" of Rules for the Classification and Construstion of Sea-Going Ships and in 1.2, Part I "General Regulations for Technical Supervision" of these Rules.

1.2.1 The following definitions of the areas of navigation have been adopted for the purpose of the present Part of the Rules:

unrestricted area of navigation – navigation in sea areas without restrictions on wave height and distance from the place of refuge;

restricted area of navigation **R1** – navigation in sea areas at seas with a wave height of 8,5 m with 3 per cent probability and with the ships proceeding not more than 200 miles[1] away from the place of refuge and with an allowable distance between the places of refuge not more than 400 miles;

restricted area of navigation **R2** – navigation in sea areas at seas with a wave height of 7,0 m with 3 per cent probability with ships proceeding from the place of refuge not more than 100 miles and with an allowable distance between the places of refuge not more than 200 miles;

restricted area of navigation **R2-RSN** – river-sea navigation at seas with a wave height of 6,0 m with 3 per cent probability with ships proceeding from the place of refuge:

in open seas up to 50 miles and with an allowable distance between the places of refuge not more than 100 miles;

in enclosed seas up to 100 miles and with an allowable distance between the places of refuge not more than 200 miles;

restricted area of navigation **R3-RSN** – river-sea navigation at seas with a wave height of 3,5 m with 3 per cent probability with due regard for particular restrictions on the area and conditions of navigation resulting from the wind and wave conditions of the basins with determination of a maximum allowable distance from the place of refuge which in no case should be more than 50 miles;

restricted area of navigation **R3** – harbour, roadstead and coastal navigation within limits established by the Register in each case;

restricted area of navigation **Berth-connected ship** – for berth-connected ships (with indication of siding place position and geographical service area according to Fig. 4.3.3.6, Part IV "Stability" of the Rules for the Classification and Construction of Sea-Going Ships).

1.2.2 For passenger sea and mixed (sea-river) navigation ships engaged in domestic voyages (sea cabotage), except for ships to which according to 2.6.1.1.2 of the General Provisions on Technical Supervision Activities, Directive 98/18 / EC does not apply, the following signs and corresponding to each sign restrictions are applied:

.1 A – navigation outside the navigation area of ships with area restrictions **B-R3-RSN, C-R3-RSN** and **D-R3** without additional limiting restrictions and limitations of the wave regime - an unrestricted area of navigation;

.2 A-R1– navigation with a wave height of 8,5 m with 3 per cent probability, outside the area of navigation of ships with restricted area **B-R3-RSN, C-R3-RSN** and **D-R3,** and with the ships proceeding not more than 200 miles away from the place of refuge and with an allowable distance between the places of refuge not more than 400 miles;

.3 A-R2 – navigation with a wave height of 7,0 m with 3 per cent probability outside the area of navigation of ships with restricted area **B-R3-RSN, C-R3-RSN** and **D-R3,** with ships proceeding from the place of refuge not more than 100 miles and with an allowable distance between the places of refuge not more than 200 miles;

.4 A-R2-RSN – river-sea navigation with a wave height of 6,0 m with 3 per cent probability, outside the area of navigation of ships with restricted area **B-R3-RSN, C-R3-RSN** and **D-R3,** with ships proceeding from the place of refuge:

in open seas up to 50 miles and with an allowable distance between the places of refuge not more than 100 miles;

in enclosed seas up to 100 miles and with an allowable distance between the places of refuge not more than 200 miles;

.5 B-R3-RSN – river-sea navigation with a wave height of 3,5 m with 3 per cent probability and more (a specific wave height of up to 6.0 m can be set), in the course of which the ship never departs from the coastline for more than 20 miles, to which persons injured by a catastrophe with a ship may land at an average tide altitude and not more than 50 miles from the place of refuge;

.6 C-R3-RSN – river-sea navigation at seas, in which the probability (repeatability) of the significant wave of 2,5 m and more and waves of 3,5 m with 3 per cent probability is less than 10 % for a period of one year during the operation of the ship throughout the year, or for a limited prescribed period of the year for operation exclusively during this period (for example, the summer period of operation), in the course of which it never departs more than 15 miles from the place of refuge and not more than 5 miles from the coastline, to which

persons affected by the disaster with the vessel can land at an average tide altitude;

.7 D-R3 - river-sea navigation at seas, in which the probability (repeatability) of the significant wave of 1,5 m and more or waves of 2,0 m with 3 per cent probability is less than 10 % for a period of one year during the operation of the ship throughout the year, or for a limited prescribed period of the year for operation exclusively during this period (for example, the summer period of operation), in the course of which it never departs more than 3 miles from the coastline, to which persons affected by the disaster with the vessel can land at an average tide altitude.

.8 specific geographical and seasonal restrictions of the navigation areas of self-propelled vessels with signs **B-R3-RSN**, **C-R3-RSN** and **D-R3** shown in Table 2.2.5.3-2 of Part I "Classification" of the Rules for the Classification and Construction of Ships.

1.2.3 Restrictions for particular floating crane operations (cargo-handling operations and navigation with eventual carriage of cargoes on deck and/or in the hold) shall be imposed by the Register in each particular case;

1.2.4 The following explanations have been adopted for the purpose of the present Part of the Rules:

Rules mean the Rules for the Equipment of Sea-Going Ships consisting of the following Parts:

I "Survey Regulations";

II "Life-Saving Appliances";

III "Signal Means";

IV "Radio Equipment";

V "Navigational Equipment".

Additional requirements – requirements set by the Register in the implementation of supervisory activities, which are not provided for in the Rules.

2 SURVEYS OF EQUIPMENT OF SHIPS IN SERVICE

2.1 GENERAL

2.1.1 Surveys of all the equipment of a ship, whenever practicable, shall be held simultaneously.

In general, surveys of the equipment shall be held concurrently with periodical classification surveys, as stated in "General Provisions" of the Rules for the Classification Surveys of Ships in Service and other normative documents of the Register.

2.2 INITIAL SURVEY

2.2.1 The initial survey is held in order to ascertain that the equipment initially submitted to the Register can be allowed for service on board the ship.

The scope of the initial survey of equipment is determined by the Register on the basis of Table 2.3 with due regard to the provisions stated under 2.4 and 2.5 of General Regulations for the Classification and Other Activity.

2.3 PERIODICAL SURVEYS

2.3.1 The periodical surveys (annual and special) are held in order to ascertain that the equipment complies with the requirements of the Rules and additional requirements of the Register. The scope of periodical surveys and intervals between them are given in Table 2.3.

The scope of individual inspections, measurements, tests, etc. is determined by a Surveyor to the Register depending upon the instructions in force and particular circumstances.

Table 2.3. **Scope of periodical surveys**

Nos	Item to be surveyed	Survey of a ship				
		1st annual	2nd annual	3rd annual	4th annual	special
	1. Life-saving arrangements and appliances					
1.1	Launching appliances	P[1]	P[1]	P[1]	P[1]	P[1]
1.2	Lifeboats and rescue boats	OP[1,2]	OP[1,2]	OP[1,2]	OP[1,2]	OP[1,2]
1.3	Rigid liferafts and buoyant apparatus	O[1]	O[1]	O[1]	O[1]	O[1]
1.4	Inflatable liferafts, marine evacuation systems, inflated rescue boats, hydrostatic Release units. Inflatable lifejackets, immersion suits, antiexposure suits and thermal protective aids	CE[3]	CE[3]	CE[3]	CE[3]	CE[3]
1.5	Lifebuoys and rigid lifejackets	C	C	C	C	CE[3]
1.6	Line-throwing appliances	C	C	C	C	C
1.7	Posters or signs using symbols	C	C	C	C	C
	2. Signal means					
2.1	Navigation and flashing lights	P	P	P	P	OP
2.1.1	Spare parts for navigation and flashing lights	–	–	–	–	C
2.2	Sound signal means	P	P	P	P	P
2.3	Signal shapes and pyrotechnic means	C	C	C	C	C
	3. Navigational equipment					
3.1	Standard magnetic compass	P	P	P	P	EP
3.2	Spare magnetic compass	P	C	P	C	P
3.3	Gyrocompass	P	P	P	P	P
3.4	Ship's heading or track control system	P	P	P	P	P
3.5	Transmitting heading device (THD)	P	P	P	P	P
3.6	Electronic chart display and information system (ECDIS)	P	P	P	P	P
3.7	Back up arrangements for ECDIS	P	P	P	P	P

Continue of Table 2.3

Nos	Item to be surveyed	Survey of a ship

		1st annual	2nd annual	3rd annual	4th annual	special
3.8	Receiver for a global navigation satellite system(s)/terrestrial radionavigation system	P	P	P	P	P
3.9	Radar	P	P	P	P	P
3.10	Electronic plotting aid (EPA)	P	P	P	P	P
3.11	Automatic tracking aid (ATA)	P	P	P	P	P
3.12	Automatic radar plotting aid (ARPA)	P	P	P	P	P
3.13	Automatic identification system (AIS)	P	P	P	P	P
3.14	Voyage data recorder (VDR)	EC	EC	EC	EC	EC
3.15	Speed and distance measuring device (through the water, over the ground in the forward and athwart ship direction)	P	C	P	C	OP
3.16	Mechanical log	C	C	C	C	C
3.17	Echosounder	P	P	P	P	OP
3.18	Sound reception system	P	P	P	P	P
3.19	Radar reflector	P	C	P	C	P
3.20	Radiobeacon station	P	P	P	P	P
3.21	Navigational devices and instruments	C	C	C	C	C
3.22	Spaces intended for installation of navigational equipment	C	C	C	C	C
3.23	Sources of electrical power	P	P	P	P	OMP
3.24	Aerials	P	P	P	P	OP
3.25	Earthing	C	C	C	C	C
3.26	Spare parts, measuring instruments, tools and materials	C	C	C	C	CE
	4. Radio equipment					
4.1	Spaces where shipboard radiocommunication facilities are installed	C	C	C	C	C
4.2	Spaces where survival craft radiocommunication facilities are located	C	C	C	C	C
4.3	VHF radio installation:					
	DSC encoder;	P	P	P	P	OMP
	DSC watch receiver;	P	P	P	P	OMP
	Radiotelephone station	P	P	P	P	OMP
4.4	MF radio installation:					
	DSC encoder;	P	P	P	P	OMP
	DSC watch receiver;	P	P	P	P	OMP
	Radiotelephone station	MP	MP	MP	MP	OMP

Continue of Table 2.3

Nos	Item to be surveyed	Survey of a ship

		1st annual	2nd annual	3rd annual	4th annual	special
	MF/HF radio installation:					
	.1 DSC encoder;	P	P	P	P	OMP
4.5	**.2** DSC watch receiver;	P	P	P	P	OMP
	.3 radio receiver for telephony and NBDP;	P	P	P	P	OMP
	.4 radio transmitter for telephony DSC and NBDP;	MP	MP	MP	MP	OMP
	.5 improved fidelity printer;	P	P	P	P	OP
	.6 terminal printer	P	P	P	P	OP
4.6	INMARSAT ship earth station	P	P	P	P	OMP
4.7	Security alert system	P	P	P	P	OMP
4.8	NAVTEX service receiver	P	P	P	P	OMP
4.9	EGC receiver	P	P	P	P	OMP
4.10	HF direct-printing radiotelegraphy receiver for reception of MSI	P	P	P	P	OMP
4.11	COSPAS-SARSAT satellite EPIRB	EP	EP	EP	EP	EP
4.12	INMARSAT satellite EPIRB	EP	EP	EP	EP	EP
4.13	VHF EPIRB	EP	EP	EP	EP	EP
4.14	Ship's search and rescue locating device: ship's radar search and rescue transponder (SART) or ship's AIS search and rescue transmitter (AIS-SART)	P	P	P	P	P
4.15	Receiver for audio watch on the radiotelephone distress frequency 2182 kHz	P	P	P	P	OMP
4.16	Automatic receiver of radiotelephone alarms at a frequency of 2182 kHz	P	P	P	P	OMP
4.17	Two-way VHF radiotelephone apparatus[4]	CP	CP	CP	CP	CP
4.18	Fixed two-way VHF radiotelephone apparatus[4]	CP	CP	CP	CP	OMP
4.19	Equipment of public address system (including spaces, sources of energy, earthing and spare parts	P	P	P	P	OMP
4.20	Sources of electrical power:					
	.1 transformers;	P	P	P	P	OMP
	.2 accumulator batteries;	P	P	P	P	OMP
	.3 charging devices (including automatic ones);	P	P	P	P	OMP

End of Table 2.3

Nos	Item to be surveyed	Survey of a ship

		1st annual	2nd annual	3rd annual	4th annual	special
	.4 cabling;	C	C	C	C	OM
	.5 switchboards and fittings;	P	P	P	P	OP
	.6 protective equipment against radio interference;	C	C	C	C	O
4.21	Aerials	MP	MP	MP	MP	OMP
4.22	Lead-in and interior wiring of aerials	C	C	C	C	O
4.23	Earthing	C	C	C	C	OM
4.24	Spare parts, portable measuring instruments	C	C	C	C	CP

Symbols:

O — examination with provision of measures to enable the items involved to be made accessible for examination, to be opened up or dismantled, if necessary;

C — external examination;

M — measurement of wears, clearances, insulation resistance, etc;

P — testing of machinery, equipment and arrangements under working conditions, external examination included; E — checking of documents and/or brands confirming carrying-out of obligatory periodical checking by an appropriate competent body.

[1] When determining the technical condition of life-saving appliances as related to strength and/or tightness, the proof load testing of the launching devices, hook releasing devices of the lifeboat, lifeboats and rescue boats or checking of tightness of the boats and their air boxes or compartments of the rigid liferafts and buoyant apparatus may be required at the discretion of a Surveyor. Such testing and checking are obligatory during special surveys of ship for lifeboats (except for free-fall lifeboats), rescue boats of rigid and combination of rigid and inflated construction, rigid liferafts and buoyant apparatus of 10 years old and over, for inflated rescue boats of 5 years old and for the launching devices and hook releasing devices of the lifeboat — not less than once every 5 years. Measurement of residual thicknesses of metal structures being part of the life-saving arrangements shall be made at the discretion of a Surveyor.

[2] Checking in operation of motor lifeboats and rescue boats, their propelling gears, launching and recovery appliances, drainage arrangements, as well as drenching and compressed air systems of the lifeboats in oil tankers.

[3] Checking of documentation to confirm carrying-out of the periodical surveys and testing at the survival craft stations as well as at other specialized locations for surveying, testing and repairing the personal life-saving appliances.

[4] Operability of the two-way VHF radiotelephone apparatus shall be checked by a primary battery not intended for use in distress.

2.4 OCCASIONAL SURVEYS

2.4.1 The occasional surveys of ship's equipment are held in all other cases except initial and periodical surveys. The scope of the surveys and procedure for them are determined by the Register depending on the purpose of the survey and on technical condition of the equipment.

2.4.2 A survey after emergency is carried out in case the damage has been

sustained by ship's equipment, arrangements or outfit enlisted in the Register Nomenclature.

The survey shall be held in a port where the ship is at the moment or in the first port she calls after the emergency.

This survey is held in order to reveal the damage, agree upon the scope of work required to eliminate the consequences of an emergency and to determine possibility and conditions of retaining validity of the relevant documents of the Register.

2.4.3 The occasional surveys may be held at the request of the shipowner or the underwriter to the extent necessary to comply with their application or they may be initiated by the Register.

2.5 SURVEY OF EQUIPMENT OF THE SHIPS IN SERVICE WHICH ARE NOT REGISTERED BY THE REGISTER

2.5.1 The Register may establish the survey of ship in service which is not registered by the Register provided that this ship was submitted to the initial survey (refer to 2.2).

2.5.2 When submitting the ship for survey of the equipment the technical documentation in the scope defined in 3.1 as well as the documents on the previous survey of the equipment shall be submitted.

If the shipowner is not able to submit some materials from the ones specified in 3.1 he shall ensure the receiving by the Register of all the necessary information for carrying out the initial survey.

3. DESIGN DOCUMENTATION OF A SHIP UNDER CONSTRUCTION

3.1 DESIGN DOCUMENTATION FOR EQUIPMENT OF A SHIP UNDER CONSTRUCTION

3.1.1 General.

Prior to the commencement of a ship construction, technical documentation, specified in 4.1, 4.2.1 and 4.2.5, Part I "Classification" of the Rules for Classification and Construction of Ships proving that all requirements of the Register applicable to the ship concerned are complied with shall be submitted to the Register for review.

3.2 DESIGN DOCUMENTATION FOR EQUIPMENT OF A SHIP UNDER CONSTRUCTION

Working documentation for the ship under construction, for the equipment of which the requirements of the Rules apply, which, specified in 4.3.1 and 4.3.4, Part I "Classification" of the Rules for Classification and Construction of Ships shall be submitted to the Register for rewiev.

3.3 TECHNICAL DOCUMENTATION FOR EQUIPMENT OF SHIP

SUBJECT TO CONVERSION OR RECONSTRUCTION

3.3.1 Prior to the commencement of work on conversion or reconstruction of a ship, technical documentation concerning those items of equipment which are liable to conversion or reconstruction shall be submitted to the Register for review.

3.3.2 In case of new components of equipment on board the ship, which differ substantially from those fitted initially and covered by the Rules, additional technical documentation on these components shall be submitted to the Register for review within the scope required for a ship under construction (refer to 3.1).

PART II. LIFE-SAVING APPLIANCES

1. GENERAL

1.1 APPLICATION

1.1.1 The requirements of the present Part of the Rules, unless expressly provided otherwise, apply to the ships constructed after 1 July 1998 whose equipment with life-saving appliances and arrangements is subject to survey by the Register as well as to the life-saving appliances and arrangements intended for installation aboard these ships.

1.1.2 The ships constructed before 1 July 1998 shall comply with the requirements of regulations being in force prior to 1 July 1998.

1.1.3 For ships constructed before 1 July 1998, when life-saving appliances or arrangements on such ships are replaced or such ships undergo repairs, alterations or modifications of a major character which involve replacement of, or any addition to, their existing life-saving appliances or arrangements, such life-saving appliances or arrangements, in so far as is reasonable and practicable, comply with the requirements of the present Part of the Rules. However, if a survival craft other than an inflatable liferaft is replaced without replacing its launching appliance, or vice versa, the survival craft or launching appliance may be of the same type as that replaced.

1.1.4 The present Part of the Rules lays down the technical requirements which life-saving appliances and arrangements shall comply with and specifies the number of these appliances and arrangements and their location on board ships.

1.1.5 Individual ships which, in the course of their voyage, do not proceed more than 20 miles from the nearest land, may be exempted from the requirements of the present Part, taking into account that the sheltered nature and conditions of the voyage are such that the application of such requirements rendered unreasonable or unnecessary, that shall be in each case substantiated by the procedure approved by the Register.

1.1.6 Confirmation of compliance of a passenger ship with the sign **A**, **A-R1**, **A-R2**, **A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN** and **D-R3** in the ship's class notation with the provisions of Council Directive 98/18 / EC of 17 March 1998 on safety rules and regulations on passenger vessels of inland navigation shall be carried out in accordance with the requirements of 2.6.1 "Confirmation of compliance according to the Council of Europe Directive" of the General Provisions on Technical supervision Activities and compliance with the requirements of 1.1.1.5, Part I of the "Provisions for Supervision" and the specific requirements of this Part of the Rules, depending on the sign, both for new (built on July 1, 1998 and after this date) or existing (built before 1 July 1998) ships, namely:

- existing ships with a sign **B-R3-RSN**, **C-R3-RSN** and

D-R3 - 2.7.1.6;

- existing ships with a sign **B-R3-RSN**, which carry more than 36 passengers *(no later than October 1, 2000)* - 2.1.3.2, 6.22.2.1;

- new and existing ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3**, which carry more than 36 passengers - 6.22.2.1;

- new and existing ships with a sign **A, A-R1, A-R2, A-R2-RSN** - 2.9.1;

- new ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3**, and existing ships with a sign **B-R3-RSN** of Ro-Ro type - 2.6;

- new and existing ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3** - 2.1.3.2, 2.3.1, 2.3.2, 2.3.4, 2.3.8, 2.3.9, 2.4.1.1, 2.4.1.3, 2.4.1.4, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.6, 2.4.8, 2.4.10, 2.5, 2.7.1.1, 2.8.1, 2.8.3, 2.8.4, 2.9.4, 3.1.1.4.2, 3.3.1, 3.3.2, 3.5, 6.20.8.3.1.2;

- ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3**, constructed on or after January 1, 2003 - 2.7.1.7, 2.7.2, 2.7.3, 2.7.4, 2.7.5, 2.7.6, 2.7.7, 2.7.8, 2.8.5, 6.22.1.1, 6.22.2.2;

- нові судна зі знаком **B-R3-RSN, C-R3-RSN** та **D-R3** - 2.3.7, 3.3.1.3, 2.4.10, 2.6.5;

- new ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3** of Ro-Ro type (*on the date of the first periodic survey after 1 st of November 1998)* - 3.4.6.1, 3.4.6.2;

- ships with a sign **B-R3-RSN, C-R3-RSN** та **D-R3** of Ro-Ro type, built before January 1, 2003 *(before the first periodic survey after January 1, 2006)* - 3.4.2, 3.4.3, 3.4.4, 3.4.5;

- ships with a sign **B-R3-RSN, C-R3-RSN** та **D-R3** of Ro-Ro type, built after January 1, 2003 – 3.4.2.1, 3.4.2.2, 3.4.2.3, 3.4.2.4, 3.4.3.1, 3.4.3.2, 3.4.3.3, 3.4.3.4, 3.4.4.1, 3.4.4.2, 3.4.4.3, 3.4.5;

- ships with a sign **B-R3-RSN**, **C-R3-RSN** and **D-R3 of Ro-Ro type**, built on or after 1 January 2003, which carry more than 36 passengers - 6.22.2.2;

1.2 DEFINITIONS AND EXPLANATIONS

Definitions and explanations relating to the general terminology of the Rules are given in Part I "Classification" of the Rules for the Classification and Construction of Ships and in 1.2, Part I "Survey regulations" of theses Rules.

For the purpose of the present Part of the Rules the following definitions have been adopted:

Detection is the determination of the location of survivors and life-saving appliances.

Retro-reflective material is a material which reflects in the opposite direction abeam of light directed on it.

Immersion suit – is a protective suit made of waterproof material intended for reducing the body heat-loss of a person wearing it in cold water.

Highly visible colour is saturate orange or yellow colour.

Length of ship is 96 percent of the total length on a water line at 85 percent of the least moulded depth measured from the top of the keel, or the length from the fore-side of the stem to the axis of the rudder stock on the same waterline, if that is greater.

In ships designed with a rake of keel the waterline on which this is measured shall be parallel to the designed waterline.

Permissible height of a free-fall lifeboat installation is the distance measured from the lowest point of the lifeboat, ready to launch, to the surface of the water, approved by the Register.

Effective clearing of the is the ability of the free-fall lifeboat to move away from the ship after free-fall launching without using its engine.

Anti-exposure suit is a protective suit designed for use by rescue boat crews and marine evacuation system parties.

The final port of destination is the last port of call in the scheduled voyage at which the ship commences its return voyage to the country in which the voyage began.

Survival craft is a craft capable of sustaining the lives of persons in distress from the time of abandoning the ship.

Short international voyage – is an international voyage in the course of which a ship is not more than 200 miles from a port or place in which the passengers and crew could be placed in safety. The distance between the last port of call in the country in which the voyage begins and the final port of destination as well as the return voyage shall not exceed 600 miles.

Water entry angle is the angle between the horizontal and the keel of a free-fall lifeboat when it first enters water after falling from the certificated height of installation.

Launching ramp angle is the angle between the horizontal and the launch rail of the lifeboat in its launching position with the ship on even keel.

International voyage is a voyage from a country to which the

International Convention for the Safety of Life at Sea, 1974, applies to a port outside this country, or conversely.

Marine evacuation system is an appliance for the rapid transfer of persons from the embarkation deck of a ship to a floating survival craft.

Inflatable appliance is an appliance which depends upon non–rigid, gas filled chambers for buoyancy and which is normally kept uninflated until ready for use.

Inflated appliance is an appliance which depends upon non-rigid, gas filled chambers for buoyancy and which is kept inflated and ready for use at all times.

The lowest operating draft is the draft of the vessel on a even keel, without cargo, with 10% of the stores and fuel, and in case of a passenger ship, in addition, with the full number of passengers and crew with their luggage.

Positive stability is the ability of a craft to return to its original position after the removal of a heeling moment.

Embarkation ladder is the ladder provided at survival craft embarkation stations to permit safe access to survival craft after their launching..

Free-fall acceleration is the rate of change of velocity experienced by the occupants during launching of a free-fall lifeboat.

Novel life-saving appliance or arrangement is an appliance or arrangement which embodies new features not fully covered by the provisions of this Chapter but which provides an equal or higher standard of safety.

Float-free launching is that method of launching survival craft where by the craft is automatically released from a sinking ship and is ready for use.

Free-fall launching is that method of launching survival craft whereby the craft with its complement of persons and equipment on board is released from a ship and allowed to fall into the water without any restraining apparatus.

Launching crew is the personnel remaining aboard a lifeboat to handle it during launching and recovering..

Launching appliance is the davits and other arrangements aboard ship intended for launching and recovery the lifeboats, rescueboats and liferafts.

Moulded depth is the vertical distance measured from the top of the keel to the top of the freeboard deck beam at side. In wood and composite ships this distance is measured from the lower edge of the keel rabbet. Where the form at the lower part of the midship section is of a hollow character, or where thick garboards are fitted, the depth is measured from the point where the line of the flat of the bottom continued inwards cuts the side of the keel.

In ships having rounded gunwales, the moulded depth shall be measured to the point of intersection of the moulded lines of the deck and side shell plating, the lines extending as though the gunwales were of angular design.

If the freeboard deck is stepped in the longitudinal direction and the raised part of the deck extends over the point at which the moulded depth shall be determin-

ed, the moulded depth shall be measured to a line of reference extending from t he lower part of the deck along a line parallel with the raised part.

Thermal protective aid is a bag or suit made of waterproof material with low thermal conductivity.

Recovery time for a rescue boat is the time required to raise the boat to a position where persons on board can disembark to the deck of the ship. Recovery time includes the time required to make preparations for recovery on board the rescue boat such as passing and securing a painter, connecting the rescue boat to the launching appliance, and the time to raise the rescue boat. Recovery time does not include the time needed to lower the launching appliance in to position to recover the rescue boat.

Rescue boat is a special life-saving appliance intended to rescue persons fallen into the water, persons from a ship in distress, as well as to marshal and t ow liferafts in emergency conditions.

Fast rescue boat is a rescue boat which is capable of manoeuvring for at least 4h at a speed of at least 20 knots in calm water with a crew of 3 persons and at least 8 knots with a full complement of persons and equipment.

1.3 SCOPE OF SURVEY

1.3.1 General provisions for the procedure of survey of the life-saving appliances and arrangements, their manufacturing and service, as well as the requirements for the technical documentation to be submitted to the Register for review and provisions concerning documents issued by the Register for the life-saving appliances and arrangements are given in General Regulations for the Classification and Other Activity and in Part I "Survey Regulations".

Except cases prescribed by 1.3.5 and 1.3.6 the life-saving appliances and arrangements required by the present Part shall be approved by the Register.

1.3.2 Before giving approval to life-saving appliances and arrangements the Register shall ensure that such life-saving appliances and arrangements:

.1 are tested in accordance with the provisions of IMO resolution MSC.81(70) "Revised Recommendation on Testing of Life-Saving Appliances" to confirm that they comply with the requirements of the present Part; or

.2 have successfully undergone, to the satisfaction of the Register, tests which are basically equivalent to the tests prescribed in 1.3.2.1.

1.3.3 Prior to approval of the life-saving appliances or arrangements of the new type, the Register shall provide that such appliances and arrangements:

.1 provide, at least, the equivalent level of safety to the requirements of the present Part of the Rules and shall be evaluated and tested in compliance with the provisions of the Guidelines on Alternative Design and Arrangements[1];

.2 have successfully passed the engineering analysis, evaluation and approval in compliance with the requirements of 1.3.11.

1.3.4 Procedures adopted by the Register for approval shall also include the

[1] Refer to IMO MSC.1/Circ.1212

conditions whereby approval would continue to be valid or it would be withdrawn.

1.3.5 Before accepting life-saving appliances an d arrangements that have not been previously approved by the Register, the Register shall be satisfied that life-saving appliances and arrangements comply with the requirements of the present Part.

1.3.6 Life-saving appliances required by the present Part for which detailed specifications are not included in this Part of the Rules shall be to the satisfaction of the Register.

1.3.7 Production tests.

The Register shall require life-saving appliances to be subjected to such production tests as are necessary to ensure that the life-saving appliances are manufactured to the same standards as the approved prototype.

1.3.8 The technical documentation on life-saving appliances and arrangements to be submitted to the Register for approval shall be as follows:

.1 On lifeboats and rescue boats the following shall be submitted:

.1.1 specification (hull, machinery and electrical equipment) including calculations of strength, stability, unsinkability, carrying capacity (the number of persons), volume of buoyancy, calculations of protective means and compressed air system, heel of equipment;

.2 lines drawing;

.3 longitudinal and transverse sections with indication of arrangement of the air cases or compartments, their volume and material;

.4 drawing of the launching and recovery appliance including launching/recovery strops for lifeboat launched by free-fall, with the use of falls and for rescue boat which is not a lifeboat (arrangement, securing and strength calculations);

.5 drawing of the steering gear;

.6 general arrangement plan with indication of stowage of equipment and accommodation of persons;

.7 diagram of protective foldable cover (canopy);

.8 shell expansion for metal lifeboats;

.9 sailing rig, if available;

.10 drawings of the propulsion unit and the shafting including calculations drawings of driving engine, bed and protective casing, fuel tank as well as electric equipment circuit diagram and choice of accumulator batteries;

.11 test programme;

.12 drawing of survival craft towing arrangements (location, securing and strength calculation);

.13 drawing showing safety belts fitted to boat;

.14 drawings of air support and water spray systems.

.2 On rigid liferafts the following shall be submitted:

.2.1 specification of the liferaft including the strength calculations of the liferaft, its towing and launching and recovery arrangements, volume of deck are a

and carrying capacity (number of persons), as well as draught; heel of equipment;

.2.2 general arrangement plan (construction of life-raft and main dimensions) with indication of stowage of equipment and accommodation of persons;

.2.3 test programme;

.3 On inflatable liferafts the following shall be submitted:

.3.1 specification of the liferaft including the strength calculations of the towing and launching and recovery arrangements, volume of buoyancy, deck area and carrying capacity (number of persons), as well as draught; heel of equipment;

.3.2 general arrangement plan (construction of lifeboat and main dimensions with indication of accommodation of persons, stowage of equipment, location of fittings and valves), container drawing;

.3.3 arrangement diagram, drawings and calculations of pressure vessels, fittings and valves of automatic gas inflation system, electric lighting circuit;

.3.4 test programme;

.4 On lifejackets and lifebuoys, immersion suits and thermal protective aids the following shall be submitted:

.4.1 specification (no stamp of approval is needed);

.4.2 drawing and calculation of pressure vessels, fittings and valves of automatic gas inflation system in the case of inflatable lifejackets and immersion suits;

.4.3 general view drawing (construction, material and equipment);

.4.4 test programme;

.5 On items of equipment of life-saving appliances the following shall be submitted:

.5.1 specification (no stamp of approval is needed);

.5.2 general view drawing (construction, material and equipment);

.5.3 test programme;

.6 On launching appliances the following shall be submitted:

.6.1 specification (no stamp of approval is needed);

.6.2 general view drawing (construction, material and equipment);

.6.3 strength calculation and diagrams of forces (no stamp of approval is needed);

.6.4 test programme;

.7 On winches and mechanical drives of launching appliances the following shall be submitted:

.7.1 specification (no stamp of approval is needed);

.7.2 general view drawing (construction, material and parts with dimensions);

.7.3 strength calculation (no stamp of approval is needed);

.7.4 test programme;

.8 technical analysis of alternative design solutions and tools (see 3.1.11) - in case of their application.

1.3.9 The following items are subject to survey by the Register during manufacture:

.1 lifeboats and rescue boats;

.2 liferaft s (inflatable and rigid) ;

.3 lifebuoys;

.4 lifejackets;

.5 immersion and anti-exposure suits;

.6 thermal protective aids;

.7 marine evacuation systems;

.8 launching appliance winches;

.9 engines of lifeboats and rescue boats;

.10 line-throwing appliances;

.11 means of rescue;

.12 self-igniting lights of lifebuoys;

.13 self-activating smoke signals of lifebuoys;

.14 lifeboat searchlights;

.15 launching appliances of lifeboats, liferafts and rescue boats;

.16 containers for inflatable liferafts;

.17 release mechanism of lifeboats, liferafts and rescue boats including launching/recovery strops for lifeboat launched by free-fall, with the use of falls and for rescue boat which is not a lifeboat;

.18 hydrostatic release units;

.19 embarkation ladders;

.20 lights of lifeboats, liferafts and lifejackets;

.21 buoyant rescue quoits with buoyant line;

.22 parachute flares, hand flares and buoyant smoke signals;

.23 manual bailing pumps of lifeboats;

.24 food rations;

.25 watertight receptacles with fresh water;

.26 sea-activated power sources for lights of lifejackets, liferafts and for lifebuoy self-igniting lights;

.27 items of equipment and parts of life-saving appliances and arrangements required in 6.8.5 and 6.13.8. Survey by the Register consists only of review and approval of technical documentation.

1.3.10 Equipment of ships with life-saving appliances and arrangements shall be effected under survey by the Register.

1.3.11 Alternative design and arrangements.

1.3.11.1 General.

.1 Life-saving appliances and arrangements may deviate from the requirements of the present Part of the Rules, provided that such alternative design and arrangements satisfy the intent of these requirements and provide the equivalent level of safety to the Rules.

.2 When alternative design or arrangements deviate from the prescriptive requirements of the Rules, an engineering analysis, evaluation and approval of such design and arrangements shall be carried out in compliance with the present Chapter.

1.3.11.2 Engineering analysis.

The engineering analysis shall be prepared on the basis of the Guidelines on Alternative Design and Arrangements[1] and submitted to the Register.

It shall include, at least, the following elements:

.1 determination of the ship type and appropriate life-saving appliances and **arrangements;**

.2 identification of the prescriptive requirement(s), from which the life-saving appliances and arrangements will deviate;

.3 identification of the reason of the proposed design deviation from the prescriptive requirements, taking into account its compliance with other technical standards recognized by the Register;

.4 determination of the performance criteria for the ship and appropriate life-saving appliances and arrangements considered in the relevant prescriptive requirement(s):

.4.1 performance criteria shall provide the level of safety not lower than the relevant prescriptive requirements contained in Sections 1-5 of the Rules;

.4.2 performance criteria shall be subject to quantitative analysis and measurement;

.5 detailed description of the alternative design and arrangements, including a list of the assumptions used in the design and any proposed operating limitations and conditions;

.6 technical justification demonstrating that the alternative design and arrangements satisfy the safety performance criteria; and

.7 risk assessment based on identification of possible failures and hazards associated with the proposal.

1.3.11.3 Evaluation of the alternative design and arrangements.

.1 The engineering analysis required in 1.3.11.2 shall be evaluated and approved by the Register, taking into account the Guidelines on Alternative Design and Arrangements[1] ;

.2 Copies of the documents approved by the Register, indicating that the alternative design and arrangements comply with the Rules, shall be provided on board.

1.3.11.4 Re-evaluation under the changed conditions.

If the assumptions and operating limitations indicated in the description of the alternative design and arrangements are changed, then under the changed conditions engineering design shall be carried out and approved by the Register.

2. REQUIREMENTS FOR ALL TYPES OF SHIPS

2.1 COMMUNICATIONS

2.1.1 Radio life-saving appliances .

2.1.1.1 Two-way VHF radiotelephone apparatus.

At least three two-way VHF radiotelephone apparatus shall be provided on every cargo ship of 500 gross tonnage and upwards. At least two two-way VHF

radiotelephone apparatus shall be provided on every cargo ship of 300 gross tonnage and upwards but less than 500 gross tonnage.

At least two two-way VHF radiotelephone apparatus shall be provided on every passenger ship of restricted area **D-R3** in the ship's class notation, carrying up to 250 passengers.

Ships under the flag of Ukraine that do not carry out international voyages, shall be provided with two-way VHF radiotelephone apparatus according to Table 2.2.2 of Part IV "Radio Equipment".

Such apparatus shall comply with the requirements of Section 12, Part IV "Radio Equipment".

2.1.1.2 Search and rescue locating devices (Radar Transponder (Search and Rescue Radar Transponder) (SART) or AIS Search and Rescue Transmitter (AIS-SART)[2].

Since 01.01.2010:

At least one search and rescue locating device shall be carried on each side of every passenger ship and of every cargo ship of 500 gross tonnage and upwards.

At least one search and rescue locating device shall be carried on every cargo ship of 300 gross tonnage and upwards but less than 500 gross tonnage.

Such search and rescue locating devices shall comply with the requirements of Section 10, Part IV "Radio Equipment".

Search and rescue locating devices shall be stowed in such locations that they can be rapidly placed in any survival craft other than the liferaft or liferafts required by 4.1.1.4.

Alternatively one search and rescue locating device shall be stowed in each survival craft other than those required by 4.1.1.4.

On ships carrying at least two search and rescue locating devices and equipped with free-fall lifeboats one of the search and rescue locating devices shall be stowed in a free-fall lifeboat and the other located in the immediate vicinity of the navigation bridges or that it can be utilized on board and ready for transfer to any of the other survival craft.

Ships under the flag of Ukraine that do not carry out international voyage, shall be provided with search and rescue locating devices in quantity corresponding to the requirements of 8, Table 2.2.2, Part IV "Radio Equipment" regarding the radar transponder.

2.1.1.3 Every fishing vessel, cargo ship of under 300 gross tonnage, non-propelled ship with people on board towed or pushed at sea, or intended for the prolonged anchorage outside the port water area and roads, as well as ships not engaged in international voyages shall be fitted with one search and rescue locating device and two sets of two-way VHF radiotelephone apparatus.

2.1.1.4 In agreement with the Register the ships of the road and port

[2] Further on the text and for indication in the relevant documents, it is noted as: " Search and rescue locating devices".

navigation, can be exempted from the requirements of 2.1.1.1 - 2.1.1.3.

2.1.2 Distress flares.

Not less than 12 rocket parachute flares, complying with the requirements of 6.7.1, shall be carried and be stowed on or near the navigation bridge.

Ships under the flag of Ukraine that do not carry out international voyage, shall be provided with pyrotechnic means, such as distress flares, in accordance with 2.5, Part III "Signal Means".

2.1.3 On-board communications and alarm systems.

2.1.3.1 Emergency means comprised of either fixed or portable equipment or both shall be provided for two-way communications between emergency control stations, muster and embarkation stations and strategic positions on board.

2.1.3.2 A general emergency alarm system complying with the requirements of 6.22.1 shall be provided and shall be used for summoning passengers and crew to muster stations and to initiate the actions included in the muster heel. The system shall be supplemented by either a public address system complying with the requirements of 6.22.2 or other suitable means of communication. Entertainment sound systems shall automatically be turned off when the general emergency alarm system is activated.

2.1.3.3 The general emergency alarm system shall be audible throughout all the accommodation and normal crew working spaces. On passenger ships, the system shall also be audible on all open decks.

2.1.3.4 On ships fitted with a marine evacuation system communication between the embarkation station and the platform or the survival craft shall be ensured.

2.1.4 Public address systems on passenger ships.

2.1.4.1 In addition to the requirements of 2.1.3.2, all passenger ships shall be fitted with a public address system. With respect to passenger ships constructed before 1 July 1997 the requirements of 2.1.4.2 and 2.1.4.4, subject to the provisions of 2.1.4.5, shall apply not later than the date of the first periodical survey after 1 July 1997.

On ships built on July 1, 1997 and until December 31, 2010:

.1 the public address system shall have at least two loops of the low surface flame spread cable which shall be sufficiently separated throughout their length and have two separate and independent amplifiers; and

.2 the public address system and its performance standards shall be approved by the Register;

.3 all rooms and spaces of each main fire zone shall comply with the requirements of **.1**.

2.1.4.2 Public address system shall comply with 6.22.2.

2.1.4.4 The power supply of the public address system shall meet the requirements of 2.3 (Table 2.3.4), Part IV "Radio Equipment".

2.1.4.5 Ships constructed before 1 July 1997 which are already fitted with the public address system approved by the Register which complies substantially with those required by 2.1.4.2, 2.1.4.4 and 6.22.2.1 are not required to change

their system.

2.2 PERSONAL LIFE-SAVING APPLIANCES

2.2.1 Lifebuoys.

2.2.1.1 Lifebuoys complying with the requirements of 6.2.1:

.1 so distributed as to be readily available on both sides of the ship and as far as practicable on all open decks extending to the ship's side; at least one shall be placed in the vicinity of the stern;

.2 so stowed as to be capable of being rapidly cast loose, and not permanently secured in any way.

2.2.1.2 At least one lifebuoy on each side of the ship shall be fitted with a buoyant lifeline complying with the requirements of 6.2.4 equal in length to not less than twice the height at which it is stowed above the waterline in the lightest seagoing condition, or 30 m, whichever is the greater.

2.2.1.3 Not less than one half of the total number of lifebuoys shall be provided with self-igniting lights complying with the requirements of 6.2.2; not less than two of these shall also be provided with self-activating smoke signals complying with the requirements of 6.2.3 and be capable of quick release from the navigation bridge; lifebuoys with lights and those with lights and smoke signals shall be equally distributed on both sides of the ship and shall not be the lifebuoy s provided with lifelines in compliance with the requirements of 2.2.1.2.

2.2.1.4 Each lifebuoy shall be marked in block capitals of the Roman alphabet with the name and port of registry of the ship.

2.2.2 Lifejackets.

2.2.2.1 For every person on board the ship a lifejacket complying with the requirements of 6.3.1 and 6.3.2 shall be provided and, in addition:

.1 a number of lifejackets suitable for children equal to at least 10 per cent of the number of passengers on board or more as may be required to provide one lifejacket for each child;

.2 a sufficient number of lifejackets shall be provided for persons on watch as well as for use at remotely located survival craft stations. The life-jackets carried for persons on watch shall be stowed on the bridge, in the engine control room and at any other manned watch station.

.3 if the adult lifejackets provided are not designed to fit persons weighing up to 140 kg and with a chest girth of up to 1750 mm, a sufficient number of suitable accessories shall be available on board to allow them to be secured to such persons.

2.2.2.2 Lifejackets shall be so placed as to be readily accessible and their position shall be plainly indicated. Whether, due to the particular arrangement of the ship the lifejackets provided in compliance with the requirements of 2.2.2.1 may become inaccessible, alternative provisions shall be made to the satisfaction of the Register which may include an increase in the number of lifejackets to be carried on board.

2.2.2.3 If the lifejackets are not distributed between all the persons on the ship

the stowage in one place of more than 20 pieces is not permitted.

2.2.2.4 The lifejackets used in totally enclosed lifeboats, except free-fall lifeboats, shall not impede entry into the lifeboat or seating, including operation of the seat belts in the lifeboat.

2.2.2.5 Lifejackets selected for free-fall lifeboats, and the manner in which they are carried or worn, shall not interfere with entry into the lifeboat, occupant safety or operation of the lifeboat.

2.2.3 Immersion suits and anti-exposure suits.

2.2.3.1 An immersion suit, complying with the requirements of paragraph 6.4 or an anti-exposure suit complying with paragraph 6.5, of an appropriate size, shall be provided for every person assigned to crew the rescue boat or assigned to the marine evacuation system party. If the ship is constantly engaged in warm climates where thermal protection is unnecessary, this protective clothing need not be carried.

2.2.3.2 Immersion suits shall be stowed on the ship in accordance with the manufacturer's instructions. As far as practicable a special room shall be provided for drying and airing of wetted immersion suits as well as for minor repairing them in accordance with the manufacturer's instructions.

2.3 ARRANGEMENT OF SURVIVAL CRAFT

2.3.1 Lifeboats and liferafts for which approved launching appliances are required shall be stowed as close to accommodation and service spaces as possible.

2.3.2 Muster stations shall be provided close to the embarkation stations. Each muster station shall have sufficient clear deck space to accommodate all persons assigned to muster at that station, but at least 0,35 m^2 per person.

2.3.3 Muster and embarkation stations shall be readily accessible from accommodation and work areas.

2.3.4 Muster and embarkation stations shall be adequately illuminated by lighting supplied from the emergency source of electrical power required by Sections 9 and 19, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

For liferafts meeting the requirements of 4.1.1.4, portable lighting equipment may be used that shall be able to provide coverage of the raft and the surface of the water in the area of its launching in order to meet the requirements of 2.7.7. Portable lighting facilities shall be provided with holders, which allow to secure them on both sides of the ship.

2.3.5 Alleyways, stairways and exits giving access to the muster and embarkation stations shall be lighted. Such lighting shall be capable of being supplied by the emergency source of electrical power required by Sections 9 and 19, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships. In addition to and as part of the markings required in 8.5.5, Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships, routes to muster stations shall be indicated

with the muster station symbol, intended for that purpose, in accordance with the recommendations of Appendix 2.

2.3.6 Davit-launched and free-fall launched survival craft muster and embarkation stations shall be so arranged as to enable stretcher cases to be placed in survival craft.

2.3.7 An embarkation ladder complying with the requirements of 6.20.7 extending, in a single length, from the deck to the waterline in the lightest seagoing condition under all conditions of trim of up to 10° and a heel of up to 20° either way shall be provided at each embarkation station or at every two adjacent embarkation stations for survival craft launched down the side of the ship. However, the Register may permit such ladders to be replaced by approved devices to afford access to the survival craft when waterborne, provided that there shall be at least one embarkation ladder on each side of the ship.

Embarkation ladders may not be provided for cargo and passenger ships of less than 500 gross tonnage as well as for fishing ships of less than 45 m in length where the liferafts to be boarded from the deck located at height at least 2 m (less than 1,5 m for passenger ships) above the waterline in the lightest seagoing condition and on the ships where the lifeboats are launched from the stern by the method of free-fall launching.

2.3.8 Where necessary, means shall be provided for bringing the davit-launched survival craft against the ship's side and holding them alongside so that persons can be safely embarked.

2.3.9 Launching stations shall be in such positions as to ensure safe launching of the survival craft having particular regard to clearance from the propeller and steeply overhanging portions of the hull and so that, as far as possible, survival craft, except survival craft specially designed for free-fall launching, can be launched down the straight side of the ship. If positioned forward, they shall be located abaft the collision bulkhead in a sheltered position and, in the respect it is necessary to give special consideration to the strength of the launching appliance.

2.4 STOWAGE OF SURVIVAL CRAFT

2.4.1 Each survival craft shall be stowed:

.1 so that the survival craft nor its stowage arrangements will interfere with the operation of any other survival craft or rescue boat at any other launching station;

.2 for ships of 500 gross tonnage and upwards, as near the water surface as is safe and practicable and, in the case of a survival craft other than a liferaft intended for throw-overboard launching, in such a position that the survival craft in the embarkation position is not less than 2 m above the waterline with the ship in the fully loaded condition under unfavorable conditions of trim of up to 10° and heel up to 20° either way, or to the angle at which the ship's weather deck

edge becomes submerged, whichever is less;

.3 in a state of continuous readiness so that two crew members can carry out preparations for embarkation and launching in less than 5 min;

.4 fully equipped as required by this Part;

.5 as far as practicable, in a secure and sheltered position and protected from damage by fire and explosion. In particular, survival craft on oil tankers, other than the liferafts required by 4.1.1.4, shall not be stowed on or above a cargo tank, slop tank, or other tank containing explosive or hazardous cargoes.

2.4.2 Lifeboats for lowering down the ship's side shall be stowed as far forward of the propeller as practicable. On cargo ships of 80 to 120 min length each lifeboat shall be so stowed that the after end of the lifeboat is not less than its length forward of the propeller. On cargo ships of 120 m in length and upwards and passenger ships of 80 m in length and upwards, each lifeboat shall be so stowed that the after end of the lifeboat is not less than 1,5 times the length of the lifeboat forward of the propeller. Where necessary, the ship shall be so arranged that lifeboats, in their stowed positions, are protected from damage by heavy seas.

2.4.3 Lifeboats shall be stowed attached to launching appliances.

2.4.4 Every liferaft shall be stowed with its painter permanently attached to the ship.

2.4.5 Each liferaft or group of liferafts shall be stowed with a float-free arrangement complying with the requirements of 6.8.6 so that each floats free and, if inflatable, inflates automatically when the ship sinks.

2.4.6 Liferafts shall be so stowed as to permit manual release of one raft or container at a time from their securing arrangements.

2.4.7 Requirements of 2.4.4 and 2.4.5 do not apply to liferafts required by regulation 4.1.1.4.

2.4.8 Davit-launched liferafts shall be stowed within reach of the lifting hooks, unless some means of transfer is provided which is not rendered inoperable within the limits of trim and heel prescribed in 2.4.1.2 or by ship motion or power failure.

2.4.9 Liferafts intended for throw-overboard launching shall be so stowed as to be readily transferable for launching on either side of the ship unless liferafts, of the aggregate capacity required by 4.1.1 to be capable of being launched on either side, are stowed on each side of the ship.

2.4.10 Posters or signs shall be provided on the survival craft or in the vicinity of them and their launching controls and shall:

.1 illustrate the purpose of controls and the procedures for operating the appliance and give relevant instructions or warnings;

.2 be easily seen under emergency lighting conditions;

.3 use symbols in accordance with the recommendations of Appendix 2.

2.5 STOWAGE OF RESCUE BOATS

2.5.1 Rescue boats shall be stowed:

.1 in a state of continuous readiness for launching is not more than 5 min, and if the inflated type, in a fully inflated condition at all times;

.2 in a position suitable for launching and recovery;

.3 so that neither the rescue boat nor its stowage arrangements will interfere with the operation of any survival craft at any other launching station;

.4 in compliance with the requirements of 2.4, if they are also lifeboats.

2.6 STOWAG E O F MARIN E EVACUATIO N SYSTEM S

2.6.1 The ship's side shall not have any openings between the embarkation station of the marine evacuation station and the sea level in the lightest sea-going condition. This means no openings, be they permanent openings, recessed promenades or temporary openings such as shell doors, windows or ports. Windows and side scuttles of non-opening type may be installed if complying with the requirements of 2.2.4.4, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships.

2.6.2 Marine evacuation systems shall be in such positions as to ensure safe launching having particular regard to clearance from the propeller and steeply overhanging positions of the hull and so that, as far as practicable, the system can be launched down the straight side of the ship.

2.6.3 Each marine evacuation system shall be stowed so that neither the passage nor platform nor its stowage or operational arrangements will interfere with the operation of any other life-saving appliance at any other launching station.

2.6.4 Where appropriate, the ship shall be so arranged that the marine evacuation systems in their stowed positions are protected from damage by heavy seas.

2.6.5 Communication shall be provided between the embarkation station on deck and the platform of the maritime evacuation system.

2.7 SURVIVAL CRAFT LAUNCHING AND RECOVERY ARRANGEMENTS

2.7.1 Unless in the present Part of the Rules expressly provided otherwise, launching and embarkation appliances complying with the requirements of 6.20 shall be provided for all survival craft except liferafts which are:

.1 boarded from a position on deck less than 4,5 m above the waterline in the lightest sea-going condition and which have a mass of not more than 185 kg;

.2 boarded from a position on deck less than 4,5 m above the waterline in the lightest seagoing condition and which are stowed for launching directly from the stowed position under unfavourable conditions of trim of up to 10° and heel of up to 20° either way;

.3 carried in excess of the survival craft for 200 per cent of the total number of persons on board the ship and which have a mass of not more than 185 kg;

.4 carried in excess of the survival craft for 200 per cent of the total number of persons on board the ship, are stowed for launching directly from the stowed position under unfavourable conditions of trim of up to 10° and heel of up to 20° either way;

.5 provided for use in conjunction with a marine evacuation system, complying with the requirements of 6.20.8 and stowed for launching directly from the stowed position under unfavourable conditions of trim of up to 10° and heel of up to 20° either way.

.6 on passenger ships with a sign **B-R3-RSN**, **C-R3-RSN** and **D-R3** in the symbol of the ship's class notation, in relation to:

- liferafts, which are stowed for launching directly from the stowed position under unfavourable conditions of trim of up to 10° and heel of up to 15° either way; або

- liferafts, carried in excess of the survival craft for 110 per cent of the total number of persons on board the ship; або

- the environmental conditions for which the ship will likely be operated, if the ship's freeboard in a place intended for embarkation into life and rescue boats, in all conditions of trim and heel undamaged or attributed damage to the ship, is less than 4,5 m above the waterline in the lightest seagoing condition, and with effective means of embarkation, the Register can allow a system through which persons directly board the survival crafts.

2.7.2 Each lifeboat shall be provided with an appliance which is capable of launching and recovering the lifeboat. In addition there shall be provision for hanging-off (attaching) the lifeboat to free the release gear for maintenance.

2.7.3 Launching and recovery appliances shall be such that the appliance operator on the ship is able to observe the survival craft at all times during launching and for lifeboats during recovery.

2.7.4 Only one type of release mechanism shall be used for similar survival craft carried on board the ship.

2.7.5 Preparation and handling of survival craft at any one launching station shall not interfere with the prompt preparation and handling of any other survival craft or rescue boat at any other launching station.

2.7.6 Falls, where used, shall be long enough for the survival craft to reach the water with the ship in its lightest seagoing condition, under unfavourable conditions of trim of up to 10° and heel of up to 20° either way.

2.7.7 During preparation and launching the survival craft, its launching appliance and the area of water into which it is to be launched shall be adequately illuminated by lighting supplied from the emergency source of electrical power required by Sections 9 and 19, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

2.7.8 Means shall be available to prevent any discharge of water onto survival craft during abandonment.

2.7.9 If there is a danger of the survival craft being damaged by the ship's stabilizer wings, means shall be available, powered by an emergency source of power, to bring the stabilizer wings inboard. In this case indicators of the position of the stabilizer wings operated by an emergency source of power shall be available on the navigation bridge.

2.7.10 If the lifeboats complying with the requirements of 6.14 are installed on the ship, a davit span shall be provided , fitted with not less than two lifelines of sufficient length to reach the water with the ship in the lightest seagoing condition, under unfavourable conditions of trim up to 10° and heel not less than 20° either way. The breaking strength of lifelines, as a whole, shall be at least 17 kN . Their rated diameter is not less than 20 mm.

2.7.11 Launching appliances shall be installed on the open parts of the deck so that the lifeboats and rescue boats are stowed 3° inside from a vertical line drawn through a point of intersection of the boat deck with the side of the ship. If the launching appliances are mounted on the 'tween deck, then no parts of the launching appliance, life and rescue boats shall extend beyond the shell plating of the ship.

2.7.12 Sets of davits shall be so stowed that the distance between two davits was equal to that between the sling hooks of the lifeboat. Where this requirement cannot be complied with, a 3° deviation to either side from the vertical line in the longitudinal direction may be allowed.

2.7.13 Lifeboat tackle falls shall be evenly wound on the winch drum. Where the falls run through fixed sheaves, a maximum deviation of the rope from the sheave central plane shall not exceed 8° for grooved drums and 4° for smooth drums.

2.8 RESCUE BOAT EMBARKATION, LAUNCHING AND RECOVERY ARRANGEMENTS

2.8.1 The rescue boat embarkation and launching arrangements shall be such that rescue boat can be boarded and launched in the shortest time.

2.8.2 If the rescue boat is one of the ship's lifeboats, the embarkation arrangements and launching station shall comply with the requirements of 2.3.

2.8.3 Launching arrangements shall comply with the requirements of 2.7. All rescue boats shall be capable of being launched, where necessary utilizing painters, with the ship making headway at speeds up to 5 knots in calm water.

2.8.4 Recovery time of the rescue boat shall be not more than 5 m in in moderate sea conditions when loaded with its full complement of persons and equipment. If the rescue boat is also a lifeboat, this recovery time shall be possible when loaded with its lifeboat equipment and the approved rescue boat complement of at least six persons.

2.8.5 Rescue boat embarkation and recovery arrangements shall allow for safe and efficient handling of a stretcher case. Foul weather recovery strops shall be provided for safety if heavy fall blocks constitute a danger.

2.9 LINE-THROWING APPLIANCES

2.9.1 All ships, with the exception of those specified in 2.9.2 and 2.9.4 and taking into account 2.9.3, shall be equipped with line-throwing appliances having four projectiles and four lines each.

2.9.2 The ships not engaged on international voyages of 24 m in length and above, except for ships with a sign **A**, **A-R1, A-R2**, **A-R2-RSN** and specified in 2.9.4, shall be equipped with line-throwing appliances having not less than two projectiles and two lines each.

2.9.3 Ships of less than 24 m in length, except for ships with a sign **A**, **A-R1, A-R2**, **A-R2-RSN** and specified in 2.9.4, not engaged in international voyages as well as the roadstead and harbour ships may be exempted from carriage of line-throwing appliances.

2.9.4 Passenger sea and mixed (sea-river) navigation ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3**, shall be equipped with line-throwing appliances according to the requirements of Table 3.5.2.

3. REQUIREMENTS FOR PASSENGER SHIPS

3.1 SURVIVAL CRAFT AND RESCUE BOATS

3.1.1 Survival craft.

3.1.1.1 Passenger ships engaged in voyages which are, based on cruising range, not short international voyages shall carry:

.1 lifeboats complying with the requirements of 6.13 or 6.14 on each side of such aggregate capacity as will accommodate not less than 50 per cent of the total number of persons on board. On agreement with the Register it may be permitted the substitution of lifeboats by liferafts of equivalent total capacity provided that there shall never be less than sufficient lifeboats on each side of the ship to accommodate at least 37,5 per cent of the total number of persons on board. The liferafts shall comply with the requirements of 6.9 or 6.10 and shall be served by launching appliances equally distributed on each side of the ship; and

.2 in addition, liferafts complying with the requirements of 6.9 or 6.10 of such aggregate capacity as will accommodate at least 25 per cent of the total number of persons on board. These liferafts shall be served by at least one launching appliance on each side which may be those provided in compliance with the requirements of 3.1.1.1.1 or equivalent approved appliances capable of being used on both sides of the ship. However, stowage of these liferafts need not comply with the requirements of 2.4.8.

3.1.1.2 Passenger ships engaged in short international voyages shall carry:

.1 lifeboats complying with the requirements of 6.14 or 6.15 equally distributed, as far as practicable, on each side of the ship and of such aggregate capacity as will accommodate at least 30 per cent of the total number of persons on board

and liferafts complying with requirements of 6.9 or 6.10 of such aggregate capacity that, together with the lifeboat capacity, the survival craft will accommodate the total number of persons on board. The liferafts shall be served by launching appliances equally distributed on each side of the ship; and

.2 in addition, liferafts complying with the requirements of 6.9 or 6.10 of such aggregate capacity as will accommodate at least 25 per cent of the total number of persons on board. These liferafts shall be served by at least one launching appliance on each side which may be those provided in compliance with the requirements of 3.1.1.2.1 or equivalent approved appliances capable of being used on both sides of the ship. However, stowage of these liferafts need not comply with the requirements of 2.4.8.

3.1.1.3 All survival craft required to provide for abandonment by the total number of persons on board shall be capable of being launched with their full complement of persons and equipment after all persons have been assembled, with lifejackets donned within a period of time not exceeding 30 min from the time the abandon ship signal is given.

3.1.1. In lieu of meeting the requirements of 3.1.1.1, 3.1.1. 2 passenger ships of less than 500 gross tonnage where the total number of persons on board is less than 200, may comply with the following:

.1 they shall carry on each side of the ship liferafts complying with the requirements of 6.9 or 6.10 of such aggregate capacity as will accommodate the total number of persons on board;

.2 unless the liferafts required by 3.1.1.4.1 can be readily transferred for launching on either side of the ship, additional liferafts shall be provided so that the total capacity available on each side will accommodate 150 per cent of the total number of persons on board;

.3 if the rescue boat required by 3.1.2.2 is also a lifeboat complying with the requirements of 6.14 or 6.15 its capacity may be included in the aggregate capacity required by 3.1.1.4.1, provided that the total capacity of survival craft available on each side of the ship is at least150 per cent of the total number of persons on board;

.4 in the event of any one survival craft being lost or rendered unserviceable, there shall be sufficient survival craft available for use on each side, including any which are stowed in a position providing for easy side-to-side transfer at a single open deck level, to accommodate the total number of persons on board.

3.1.1.6 A marine evacuation system or systems complying with the requirements of 6.20.8 may be substituted for the equivalent capacity of liferafts and launching appliances required by paragraphs 3.1.1.1 and 3.1.1.2.

3.1.1.7 Passenger ships of coastal navigation under 30 min length (of 200 gross tonnage and below) engaged on voyages at a distance not more than 12 miles from the land shall carry liferafts of such aggregate capacity as will accommodate 100 per cent of the total number of persons on board.

3.1.2 Rescue boats.

3.1.2.1 Passenger ships of 500 gross tonnage and over shall carry at least one rescue boat complying with the requirements of 6.19 on each side of the ship.

3.1.2.2 Passenger ships of less than 500 gross tonnage shall carry at least one rescue boat complying with the requirements of 6.19.

3.1.2.3 A lifeboat may be accepted provided that it and its launching and recovery arrangements also comply with the requirements for a rescue boat.

3.1.2.4 Passenger ships under 30 min length may be exempted from the re-quirement to carry a rescue boat provided their dimensions and maneuverability, vicinity of search and rescue services and hydrometeorological conditions in the area of navigation do not dictate necessary fulfilment of this require - ment.

3.1.3 Marshalling of liferaft.

3.1.3.1 The number of lifeboats and rescue boats that are carried on passenger ships shall be sufficient to ensure that in providing for abandonment by the total number of persons on board not more than six liferafts need be marshalled by each lifeboat or rescue boat.

3.1.3.2 The number of lifeboats and rescue boats that are carried on passenger ships engaged in short international voyages shall be sufficient to ensure that in providing for abandonment by the total number of persons on board not more than nine liferafts need be marshalled by each lifeboat or rescue boat.

3.2 PERSONAL LIFE-SAVING APPLIANCES

3.2.1 Lifebuoys.

.1 A passenger ship shall carry not less than the prescribed number of life-buoys in accordance with Table 3.2.1.1, complying with the requirements of 2.2 and 6.2.

Table 3.2.1.1

Length of ship, m	Minimum number of lifebuoys
Under 60	8
60 and under 120	12
120 and under 180	18
180 and under 240	24
240 and over	30

.2 Notwithstanding the requirements of 2.2.1.3, passenger ships under 60 m in length shall carry not less than six lifebuoys provided with selfigniting lights.

3.2.2 Lifejackets.

3.2.2.1 In addition to the lifejackets required by 2.2.2:

.1 every passenger ship shall carry lifejackets for not less than 5 per cent of

the total number of persons on board. These lifejackets shall be stowed in conspicuous place on deck at muster stations;

.2 on passenger ships performing voyages of less than 24 hours, the number of lifejackets suitable for infants shall be provided equal to at least 2.5% of the number of passengers on board;

.3 on passenger ships performing voyages of 24 hours or more, lifejackets suitable for infants shall be provided for each infant on board;

3.2.2.2 Where lifejackets for passengers are stowed in staterooms which are located remotely from direct routes between public spaces and muster stations, the additional lifejackets for these passengers required by 2.2.2.2, shall be stowed either in the public spaces, the muster stations, or on direct routes between them. The lifejackets shall be stowed so that their distribution and donning does not impede orderly movement to muster stations and survival craft embarkation stations.

3.2.3 Lifejacket lights.

On passenger ships each lifejacket shall be fitted with a light complying with the requirements of 6.3.3.

3.2.4 Immersion suits and thermal protective aids.

3.2.4.1 Passenger ships shall carry for each lifeboat on the ship at least three immersion suits complying with the requirements of 6.4 and, in addition, one thermal protective aid complying with the requirements of 6.6 for ever y person to be accommodated in the lifeboat and not provided with an immersion suit. These immersion suits and thermal protective aids need not be carried:

.1 for persons to be accommodated in totally or partially enclosed lifeboats

.2 if the ship is constantly engaged in voyages in warm climates where thermal protective aids are unnecessary, in the opinion of the Register.

3.2.4.2 The provisions of 3.2.4.1 also apply to totally or partially enclosed lifeboats not complying with the requirements of 6.13 or 6.14, provided they are carried on ships constructed before 1 July 1986.

3.3 SURVIVAL CRAFT AND RESCUE BOAT EMBARKATION ARRANGEMENTS

3.3.1 On passenger ships, survival craft embarkation arrangements shall be designed for:

.1 all lifeboats to be boarded and launched either directly from the stowed position or from an embarkation deck but not both;

.2 davit-launched liferafts to be boarded and launched from a position immediately adjacent to the stowed position or from a position to which, in compliance with the requirements of 2.4.8, the liferaft is transferred prior to launching.

.3 If the survival craft launching arrangement does not provide boarding into survival craft before its launch, and the height from the embarkation station on

deck, with the minimal operational draft, is above the waterline of more than 4.5 meters, an approved marine type evacuation system shall be provided.

3.3.2 Rescue boat embarkation arrangements shall be such that the rescue boat can be boarded and launched directly from the stowed position with the number of persons assigned to crew the rescue boat on board. Notwithstanding the requirements of 3.3.1 if the rescue boat is also a lifeboat and the other lifeboats are boarded and launched from an embarkation deck, the arrangements shall be such that the rescue boat can also be boarded and launched from the embarkation deck.

3.3.3 Stowage of survival craft.

The stowage height of a survival craft on a passenger ship shall take into account the requirements of regulation 2.4.1.2, the escape provisions of Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships, the size of the ship, and the weather conditions likely to be encountered in its intended area of operation. For a davit-launched survival craft, the height of the davit head with the survival craft in embarkation position, shall, as far as practicable, not exceed 15 m above the waterline when the ship is in its lightest sea-going condition.

3.3.4 Muster stations.

Every passenger ship shall comply with the requirements of 2.3 and, in addition, have passenger muster stations which shall:

.1 be in the vicinity of, and permit ready access for the passengers to, the embarkation stations unless in the same location;

.2 have ample room for marshalling and instruction of the passengers, but at least 0,35 m^2 per passenger.

3.4 ADDITIONAL REQUIREMENTS FOR RO-RO PASSENGER SHIPS

3.4.1 These requirements apply to all ro-ro passenger ships. Ro-ro passenger ships constructed:

.1 on or after 1 Jul y1998 shall comply with the requirements of 3.4.2.3, 3.4.2.4, 3.4.3.1 to 3.4.3.3, 3.4.4 and 3.4.5;

.2 on or after 1 July 1986 but before 1 July 1998 shall comply with the requirements of 3.4.5 not later than the first periodical survey after 1 July 1998 and with the requirements of 3.4.2.3, 3.4.2.4, 3.4.3 and 3.4.4 not later than the first periodical survey after 1 July 2000;

.3 before 1 July 1986 shall comply with the requirements of 3.4.5 not later than the first periodical survey after 1 July 1998 and with the requirements of 3.4.2.1 to 3.4.2.4, 3.4.3 and 3.4.4 not later than the first periodical survey after 1 July 2000.

.4 before 1 July 2004 shall comply with the requirements of 3.4.2.5 not later than the first survey carried out on or after 1 July 2004.

3.4.2 Liferafts.

3.4.2.1 The ro-ro passenger ships' liferafts shall be served by marine evacuation systems (MES) complying with the requirements of 6.20.8 or launching appliances equally distributed on each side of the ship complying with the requirements of 6.20.5.

3.4.2.2 Every liferaft on ro-ro passenger ships shall be provided with float-free arrangements complying with the requirement s o f 6.8.6.

3.4.2.3 Every liferaft on ro-ro passenger ships shall be fitted with a boarding ramp complying with the requirements of 6.9.4.1 or 6.10.4.1.

3.4.2.4 Every liferaft on ro-ro passenger ships shall be either canopied reversible liferaft or self-righting liferaft complying with the requirements of 6.11 and 6.12. Alternatively, the ship may carry self-righting or reversible liferafts, in addition to its normal complement of liferafts of such aggregate capacity as will accommodate at least 50 per cent of the persons not provided with seats in lifeboats. This additional liferaft capacity is determined on the basis of the difference between the total number of persons on board and the number of persons provided with seats in lifeboats.

3.4.2.5 Liferafts on ro-ro passenger ships shall be fitted with search and rescue locating devices: one search and rescue locating device for four liferafts. Search and rescue locating device shall be attached inside a liferaft so that its antenna is located 1 m above the water surface when a liferaft is inflated except that on the canopied reversible liferafts the search and rescue locating device shall be located so that it could be easily installed and be accessible for people onboard liferaft. Each search and rescue locating device shall be fit for its manual installation when a liferaft is inflated. Containers of liferafts fitted with the search and rescue locating device shall be clearly marked.

3.4.3 Fast rescue boats.

3.4.3.1 At least one of the rescue boats on a ro-ro passenger ship shall be a fast rescue boat complying with the requirements of 6.19.4.

3.4.3.2 Each fast rescue boat shall be served by a launching appliance complying with the requirements of 6.20.6. When approving these launching appliances, it shall be taken into account that the fast rescue boat is intended to be launched and recovered even under severe adverse weather conditions.

3.4.3.3 At least two crews of each fast rescue boat shall be trained and drilled regularly, including all aspects of rescue, handling, maneuvering, operating these craft in various conditions and righting them after capsize.

3.4.3.4 In the case where the arrangement or size of a ro-ro passenger ship, constructed before 1 July 1997, is such as to prevent the installation of the fast rescue boat required in 3.4.3.1, the fast rescue boat may be installed in place of an existing lifeboat which is accepted as a rescue boat or, in the case of the ship

constructed prior to 1 July 1986, a boat for use in an emergency, provided that all of the following conditions are met:

.1 the fast rescue boat installed is served by a launching appliance complying with 3.4.3.2;

.2 the capacity of the lifeboat lost by the above substitution is compensated by the installation of liferafts capable of carrying at least an equal number of persons served by the lifeboat replaced;

.3 the above liferafts are served by the existing launching appliances or MES.

3.4.4 Means of rescue.

3.4.4.1 Each ro-ro passenger ship shall be equipped with efficient means of rescue complying with the requirements of 6.20.9.

3.4.4.2 The means of transfer of survivors to the ship may be part of a MES, or part of a system intended for rescue purposes.

3.4.4.3 If the slide of a MES is intended to provide the means of transfer of survivors to the deck of the ship, the slide shall be equipped with hand lines or a ladder to aid in climbing up the slide.

3.4.5 Lifejackets.

.1 Notwithstanding the requirements in 2.2.2 and 3.2.2, a sufficient number of lifejackets shall be stowed in the vicinity of muster stations so that passengers do not have to return to their cabins to collect their lifejackets.

.2 Each lifejacket shall be provided with a light complying with the requirements of 6.3.3.

3.4.6 Helicopter landing and pick-up areas.

3.4.6.1 All ro-ro passenger ships shall be provided with a helicopter pick-up area.

3.4.6.2 Ro-ro passenger ships of 130 m in length and upwards, constructed on or after 1 July 1999, shall be provided with a helicopter landing area.

3.5 REQUIREMENTS FOR THE EQUIPMENT WITH LIFE-SAVING APPLIANCES OF PASSENGER SHIPS WITH SIGNS B-R3-RSN, C-R3-RSN AND D-R3 IN THE SHIP'S CLASS NOTATION

3.5.1 Providing with life-saving appliances of passenger sea and mixed (sea-river) navigation of ships with signs **B-R3-RSN**, **C-R3-RSN** and **D-R3**, engaged in inland navigation (sea cabotage) shall comply with Table. 3.5.1.

Table 3.5.1

Ship's class	**B-R3-RSN**		**C-R3-RSN**		**D-R3**	
1	2	3	4	5	6	7
Number of persons (N)	> 250	≤ 250	> 250	≤ 250	> 250	≤ 250
Survival craft [1), 2), 3), 4)]						
- existing ships	1,10 N	1,10 N	1,10 N	1,10 N	1,10 N	1,10 N
- new ships	1,25 N	1,25 N	1,25 N	1,25 N	1,25 N	1,25 N
Rescue boats [4),5)]	1	1	1	1	1	1
Lifebuoys [6)]	8	8	8	4	8	4
Lifejackets [7),8),9)]	1,05 N	1,05 N	1,05 N	1,05 N	1,05 N	1,05 N
Child's lifejackets [10)]	0,10 N	0,10 N	0,10 N	0,10 N	0,10 N	0,10 N
Line-throwing appliance [11)]	1	1	1	1	-	-

[1)] Life-saving appliances can be lifeboats that meet the requirements of 6.14 or 6.15 or 6.16, or liferafts that meet the requirements of 6.8 and 6.9 or 6.10. In addition, life rafts on ro-ro passenger ships shall also meet the requirements of 3.4.2.

Taking into account places of refuge within the course of voyages performed by the ship and / or favorable climatic conditions of the zone and the established period of operation, the Register may allow the use of:

a) open double side inflatable life rafts that do not comply with 6.9 or 6.10 in the condition that these liferafts fully comply with the requirements of Annex 10 of the High-Speed Craft Code;

b) liferafts that do not meet the requirements of 6.9.2.1 and 6.9.2.2 to ensure sufficient insulation of the life raft bottom from the cold.

Life-saving appliances for existing ships shall comply with the relevant rules of the SOLAS Convention 1974, as amended, for existing ships as of the date of the adoption of the European Council Directive 98/18 / EC on 1 July 1998.

Marine evacuation system or systems that meet the requirements of 6.20.8 may serve as a substitute for the equivalent capacity of liferafts and launching devices, required by Table 3.5.2.

[2)] Life-saving appliances shall, as far as possible, be evenly distributed on each side of the ship.

[3)] The total number of life-saving appliances, in accordance with the percentage indicated in the table and the total capacity of life-saving appliances and additional life rafts, shall be 110% of the total number of persons (N), which the ship may carry.

In the event of any one survival craft being lost or rendered unserviceable, there shall be sufficient survival craft available to accommodate the total number of persons that the ship is authorized to carry.

[4)] The number of lifeboats and / or rescue boats shall be sufficient to ensure that when the ship is abandoned by all persons, not more than nine liferafts need be marshalled by each lifeboat or rescue boat.

[5)] Rescue boats shall be served by their own launching appliances capable of launching and recovering.

If a rescue boat meets the requirements of 6.14 or 6.15, it can be counted as a survival craft indicated in the table.

At least one of the rescue boats on ro-ro passenger ships shall be a fast rescue boat that meets the requirements of 6.19.4.

When it is proved to the Register that it is physically impossible to establish a rescue boat on board, such ship is exempted from having an rescue boat, provided that the ship meets all of the following requirements:

a) the ship is equipped with arrangements providing recovery of helpless persons from the water;

b) it is possible to observe recovery of helpless persons aboard the navigation bridge; and

c) the ship has sufficient maneuverability to approach and recover persons, even in the worst intended conditions.

[6)] At least one lifebuoy on each side of the ship shall be fitted with a buoyant lifeline equal in length to not less than twice the height at which it is stowed above the waterline in the lightest seagoing condition, or 30 m, whichever is the greater.

Two lifebuoys shall be provided with self-igniting lights complying with the requirements of 6.2.2; and self-activating smoke signals capable of quick release from the navigation bridge.

[7)] Every person who must perform any work on board a ship in risk zones shall be provided with an inflatable lifejacket. These inflatable lifejackets can be counted as a total number of life jackets, which are required by Table. 3.5.2.

[8)] Lifejackets on board ro-ro type ships shall meet the requirements of 3.4.5.

[9)] If the adult lifejackets provided are not designed to fit persons weighing up to 140 kg and with a chest girth of up to 1750 mm, a sufficient number of suitable accessories shall be available on board to allow them to be secured to such persons.

[10)] In addition to the specified lifejackets for children:

- on passenger ships performing voyages of less than 24 hours, the number of lifejackets suitable for infants shall be provided equal to at least 2.5% of the number of passengers on board;

- on passenger ships performing voyages of 24 hours or more, lifejackets suitable for infants shall be provided for each infant on board;

[11)] Line-throwing appliances shall comply with the requirements of 6.21.

4. REQUIREMENTS FOR CARGO SHIPS

4.1 SURVIVAL CRAFT AND RESCUE BOATS

4.1.1 Lifeboats and liferafts.

4.1.1.1 Cargo ships shall carry:

.1 on each side of the ship one or more lifeboats complying with the requirements of 6.15 of such aggregate capacity as will accommodate the total number of persons on board;

.2 in addition, one or more inflatable or rigid liferafts, complying with the requirements of 6.9 or 6.10, of a mass of less than 185 kg or stowed in a position providing for easy side-to-side transfer at a single open deck level, and of such aggregate capacity as will accommodate the total number of persons on board. If the liferaft or liferafts are not of a mass of less than 185 kg or stowed in a position

providing for easy side-to-side transfer at a single open deck level, the total capacity available on each side shall be sufficient to accommodate the total number of persons on board.

4.1.1.2 In lieu of meeting the requirements of 4.1.1.1, cargo ships may carry:

.1 one or more lifeboats, complying with the requirements of 6.16 capable of being free-fall launched over the stern of the ship of such aggregate capacity as will accommodate the total number of persons on board;

.2 in addition, on each side of the ship one or more liferafts complying with the requirements of 6.9 or 6.10 of such aggregate capacity as will accommodate the total number of persons on board.

The liferafts on at least one side of the ship shall be served by launching appliances.

4.1.1.3 In lieu of meeting the requirements of 4.1.1.1 or 4.1.1.2, cargo ships of less than 85 m in length other than oil tankers, chemical tankers and gas carriers may comply with the following:

.1 they shall carry on each side of the ship one or more liferafts complying with the requirements of 6.9 or 6.10 of such aggregate capacity as will accommodate the total number of persons on board;

.2 unless the liferafts required by 4.1.1.3.1 are of a mass of less than 185 kg and stowed in a position providing for easy side-to-side transfer at a single open deck level, additional liferafts shall be provided so that the total capacity available on each side will accommodate 150 per cent of the total number of persons on board;

.3 if the rescue boat required by 4.1.2 is also a lifeboat complying with the requirements of 6.15, it may be included in the aggregate capacity required by 4.1.1.3.1, provided that the total capacity of lifeboats and liferafts available on each side is sufficient to accommodate at least 150 per cent of the total number of persons on board;

.4 in the event of any one survival craft being lost or rendered unserviceable, there shall be sufficient survival craft available for use on each side, including any which are of a mass of less than 185 kg and stowed in a position providing for easy side-to-side transfer at a single open deck level, to accommodate the total number of persons on board.

4.1.1.4 Cargo ships where the horizontal distance from the extreme end of the stem or stern of the ship to the nearest end of the closest survival craft is more than 100 m shall carry, in addition to the liferafts required by 4.1.1.1. 2 and 4.1.1.2.2 a liferaft stowed as far forward or aft, or one as far forward and another as far aft, as is reasonable and practicable. Such liferaft or liferafts may be securely fastened so as to permit manual release and need not be of the type which can be launched from an approved launching device.

4.1.1.5 All survival craft required to provide for abandonment by the total number of persons on board, with the exception of the survival craft referred to in 2.7.1.1, shall be launched with their full complement of persons and equipment within a period of 10 min. from the time the abandon ship signal is given.

4.1.1.6 Chemical tankers and gas carriers emitting toxic vapours or gases shall carry, in lieu of lifeboats complying with the requirements of 6.15, lifeboats complying with the requirements of 6.17.

4.1.1.7 Oil tankers, chemical tankers and gas carriers carrying cargoes having a flashpoint not exceeding 60 °C (closed cup test) shall carry, in lieu of lifeboats complying with the requirements of 6.15, lifeboats complying with the requirements of 6.18.

4.1.1.8 Notwithstanding the requirements of 4.1.1.1, bulk carriers as defined in paragraph 1.2.1, Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships shall comply with the requirements of 4.1.1.2.

4.1.1.9 Ships mentioned in 4.1.1.6 and 4.1.1.7 of less than 85 m in length and not engaged in international voyages may carry only one lifeboat of such capacity as will accommodate 100 per cent of the persons on board, if the launching appliance is fitted providing the lifeboat launching from either side of the ship.

4.1.1.10 Harbour, roadstead and coastal ships shall carry one or several liferafts of such aggregate capacity as will accommodate 100 per cent of the persons on board. In summer in these ships the liferafts may be replaced by the lifebuoys for 100 per cent of the persons on board; in this case the lifebuoys required in 4.2.1.1 may be included. This replacement shall be substantiated with regard to the area of navigation.

4.1.2 Rescue boats.

Cargo ships shall carry at least one rescue boat complying with the requirements of 6.19. A lifeboat may be accepted as a rescue boat, provided that it and its launching and recovery arrangements also comply with the requirement for a rescue boat.

4.1.3 Cargo ships under 500 gross tonnage in agreement with the Register, may be exempted from meeting the requirements of 4.1.2 if their size and maneuverability, as well as the area of operation, do not necessitate the fulfillment of this requirement.

4.1.4 In addition to their lifeboats, all cargo ships constructed before 1 July 1986 shall carry:

.1 one or more liferafts capable of being launched on either side of the ship and of such aggregate capacity as will accommodate the total number of persons on board. The liferaft or liferafts shall be equipped with a lashing or an equivalent means of securing the liferaft which will automatically release it from a sinking ship;

.2 where the horizontal distance from the extreme end of the stem or stern of the ship to the nearest end of the closest survival craft is more than 100 m, in addition to the liferafts required by 4.1.4.1 a liferaft stowed as far forward or aft, or one as far forward and another as far aft, as is reasonable and practicable. Notwithstanding the requirements of 4.1.4.1, such liferaft or liferafts may be securely fastened so as to permit manual release.

4.2 PERSONAL LIFE-SAVING APPLIANCES

4.2.1 Lifebuoys.

.1 A passenger ship shall carry not less than the prescribed number of lifebuoys in accordance with Table 4.2.1.1, complying with the requirements of 2.2.1 and 6.2

.2 Self-igniting lights for lifebuoys on tankers required by 2.2.1.3 shall be of an electric battery type.

Table 4.2.1.1

Length of ship, m	Minimum number of lifebuoys
Under 30	4
30 and under 100	8
100 and under 150	10
150 and under 200	12
200 and over	14

4.2.2 Lifejacket lights (this paragraph applies to all cargo ships).

.1 On cargo ships each lifejacket shall be fitted with a light complying with the requirements of 6.3.3.

4.2.3 Immersion suits.

4.2.3.1 The requirements of 4.2.3.2 to 4.2.3.5 are applicable to all cargo ships.

4.2.3.2 An immersion suit of the appropriate size complying with the requirements of 6.4 shall be provided for every person on board. However, for ships other than bulk carriers, as defined in 1.2.1, Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships, these immersion suits need not be required if the ship is constantly engaged on voyages in warm climates where the immersion suits are unnecessary.

4.2.3.3 If a ship has any watch or work stations, which are located remotely from the place or places where immersion suits are normally stowed in accordance with 4.1.1.4, additional immersion suits of the appropriated size shall be provided at these locations for the number of persons normally on watch or working at those locations at any time.

4.2.3.4 Immersion suits shall be so placed as to be readily accessible and their position shall be clearly indicated.

4.2.3.5 The immersion suits required by this paragraph may be used to fulfill the requirement of 2.2.3.1.

4.2.3.6 With regard to cargo ships of unrestricted and restricted navigation areas not covered by the SOLAS-74 Convention, requirements of 4.2.3.2-4.2.3.5 shall be carried out not later than the first prescribed survey arrangements and outfit (annual / periodic / renewal), carried out on 1 July 2007 or after this date.

4.2.3.7 Cargo ships of restricted area of navigation **R3** (harbour, roadsted and coastal navigation) not engaged in international voyages need not be provided with immersion suits.

4.2.4 At the stowage of liferafts required by 4.1.1.4, at least two lifejackets and at least two immersion suits shall be provided. They shall be easily accessible and their place of storage should be clearly marked.

4.3 SURVIVAL CRAFT EMBARKATION AND LAUNCHING ARRANGEMENTS

4.3.1 Cargo ship survival craft embarkation arrangements shall be so designed that lifeboats can be boarded and launched directly from the stowed position and davit launched liferafts can be boarded and launched from a position immediately adjacent to the stowed position or from a position to which the liferaft is transferred prior to launching in compliance with the requirements of 2.4.8.

4.3.2 On cargo ships of 20000 gross tonnage and upwards, lifeboats shall be capable of being launched with the ship making headway at speeds up to 5 knots in calm water, utilizing painters, where necessary.

4.3.3 On cargo ships, as defined in 4.1.1.3 where no launching appliances complying with 2.7.1 are provided for liferafts, the embarkation stations of liferafts shall be provided on each side with embarkation ladders meeting the requirements of 6.20.7.

5. REQUIREMENTS FOR OTHER TYPES OF SHIPS

5.1 FISHING VESSELS

5.1.1 Lifeboats, liferafts and rescue boats.

Fishing vessel shall carry:

.1 on each side lifeboats complying with the requirements of 6.14 o r 6.15, with a total capacity sufficient to accommodate 50% of the total number of persons on board;

.2 liferafts complying with the requirements of 6. 9 or 6.10, with a total capacity sufficient to accommodate the total number of persons on board.

5.1.2 Fishing vessels of less than 85 m, in agreement with the Register, may be provided with only liferafts of capacity from each side, sufficient to accommodate all those on board.

If these rafts can not be easily moved for launching from any side, additional rafts shall be provided from each side with capacity sufficient to accommodate 50% of the total number of persons on board.

5.1.3 Fishing vessels of less than 85 m taking into account the nature of voyages and weather conditions, in agreement with the Register, may be provided with one or more life-rafts of sufficient capacity to accommodate all persons on board.

5.1.4 Rescue boats.

5.1.4.1 Fishing vessels shall carry one rescue boat complying with the requirements of 6.19. The ship may be exempted from carriage of a rescue boat, provided it carries any other survival craft or means of rescue, which may be used in rescue operations.

5.1.4.2 Fishing vessels of less than 45 m, in agreement with the Register, may be exempted from requirements of 5.1.4.1, provided the ship dimensions and maneuverability, vicinity of search and rescue services and meteorological information systems, as well as area of operation and weather conditions do not dictate necessary fulfillment of this requirement.

5.1.5 Arrangement of survival craft and rescue boats shall comply with the requirements of 2.4 and 2.5.

5.1.6 Fishing vessels shall be provided with life-jackets and immersion suits as required for cargo ships.

However, with regard to the providing with immersion suits of fishing vessels built before 1 October 2008, requirements of 4.2.3.2 to 4.2.3.5 shall be carried out not later than the first assigned survey of arrangements and outfit (annual / periodic / renewal), carried out on or after 1 October 2008.

5.2 SPECIAL PURPOSE SHIPS

5.2.1 Ships carrying onboard not more than 60 persons shall be provided with survival craft as required for cargo ships other than oil tankers.

5.2.2 Ships carrying onboard not more than 60 persons shall be provided with survival craft as required for passenger ships engaged in the international voyages which are not short international voyages, according to 1.2.

5.2.3 Ships mentioned in 5.2.1 may be provided with survival craft in accordance with 5.2.2, provided that they comply with the requirements of the Rules for the subdivision of ships carrying more than 60 persons onboard.

5.2.4 Despite the requirements of 5.2.2 sail training ships carrying more than 60 persons may be provided with survival craft in accordance with 3.1.1.5 instead of 3.1.1.1, if they are also provided with at least two rescue boats in accordance with 3.1.2.1.

5.2.5 The requirements of 1.1.5, 3.1.1.2, 3.1.1.3, 4.1.1.6, 4.1.1.7, 6.17 and 6.18 are not applied to special purpose ships.

5.2.6 Training sailing vessels, regardless of their gross tonnage, carrying more than 60 persons on board, may be provided with survival craft according to 5.2.4. In this case, an immersion suit shall be provided for each person on the ship.

5.3 SPECIALIZED SHIPS

5.3.1 Salvage ships, icebreakers, ships equipped with means of combating fire at the other objects, pilot ships, tugs, ships of dredging fleet and other ships shall be provided with life-saving appliances as required for cargo ships, and icebreakers are assigned descriptive notation "special purpose ship" added to the

character of classification shall be provided with life-saving appliances as required for special purpose ships.

5.3.2 Salvage ships and ships equipped with means of combating fire at the other objects are recommended to be supplied with additional life-saving appliances (fast rescue boats, appliances for rapid recovery of survivors on board from the water, appliances for transfer of survivors on board from the survival craft, etc.) which quantity and composition are defined by shipowner and is agreed with the Register.

5.3.3 Ships with a descriptive notation **Oil recovery ship** in the class notation are recommended to be provided with life-saving appliances as required for oil tankers.

The provision of life-saving equipment for ships incidentally engaged in oil or oil products recovery from the surface of water, is in each case subject to special consideration by the Register.

5.4 BERTH-CONNECTED SHIPS

5.4.1 Berth-connected ships under 30 min length shall be provided with at least two lifebuoys on each deck, and berth-connected ships of more than 30 m in length — with at least four lifebuoys on each deck.

5.4.2 Each lifebuoy shall be fitted with a buoyant lifeline in length equal to not less than twice the distance measured between the lifebuoy and the waterline or 30 m, whichever is greater.

5.4.3 The list of life-saving appliance of the berth-connected ships which are intended to be operated not in the immediate vicinity of the shore is in each case subject to special consideration by the Register.

6. REQUIREMENTS FOR LIFE-SAVING APPLIANCES

6.1 GENERAL REQUIREMENTS FOR LIFE-SAVING APPLIANCES

6.1.1 Unless expressly provided otherwise or unless, in the opinion of the Register having regard to the particular voyages on which the ship is constantly engaged, other requirements are appropriate, all life-saving appliances prescribed in this section shall comply with the following requirements:

.1 be constructed of materials approved by the Register;

.2 not be damaged in stowage throughout the air temperature range -30°C to +65°C and, in the case of personal life-saving appliances, unless otherwise specified, remain operational throughout the air temperature range -15°C to +40°C;

.3 operate throughout the seawater temperature range -1°C to +30°C, if they are likely to be immersed in seawater;

.4 where applicable, be rot-proof, corrosion-resistant and not be unduly affected by seawater, oil or fungal attack;

.5 be resistant to prolonged exposure of sunlight, (be resistant to deterioration);

.6 be of international or vivid reddish orange, or a comparably highly visible color on all parts where this will assist detection at sea;

.7 be fitted with retro-reflective material where it will assist in detection and in accordance with Appendix 1.

.8 if they shall be used in a seaway, be capable of satisfactory operation in that environment.

.9 be clearly marked with approval information including the Register which approved it, and any operational restrictions; and

.10 where applicable, be provided with electrical short circuit protection to prevent damage or injury.

6.1.2 The life of life-saving appliances which are subject to deterioration with age shall be determined. Such life-saving appliances shall be marked with a means for determining their life or the date by which they must be replaced. Permanent marking with a date of expiry is the preferred method of establishing the period of acceptability. Batteries not marked with a date of expiry may be used if they are replaced annually, or in the case of a secondary battery (accumulator), if the condition of the electrolyte can be readily checked.

In case of pyrotechnic lifesaving appliances, the date of expiry shall be indelibly marked on the product.

6.1.3 The materials used for manufacturing the life-saving appliances and arrangements shall comply with the requirements of Part XIII "Materials" and the welded structures shall be made in accordance with the requirements of Part XIV "Welding" of the Rules for the Classification and Construction of Sea-Going Ships.

6.1.4 Chains and ropes (wire, natural fibre and synthetic fibre) shall comply with the requirements of Part XIII "Materials" of the Rules for the Classification and Construction of Sea-Going Ships, while blocks, shackles, swivels, screw stratchers and other removable components shall comply with the requirements of the Rules for the Cargo Handling Gear of Sea-Going Ships.

6.1.5 Winches for launching appliances shall meet the applicable requirements of 6.1, Part IX "Machinery" of the Rules for the Classification and Construction of Sea-Going Ships, while their electric drives shall meet the requirements of 5.9, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

6.2 LIFEBUOYS

6.2.1 Lifebuoy shall comply with the following requirements:

.1 its outer diameter shall be not more than 800 mm and its inner diameter shall be not less than 400 mm;

.2 be constructed of inherently buoyant material; it shall not depend upon rushes, cork shavings or granulated cork, other loose granulated material or any air compartment which depends on inflation for buoyancy;

.3 be capable of supporting not less than 14,5 kg of iron in fresh water for a period of 24 h;

.4 have a mass of not less than 2,5 kg;

.5 not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 s;

.6 be constructed to withstand a drop into the water from the height equal to the distance between the place of stowage and the waterline in the lightest seagoing condition or 30 m, whichever is the greater, without impairing either its operating capability or that of its attached components;

.7 if the lifebuoy is intended to operate the quick-release arrangement provided for the self-activated smoke signals and self-igniting lights, have a mass of not less than 4 kg;

.8 be fitted with a grab line not less than 9,5 mm in diameter and not less than 4 times the outside diameter of the buoy body in length. The grabline shall be secured at four equidistant points around the circumference of the buoy to form four equal loops.

6.2.2 Self-igniting lights shall comply with the following requirements:

.1 be of such construction that cannot be extinguished by water;

.2 be of white colour and capable of either burning continuously with a luminous intensity of not less than 2 cd in all directions of the upper hemisphere or flashing (discharge flashing) at a rate of not less than 50 flashes and not more than 70 flashes per min with at least the corresponding effective luminous intensity;

.3 be provided with a source of power capable of meeting the requirement of 6.2.2.2 for a period of at least 2 h;

.4 be capable of withstanding the drop test required by 6.2.1.6.

6.2.3 Self-activating smoke signal shall comply with the following requirements:

.1 emit smoke of a highly visible colour at a uniform rate for a period of at least 15 min when floating in calm water;

.2 not ignite explosively or emit any flame during the entire smoke emission time;

.3 not be swamped in a seaway;

.4 continue to emit smoke when submerged in water for a period of at least 10 s;

.5 be capable of withstanding the drop test required by 6.2.1.6;

.6 be provided with a quick-release arrangement that will automatically release and activate the signal and associated self-igniting light connected to a lifebuoy having a mass of not less than 4 kg.

6.2.4 Buoyant lifelines for lifebuoys shall comply with the following requirements:

.1 be non-kinking;

.2 have a diameter of not less than 8 mm;

.3 have a breaking strength of not less than 5 kN.

6.3 LIFEJACKETS

6.3.1 General requirements for lifejackets.

6.3.1.1 A lifejacket shall not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 s.

6.3.1.2 Lifejackets shall be provided in three sizes in accordance with table 6.3.1.2. If a lifejacket fully complies with the requirements of two adjacent size ranges (weight and height), it may be marked with both size ranges, but the specified ranges (weight and height) shall not be divided. Lifejackets shall be marked by either weight or height, or by both weight and height, according to Table 6.3.1.2.

Table 6.3.1.2.

Lifejacket marking	Infant	Child	Adult
User's size:			
Weight (kg)	less than 15	15 or more but less than 43	43 or more
Height (cm)	less than 100	100 or more but less than 155	155 or more

6.3.1.3 If an adult lifejacket is not designed to fit persons weighing up to 140 kg and with a chest girth up to 1750 mm, suitable accessories shall be available to allow it to be secured to such persons.

6.3.1.4 An adult lifejacket shall be so constructed that:

.1 at least 75 per cent of persons who are completely unfamiliar with the lifejacket can correctly don it within a period of 1 min without assistance, guidance or prior demonstration;

.2 after demonstration , all persons can correctly don it within a period of 1 min without assistance;

.3 it is clearly capable of being worn only one way or inside-out and, if donned incorrectly, it is not injurious to the wearer;

.4 the method of securing the lifejacket to the wearer has quick and positive means of closure that do not require tying of knots;

.5 it is comfortable to wear; and

.6 it allows the wearer to jump into the water from a height of at least 4,5 m while holding on to the lifejacket, and from a height of at least 1 m with arms held overhead, without injury and without dislodging or damaging the lifejacket or its attachments.

6.3.1.5 An adult lifejackets shall have sufficient buoyancy and stability in calm fresh water to:

.1 lift the mouth of exhausted or unconscious persons by an average height of not less than 120 mm, incline the body backwards from the vertical position for an average torso angle of not less than that 20°;

.2 turn the body of unconscious, face-down persons in the water to a position where the mouth is clear of the water in an average time not exceeding 5 s.

6.3.1.6 An adult lifejacket shall allow the person wearing it to swim a short distance and to board a survival craft.

6.3.1.7 An infant or child lifejacket shall perform the same as an adult lifejacket except as follows:

.1 donning assistance is permitted for small children and infants;

.2 lift the mouth of exhausted or unconscious child, by an average height above the water surface, corresponding to its size; and

.3 assistance may be given to board a survival craft, but wearer mobility shall not be reduced to any greater extent.

6.3.1.8 With the exception of freeboard and self-righting performance, the requirements for infant lifejackets may be relaxed, if necessary, in order to:

.1 facilitate the rescue of the infant by a caretaker;

.2 allow the infant to be fastened to a caretaker and contribute to keeping the infant close to the caretaker;

.3 keep the infant dry, with free respiratory passages;

.4 protect the infant against bumps and jolts during evacuation; and

.5 allow a caretaker to monitor and control heat loss by the infant.

6.3.1.9 In addition to the markings required by 6.1.1.9, an infant or child lifejacket shall be marked with:

.1 the size range in accordance with 6.3.1.2; and

.2 an "infant" or "child" symbol as shown in the "infant's lifejacket" or "child's lifejacket" symbol as given in Appendix 2.

6.3.1.10 A lifejacket shall have buoyancy which is not reduced by more than 5 per cent after 24 h submersion in fresh water.

6.3.1.11 The buoyancy of a lifejacket shall not depend on the use of loose granulated materials.

6.3.1.12 Each lifejacket shall be fitted with a whistle firmly secured by a lanyard.

6.3.1.14 Each lifejacket shall be provided with means of securing a lifejacket light as specified in 6.3.3 such that it shall be capable of complying with the requirements of 6.3.1.4.5 and 6.3.3.1.3.

6.3.1.15 Lifejacket lights and whistles shall be selected and secured to the lifejacket in such a way that their performance in combination is not degraded.

6.3.1.16 A lifejacket shall be provided with a releasable buoyant line or other means to secure it to a lifejacket worn by another person in the water.

6.3.1.17 A lifejacket shall be provided with a suitable means to allow a rescuer to lift the wearer from the water into a survival raft or rescue boat.

6.3.2 Inflatable lifejackets.

A lifejacket which depends on inflation for buoyancy shall have not less than two separate compartments, shall comply with the requirements of 6.3.1 and shall:

.1 inflate automatically upon immersion, be provided with a device to permit inflation by a single manual motion and be capable of having each chamber inflated by mouth;

.2 in the event of loss of buoyancy in any one compartment be capable of complying with the requirements of 6.3.1.4 - 6.3.1.6 ; and

.3 comply with the requirements of 6.3.1.10 after inflation by means of the automatic mechanism.

6.3.3 Lifejacket lights.

6.3.3.1 Each lifejacket light shall:

.1 have a luminous intensity of not less than 0,75 cd in all directions of the upper hemisphere;

.2 have a source of energy capable of providing a luminous intensity of 0,75 cd for a period of at least 8 h;

.3 be visible over as a great segment of the upper hemisphere as is practicable when attached to a lifejacket; and

.4 be of white colour.

6.3.3.2 If the light referred to in 6.3.3.1 is a flashing light, it shall, in addition:

.1 be provided with a manually operated switch; and

.2 flash at a rate of not less than 50 and not more than 70 flashes per minute with an effective luminous intensity of at least 0,75 cd.

6.4 IMMERSION SUITS

6.4.1 General requirements for immersion suits.

6.4.1.1 The immersion suit shall be constructed with waterproof materials such that:

.1 it can be unpacked and donned without assistance within 2 min, taking into account donning of any associated clothing, donning of a lifejacket if the immersion suit must be worn in conjunction with a lifejacket and inflation of orally inflatable chambers if fitted;

.2 it will not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 s;

.3 it will cover the whole body with the exception of the face, except that covering for the hands may be provided by separate gloves which shall be permanently attached to the suit;

.4 it is provided with arrangements to minimize or reduce free air in the legs of the suit;

.5 following a jump from a height of not less than 4,5 m into the water there is no undue ingress of water into the suit.

6.4.1.2 An immersion suit on its own, or worn in conjunction with a lifejacket if necessary, shall have sufficient buoyancy and stability in calm fresh water to:

.1 lift the mouth of an exhausted or unconscious person clear of the water by not less than 120 mm; and

.2 allow the wearer to turn from a face-down to a face-up position in not more than 5 s.

6.4.1.3 An immersion suit shall permit the person wearing it, and also wearing a lifejacket if the immersion suit shall be worn in conjunction with a lifejacket, to:

.1 climb up and down a vertical ladder of at least 5 min length;

.2 perform normal duties during abandonment;

.3 jump from a height of not less than 4,5 m into the water without damaging or dislodging the immersion suit or its attachments, or being injured;

.4 swim a short distance through the water and board a survival craft.

6.4.1.4 An immersion suit which has buoyancy and is designed to be worn without a lifejacket shall be fitted with a light complying with the requirements of 6.3.3 and the whistle prescribed by 6.3.1.12.

6.4.1.5 An immersion suit which has buoyancy and is designed to be worn without a lifejacket shall be provided with a releasable buoyant line or other means to secure it to a suit worn by another person in the water.

6.4.1.6 An immersion suit which has buoyancy and is designed to be worn without a lifejacket shall be provided with a suitable means to allow a rescuer to lift the wearer from the water into a survival craft or rescue boat.

6.4.1.7 If an immersion suit shall be worn in conjunction with a lifejacket, the lifejacket shall be worn over the immersion suit. Persons wearing such an immersion suit shall be able to don a lifejacket without assistance. The immersion suit shall be marked to indicate that it must be worn in conjunction with a compatible lifejacket.

6.4.1.8 An immersion suit shall have buoyancy which is not reduced by more than 5 per cent after 24 h submersion in fresh water and does not depend on the use of loose granulated materials.

6.4.2 Thermal performance requirements for immersion suits.

6.4.2.1 An immersion suit made of material which has no inherent insulation shall be:

.1 marked with instructions that it shall be worn in conjunction with warm clothing;

.2 so constructed that, when worn in conjunction with warm clothing, and with a lifejacket if the immersion suit shall be worn with a lifejacket, the immersion suit continues to provide sufficient thermal protection, following one jump by the wearer into the water from a height of 4,5 m, to ensure that when it is worn for a period of 1 h in calm circulating water at a temperature of 5°C, the wearer's body core temperature does not fall more than 2°C.

6.4.2.2 An immersion suit made of material with inherent insulation, when worn either on its own or with a lifejacket, if the immersion suit is to be worn with a lifejacket shall provide the wearer with sufficient thermal insulation, following one jump by the wearer into the water from a height of 4,5 m, to ensure that when it is worn for a period of 6 h in calm circulating water at a temperature of range 0 to 2°C, the wearer's body core temperature does not fall more than 2°C.

6.5 ANTI-EXPOSURE SUITS

6.5.1 General requirements for anti-exposure suits.

6.5.1.1 The anti-exposure suit shall be constructed with waterproof materials such that it:

.1 provides inherent buoyancy of at least 70 N;

.2 is made of material which reduces the risk of heat stress during rescue and evacuation operations;

.3 covers the whole body except the feet; covering for the hands and head may be provided by separate gloves and a hood, both of which shall be permanently attached to the suit;

.4 can be unpacked and donned without assistance within 2 min;

.5 does not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 s;

.6 is equipped with a pocket for a portable VHF telephone;

.7 has a lateral field of vision of at least 120°.

6.5.1.2 An anti-exposure suit shall permit the person wearing it, to:

.1 climb up and down a vertical ladder of at least 5 m in length;

.2 jump from a height of not less than 4,5 m into the water with feet first, without damaging or dislodging the suit or its attachments, or being injured;

.3 swim through the water at least 25 m and board a survival craft;

.4 don a lifejacket without assistance;

.5 perform all duties associated with abandonment, assist others and operate a rescue boat.

6.5.1.3 An anti-exposure suit shall be fitted with a light complying with the requirements of 6.3.3 such that it shall be capable of complying with 6.3.3.1.3 and 6.5.1.2.2, and the whistle prescribed by 6.3.1.13.

6.5.2 Thermal performance requirements for anti-exposure suits.

6.5.2.1 An anti-exposure suit shall:

.1 if made of material which has no inherent insulation, be marked with instructions that it shall be worn in conjunction with warm clothing; and

.2 be so constructed that, when worn as marked and following one jump into water which totally submerges the wearer, the suit continues to provide sufficient thermal protection to ensure that when it is worn in calm circulating water at a temperature of 5°C, the wearer's body core temperature does not fall at the rate of more than 1,5°C per h, after the first 0,5 h.

6.5.3 Stability requirements.

A person in fresh water wearing an anti-exposure suit complying with the requirements of this section shall be able to turn from a face-down to a face-up position in not more than 5 s and shall be stable face-up. The suit shall have no tendency to turn the wearer face-down in moderate sea condition.

6.6 THERMAL PROTECTIVE AIDS

6.6.1 A thermal protective aid shall be made of waterproof material having a thermal conductance of not more than 7800 W/(m^2-K) and shall be so constructed that, when used to enclose a person, it shall reduce both the convective and evaporative heat loss from the wearer's body.

6.6.2 The thermal protective aid shall:

.1 cover the whole body of persons of all sizes wearing a lifejacket with the exception of the face. Hands shall also be covered unless permanently attached gloves are provided;

.2 be capable of being unpacked and easily donned without assistance in a survival craft;

.3 permit the wearer to remove it in the water in not more than 2 min, if it impairs ability to swim.

6.6.3 The thermal protective aid shall function properly throughout an air temperature range -30°C to +20°C.

6.7 PYROTECHNIC SIGNAL MEANS

6.7.1 Rocket parachute flares.

6.7.1.1 The rocket parachute flare shall:

.1 be contained in a water-resistant casing;

.2 have brief instructions or diagrams clearly illustrating the use of the rocket parachute flare printed on its casing;

.3 be so designed as not to cause discomfort to the person holding the casing when used in accordance with the manufacturer's operating instructions.

.4 have integral means of ignition.

6.7.1.2 The rocket shall, when fired vertically, reach an altitude of not less than 300 m. At or near the top of its trajectory, the rocket shall eject a parachute flare, which shall:

.1 burn with a bright red colour;

.2 burn uniformly with an average luminous intensity of not less than 30000 cd;

.3 have a burning period of not less than 40 s;

.4 have a rate of descent of not more than 5 m/s;

.5 not damage its parachute or attachments while burning.

6.7.2 Hand flares.

6.7.2.1 The hand flare shall:

.1 have brief instructions or diagrams printed on its casing clearly illustrating the use of the hand flare;

.2 be contained in a water-resistant casing;

.3 have integral means of ignition;

.4 be so designed as not to cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used it in accordance with the manufacturer's operating instructions.

6.7.2.2 The hand flare shall:

.1 burn with a bright red colour;

.2 burn uniformly with an average luminous intensity of not less than 15000 cd;

.3 have a burning period of not less than 1 min;

.4 continue to burn after having been immersed for 10 s under 100 mm of

water.

6.7.3 Buoyant smoke signals.

6.7.3.1 The buoyant smoke signal shall:

.1 be contained in a water-resistant casing;

.2 not ignite explosively when used it in accordance with the manufacturer's operating instructions;

.3 have brief instructions or diagrams printed on its casing clearly illustrating the use of the buoyant smoke signal.

6.7.3.2 The buoyant smoke signal shall:

.1 emit highly visible smoke at a uniform rate for a period of not less than 3 min when floating in calm water;

.2 not emit any flame during the entire smoke emission time;

.3 not be swamped in a seaway;

.4 continue to emit smoke when submerged in water for 10 s under 100 mm of water.

6.8 LIFERAFTS

6.8.1 General.

6.8.1.1 Construction of a liferaft shall provide its using in all sea conditions for not less than 30 days afloat.

6.8.1.2 The liferaft shall be so constructed that when it is dropped into the water from a height of 18 m, the liferaft and its equipment will operate satisfactorily.

If the liferaft is stowed at a height of more than 18 m above the waterline in the lightest sea-going condition, it shall be of a type which has been satisfactorily drop-tested from at least that height.

6.8.1.3 The floating liferaft shall be capable of withstanding repeated jumps onto it from a height of at least 4,5 m above its floor both with and without the canopy erected.

6.8.1.4 The liferaft and its fitting shall be so constructed as to enable it to be towed at a speed of 3 knots in calm water with its full complement of persons and equipment and with one of its sea anchors streamed.

6.8.1.5 The liferaft shall have a canopy to protect the occupant from exposure which shall automatically set in place when the liferaft is being put into operating condition.

The canopy shall comply with the following:

.1 provide protection of the under-canopy space against heat and cold by means of either two layers of material separated by an air gap or other equally efficient means. Measures shall be taken to prevent accumulation of water in the air gap;

.2 its interior surface shall be of a colour that does not irritate the occupants;

.3 each entrance shall be clearly indicated and be provided with efficient adjustable closing arrangements which can be easily and quickly opened by persons

clothed in immersion suits from inside and outside, and closed from inside, the liferaft so as to permit ventilation but exclude seawater, wind and cold. Liferafts accommodating more than eight persons shall have at least two diametrically opposite entrances;

.4 admit sufficient air for the occupants at all times, even with the entrances closed;

.5 have at least one viewing port;

.6 have the means for collecting rain water;

.7 it shall be provided with means to mount a survival craft radar transponder at a height of at least 1 m above the sea;

.8 have sufficient headroom for sitting occupants under all parts of the canopy.

6.8.2 Minimum carrying capacity and mass of liferafts.

6.8.2.1 No liferaft shall be approved which has a carrying capacity of less than six persons calculated in accordance with the requirements of 6.9.3 or 6.10.3 as appropriate.

6.8.2.2 Unless the liferaft shall be launched by an approved launching appliance complying with the requirements of 6.20.5 or is not intended for easy side-to-side transfer, the total mass of the liferaft, its container and its equipment shall not be more than 185 kg.

6.8.3 Liferaft fittings.

6.8.3.1 The liferaft shall be fitted with lifelines securely becketed around the inside and outside of the liferaft.

6.8.3.2 The liferaft shall be fitted with an efficient painter of length equal to not less than 10 m plus the distance from the stowed position to the waterline in the lightest seagoing condition or 15 m whichever is the greater. The breaking strength of the painter system, including its means of attachment to the liferaft, except the weak link required by 6.8.6, shall be not less than 15,0 kN for liferafts permitted to accommodate more than 25 persons, not less than 10,0 kN for liferafts permitted to accommodate 9 to 25 persons and not less than 7,5 kN for any other liferaft.

6.8.3.3 A manually controlled exterior light shall be fitted to the uppermost position of the liferaft canopy or structure. The light shall be white and be capable of operating continuously for at least 12 h with a luminous intensity of not less than 4,3 cd in all directions of the upper hemisphere. However, if the light is a flashing light it shall flash at a rate of not less than 50 flashes and not more than 70 flashes per min for the 12 h operating period with an equivalent effective luminous intensity. The lamp shall light automatically when the canopy is erected. Batteries shall be of a type that does not deteriorate due to dampness or humidity in the stowed liferaft.

6.8.3.4 A manually controlled interior light shall be fitted inside the liferaft capable of continuous operation for a period of at least 12 h. It shall light automatically when the canopy is erected and shall produce an arithmetic mean luminous

intensity of not less than 0,5 cd when measured over the entire hemisphere to permit reading of survival and equipment instructions. Batteries shall be of a type that does not deteriorate due to dampness or humidity in the stowed liferaft.

6.8.4 Davit-launched liferafts.

6.8.4.1 Davit-launched liferaft shall comply with the following provisions:

.1 be capable of withstanding, when loaded with its full complement of persons and equipment, a lateral impact against the ship's side at an impact velocity of not less than 3,5 m/s and also a drop into the water from a height of not less than 3 m without damage that will affect its function;

.2 be provided with means for bringing it alongside the embarkation deck and holding the liferaft securely during embarkation of persons.

6.8.4.2 Every passenger ship davit-launched life-raft shall be so constructed that it can be rapidly boarded by its full complement of persons.

6.8.4.3 Every cargo ship davit-launched liferaft shall be so constructed that it can be boarded by its full complement of persons in not more than 3 min from the time the instruction to board is given.

6.8.5 Equipment.

6.8.5.1 The normal equipment of every liferaft shall consist of:

.1 one buoyant rescue quoit, attached to not less than 30 m of buoyant line;

.2 one knife of the non-folding type having a buoyant handle attached by a lanyard and stowed in a pocket on the exterior of the canopy near the point at which the painter is attached to the liferaft. The liferafts which are permitted to accommodate 13 persons or more shall be provided with a second knife which may be of folding type;

.3 one buoyant bailer for a liferaft which is permitted to accommodate not more than 12 persons and two buoyant bailers for a liferaft which is permitted to accommodate 13 persons and more;

.4 two sponges;

.5 two sea-anchors each with a shock resistant hawser and tripping line if fitted, one being spare and the other permanently attached to the liferaft in such a way that when the liferaft inflates or is waterborne it will cause the liferaft to lie oriented to the wind in the most stable manner. The strength of each sea-anchor and its hawser and tripping line if fitted shall be adequate in all sea conditions. The sea-anchors shall have means to prevent twisting of the line and shall be of a type which is unlikely to turn inside out between its shroud lines. The sea-anchor permanently attached to davit-launched liferafts and liferafts fitted on passenger ships shall be arranged for manual deployment only. All other liferafts shall have the sea-anchor deployed automatically when the liferaft inflates;

.6 two buoyant oars (paddles);

.7 three tin-openers and a pair of scissors. Safety knives containing special tin-opener blades are satisfactory for this requirement;

.8 one first-aid outfit in a waterproof case capable of being closed tightly after use;

.9 one signal whistle or other equivalent sound signal providing a sound pressure level of about 100 dB at a distance of 1 m;

.10 four red rocket parachute flares complying with the requirements of 6.7.1;

.11 six hand flares complying with the requirements of 6.7.2;

.12 two buoyant smoke signals complying with the requirements of 6.7.3;

.13 one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;

.14 one efficient radar reflector, unless search and rescue locating device is stowed in the liferaft;

.15 one daylight signalling mirror (heliograph) with instructions on its use for signalling to ships and aircraft;

.16 a table of the life-saving signals in a waterproof container or on a watertight material (one copy);

.17 one set of fishing tackle;

.18 a food ration consisting of not less than 10000 kJ (2400 kCal) for each person the liferaft is permitted to accommodate. These rations shall be palatable, edible throughout the marked life, and packed in a manner which can be readily divided and easily opened, taking into account immersion suit gloved hands.

The rations shall be packed in permanently sealed metal containers or vacuum packed in a flexible packaging material with a negligible vapour transmission rate (< 0,1 g/m^2 per 24 h at 23°C/85 per cent relative humidity when tested according to the standard, which application is agreed with the Register) . Flexible packaging material shall be further protected by outer packing if needed to prevent physical damage to the food ration or other items as result of sharp edges. The packaging shall be clearly marked with date of packing and date of expiry, the production lot number, the content in the package and instructions for use. The content of the food ration and its portions shall be acceptable to the Register.

.19 1,5 1 of fresh water for each person the liferaft is permitted to accommodate, of which either 0,5 1 per person may be replaced by a desalinating apparatus capable of producing an equal amount of fresh water in 2 days or 1 1 per person may be replaced by a manually powered reverse osmosis desalinator, as described in 6.13.7.5, capable of producing an equal amount of fresh water in 2 days. The water shall satisfy suitable international requirements for chemical and microbiological content, and shall be packed in sealed watertight containers that are of corrosion resistant material or are treated to be corrosion resistant. Flexible packaging materials, if used, shall have a negligible vapour transmission rate (< 0,1 g/m^2 per 24 h at 23 °C/85 per cent relative humidity when tested to a standard accepted to the Register), except that individually packaged portions within a larger container need not meet this vapour transmission requirement. Each water container shall have a method of spill proof reclosure, except for individually packaged portions of less than 125 ml. Each container shall be clearly marked with date of packing and date of expiry, the production lot number, the quantity

of water in the container, and instructions for consumption. The containers shall be easy to open, taking into account immersion suit gloved hands. Water for emergency drinking complying with the international standard acceptable to the Register is acceptable in compliance with these requirements;

.20 one rustproof graduated vessel for drinking water;

.21 anti-seasickness medicine sufficient for at least 48 h and one seasickness bag for each person the liferaft is permitted to accommodate;

.22 instructions on how to survive in the liferaft;

.23 instructions for immediate action;

.24 personal thermal protective aids complying with the requirements of 6.6 sufficient for at least 10 per cent of the number of persons the liferaft is permitted to accommodate but not less than two.

6.8.5.2 The marking required in 6.9.6.3.5, 6.10.6.7 on liferafts equipped in accordance with 6.8.5.1 shall be "SOLAS A PACK" in block capitals of the Roman alphabet.

6.8.5.3 For the passenger ships engaged on short international voyages or on such voyages which by cruising range may be rendered as the short international voyages of such duration that not all the items specified in 6.8.5.1 are necessary, it may be allowed, when substantiated with regard to the area of navigation, that the liferafts carried on such ships be provided with the equipment specified in 6.8.5.1.1 to 6.8.5.1.6 inclusive, 6.8.5.1.8, 6.8.5.1.9, 6.8.5.1.13 to 6.8.5.1.16 inclusive, 6.8.5.1.21 to 6.8.5.1.24 inclusive as well as one half of the equipment specified in 6.8.5.1.10 to 6.8.5.1.12 inclusive. The marking required in 6.9.6.3.5 and 6.10.6.7 on such liferafts shall be "SOLAS B PACK" in block capitals of the Roman alphabet.

6.8.5.4 The liferafts for coastal ships not engaged on international voyages shall at least be fitted with the following equipment:

. 1 the items of equipment specified in 6.8.5.1.1, 6.8.5.1.4, 6.8.5.1.6, 6.8.5.1.8, 6.8.5.1.9, 6.8.5.1.11, 6.8.5.1.13 and 6.8.5.1.22;

.2 one buoyant bailer and one sea anchor. The marking required in 6.9.6.3.5 and 6.10.6.7 on such liferafts shall be "C PACK" in block capitals of the Roman alphabet.

6.8.5.5 In general the items of equipment of the liferaft shall be stowed in a container which shall be secured inside the liferaft, if the container is not an integral part of the liferaft or permanently attached to it, and be capable of floating in water for at least 30 min. without damage to its contents.

6.8.6 Float-free arrangements for liferafts.

6.8.6.1 The liferaft painter system shall provide a connection between the ship and the liferaft and shall be so arranged as to ensure that the liferaft when released and inflated (if the liferaft is inflatable) is not dragged under by the sinking ship.

6.8.6.2 If the float-free arrangements use a weak link, it shall:

.1 not be broken by the force required to pull the painter from the liferaft

container;

.2 be of sufficient strength to permit the inflation of the liferaft;

.3 break under a strain of 2,2 ± 0,4 kN.

6.8.6.3 Hydrostatic release unit.

If the float-free arrangements use a hydrostatic release unit, it shall:

.1 be constructed of compatible materials so as to prevent malfunction of the unit. Galvanizing or other forms of metallic coating on parts of the hydrostatic release unit not permitted;

.2 automatically release the liferaft from a ship at a depth of not more than 4 m;

.3 have drains to prevent the accumulation of water in the hydrostatic chamber when the unit is in its normal position;

.4 be so constructed as to prevent release the liferaft from a ship when sea swash over the unit;

.5 be permanently marked on its exterior with its type and serial number;

.6 be permanently marked on the unit or identification plate securely attached to the unit, with the date of manufacture, type and serial number and whether the unit is suitable for use with a liferaft with a capacity of more than 2 5 persons;

.7 be such that each part connected to the painter system has a strength of not less than that required for the painter;

.8 if disposable, in lieu of the requirement in 6.8.6.3.6 be marked with a means of determining its date of expiry.

6.9 INFLATABLE LIFERAFTS

6.9.1 Inflatable liferafts shall comply with the requirements of 6.8 and, in addition, shall comply with the requirements of the present Chapter.

6.9.2 Construction of inflatable liferafts.

6.9.2.1 The main buoyancy chambers shall be divided into not less than two separate compartments, each inflated through a non-return inflation valve on each compartment. The buoyancy chambers shall be so arranged that in the event of any one of the compartments being damaged or failing to inflate, the intact compartments shall be able to support afloat the number of persons, each having a mass of 82,5 kg, which the liferaft is permitted to accommodate, seated in their normal positions with positive freeboard over the liferaft's entire periphery.

6.9.2.2 The floor of the liferaft shall be water-proof and shall be capable to provide sufficient insulation against cold either:

.1 by means of one or more compartments which can be inflated automatically or by the occupants and then can be deflated and reinflated by the occupants;

.2 by other equally efficient means not dependent on inflation.

6.9.2.3 The liferaft shall be capable of being inflated by one person. The liferaft shall be inflated with a nontoxic gas. The inflation system, including any

relief valves installed in compliance with 6.9.2.4 shall be approved by the Register. Inflation shall be completed within a period of 1 min at an ambient temperature of between 18°C and 20°C and within a period of 3 min at an ambient temperature of — 30°C. After inflation the liferaft shall maintain its form when loaded with its full complement of persons and equipment. The pressure vessels used in an automatic gas inflation system shall be approved by the Register or other competent body.

6.9.2.4 Each inflatable compartment shall withstand a pressure equal to 3 times the working pressure and shall be prevented from reaching a pressure exceeding twice the working pressure either by means of relief valves or by a limited gas supply. Means shall be provided for fitting the topping-up pump or bellows required by 6.9.9.1 so that the working pressure can be maintained.

6.9.3 Carrying capacity of inflatable liferafts.

The number of persons which a liferaft shall be permitted to accommodate shall be equal to the lesser of:

.1 the greatest whole number obtained by dividing by 0,096 the volume in cubic metres of the inflated main buoyancy chambers (which for this purpose shall include neither the arches nor the thwarts if fitted)

.2 the greatest whole number obtained by dividing by 0,372 the inner horizontal cross-sectional area of the liferaft in square metres (which for this purpose may include the thwart or thwarts, if fitted, measured to the innermost edge of the buoyancy tubes)

.3 the number of persons having an average mass of 82,5 kg, all wearing either immersion suits and lifejackets or, in the case of davit-launched liferafts, lifejackets, that can be seated with sufficient comfort and headroom without interfering with the operation of any of the liferaft's equipment.

6.9.4 Access into inflatable liferafts.

6.9.4.1 At least one entrance shall be fitted with a boarding ramp, capable of supporting a person weighing 100 kg sitting or kneeling or not holding onto any other part of the liferaft, to enable persons to board the liferaft from the sea. The boarding ramp shall be so arranged as to prevent significant deflation of the liferaft if the raft is damaged. The rest remains as it stands. The boarding ramp shall be so arranged as to prevent significant deflation of the liferaft if the ramp is damaged. In the case of a davit-launched liferaft having more than one entrance, the boarding ramp shall be fitted at the entrance opposite the bowsing lines and embarkation facilities.

6.9.4.2 Entrances not provided with boarding ramps shall have boarding ladders, the lowest step of which shall be situated not less than 0,4 m below the liferaft's light waterline.

6.9.4.3 There shall be means inside the liferaft to assist persons to pull themselves into the liferaft from the ladder.

6.9.5 Stability of inflatable liferafts.

6.9.5.1 Every inflatable liferaft shall be so constructed that, when fully inflated and floating with the canopy uppermost, it is stable in a seaway.

6.9.5.2 The stability of the liferaft when in the inverted position shall be such that it can be righted in a seaway and in calm water by one person.

6.9.5.3 The stability of the liferaft when loaded with its full complement of persons and equipment shall be such that it can be towed at speeds of up to 3 knots in calm water.

6.9.5.4 The liferaft shall be fitted with water pockets complying with the following requirements:

.1 the water pockets shall be of a highly visible colour;

.2 the design shall be such that the pockets fill to at least 60 per cent of their capacity within 25 s of deployment;

.3 the pockets shall have an aggregate capacity of at least 220 1 for liferafts up to 10 persons;

.4 the pockets for liferafts certified to carry more than 10 persons shall have an aggregate capacity of not less than 20 *N* 1, where *N*= number of persons carried;

.5 the pockets shall be positioned symmetrically round the circumference of the liferaft. Means shall be provided to enable air to readily escape from underneath the liferaft.

6.9.6 Containers for inflatable liferafts.

6.9.6.1 The liferaft shall be packed in a container complied with the following requirements:

.1 be so constructed as to withstand hard wear under any conditions of service encountered at sea;

.2 when packed with the liferaft and its equipment, be of sufficient inherent buoyancy to pull the painter and to operate the gas inflation mechanism shall the ship sink;

.3 be watertight as far as practicable, except for drain holes in the container bottom.

6.9.6.2 The liferaft shall be packed in its container in such a way as to ensure that the waterborne liferaft inflates in an upright position on breaking free from its container.

6.9.6.3 The container shall be marked with the following data:

.1 manufacturer's name or trade mark;

.2 serial number;

.3 name of approving authority and the number of persons it is permitted to carry;

.4 SOLAS (excluding the containers containing the liferafts equipped in accordance with 6.8.5.4);

.5 type of emergency pack enclosed;

.6 date when last serviced;

.7 length of painter;

.8 mass of the packed liferaft, if greater than 185 kg;

.9 maximum permitted height of stowage above waterline (depending on drop-test height and length of painter);

.10 launching instructions;

.11 type of the weak link system if any inside the liferaft container or indication of its absence.

6.9.7 Marking on inflatable liferafts.

6.9.7.1 The liferaft shall be marked with the following:

.1 manufacturer's name or trade mark;

.2 serial number;

.3 date of manufacture (month and year);

.4 name of authority approved the liferaft;

.5 name and place of servicing station where it was last serviced;

.6 number of persons it is permitted to accommodate over each entrance in characters not less than 100 mm in height of a colour contrasting with that of the liferaft.

6.9.7.2 Provision shall be made for marking each liferaft with the name and port of registry of the ship to which shall to be fitted, in such a form that the ship identification can be changed at any time without opening the container.

6.9.8 Davit-launched inflatable liferafts.

6.9.8.1 In addition to complying with the above requirements, a liferaft intended for use with a launching appliance, when suspended from its lifting hook or bridle, shall withstand a load of:

.1 4 times the mass of its full complement of persons and equipment, at an ambient temperature and a stabilized liferaft temperature of 20 ± 3°C with all relief valves inoperative;

.2 1,1 times the mass of its full complement of persons and equipment at an ambient temperature and a stabilized liferaft temperature of — 30°C with all relief valves operative.

6.9.8.2 Rigid containers of the liferafts to be launched by a launching appliance shall be so secured that the container or parts of it are prevented from falling into the sea during and after inflation and launching of the contained liferaft.

6.9.9 Additional equipment for inflatable liferafts.

6.9.9.1 In addition to the equipment required by 6.8.5, every inflatable liferaft shall be provided with:

.1 one repair outfit for repairing punctures in buoyancy compartments;

.2 one topping-up pump or bellows.

6.9.9.2 The knives, the tin openers and scissors required by paragraph 6.8.5 shall be of safe type.

6.10 RIGID LIFERAFTS

6.10.1 Rigid liferafts shall comply with the requirements of 6.8 and in addition shall comply with the requirements of the present Part.

6.10.2 Construction of rigid liferafts.

6.10.2.1 The buoyancy of the liferaft shall be provided by approved inherently buoyant material placed as near as possible to the periphery of the liferaft. The buoyant material shall be low flame spread or be protected by a relevant coating.

6.10.2.2 The floor of the liferaft shall prevent the ingress of water and shall effectively support the occupants out of the water and insulate them from cold.

6.10.3 Carrying capacity of rigid liferafts.

The number of persons which a liferaft shall be permitted to accommodate shall be equal to the lesser of:

.1 the greatest whole number obtained by dividing by 0,096 the volume, measured in cubic metres, of the buoyancy material multiplied by a factor of 1 minus the specific gravity of that material;

.2 the greatest whole number obtained by dividing by 0,372 the horizontal cross-sectional area of the floor of the liferaft measured in square metres;

.3 the number of persons having an average mass of 82,5 kg, all wearing immersion suits and life-jackets, that can be seated with sufficient comfort and headroom without interfering with the operation of any of the liferaft's equipment.

6.10.4 Access into rigid liferafts.

6.10.4.1 At least one entrance shall be fitted with a boarding ramp, capable of supporting a person weighing 100 kg sitting or kneeling and not holding onto other part of the liferaft, to enable persons to board the liferaft from the sea. In the case of a davit-launched liferaft having more than one entrance, the boarding ramp shall be fitted at the entrance opposite to the bowsing and embarkation facilities.

6.10.4.2 Entrances not provided with a boarding ramp shall have a boarding ladder, the lowest step of which shall be situated not less than 0,4 m below the liferaft's light waterline.

6.10.4.3 There shall be means inside the liferaft to assist persons to pull themselves into the liferaft from the ladder.

6.10.5 Stability of rigid liferafts.

6.10.5.1 Unless the liferaft is capable of operating safely whichever way up it is floating, its strength and stability shall be such that it is either self-righting or can readily be righted to the operating condition in a seaway and in calm water by one person.

6.10.5.2 The stability of a liferaft when loaded with its full complement of persons and equipment shall be such that it can be towed at speeds of up to 3 knots in calm water.

6.10.6 Marking on rigid liferafts.

The liferaft shall be marked with:

.1 name and port of registry of the ship to which it belongs;

.2 manufacturer's name or trade mark;

.3 serial number;

.4 name of approving authority;

.5 number of persons it is permitted to accommodate over each entrance in characters not less than 100 mm in height of a colour contrasting with that of the liferaft;

.6 "SOLAS" (excepting the liferaft equipped in accordance with 6.8.5.4);

.7 type of emergency pack enclosed;

.8 length of painter;

.9 maximum permitted height of stowage above waterline depending on drop-test height;

.10 launching instructions.

6.10.7 Davit-launched rigid liferafts.

In addition to the above requirements, a rigid liferaft intended for use with an approved launching appliance, when suspended from its lifting hook or bridle, shall withstand a load of 4 times the mass of its full complement of persons and equipment.

6.11 CANOPIED REVERSIBLE LIFERAFTS

6.11.1 All canopied reversible liferafts shall comply with the requirements of 6.8.1, inflatable canopied reversible liferafts — requirements of 6.9, except 6.9.5.2 and 6.9.6.2, rigid canopied reversible liferafts shall comply with the requirements of 6.10, except 6.10.5.1 and the requirements of the present Chapter.

6.11.2 The canopied reversible liferafts shall be fitted with self-draining arrangements. Liferafts shall be capable of being safely used at all times by untrained persons.

6.11.3 The canopied reversible liferaft shall be capable of operating safely whichever way up it is floating. The liferaft shall have a canopy on both sides of the main body, if applicable, of the liferaft, which shall be set in place when the liferaft is launched and waterborne. Both canopies shall comply with the requirements of 6.8.1.5.5, 6.8.3.3 and 6.8.3.4.

6.11.4 The equipment required under 6.8.5 shall be readily accessible whichever way up the canopied reversible liferaft is floating, either by use of an equipment container which is accessible from either side, or by duplication of equipment on each side of the liferaft.

6.11.5 The fully equipped canopied reversible liferaft shall float in a stable upright position at all times, regardless of the conditions of loading.

6.11.6 The canopied reversible liferaft do not need to be arranged for easy side-to-side transfer, and are therefore, not subject to the 185 kg mass limitation of 6.8.2.2.

6.11.7 On ro-ro passenger ships operating on fixed routes in shallow water, the requirements that liferafts be arranged as to ensure that the liferafts are not dragged under the sinking ship, can be achieved by using a liferaft painter with

a length of at least the maximum depth of water plus an additional 20 per cent.

6.12 SELF-RIGHTING LIFERAFTS

6.12.1 All self-righting liferafts shall comply with the requirements of 6.8.1, inflatable self-righting liferafts — requirements of 6.9, except 6.9.5.2 and 6.9.6.2, rigid self-righting liferafts shall comply with the requirements of 6.10 except 6.10.5.1 and the requirements of the present Chapter.

6.12.2 The fully equipped liferaft shall automatically turn from a capsized position to an upright position on the surface of the water, regardless of whether it inflates in the inverted position underwater or capsizes for any reason following inflation.

6.12.3 The self-righting liferafts shall be fitted with self-draining arrangements. Liferafts shall be capable of being safely used at all times by untrained persons.

6.12.4 The self-righting liferafts do not need to be arranged for easy side-to-side transfer, and are therefore, not subject to the 185 kg mass limitation of 6.8.2.2.

6.12.5 On ro-ro passenger ships operating on fixed routes in shallow water, the requirement that liferafts be arranged as to ensure that the liferafts are not dragged under the sinking ship, can be achieved by using a liferaft painter with a length of at least the maximum depth of water plus an additional 20 per cent.

6.13 LIFEBOATS

6.13.1 Construction of lifeboats.

6.13.1.1 All lifeboats shall be properly constructed and shall be of such form and proportion that they have ample stability in a seaway and sufficient freeboard when loaded with their full complement of persons and equipment, and are capable of being safely launched under all conditions of trim up to 10° and list up to 20° either way. All lifeboats shall have rigid hulls and shall be capable of maintaining positive stability when in an upright position in calm water and loaded with their full complement of persons and equipment and holed in any location below the waterline, provided no loss of buoyancy material or other damages..

6.13.1.2 All lifeboats shall be of sufficient strength to:

.1 enable them to be safely lowered into the water when loaded with their full complement of persons and equipment;

.2 be capable of being launched and towed when the ship is making headway at a speed of 5 knots in calm water.

6.13.1.3 Hulls and rigid covers of the lifeboats shall be manufactured of fire-retardant or low flame-spread materials.

6.13.1.4 Seating shall be provided on thwarts, benches or fixed chairs which are constructed so as to be capable of supporting:

.1 a static load equivalent to the number of persons each weighing 100 kg for which spaces are provided in compliance with the requirements of 6.13.2;

.2 a load of 100 kg in any single seat location when a lifeboat to be launched by falls is dropped into the water from a height of at least 3 m;

.3 a load of 100 kg in any single seat location when a free-fall lifeboat is launched from a height of at least 1,3 times its free-fall certification height.

6.13.1.5 Except for free-fall lifeboats, each lifeboat to be launched by falls shall be of sufficient strength to withstand a load, without residual deflection on removal of that load:

.1 in the case of boats with metal hulls, 1,25 times the total mass of the lifeboat when loaded with its full complement of persons and equipment;

.2 in the case of other boats, twice the total mass of the lifeboat when loaded with its full complement of persons and equipment.

6.13.1.6 Except for free-fall lifeboats, each lifeboat to be launched by falls shall be of sufficient strength to withstand, when loaded with its full complement of persons and equipment and with, where applicable, skates or fenders in position, a lateral impact against the ship's side at an impact velocity of at least 3,5 m/s and also a drop into the water from a height of at least 3 m.

6.13.1.7 The vertical distance between the floor surface and the interior of the enclosure or canopy extending over 50 per cent of the floor area shall be:

.1 not less than 1,3 m for lifeboats permitted to accommodate 9 persons or less;

.2 not less than 1,7 m for lifeboats permitted to accommodate 24 persons or more;

.3 not less than the distance as determined by linear interpolation between 1,3 m and 1,7 m for lifeboats permitted to accommodate from 9 to 24 persons.

6.13.1.8 Each lifeboat shall be fitted with a Type Approval Certificate issued by the Register, containing the following items:

number of the Type Approval Certificate;

manufacturer's name and address;

lifeboat model;

material of hull construction, in such detail as to ensure that compatibility problems in repair shall not occur;

total mass of fully equipped and fully manned boats;

the measured towing force of the lifeboat;

statement of approval as to 6.14, 6.15, 6.16, 6.17 or 6.18.

Moreover, the Register shall provide a series-built lifeboat with a Certificate which, in addition to the above items, specifies:

lifeboat serial number;

month and year of manufacture;

number of persons the lifeboat is approved to carry;

information required under 6.1.1.9.

Each lifeboat shall be fitted with a permanently affixed approval plate with the Register brand containing at least the following items:

manufacturer's name and address;

lifeboat model or type and serial number;

month and year of manufacture;

number of persons the lifeboat is approved to carry; and

the approval information required under paragraph 6.1.1.9.

6.13.2 Carrying capacity of lifeboats.

6.13.2.1 No lifeboat shall be approved to accommodate more than 150 persons.

6.13.2.2 The number of persons which a lifeboat is permitted to accommodate shall be equal to the lesser of:

.1 the number of persons having an average mass of 75 kg (for a lifeboat intended for a passenger ship) or 82,5 kg (for a lifeboat intended for a cargo ship) all wearing lifejackets, that can be seated in a normal position without interfering with the means of propulsion or the operation of any of the lifeboat's equipment;

.2 the number of spaces that can be provided on the seating arrangements in accordance with Fig. 6.13.2.2.2. The shapes may be overlapped as shown in the figure, provided footrests are fitted and there is sufficient room for legs and the vertical separation between the upper and lower seat is not less than 350 mm.

6.13.2.3 Each seating position shall be clearly indicated in the lifeboat.

6.13.3 Access into lifeboats.

6.13.3.1 Every passenger ship lifeboat shall be so arranged that it can be boarded by its full complement of persons in not more than 10 min from the time the instruction to board is given. Rapid disembarkation shall also be possible.

6.13.3.2 Every cargo ship lifeboat shall be so arranged that it can be boarded by its full complement of persons in not more than 3 min from the time the instruction to board is given. Rapid disembarkation shall also be possible.

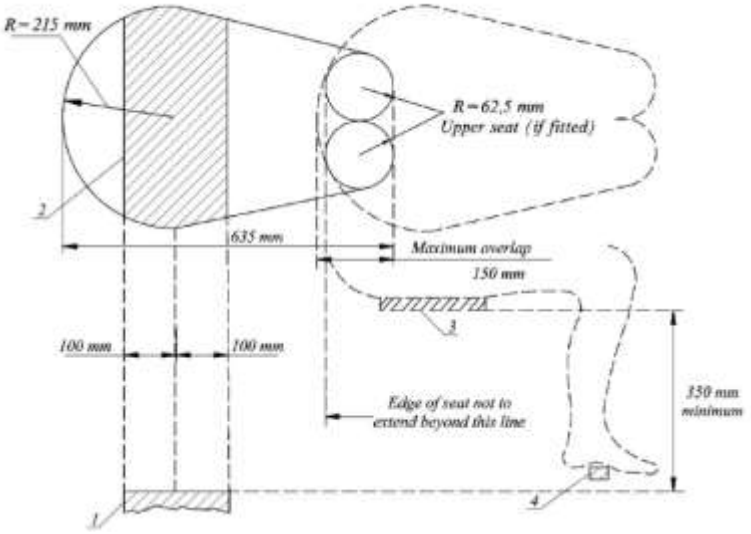


Fig.6.13.2.2:

1 — lower scat; *2* — minimum seat area extends 100 mm to both sides of half-circle base line and to full width of Figure; *3* - upper seat; *4* - - footrest.

6.13.3.3 Lifeboats shall have a boarding ladder that can be used on either side of the lifeboat to enable persons in the water to board the lifeboat. The lowest step of the ladder shall be not less than 0,4 m below the lifeboat's light waterline.

6.13.3.4 The lifeboat shall be so arranged that helpless people can be brought on board either from the sea or on stretchers.

6.13.3.5 All surfaces of the lifeboat on which persons might walk shall have a non-skid finish.

6.13.4 Lifeboat buoyancy.

All lifeboats shall have inherent buoyancy or shall be fitted with inherently buoyant material which shall not be adversely affected by seawater, oil or oil products, sufficient to float the lifeboat with all its equipment on board when flooded and open to the sea. Additional inherently buoyant material, equal to 280 N of buoyant force per person shall be provided for the number of persons the lifeboat is permitted to accommodate. Buoyant material, unless in addition to that required above, shall not be installed external to the hull of the lifeboat.

6.13.5 Lifeboat freeboard and stability.

6.13.5.1 All lifeboats shall be stable and have a positive GM value when loaded with 50 per cent of the number of persons the lifeboat is permitted to accommodate in their normal positions to one side of the centreline.

6.13.5.2 Under the condition of loading in 6.13.5.1:

.1 each lifeboat with side openings near the gunwale

shall have a freeboard, measured from the waterline to the lowest opening through which the lifeboat may become flooded, of at least 1,5 per cent of the lifeboat's length or 100 mm, whichever is the greater;

.2 each lifeboat without side openings near the gunwale shall not exceed an angle of heel of 20° and shall have a freeboard, measured from the waterline to the lowest opening through which the lifeboat may become flooded, of at least 1,5 per cent of the lifeboat's length or 100 mm, whichever is greater.

6.13.6 Lifeboat propulsion.

6.13.6.1 Every lifeboat shall be powered by a compression ignition engine. No engine shall be used for any lifeboat if its fuel has a flashpoint of 43 °C or less (closed cup test).

6.13.6.2 The engine shall be provided with either a manual starting system, or a power starting system with two independent sources of power. Any necessary starting aids shall also be provided. The engine starting systems and aids shall start the engine at an ambient temperature of — 15 °C within 2 min. of commencing the start procedure. The temperature for the lifeboat provided for the ship constantly engaged in particular voyages may be different when substantiated by the procedure approved by the Register with regard to the area of navigation. The starting systems shall not be impeded by the engine casing, thwarts or other obstructions.

6.13.6.3 The force on the handle when actuating the propelling gear at the moment of starting shall not be more than 160 N per one person.

6.13.6.4 The engine shall be capable of operating for not less than 5 min. after starting from cold condition when the lifeboat is out of water in "ready-to-lower" condition.

6.13.6.5 The engine shall be capable of operating when the lifeboat is flooded up to the centreline of the crank shaft.

6.13.6.6 The engine shall be provided with a reverse-reduction gear or other arrangement disengaging the propeller shafting and the propeller from the engine. Provision shall be made for ahead and astern propulsion of the lifeboat.

6.13.6.7 The exhaust pipe shall be so arranged as to prevent water from entering the engine in normal operation.

6.13.6.8 The propeller shall be so arranged and guarded as to ensure safety of persons in the water and prevent damage to the propeller by floating debris.

6.13.6.9 The speed of a lifeboat when proceeding ahead in calm water loaded with its full complement of persons and equipment and with all engine-powered auxiliary equipment shall be at least 6 knots and at least 2 knots when towing a liferaft of maximum carrying capacity available on board loaded with its full complement of persons and equipment or its equivalent. Sufficient fuel shall be provided to run the fully loaded lifeboat at 6 knots for a period of not less than 24 h at a temperature range expected in the area in which the ship operates.

6.13.6.10 The lifeboat engine, reverse-reduction gear and engine-suspended accessories shall be protected with a casing made of low spread flame materials

or non-combustible materials in accordance with 1.6, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships, or by other suitable means providing similar protection.

Such means shall also protect persons from coming into accidental contact with hot or moving parts and protect engine from exposure to weather and sea. Adequate means shall be provided to reduce the engine noise so that a shouted order can be heard.

Starter batteries shall be placed into the watertight casings providing gas venting.

6.13.6.11 The lifeboat engine and accessories shall be so constructed as to limit electromagnetic emission so that engine operation does not interfere with the operation of radio life-saving appliances used in the lifeboat.

6.13.6.12 Means shall be provided for recharging all engine-starting, radio and searchlight batteries. Radio batteries shall not be used to provide power for engine starting and for searchlight operation. Means shall be provided for recharging lifeboat batteries from the ship's power supply at a supply voltage not exceeding 50 V which can be disconnected at the lifeboat embarkation station.

6.13.6.13 Water-resistant instructions for starting and operating the engine shall be provided and mounted in conspicuous places near the engine starting controls.

6.13.6.14 The beds for the engine and reverse-reduction gear shall be sufficiently strong and resistant to vibration, and the scantlings of their members shall be assigned with due regard to the power of the engine.

6.13.6.15 The fuel and lubrication piping shall be effectively protected from mechanical damage and fitted with a readily accessible stop valve provided directly at the tank. The system of air supply and discharging the exhaust gases shall be so designed as to prevent water from penetrating into the engine and the exhaust pipe shall be efficiently insulated.

6.13.7 Lifeboat fittings.

6.13.7.1 All lifeboats except free-fall lifeboats shall be provided with at least one drain valve fitted near the lowest point in the hull, which shall automatically open to drain water from the hull when the lifeboat is not waterborne and shall automatically close to prevent entry of water when the lifeboat is waterborne. Each drain valve shall be provided with a cap or plug to close the valve, which shall be attached to the lifeboat by a lanyard, a chain, or other suitable means.

6.13.7.2 A lifeboat shall be provided with a rudder and tiller.

When a wheel or other remote steering mechanism is also provided the tiller shall be capable of controlling the ship in case of failure of the steering mechanism.

The tiller shall be permanently installed on, or linked to, the rudder stock; however, if the lifeboat is provided with a remote steering mechanism, the tiller may be removable and securely stowed near the rudder stock. The rudder and tiller shall be arranged in order not to be damaged by operation of the launching

and recovering appliance or by the propeller.

6.13.7.3 Except in the vicinity of the rudder and propeller, suitable handholds shall be provided or a buoyant lifeline shall be becketed around the outside of the lifeboat above the waterline and within reach of a person in the water.

6.13.7.4 A lifeboat which is not self-righting shall have such means as bilge keels or keel handholds to enable persons to cling to the capsized lifeboat. They shall be fastened to the lifeboat in such a way that, when subjected to heavy impact, they break away without damaging the hull of the lifeboat.

6.13.7.5 All lifeboats shall be fitted with sufficient watertight lockers or compartments to provide for the storage of the small items of equipment, water and provisions required by 6.13.8. The lifeboat shall be equipped with a means for storing the collected rain water.

All lifeboats shall be equipped with a means for collecting rain water or for producing drinking water from seawater with a manually powered desalinator. The desalinator shall not be dependent upon solar heat, nor on chemicals other than seawater.

6.13.7.6 Every lifeboat to be launched by a fall or falls, except a free-fall lifeboat, shall be fitted with a release mechanism complying with the following requirements subject to 6.13.7.6.9:

.1 the mechanism shall be so arranged that all hooks are released simultaneously;

.2 the mechanism shall have two release capabilities: normal (off-load) and on-load release capability:

.2.1 normal (off-load) release capability shall release the lifeboat when it is waterborne or when there is no load on the hooks, and not require manual separation of the lifting ring or shackle from the jaw of the hook; and

.2.2 on-load release capability shall release the lifeboat with a load on the hooks. This method shall ensure that the lifeboat is released under all conditions of load from complete off-load when the lifeboat is waterborne to a load equal to 1.1 of the total weight of the lifeboat when it is loaded with its full complement of persons and supply. This interlock override capability shall be adequately protected against accidental or premature use.

Adequate protection shall include special mechanical protection not normally required for off-load release, in addition to a danger sign. To prevent a premature on-load release, on-load operation of the release mechanism shall require multiple, deliberate and sustained action or actions by the operator;

.3 to prevent an accidental release during recovery of the boat, unless the hook is completely reset, either the hook shall not be able to support any load, or the handle or safety pins shall not be able to be returned to the reset (closed) position and any indicators shall not indicate the release mechanism is reset.

Additional danger signs shall be posted at each hook station to alert crew members to the proper method of resetting.

.4 the release mechanism shall be so designed and installed that crew members from inside the lifeboat can unambiguously determine when the system is ready for lifting by:

.4. directly observing that the movable hook portion or the hook portion that locks the movable hook portion in place is properly and completely reset at each hook; or

.4.2 observing a non-adjustable indicator that confirms that the mechanism that locks the movable hook portion in place is properly and completely reset at each hook; or

.4.3 easily operating a mechanical indicator that confirms that the mechanism that locks the movable hook portion in place is properly and completely reset at each hook;

.5 clear operating instructions shall be provided with a suitably worded warning notice using colour coding, pictograms and/or symbols as necessary for clarity. If colour coding is used, green shall indicate a properly reset hook and red shall indicate danger or improper or incorrect setting;

.6 the release control shall be clearly marked in a colour that contrasts with its surroundings;

.7 means shall be provided for hanging-off the lifeboat to free the release mechanism for maintenance;

.8 the load-bearing components of the release mechanism and the fixed structural connections in the lifeboat shall be designed with a calculated factor of safety of 6 based on the ultimate strength of the materials used, and the mass of the lifeboat when loaded with its full complement of persons, fuel, and equipment, assuming the mass of the lifeboat is equally distributed between the falls, except that the factor of safety for hanging-off arrangement may be based upon the mass of the lifeboat when loaded with its full complement of fuel and equipment plus 1000 kg;

.9 where a single fall and hook system is used for launching a lifeboat or rescue boat in combination with a suitable painter, the requirements of6.13.7.6.2.2 and 6.13.7.6.3 need not be applicable; in such an arrangement a single capability to release the lifeboat or rescue boat, only when it is fully waterborne, will be adequate.

6.13.7.7 Every lifeboat shall be fitted with a device to secure a painter near its bow. The device shall be such that the lifeboat does not exhibit unsafe or unstable characteristics when being towed by the ship making headway at speeds up to 5 knots in calm water. Except for free-fall lifeboats, the painter securing device shall include a release device to enable the painter to be released from inside the lifeboat, with the ship making headway at speeds up to 5 knots in calm water.

6.13.7.8 Every lifeboat which is fitted with a fixed two-way VHF radiotelephone apparatus with an antenna which is separately mounted shall be provided with arrangements for siting and securing the antenna effectively in its operating

position.

6.13.7.9 Lifeboats intended for launching down the side of a ship shall have skates and fenders as necessary to facilitate launching and prevent damage to the lifeboat.

6.13.7.10 A manually controlled exterior light shall be fitted outside the lifeboat. The light shall be white and be capable of operating continuously for at least 12 h with a luminous intensity of not less than 4,3 cd in all directions of the upper hemisphere. However if the light is a flashing light it shall flash at a rate of not less than 50 flashes and not more than 70 flashes per min for the 12 h operating period with an equivalent effective luminous intensity.

6.13.7.11 A manually controlled interior light shall be fitted inside the lifeboat capable of continuous operation for a period of at least 12 h. It shall produce an arithmetic mean luminous intensity of not less than 0,5 cd when measured over the entire upper hemisphere to permit reading of survival and equipment instructions; however, oil lamps shall not be permitted for this purpose.

6.13.7.12 Every lifeboat shall be so arranged as an adequate view forward, aft and to both sides is provided from the control and steering position for safe launching and maneuvering the lifeboat.

6.13.8 Lifeboat equipment.

6.13.8.1 All items of lifeboat equipment, whether required by this paragraph or elsewhere in 6.13, shall be secured within the lifeboat by lashings, storage in lockers or compartments, storage in brackets or similar mounting arrangements or other suitable means. However, in the case of a lifeboat to be launched by falls the boat-hooks shall be kept free for fending off purposes. The equipment shall be secured in such a manner as not to interfere with any abandonment procedures. All items of lifeboat equipment shall be as small and of as little mass as possible and shall be packed in a suitable and compact form. Except where otherwise stated, the normal equipment of every lifeboat shall consist of:

.1 except for free-fall lifeboats, sufficient buoyant oars to make headway in calm seas. Thole pins, prutches or equivalent arrangements shall be provided for each oar provided. Thole pins or crutches shall be attached to the boat by lanyards or chains;

.2 two boat-hooks;

.3 one buoyant bailer and two buckets;

.4 a survival manual;

.5 an operational compass which is luminous or provided with suitable means of illumination. In a totally enclosed lifeboat, the compass shall be permanently fitted at the steering position; in any other lifeboat, it shall be provided with a binnacle if necessary to protect it from the weather, and suitable mounting arrangements;

.6 a sea-anchor of adequate size fitted with a shock-resistant hawser which provides a firm hand grip when wet. The strength of the sea-anchor, hawser and tripping line if fitted shall be adequate for all sea conditions;

.7 two efficient painters of not less than twice the distance from the stowage position of the lifeboat to the waterline in the lightest sea-going condition or 15 m, whichever is greater. On lifeboats to be launched by free-fall launching, both painters shall be stowed near the bow ready for use. On other lifeboats, one painter attached to the release device required by 6.13.7.7 shall be placed at the forward end of the lifeboat and the other shall be firmly secured at or near the bow of the lifeboat ready for use.

.8 two hatches, one at each end of the lifeboat;

.9 watertight receptacles containing a total of 3 1 of fresh water as specified in 6.8.5.1.19 for each person the lifeboat is permitted to accommodate, of which either 1 1 per person may be replaced by a desalting apparatus capable of producing an equal amount of fresh water in 2 days, or 21 per person may be replaced by a manually powered reverse osmosis desalinator as described in 6.13.7.5 capable of producing an equal amount of fresh water in 2 days;

.10 one rustproof dipper with lanyard;

.11 one rustproof graduated drinking vessel;

.12 a food ration as described in 6.8.5.1.18 totalling not less than 10000 kJ for each person the lifeboat is permitted to accommodate; these rations shall be kept in airtight packaging and be stowed in a watertight container;

.13 four rocket parachute flares complying with the requirements of 6.7.1;

.14 six hand flares complying with the requirements of 6.7.2;

.15 two buoyant smoke signals complying with the requirements of 6.7.3;

.16 one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;

.17 one daylight signalling mirror (heliograph) with instructions for its use;

.18 one copy of the illustrated table of the life-saving signals in a waterproof container or made of a watertight material;

.19 one signal whistle or one equivalent sound signal providing a sound pressure level of about 100 dB at a distance of 1 m;

.20 a first-aid outfit in a waterproof case capable of being closed tightly after use;

.21 anti-seasickness medicine sufficient for at least 48 h and one seasickness bag for each person;

.22 a jack-knife attached to the lifeboat by a lanyard;

.23 three tin openers;

.24 two buoyant rescue quoits attached to not less than 30 m of buoyant line;

.25 if the lifeboat is not automatically self-bailing, a manual pump suitable for effective bailing;

.26 one set of fishing tackle;

.27 one set of tools and spares for the engine;

.28 portable fire extinguishing equipment of an approved type suitable for extinguishing oil fires;

.29 a searchlight with a horizontal and vertical sector of at least 6° and a

measured luminous intensity of 2500 cd which can work continuously for not less than 3 h;

.30 one radar reflector, unless a survival craft search and rescue locating device is fitted in the lifeboat;

.31 thermal protective aids complying with the requirements of 6.6 sufficient for 10 per cent of the number of persons the lifeboat is permitted to accommodate but not less than two;

.32 lifeboats intended for the ships engaged in voyages in which, depending on their purpose and duration, when substantiated by the procedure approved by the Register, the items specified in6.13.8.1.12 i 6.13.8.1.26 may be unnecessary.

6.13.8.2 Lifeboats intended for the coastal ships not engaged in the international voyages shall be equipped with the following items:

.1 one buoyant oar for each thwart with a rowlock;

.2 one bailer and one bucket;

.3 one painter attached to the stem and ready for use (dimensions according to 6.13.8.1.7);

.4 six hand flares in watertight containers giving a bright red light;

.5 the items specified in 6.13.8.1.19 and 6.13.8.1.20.

6.13.9 Lifeboat markings.

6.13.9.1 The number(s) of persons for which the lifeboat is approved, for passenger ships and/or cargo ships, as applicable, shall be clearly marked on it in clear permanent characters.

6.13.9.2 The name and port of registry of the ship to which the lifeboat belongs shall be marked on each side of the lifeboat's bow in block capitals of the Roman alphabet.

6.13.9.3 Marking permitting to identify the ship to which the lifeboat belongs and the lifeboat's number shall be made in such a way that it is visible from above.

6.14 PARTIALLY ENCLOSED LIFEBOATS

6.14.1 Partially enclosed lifeboats shall comply with the requirements of 6.13 and the present Chapter.

6.14.2 Partially enclosed lifeboats shall be provided with permanently attached rigid covers extending over not less than 20 per cent of the length of the lifeboat from the stem and not less than 20 per cent of the length of the lifeboat from the aftermost part of the lifeboat.

The lifeboat shall be fitted with a permanently attached foldable canopy which together with the rigid covers completely encloses the occupants of the lifeboat in a weatherproof shelter and protects them from exposure.

The lifeboat shall have entrances at both ends and on each side. Entrances in the rigid covers shall be weathertight when closed.

The canopy shall comply with the following requirements:

.1 be provided with adequate rigid sections or battens to permit its erection;

.2 can be easily erected by not more than two persons within not more than 2 min;

.3 provide insulation to protect the occupants against heat and cold by means of not less than two layers of material separated by an air gap or other equally efficient means. Means shall be provided to prevent accumulation of water in the air gap;

.4 its exterior shall be of a highly visible colour and its interior shall be of a colour which does not irritate the occupants;

.5 entrances in the canopy are provided with efficient adjustable closing arrangements which can be easily and quickly opened and closed from inside or outside so as to permit ventilation but exclude seawater, wind and cold; means shall be provided for holding the entrances securely in the open and closed position;

.6 with the entrances closed, it admits sufficient air for the occupants at all times;

.7 have means for collecting rainwater;

.8 the occupants can escape in the event of the lifeboat capsizing.

6.14.3 The interior of the lifeboat shall be of a light colour which does not cause discomfort to the occupants.

6.14.4 If a fixed two-way VHF radiotelephone apparatus is fitted in the lifeboat, it shall be installed in a cabin large enough to accommodate the radiotelephone apparatus and the operator. No separate cabin is required if the construction of the lifeboat provides a sheltered space at which operational capacity of the apparatus is not affected if the boat is flooded by water up to the level of upper seat pans.

6.15 TOTALLY ENCLOSED LIFEBOATS

6.15.1 Totally enclosed lifeboats shall comply with the requirements of 6.13 as well as with the requirements of the present Chapter.

6.15.2 Enclosure.

Every totally enclosed lifeboat shall be provided with a rigid watertight enclosure which completely encloses the lifeboat. The enclosure shall comply with the following requirements:

.1 protect the occupants against heat and cold;

.2 access to the lifeboat shall be provided by hatches which can be closed to make the lifeboat watertight;

.3 except for free-fall lifeboats, hatches are positioned so as to allow launching and recovery operations to be performed without any occupant having to leave the enclosure;

.4 provide reliable and easy opening and closing of access hatch covers from both inside and outside. Hatch covers shall be equipped with means to hold them securely in open position;

.5 except for a free-fall lifeboat, it is possible to row the lifeboat;

.6 with the hatches closed and without significant leakage to support the entire mass of the lifeboat including all equipment, machinery and its full complement of persons, when the lifeboat is in a capsized position;

.7 have windows or portholes which admit sufficient daylight to the inside of the lifeboat with the hatches closed;

.8 its exterior shall be of a highly visible colour and its interior of a light colour which does not irritate the occupants;

.9 have handrails providing a secure handhold for persons moving about the exterior of the lifeboat;

.10 persons shall have access to their seats from an entrance without having to climb over thwarts or other obstructions;

.11 during operation of the engine with the enclosure closed, the atmospheric pressure inside the lifeboat shall never be above or below the outside atmospheric pressure by more than 20 hPa.

6.15.3 Capsizing and re-righting.

6.15.3.1 Except in free-fall lifeboats, a safety belt shall be fitted at each indicated seating position. The safety belt shall be designed to hold a person with a mass of 100 kg securely in place when the lifeboat is in a capsized position.

Each set of safety belts for a seat shall be of a colour which contrasts with the belts for seats immediately adjacent.

Free-fall lifeboats shall be fitted with a safety harness at each seat in contrasting colour designed to hold a person with a mass of 100 kg securely in place during a free-fall launch as well as with the lifeboat in capsized position.

6.15.3.2 The stability of the lifeboat shall be such that it is inherently or automatically self-righting when loaded with its full or a partial complement of persons and equipment and all entrances and openings are closed watertight and the persons are secured with safety belts.

6.15.3.3 The lifeboat shall be capable of supporting its full complement of persons and equipment when the lifeboat is in the damaged condition prescribed in 6.13.1.1 and its stability shall be such that in the event of capsizing, it will automatically attain a position that will provide an above-water escape for its occupants. When the lifeboat is in the stable flooded condition, the water level inside the lifeboat, measured along the seatback, shall not be more than 500 mm above the seat pan at any occupant seating position.

6.15.3.4 The design of all engine exhaust pipes, air ducts and other openings shall be such that water is excluded from the engine when the lifeboat capsizes and re-rights.

6.15.4 Lifeboat propulsion.

6.15.4.1 The engine and transmission shall be controlled from the helmsman's position.

6.15.4.2 The engine and engine installation shall be capable of running in any position during capsizing and continue to run after the lifeboat returns to the upright or shall automatically stop on capsizing and be easily restarted after the

lifeboat returns to the upright. The design of the fuel and lubricating systems shall prevent the loss of fuel and the loss of more than 250 ml of lubricating oil from the engine during capsizing.

6.15.4.3 Air-cooled engines shall have a duct system to take in cooling air from, and exhaust it to, the outside of the lifeboat. Manually operated dampers shall be provided to enable cooling air to be taken in from, and exhausted to, the interior of the lifeboat.

6.15.5 Construction and fendering.

Notwithstanding the requirements of 6.13.1.6 a totally enclosed lifeboat shall be so constructed and fendered as to ensure that the lifeboat renders protection against harmful accelerations resulting from an impact of the lifeboat, when loaded with its full complement of persons and equipment, against the ship's side at an impact velocity of not less than 3,5 m/s.

6.16 FREE-FALL LIFEBOATS

6.16.1 Free-fall lifeboats shall comply with the requirements of 6.15 and in addition shall comply with the requirements of this section.

6.16.2 Carrying capacity of a free-fall lifeboat.

6.16.2.1 The carrying capacity of a free-fall lifeboat is the number of persons having an average mass of 82,5 kg that can be provided with a seat without interfering with the means of propulsion or the operation of any of the lifeboat's equipment. The seating surface shall be smooth and shaped and provided with cushioning of at least 10 mm over all contact areas to provide support for the back and pelvis and flexible lateral side support for the head. The seats shall be of the non-folding type, permanently secured to the lifeboat and arranged so that any deflection of the hull or canopy during launching will not cause the injury to the occupants. The location and structure of the seat shall be arranged to preclude the potential for injury during launch if the seat is narrower than the occupant's shoulders.

The passage between the seats shall have a clear width of at least 480 mm from the deck to the top of the seats, be free of any obstruction and provided with an antislip surface with suitable footholds to allow safe embarkation in the ready-to-launch position. Each seat shall be provided with a suitable locking harness capable of quick release under tension to restrain the body of the occupant during launching.

6.16.2.2 The angle between the seat pan and the seat back shall be at least 90°. The width of the seat pan shall be at least 480 mm. Free clearance in front of the backrest (buttock to knee length) shall be at least 650 mm measures at an angle of 90° to the backrest. The backrest shall extent at least 1075 mm above the seat pan. The seat shall provide for shoulder height, measured along the seat back, of at least 760 mm. The footrest shall be oriented at not less than half of the angle of the seat pan and shall have a foot length of at least 330 mm (refer to Fig. 6.16.2.2).

6.16.3 Each free-fall lifeboat shall make positive headway immediately after water entry and shall not come into contact with the ship after a free-fall launching against a trim by the bow or by the stem of up to 10° and a heel of up to 20° either way from the certification height frilly equipped and loaded with:

.1 its full complement of persons;

.2 occupants so as to cause the centre of gravity to be in the most forward position;

.3 occupants so as to cause the centre of gravity to be in the most aft position; and

.4 its operating crew only.

6.16.4 For oil tankers, chemical tankers and gas carriers with a final angle of heel greater than 20° calculated in accordance with the requirements of Part V "Subdivision" of the Rules for the Classification and Construction of Sea-Going Ships, a lifeboat shall be capable of being free-fall launched at the final angle of heel and on the base of the final waterline of that calculation.

6.16.5 Each free-fall lifeboat shall be of sufficient strength to withstand, when loaded with its full complement of persons and equipment, a free-fall launch from a height of at least 1,3 times the free-fall certification height.

6.16.6 Each free-fall lifeboat shall be so constructed as to ensure that the lifeboat is capable of rendering protection against harmful accelerations resulting from being launched from the height for which it shall be certified in calm water under unfavourable conditions of trim of up to 10° and heel of up to 20° either way when it is fully equipped and loaded with:

.1 its full complement of persons;

.2 occupants so as to cause the centre of gravity to be in the most forward position;

.3 occupants so as to cause the centre of gravity to be in the most aft position;

.4 the operating crew only.

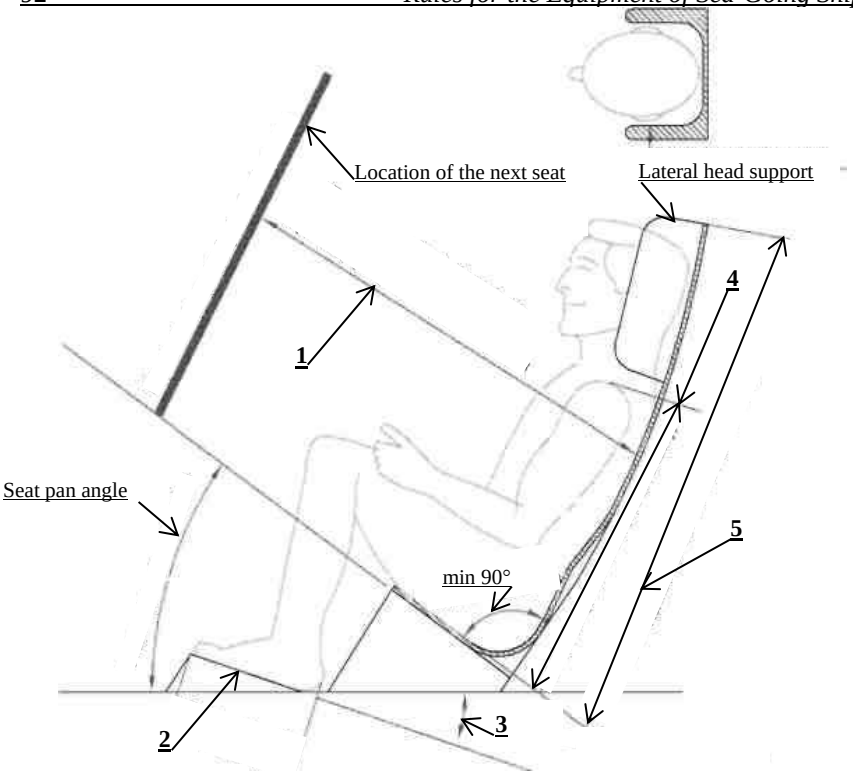


Fig. 6.16.2.2 Parameters and layout of the seat in a free-fall lifeboat.

1- buttock to knee length (Min. 650 mm perpendicular to seat back);
2- foot length (Min. 330 mm);
3- foot support angle (Min.1/2 seat pan angle);
4- height to shoulder (760 mm clear);
5- height to backrests (Min. 1075 mm).

6.16.7 Each free-fall lifeboat shall be fitted with a release system which shall:

.1 have two independent activation systems for the release mechanisms which may only be operated from inside the lifeboat and be marked in a colour that contrasts with its surroundings;

.2 be so arranged as to release the boat under any condition of loading from no load up to at least 200 per cent of the normal load caused by the fully equipped lifeboat when loaded with the number of persons for which it shall be approved;

.3 be adequately protected against accidental or premature use;

.4 be designed to test the release system without launching the lifeboat;

.5 be designed with a factor of safety of 6 based on the ultimate strength of the materials used.

6.16.8 In addition to the requirements of 6.13.1.8 the Certificate of Approval for a free-fall lifeboat shall also state:

.1 free-fall certification height;

.2 required launching ramp length; and

.3 launching ramp angle for the free-fall certification height.

6.17 LIFEBOATS WITH A SELF-CONTAINED AIR SUPPORT SYSTEM

6.17.1 Lifeboats with a self-contained air support system shall comply with the requirements of 6.15 and shall be equipped with the compressed air system. The capacity of compressed air cylinders of this system shall be sufficient to ensure safety of people and reliable functioning of the engine for at least 10 min with all entrances closed. During this period the atmospheric pressure inside the lifeboat shall never fall below the outside atmospheric pressure nor shall it exceed this pressure by more than 20 hPa. The system shall have visual indicators to indicate the pressure of the air supply at all times.

6.18 FIRE-PROTECTED LIFEBOATS

6.18.1 A fire-protected lifeboat shall comply with the requirements of 6.17 and, in addition, shall provide protection of the number of persons it is permitted to accommodate when subjected to a continuous oil fire that envelops the lifeboat for a period of not less than 8 min.

6.18.2 The lifeboat shall be provided with detailed instructions on operation in fire conditions, as well as with the first aid outfit for burns and for CO poisoning.

6.18.3 Under the conditions specified in 6.18.1, CO concentration inside the lifeboat shall not exceed 0,2 mg/1 and $C0_2$ concentration — 3 per cent by volume.

6.18.4 Water spray system.

A lifeboat which has a water spray fire-protection system shall comply with the following requirements:

.1 water for the system shall be drawn from the sea by a self-priming motor pump, and it shall be possible to turn on and turn off the flow of water over the exterior of the lifeboat;

.2 the seawater intake shall be so arranged as to prevent the intake of flammable liquids from the sea surface;

.3 the system shall be arranged for flushing with fresh water and allowing complete drainage.

6.18.5 Water spray system or thermal insulation of the hull shall provide air temperature inside the lifeboat at the level of sitting person's head not over 60 °C under the conditions specified in 6.18.1.

6.19 RESCUE BOATS

6.19.1 General.

6.19.1.1 Except as provided by this section, all rescue boats shall comply with the requirements of 6.13.1 to 6.13.6.8 (except 6.13.6.9), 6.13.6.10 - 6.13.7.4, 6.13.7.6, 6.13.7.7, 6.13.7.9, 6.13.7.10 i 6.13.9 except that, for all rescue boats, an average mass of 82,5 kg shall apply to 6.13.2.2.1. A lifeboat may be approved and used as a rescue boat if it meets all of the requirements of this section, if it successfully completes the testing for a rescue boat required by 1.3.2 and if its stowage, launching and recovery arrangements on the ship meet all of the requirements for a rescue boat.

6.19.1.2 Notwithstanding the requirements of 6.13.4 required buoyant material for rescue boats may be installed external to the hull, provided it is adequately protected against damage and is capable of withstanding exposure as specified in 6.19.3.3.

6.19.1.3 Rescue boats may be either of rigid or inflated construction or a combination of both and shall:

.1 be not less than 3,8 m and not more than 8,5 m in length;

.2 be capable of carrying at least five seated persons and a person lying on a stretcher all wearing immersion suits, and lifejackets if required. Notwithstanding 6.13.1.4, seating, except for the helmsman, may be provided on the floor, provided that the seating space analysis in accordance with 6.13.2.2.2 uses shapes similar to figure 6.13.2.2, but altered to an overall length of 1190 mm to provide for extended legs. No part of a seating space shall be on the gunwale, transom, or on inflated buoyancy at the sides of the boat.

In agreement with the Register, cargo ships with a gross tonnage of less than 500 and fishing vessels of less than 45 m in length can be provided with rescue boats of a lower capacity.

6.19.1.4 Rescue boats which are a combination of rigid and inflated construction shall comply with the appropriate requirements of this Chapter.

6.19.1.5 Unless the rescue boat has adequate sheer, it shall be provided with a bow cover extending for not less than 15 per cent of its length.

6.19.1.6 Every rescue boat shall be provided with sufficient fuel, suitable for use throughout the temperature range expected in the area in which the ship operates, and be capable of maneuvering at a speed of at least 6 knots and maintaining that speed, for a period of at least 4 h, when loaded with its full complement of persons and equipment.

6.19.1.7 Rescue boats shall have sufficient mobility and maneuverability in a seaway to enable persons to be retrieved from the water, marshal liferafts and tow the largest liferaft carried on the ship when loaded with its full complement of persons and equipment or its equivalent at a speed of at least 2 knots.

6.19.1.8 A rescue boat shall be fitted with an inboard engine or outboard motor. If it is fitted with an outboard motor, the rudder and tiller may form part of

the engine. Notwithstanding the requirements of 6.13.6.1, rescue boats may be fitted with petrol-driven outboard motors with an approved fuel system provided the fuel tanks are specially protected against fire and explosion.

6.19.1.9 Arrangements for towing shall be permanently fitted in rescue boats and shall be sufficiently strong to marshal or tow liferafts as required by 6.19.1.7.

6.19.1.10 Rescue boats shall be fitted with weathertight stowage for small items of equipment.

6.19.1.11 Unless expressly provided otherwise, every rescue boat shall be provided with effective means of bailing or be automatically self-bailing.

6.19.1.12 Every rescue boat shall be so arranged that an adequate view forward, aft and to both sides is provided from the control and steering position for safe launching and maneuvering and, in particular, with regard to visibility of areas and crew members essential to man-overboard retrieval and marshalling of survival craft.

6.19.2 Rescue boat equipment.

6.19.2.1 All items of rescue boat equipment, with the exception of boat hooks which shall be kept free for fending off purposes, shall be secured within the rescue boat by lashings, storage in lockers or compartments, storage in brackets or similar mounting arrangements, or other suitable means. The equipment shall be secured in such a manner as not to interfere with any launching or recovery procedures. All items of rescue boat equipment shall be as small and of as little mass as possible and shall be packed in suitable and compact form.

6.19.2.2 The normal equipment of every rescue boat shall consist of:

.1 sufficient number of buoyant oars or paddles to make headway in calm seas. Thole pins, crutches or equivalent arrangements shall be provided for each oar. Thole pins or crutches shall be attached to the boat by lanyards or chains;

.2 a buoyant bailer;

.3 a binnacle containing an efficient compass with luminous card or provided with suitable means of illumination;

.4 a sea-anchor and tripping line with a hawser of adequate strength not less than 10 m in length;

.5 a painter of sufficient length and strength, attached to the release device complying with the requirements of 6.13.7.7 and placed at the forward end of the rescue boat;

.6 one buoyant line, not less than 50 m in length, of sufficient strength to tow a liferaft as required by 6.19.1.7;

.7 one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;

.8 one whistle or equivalent sound signal;

.9 a first-aid outfit in a waterproof case capable of being closed tightly after use;

.10 two buoyant rescue quoits, attached to not less than 30 m of buoyant line;

.11 a searchlight with a horizontal and vertical sector of at least 6° and a measured luminous intensity of 2500 cd which can work continuously for not less than 3 h;

.12 an efficient radar reflector;

.13 thermal protective aids complying with the requirements of 6.6 sufficient for 10 per cent of the number of persons the rescue boat is permitted to accommodate or two, whichever is greater;

.14 portable fire extinguishing equipment of an approved type suitable for extinguishing oil fires.

6.19.2.3 In addition to the equipment required by 6.19.2.2, the normal equipment of every rigid rescue boat shall include a boat hook, a bucket, a knife or a hatchet.

6.19.2.4 In addition to the equipment required by 6.19.2.2, the normal equipment of every inflated rescue boat shall include:

.1 a buoyant safety knife;

.2 two sponges;

.3 an efficient manually operated bellows or pump;

.4 a repair kit for repairing punctures in a suitable container;

.5 a safety boat hook.

6.19.3 Additional requirements for inflated rescue boats.

6.19.3.1 The requirements of 6.13.1.3 and 6.13.1.5 do not apply to inflated rescue boats.

6.19.3.2 An inflated rescue boat when suspended by its bridle or lifting hook shall be:

.1 of sufficient strength and rigidity to enable it to be lowered and recovered with its full complement of persons and equipment;

.2 of sufficient strength to withstand a load of 4 times the mass of its full complement of persons and equipment at an ambient temperature of 20 ± 3 °C with all relief valves inoperative;

.3 of sufficient strength to withstand a load of 1,1 times the mass of its full complement of persons and equipment at an ambient temperature of —30 °C with all relief valves operative.

6.19.3.3 Inflated rescue boats shall be so constructed as to be capable;

.1 to withstand exposure when stowed on an open deck of ship at sea;

.2 to withstand exposure for 30 days afloat in all sea conditions.

6.19.3.4 In addition to complying with the requirements of 6.13.9 inflated rescue boats shall be marked with a serial number, the manufacturer's name or trade mark and the date of manufacture.

6.19.3.5 The buoyancy of an inflated rescue boat shall be provided by either a single tube subdivided into at least five separate compartments of approximately equal volume or two separate tubes neither exceeding 60 per cent of the total volume. The buoyancy tubes shall be so arranged that the intact compartments shall be able to support the number of persons which the rescue boat is

permitted to accommodate, each having a mass of 82,5 kg, when seated in their normal positions with positive freeboard over the rescue boat's entire periphery under the following conditions:

.1 with the forward buoyancy compartment deflated;

.2 with the entire buoyancy on one side of the rescue boat deflated; and

.3 with the entire buoyancy on one side and the bow compartment deflated.

6.19.3.6 The buoyancy tubes forming the boundary of the inflated rescue boat shall on inflation provide a volume of not less than 0,17 m^3 for each person the rescue boat is permitted to accommodate.

6.19.3.7 Each buoyancy compartment shall be fitted with a non-return valve for manual inflation and means for deflation. A safety relief valve shall also be fitted.

6.19.3.8 Underneath the bottom and on vulnerable places on the outside of the inflated rescue boat, rubbing strips shall be provided.

6.19.3.9 Where a transom is fitted it shall not be inset by more than 20 per cent of the overall length of the rescue boat.

6.19.3.10 Suitable patches shall be provided for securing the painters fore and aft and the becketed lifelines inside and outside the boat.

6.19.4 Fast rescue boats.

6.19.4.1 The fast rescue boat and its launching appliances shall be such as to enable it to be safely launched and retrieved under adverse weather and sea conditions.

6.19.4.2 All fast rescue boats shall comply with the requirements to rescue boats except for 6.13.1.6, 6.13.6.9, 6.13.7.2, 6.19.1.6 and 6.19.1.11 and also comply with the requirements of this Chapter.

6.19.4.3 Notwithstanding 6.19.1.3.1 fast rescue boats shall have a full length of not less than 6 meters and not more than 8,5 m, including inflated structures or fixed fenders.

6.19.4.4 Fully equipped fast rescue boats shall be capable of maneuvering for at least 4 h at a speed of at least 20 knots in calm water with a crew of 3 persons and at least 8 knots with a full complement of persons and equipment.

6.19.4.5 Fast rescue boats shall be self-righting or capable of being readily righted by not more than two of their crew.

6.19.4.6 Fast rescue boats shall be either self-bailing or be capable of being rapidly cleared of water.

6.19.4.7 Fast rescue boats shall be steered by a wheel at a helmsman's position remote from the tiller. An emergency steering system providing direct control of the rudder, water jet or outboard motor shall be also provided.

6.19.4.8 Engines in fast rescue boat shall stop automatically or be stopped by the helmsman's emergency release switch shall the rescue boat capsize.

When the rescue boat has righted, each engine or motor shall be capable of being restarted, provided the helmsman's emergency release, is fitted, has been reset. The design of the fuel and lubricating systems shall prevent the loss of

more than 250 ml of fuel or lubricating oil from the propulsion system shall the rescue boat capsize.

6.19.4.9 Fast rescue boats shall, if possible, be equipped with an easily and safely operated fixed single point suspension arrangement or equivalent.

6.19.4.10 A rigid fast rescue boat shall be constructed in such a way that, when suspended by its lifting point it is sufficient strength to withstand a load without residual deflection on removal of load of 4 times the mass of its full complement of persons and equipment.

6.19.4.11 The normal equipment of the fast rescue boat shall include a hands free and portable VHF radiocommunication set.

6.19.4.12 The crew of the fast rescue boat shall consist of at least the helmsman and two crew members trained and drilled regularly having regard to the Seafarers' Training, Certification and Watch-keeping (STCW) Code requirements.

6.19.5 Outboard petrol engines.

Outboard petrol engines shall comply with the requirements of 6.13.6.2–6.13.6.4, 6.13.6.8, 6.13.6.9, 6.13.6.11, 6.13.6.13 and additionally with the following requirements:

.1 The engine shall be equipped with a speed regulator to provide overspeed protection, oil low level and oil (cooling liquid) temperature indicators. Means of reversing and setting the throttle control at any position shall be provided.

.2 Anti-syphon devices shall be provided in the fuel tanks and fuel piping to prevent fuel spillage when the hose is disconnected. Applicable flexible joints and hoses shall be fireproof and resistant to the effects of conducted medium.

.3 The fuel tank shall be of a design recommended by the manufacturer of the engines and be securely attached to the boat.

.4 It is recommended to fit the motor with means of supplying power to the truck light.

6.20 LAUNCHING AND EMBARKATION APPLIANCES

6.20.1 General.

6.20.1.1 With the exception of the secondary means of launching the free-fall lifeboats, each launching appliance shall be so arranged that the fully equipped survival craft or rescue boat it serves can be safely launched against unfavourable conditions of trim by the bow or by the stern of up to 10° and heel of up to 20° either way:

.1 when boarded, as required by 3.3 or 4.3, by its full complement of persons; and

.2 with not more than the required operating crew on board.

6.20.1.2 Notwithstanding the requirements of 6.20.1.1, lifeboat launching appliances for oil tankers, chemical tankers and gas carriers with a final angle of heel greater than 20° calculated in accordance with Part V "Subdivision" of the

Rules for the Classification and Construction of Sea-Going Ships shall be capable of operating at the final angle of heel on the lower side of the ship taking into consideration the final damaged waterline of the ship.

6.20.1.3 A launching appliance shall not depend on any means other than gravity or stored mechanical power supplies to launch the survival craft or rescue boat it serves in the fully loaded and equipped condition and also in the light condition.

6.20.1.4 A launching appliance shall not depend on any means other than gravity or stored mechanical power supplies to launch the survival craft or rescue boat it serves in the fully loaded and equipped condition and also in the light condition.

6.20.1.5 The launching appliance and its attachments other than winches shall be of sufficient strength to withstand a factory static proof load test of not less than 2,2 times the maximum working load.

6.20.1.6 Structural members and all blocks, falls, padeyes, links, fastenings and all other fittings used in connection with launching equipment shall be designed with a factor of safety on the basis of the maximum working load assigned and the ultimate strengths of the materials used for construction. A minimum factor of safety of 4,5 shall be applied to all structural members including winch structural components and a minimum factor of safety of 6 shall be applied to falls, suspension chains, links and blocks.

6.20.1.7 Each launching appliance shall, as far as pracitcable, remain effective under conditions of icing.

6.20.1.8 A lifeboat launching appliance shall be capable of recovering the lifeboat with its crew.

6.20.1.9 Each rescue boat launching appliance shall be fitted with a powered winch motor capable of raising the rescue boat from the water with its full rescue boat complement of persons and equipment at a rate of not less than 0,3 m/s.

6.20.1.10 The arrangements of the launching appliance shall be such as to enable safe boarding of the survival craft in accordance with the requirements of 6.8.4.2, 6.8.4.3, 6.13.3.1 and 6.13.3.2.

6.20.1.11 Rescue boat launching appliances shall be provided with foul weather recovery strops for recovery where heavy fall blocks constitute a danger.

6.20.2 Launching appliances using falls and a winch.

6.20.2.1 Every launching appliance using falls and a winch, except for secondary launching appliances for free-fall lifeboats, shall comply with the requirements of 6.20.1 and in addition shall comply with the requirements of this paragraph.

6.20.2.2 The launching mechanism shall be so arranged that it may be actuated by one person from a position on the ship's deck and, except for secondary launching appliances for free-fall lifeboats, from a position within the survival craft or rescue boat. When launched by a person on the deck, the survival craft or rescue boat shall be visible to that person.

6.20.2.3 Falls shall be of rotation-resistant and corrosion-resistant steel wire rope.

6.20.2.4 In the case of a multiple drum winch the falls shall be so arranged as to wind off the drums at the same rate when lowering, and to wind on to the drums evenly at the same rate when hoisting, unless an efficient compensatory device is fitted.

6.20.2.5 The winch brakes of a launching appliance shall be of sufficient strength to withstand:

.1 a static test with a proof load of not less than 1,5 times the maximum working load;

.2 a dynamic test with a proof load of not less than 1,1 times the maximum working load at maximum lowering speed.

6.20.2.6 An efficient hand gear shall be provided for recovery of each liferaft, lifeboat and rescue boat. Hand gear handles or wheels shall not be rotated by moving parts of the winch when the liferaft, lifeboat or rescue boat is being lowered or when being hoisted by power.

6.20.2.7 Where davit arms are recovered by power, devices shall be fitted which will automatically cut off the power before the davit arms reach the stops in order to avoid overstressing the falls or davits, unless the motor is designed to prevent such overstressing.

6.20.2.8 The speed at which the fully loaded survival craft or rescue boat is lowered to the water shall not be less than that determined by the formula

$$S = 0{,}4 + 0{,}02H\,, \qquad (6.20.2.8)$$

where H= the height from the davit head to the waterline with the ship at the lightest sea-going condition, m.

6.20.2.9 The lowering speed of a fully equipped liferaft without persons onboard shall be at least 50 per cent, the lowering speed of other survival craft, fully equipped but without persons on board, shall be at least 70 per cent of that required by 6.20.2.8.

6.20.2.10 The maximum lowering speed shall be established having regard to the design of the survival craft or rescue boat, the protection of the occupants from excessive forces, and the strength of the launching arrangements taking into account inertia forces during an emergency stop but shall not exceed 1 m/s with full complement of persons on board the lifeboat, rescue boat or liferaft. The launching appliances shall be fitted with the means preventing the exceeding of this speed.

6.20.2.11 Every launching appliance shall be fitted with brakes capable of stopping the descent of the survival craft or rescue boat and holding them securely when loaded with its full complement of persons and equipment; where necessary, the brake pads shall be protected from water and oil.

6.20.2.12 Manual brakes shall be so arranged that the brake is always applied unless the operator either on deck or in survival craft or rescue boat, holds the brake control handle in the "off position.

6.20.2.13 A lifeboat launching appliance shall be provided with means for hanging-off the lifeboat to free the on-load release mechanism for maintenance.

6.20.3 Float-free launching.

Where a survival craft requires a launching appliance and is also designed to float free, the float-free release of the survival craft from its stowed position shall be automatic.

6.20.4 Launching appliances for free-fall lifeboats.

6.20.4.1 Every free-fall launching appliance shall comply with the applicable requirements of 6.20.1 and, in addition, shall comply with the requirements of this paragraph.

6.20.4.2 The launching appliance shall be designed and installed so that it and the lifeboat it serves operate as a system to protect the occupants from harmful acceleration forces as required by 6.16.6, and to ensure effective clearing of the ship as required by 6.16.3 and 6.16.4.

6.20.4.3 The launching appliance shall be constructed so as to prevent sparking and incendiary friction during the launching of the lifeboat.

6.20.4.4 The launching appliance shall be designed and arranged so that in its ready to launch position, the distance from the lowest point on the lifeboat it serves to the water surface with the ship in its lightest seagoing condition, indicated in the certificate of a free-fall boat approval, does not exceed the lifeboat's free-fall certification height, taking into account the requirements of 6.16.3.

6.20.4.5 The launching appliance shall be arranged so as to preclude accidental release of the lifeboat in its unattended stowed position. If the means provided to secure the lifeboat cannot be released from inside the lifeboat, it shall be so arranged as to preclude boarding the lifeboat without first releasing it.

6.20.4.6 The release mechanism shall be arranged so that at least two independent actions from inside the lifeboat are required in order to launch the lifeboat.

6.20.4.7 Each launching appliance shall be provided with a secondary means to launch the lifeboat by falls. Such means shall comply with the requirements of 6.20.1 (except 6.20.1.3) and 6.20.2 (except 6.20.2.6). It shall be capable of launching the lifeboat against unfavourable conditions of trim of up to only 2° and heel of up to only 5° either way and it need not comply with the speed requirements of 6.20.2.8 and 6.20.2.9. If the secondary launching appliance is not dependent on gravity, stored mechanical power or other manual means, the launching appliance shall be connected both to the ship's main and emergency sources of power.

6.20.4.8 The secondary means of launching shall be equipped with at least a single off-load capability to release the lifeboat.

6.20.5 Liferaft launching appliances.

Every liferaft launching appliance shall comply with the requirements of 6.20.1 and 6.20.2, except with regard to embarkation in the stowed position, recovery of the loaded liferaft and that manual operation is permitted for turning out the appliance. The launching appliance shall include an automatic release hook arranged so as to prevent premature release during lowering and shall release the liferaft when waterborne. The release hook shall include a capability to release the hook under load. The onload release control shall:

.1 be clearly differentiated from the control which activates the automatic release function;

.2 require at least two separate actions to operate;

.3 with a load of 150 kg on the hook, require a force of at least 600 and not more than 700 N to release the load, or provide equivalent adequate protection against inadvertent release of the hook;

.4 be designed such that the crew members on deck can clearly observe when the release mechanism is properly and completely set.

6.20.6. Fast rescue boats launching appliances.

6.20.6.1 Each fast rescue boat launching appliance shall comply with the requirements of 6.20.1 and 6.20.2 except 6.20.2.10.

6.20.6.2 The launching appliance shall be fitted with a device to dampen the forces due to interaction with waves when the fast rescue boat is launched and recovered. The device shall include a flexible element to soften shock forces and a dampening element to minimize oscillations.

6.20.6.3 The winch shall be fitted with an automatic high-speed tensioning device which prevents the wire from going slack in all sea state conditions in which the fast rescue boat is intended to operate.

6.20.6.4 The winch brake shall have a gradual action. When the fast rescue boat is lowered at full speed and brakes are applied sharply, the additional force induced in the wire due to retardation shall not exceed 0,5 times the working load of launching appliance.

6.20.6.5 The lowering speed for a fully equipped fast rescue boat with its full complement of persons on board shall not exceed 1 m/s. Notwithstanding the requirements of 6.20.1.9, the launching appliances shall be capable of hoisting the fully equipped rescue boat with 6 persons at a speed of not less than 0,8 m/s. The appliance shall be also capable of lifting the rescue boat with the maximum number of persons that can be accommodated in the rescue boat as calculated under 6.13.2.

6.20.6.6 At least three turns of wire shall remain on the winch after the fast rescue boat is lowered to the sea with the ship at its lightest seagoing condition, a trim of up to 10° and a heel of up to 20°, either way.

6.20.7 Embarkation ladders.

6.20.7.1 Handholds shall be provided to ensure a safe passage from the deck to the head of the ladder and vice versa.

6.20.7.2 The steps of ladder shall be:

.1 made of hardwood, free from knots or other irregularities, smoothly machined and free from sharp edges and splinters, or of suitable material of equivalent properties;

.2 provided with a non-slip surface either by longitudinal grooving or by the application of an approved non-slip coating;

.3 not less than 480 mm long, 115 mm wide and 25 mm in depth, excluding any non-slip surface or coating;

.4 equally spaced not less than 300 mm or more than 380 mm apart and secured in such a manner that they will remain horizontal.

6.20.7.3 The sides ropes of the ladder shall be made of two uncovered manila ropes not less than 65 mm in circumference on each side. Each rope shall be continuous with no joints below the top step. Other materials may be used provided the dimensions, breaking strain, weathering, stretching and gripping properties are at least equivalent to those of manila rope. All rope ends shall be secured to prevent unravelling.

6.20.8 Marine evacuation systems.

6.20.8.1 Construction of the marine evacuation system.

.1 The passage of the marine evacuation system shall provide for safe descent of person of various ages, sizes and physical capabilities wearing approved lifejackets from the embarkation station to the floating platform or survival craft.

.2 Strength and construction of the passage shall meet the requirements of the Register.

.3 The platform if fitted shall be:

.3.1 such that sufficient buoyancy will be provided for the working load. In the case of an inflatable platform, the main buoyancy chambers, which for this purpose shall include any thwarts or floor inflatable structural members are to meet the requirements of 6.9 based upon the platform capacity except that the capacity shall be obtained by dividing by 0,25 the usable area given in 6.20.8.3.3;

.3.2 stable in a seaway and provide a safe working area for the system operators;

.3.3 of sufficient area that will provide for the securing of at least two liferafts for boarding and to accommodate at least the number of persons that at any time are expected to be on the platform. This usable platform area shall be at least equal to

$$\frac{\text{20\% of total number of persons the Marine Evacuation System is certificated for}}{4} \quad m^2$$

or 10 m^2, whichever is greater. However, the Register may approve alternate arrangements which are demonstrated to comply with all the prescribed performance requirements;

.3.4 self-draining;

.3.5 sub-divided in such a way that the loss of gas from any one compartment

will not restrict its operational use as a means of evacuation. The buoyancy tubes shall be sub-divided or protected against damage occurring from contact with the ship's side;

.3.6 fitted with a stabilizing system to the satisfaction of the Register;

.3.7 restrained by a bowsing line or other positioning systems which are designed to deploy automatically and if necessary, to be capable of being adjusted to the position required for evacuation;

.3.8 provided with mooring and bowsing line patches of sufficient strength to securely attach the largest inflatable liferaft associated with the system.

.4 If the passage gives direct access to the survival craft, it shall be provided with a quick release arrangement.

6.20.8.2 Performance of the marine evacuation system.

6.20.8.2.1 A marine evacuation system shall be:

.1 capable of deployment by one person;

.2 such as to enable the total number of persons for which it is designed, to be transferred from the ship into the inflated liferafts within a period of 30 min in the case of a passenger ship and of 10 min in the case of a cargo ship from the time abandon ship signal is given;

.3 arranged such that liferafts may be securely attached to the platform and released from the platform by a person either in the liferaft or on the platform;

.4 capable of being deployed from the ship under unfavourable conditions of trim of up to 10° and heel of up to 20° either way;

.5 in the case of being fitted with an inclined slide, such that the angle of the slide to the horizontal is:

.5.1 within a range of 30° to 35° when the ship is upright and in the lightest sea-going condition; and

.5.2 in the case of a passenger ship, a maximum of 55° in the final stage of flooding set by the requirements of Part V "Subdivision" of the Rules for the Classification and Construction of Sea-Going Ships;

.6 evaluated for capacity by means of timed evacuation deployments conducted in harbour;

.7 capable of providing a satisfactory means of evacuation in a sea state associated with a wind of force 6 on the Beaufort scale;

.8 designed to, as far as practicable, remain effective under conditions of icing;

.9 so constructed that only a minimum amount of routine maintenance is necessary. Any part requiring maintenance by the ship's crews shall be readily accessible and easily maintained.

6.20.8.2.2 Where one or more marine evacuation systems are provided on a ship, at least 50 per cent of such systems shall be subjected to a trial deployment after installation. Subject to these deployments being satisfactory, the untried systems shall be deployed within 12 months of installation.

6.20.8.3 Inflatable liferafts associated with marine evacuation systems.

6.20.8.3.1 Any inflatable liferaft used in conjunction with the marine evacuation system shall:

.1 conform with the requirements of 6.9;

.2 be sited close to the system container but be capable of dropping clear of the deployed system and boarding platform;

.3 be capable of release one at a time from its stowage rack with arrangements which will enable it to be moored alongside the platform;

.4 be stowed in accordance with 2.4.4 to 2.4.6;

.5 be provided with pre-connected or easily connected retrieving lines to the platform.

6.20.8.4 Containers for marine evacuation systems.

6.20.8.4. The evacuation passage and platform shall be packed in a container that is:

.1 so constructed as to withstand hard wear under conditions encountered at sea;

.2 as far as practicable watertight, except for drain holes in the container bottom.

6.20.8.4.2 The container shall be marked with:

.1 manufacturer's name or trade mark;

.2 serial number;

.3 name of approval authority and the capacity of the system;

.4 SOLAS;

.5 date of manufacture (month and year);

.6 date and place of last survey;

.7 maximum permitted height of stowage above waterline;

.8 stowage position on board.

6.20.8.4.3 Launching and operating instructions shall be marked on or in the vicinity of the container.

6.20.8.5 Marking on marine evacuation systems.

6.20.8.5.1 The marine evacuation system shall be marked with:

.1 manufacturer's name or trade mark;

.2 serial number;

.3 date of manufacture (month and year);

.4 name of approving authority;

.5 name and place of servicing station where it was last serviced, along with the date of servicing;

.6 the capacity of the system.

6.20.9 Means of rescue.

6.20.9.1 The means of rescue shall provide for the safe transfer of persons, including helpless persons, from the water level to the deck of the ship.

6.20.9.2 The means of rescue shall provide an area of at least 9 m^2 at water level and have sufficient lighting from the ship deck.

6.20.9.3 The means of rescue shall be one of the following:

.1 A marine evacuation system complying with the requirements of 6.20.8

providing a suitable floating platform, with a ladder or other means to ascend to the deck for able-bodied persons, and a mechanically powered means to safely hoist persons lying down. If an inclined passage of a marine evacuation system is intended to provide the means of transfer from the platform to the deck of the ship for able-bodied persons, the inclined passage shall be provided with suitable handholds or portable ladder with steps having an efficient non-slip surface.

.2 A device equipped with the floating platform which comply with the requirements of 6.8.3.1, 6.8.4.1. 6.8.5.1.1 and requirements of 6.9.2, 6.9.2.1, 6.9.2.3, 6.9.2.4, 6.9.7, 6.9.8.1, 6.9.8.2 (if fitted) and 6.9.9.1 in the case of an inflatable device; or requirements 6.10.1, 6.10.2, 6.10.6.2–6.10.6.4, 6.10.6.6, 6.10.6.9, 6.10.6.10 and 6.10.7 in the case of a rigid device. The device shall be used by a launching appliance, complying with the requirements of 6.20.1, with a powered winch motor capable of raising the loaded device from the water to the deck of the ship with the total number of persons for which it is approved as a means of rescue at a rate of not less than 0,3 m/s. A safety device shall be fitted to prevent over stressing the launching appliance. Additionally, the device shall comply with the following:

.2.1 the device shall be of a highly visible colour, and shall be protected against damage when moving against the ship's side;

.2.2 the occupants shall be protected against injury caused by the launching appliance;

.2.3 two boarding ramps complying with 6.9.4.1 or 6.10.4.1 shall be fitted;

.2.4 the maximum number of persons permitted on the device shall be conspicuously marked;

.2.5 the floor shall be self-draining;

.2.6 suitable means shall be provided for bowsing in the device to the ship's side;

.2.7 one knife of a type described in 6.8.5.1.2 shall be stowed in a pocket close to each bowsing line attachment patch;

.2.8 a special arrangement shall be fitted to close the gap between the loaded device and deck when the rescued persons board the ship;

.2.9 the device shall be conspicuously marked to prevent confusion with liferafts;

.2.10 if inflatable, the inflation system shall be quickly initiated by a manual control;

.2.11 means shall be provided for preventing occupants from falling from the device on impact with the ship's side.

.3 A means of rescue approved in compliance with the requirements of 1.3.3.

6.21 LINE-THROWING APPLIANCES

6.21.1 Every line-throwing appliance shall:

.1 be capable of throwing a line with reasonable accuracy;

.2 include not less than four projectiles each capable of carrying the line at least 230 m in calm weather;

.3 include not less than four lines each having a breaking strength of not less than 2 kN;

.4 have brief instructions or diagrams clearly illustrating the use of the line-throwing appliance.

6.21.2 The rocket, in the case of a pistol fired rocket, or the assembly, in the case of an integral rocket and line, shall be contained in a water resistant casing. In addition in the case of a pistol-fired rocket, the line and rockets together with the means of ignition shall be stowed in a container which provides protection from the weather.

6.22 GENERAL ALARM AND PUBLIC ADDRESS SYSTEM

6.22.1 General emergency alarm system.

6.22.1.1 The general emergency alarm system shall be capable of sounding the general emergency alarm signal consisting of seven or more short blasts followed by one long blast on the ship's whistle or siren and additionally on an electrically operated bell or klaxon or other equivalent warning system, which shall be powered from the ship's main supply and the emergency source of electrical power required by Sections 9 and 19, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships, as appropriate. The system shall be capable of operation from the navigation bridge and, except for the ship's whistle, also from other strategic points.

The alarm shall continue to function after it has been triggered until it is manually turned off or is temporarily interrupted by a message on the public address system.

The alarm device shall comply with the requirements of 7.4 Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

6.22.1.2 The minimum sound pressure levels for the emergency alarm tone in interior and exterior spaces shall be 80 dB(A) and at least 10 dB(A) above ambient noise levels existing during normal equipment operation with the ship underway in moderate weather.

6.22.1.3 The sound pressure levels at the sleeping position in cabins and in cabin bathrooms shall be at least 75 dB(A) and at least 10 dB(A) above ambient noise levels.

6.22.2 Public address system.

6.22.2.1 The public address system shall be a loudspeaker installation enabling the broadcast of messages into all spaces where crew members or passengers, or both, are normally present, and to muster stations. Such spaces may not include under deck passageways, bosun's lockers, hospitals, pump rooms.

It shall allow for the broadcast of messages from the navigation bridge and such other places on board the ship. It shall be installed with regard to acoustically marginal conditions and not require any action from the addressee. It shall be protected against unauthorized use.

6.22.2.2 With the ship underway in normal conditions, the minimum sound pressure levels for broadcasting emergency announcements shall be:

.1 in interior spaces 75 dB(A) and at least 20 dB(A) above the speech interference level (with respect to cabin/state rooms, the above sound pressure levels shall also be attained during sea trials);

.2 in exterior spaces 80 dB(A) and at least 15 dB(A) above the speech interference level.

6.22.2.3 Where an individual loudspeaker has a device for local silencing, an override arrangement from the control station(s), including the navigation bridge, shall be provided.

6.22.2.4 The public address system shall comply with the requirements of 3.8 and Section 11, Part IV "Radio Equipment".

ANNEX 1

RECOMMENDATION ON THE USE AND FITTING OF RETRO-REFLECTIVE MATERIALS ON LIFE-SAVING APPLIANCES

1. LIFEBOATS AND RESCUE BOATS

Retro-reflective materials shall be fitted on top of the gunwale as well as on the outside of the boat as near the gunwale as possible. The materials shall be sufficiently wide and long to give a minimum area of 150 cm^2 and shall be spaced at suitable intervals (approximately 80 cm from centre to centre). If a canopy is fitted, it shall not be allowed to obscure the materials fitted on the outside of the boat, and the top of the canopy shall be fitted with retro-reflective materials similar to those mentioned above and spaced at suitable intervals (approximately 80 cm from centre to centre). In the case of partially enclosed or totally enclosed lifeboats, such materials should be placed as follows:

.1 for detection by horizontal light beams, at suitable intervals at half the height between the gunwale and the top of the fixed cover

.2 for detection by vertical light beams (e.g. from helicopters), at suitable intervals around the outer portion of the horizontal (or comparable) part of the top of the fixed cover;

.3 retro-reflective materials shall also be fitted on the bottom of lifeboats and rescue boats which are not self-righting.

2. LIFERAFTS

Retro-reflective materials shall be fitted around the canopy of the liferaft. The material shall be sufficiently wide and long to give a minimum area of 150 cm^2 and shall be spaced at suitable intervals (approximately 80 cm from centre to centre) at a suitable height above the waterline, doorways included, if suitable. On inflatable liferafts, retro-reflective materials shall also be fitted to the underside of the floor, cross-shaped in the centre. The dimension of the cross shall be half the diameter of the liferaft, and a similar cross shall be applied to the top of the canopy.

On liferafts which are not equipped with canopies, materials which shall be sufficiently wide and long (to give a minimum area of 150 cm^2) shall be attached to the buoyancy chamber at suitable intervals (approximately 80 cm from centre to centre) in such a manner that they are visible both from the air and from a ship.

3. LIFEBUOYS

Retro-reflective materials of a sufficient width (approximately 5 cm) shall be applied on the closed circuit round the body of the lifebuoy at four evenly-spaced points.

4. BUOYANT APPARATUS

Buoyant apparatus shall be fitted with retro-reflective materials in the same manner as liferafts without canopies, always depending on the size and shape of the object. Such materials shall be visible both from the air and from a ship.

5. LIFEJACKETS

Lifejackets shall be fitted with patches of retro-reflective materials with a total area of at least 400 cm^2 distributed so as to be useful for search from air and surface craft from all directions. In the case of a reversible lifejacket, the arrangement shall be complied with no matter which way the lifejacket is put on. Such material shall be placed as high up on the lifejacket as possible.

6. IMMERSION SUITS

Immersion suits shall be fitted with patches of retro-reflective material with a total area of at least, 400 cm^2 distributed so as to be useful for search from air and surface craft from all directions.

For an immersion suit that does not automatically turn the wearer face up, the back of the suit should be fitted with retro-reflective material with a total area of at least 100 cm^2.

7. GENERAL REMARKS

.1 Retro-reflective materials shall be such as will meet the requirements of Part XIII "Materials" of the Rules for the Classification and Construction of Sea-Going Ships.

.2 The illustrations 7.2-1 to 7.2-11 reproduced in this Appendix are intended to provide Flag State Administration with examples from which guidance may be taken when fitting retro-reflective materials in accordance with these guidelines.

Fig.7.2.1

Fig.7.2.2

Fig.7.2.3

Fig.7.2.4

Fig.7.2.5

Fig.7.2.6

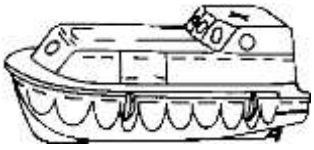


Fig.7.2.7

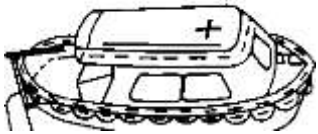


Fig.7.2.8

Fig.7.2.9

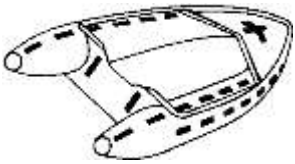


Fig.7.2.10

Fig.7.2.11

ANNEX 2[1]

SYMBOLS FOR USE IN ACCORDANCE WITH REGULATION III/9.2.3 OF THE 1974 SOLAS CONVENTION, AS AMENDED IN 1983

Ref [2]	Term	Symbol [3]	Ref [2]	Term	Symbol [3]
1	Fasten seat belts		4.3	the rescue boat	
2	Secure hatches		5	Release falls	
3	Start engine		6	Start water-spray	
4 4.1	Lower to the water: the lifeboat		7	Start air supply	
4.2	the liferaft		8	Release gripes	

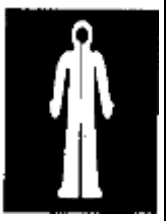
[1] This Appendix is the Appendix to IMO resolution A.760(18).
[2] Numbers are used for reference purposes only and do not indicate the sequence of events as this will depend on the type of survival craft and launching appliances provided on board the ship.

[3] All symbols shall be white on a blue background.

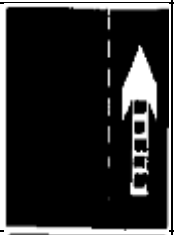
RECOMMENDED SYMBOLS INDICATING THE LOCATION OF EMERGENCY EQUIPMENT AND MUSTER AND EMBARKATION STATIONS IN ACCORDANCE WITH THE 1974 SOLAS CONVENTION, AS AMENDED IN 1983

Ref [1]	Term	Symbol [2]	Ref [1]	Term	Symbol [2]
1	Lifeboat		6	Embarkation ladder	
2	Rescue boat		7	Lifebuoy	
3	Liferaft		8	Lifebuoy with line	
4	Davit-launched liferaft		9	Lifebuoy with light	
5,*a*	Evacuation slide		10	Lifebuoy with light and smoke	
5,*b*	Evacuation slide		11	Lifejacket	

Continue of Table

Ref [1]	Term	Symbol [2]	Ref [1]	Term	Symbol [2]
12	Child's life-jacket		17	Survival craft pyrotechnic distress signals	
13	Immersion suit		18	Rocket para-chute flares	
14	Survival craft portable radio		19	Line-throwing appliance	
15	EPIRB		20	Muster station	
			The station letter shall be included on the right-hand side of the symbol.		
16	Radar transpoder		21	Embarkation station	
			Use appropriate symbol for type of survival craft at the station. The station number shall be included on the right-hand side of the symbol.		

Continue of Table

Ref [1]	Term	Symbol[2]	Ref [1]	Term	Symbol[2]
22	Direction indicator (for use with any symbol)		25	Emergency exit	
Insert appropriate symbol (i.e. symbols 1 to 21) on the left-hand side of the arrow. Point arrow in the direction of the equipment or station.					
23	Emergency exit indicator		26	Baby's lifejacket	
24	Exit				

[1] Numbers are used for reference purposes only and do not indicate the sequence of events as this will depend on the type of survival craft and launching appliances provided on board the ship.

[2] All symbols shall be white on a green background. The sizes of signs, letters and numbers shall be to the satisfaction of the Flag State Administration. Where appropriate, a white arrow on a green background may be used in conjunction with symbols to indicate direction (refer to reference 22).

N o t e s . 1. The dashed line (refer to references 20 to 23, 25) indicates that the whole symbol may consist of one part or of two separate parts (one for the sign and another for the number or letter). When a direction indicator (arrow) is also used it may be part of the symbol or be separate. The dashed line shall not be shown.

2. Point arrow (refer to references 20, 22, 23, 25) in the direction of the equipment or station.

PART III. SIGNAL MEANS

1. GENERAL

1.1 APPLICATION

1.1.1 The requirements of the present Part of the Rules applies to the ships whose equipment with signal means is subject to survey by the Register, as well as to items of the said means intended to be fitted in these ships.

1.1.2 The requirements of the present Part of the Rules applies to ships under construction and to ships in service, and the requirements specified in column 9 of Table 2.2.1, in 4.1.4 and 4.6.2.3 shall be met as far as practicable and reasonable in case of ships in service.

Any ship in service may be exempted from the requirements specified below:

.1 from repositioning of lights as a result of conversion from Imperial to metric units and rounding off measurement figures;

.2 from changing of horizontal position of masthead lights on ships of less than 150 m in length, resulting from the prescriptions of 4.2.1.2;

.3 from repositioning of lights of all-round visibility referred to in 4.1.7.

1.1.3 The present Part of the Rules establishes technical requirements, the signal means shall comply with, and determines the number of items and their location on board.

1.2 DEFINITIONS AND EXPLANATIONS

The definitions and explanations concerning the general terminology of the Rules are given in Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships.

For the purpose of the present Part of the Rules the following definitions are adopted:

H e i g h t a b o v e t h e h u l l is the height above the uppermost continuous deck. This height shall be measured from the position vertically beneath the location of the light.

F l a s h i n g l i g h t is a light flashing at regular intervals at a frequency of 120 flashes or more per minute.

L e n g t h a n d b r e a d t h o f s h i p are her overall length and greatest breadth.

S h o r t b l a s t is a blast of about 1 s duration.

P r o l o n g e d b l a s t is a blast of 4 to 6 s duration.

D a y l i g h t s i g n a l l i n g l a m p s mean fixed or portable lamps suitable for transmitting white light signals by focused light beams, which can be clearly distinguished visually as separate signals by an observer.

H o i s t e d a p p l i a n c e is a device which is lifted to the place of its use.

S t a t i o n a r y a p p l i a n c e – is a device which is kept fixed in its regular position.

Whistle is any sound signalling appliance capable of producing the prescribed short and prolonged blasts.

Sailing ship is a ship under sail provided that propelling machinery, if fitted, is not being used.

Power-driven ship is a ship propelled by machinery.

Ship restricted in her ability to maneuver is a ship which from the nature of her work is restricted in her ability to maneuver and is therefore unable to keep out of the way of another ship. At least the following ships shall be regarded as ships restricted in their ability to maneuvers:

a ship engaged in laying, servicing and/or picking up a navigation mark, submarine cable or pipeline;

a ship engaged in dredging, oceanographic, surveying or underwater operations;

a ship engaged in replenishment or transferring persons, provisions or cargo while underway;

a ship engaged in the launching or recovery of aircraft;

a ship engaged in a towing operation such as renders her unable to deviate from her course.

Ship constrained by her draught is a power-driven ship which because of her draught in relation to the available depth and width of navigable water is severely restricted in her ability to deviate from the course she is following.

Ship not under command is a ship which is unable to keep out of the way of another ship because through some exceptional circumstance she is unable to maneuver as required.

Ship engaged in fishing is a ship fishing with nets, lines, trawls or other fishing apparatus which restrict maneuverability; it does not refer to a ship fishing with trolling lines or other fishing apparatus which do not restrict maneuverability.

Ship engaged in trawling is a ship dragging a dredge net or other trawling fishing gear through the water.

Switch off time means the period of time required for luminous intensity to decrease to 5 per cent of the required luminous intensity after the daylight signalling lamp has been switched off.

Switch-on time means the period of time required for reaching 95 per cent of the required luminous intensity after the daylight signalling lamp has been switched on.

1.3 SCOPE OF SURVEY

1.3.1 The general provisions relating to the survey procedure for the signal means, as well as requirements for the technical documentation to be submitted to the Register for review and directions regarding the documents to be issued by the Register for signal means are outlined in General Regulations for the Classification and Other Activity and in Part I "Survey Regulations".

1.3.2 The following items are subject to survey by the Register during manufacture:

.1 navigation lights;

.2 flashing lights;

.3 sound signal means;

.4 pyrotechnic signal means;

.5 signal shapes;

.6 radar reflectors.

1.3.3 The items mentioned in 1.3.2.5 and 1.3.2.6 are subject to survey by the Register only as far as examination and approval of the technical documents are concerned.

1.3.4 Provision and equipment of ships with signal means shall be carried out under survey by the Register.

1.3.5 The following technical documents relative to signal means shall be submitted for approval to the Register:

.1 assembly drawing with specification of component parts and materials;

.2 technical description;

.3 program of testing;

.4 for daylight signalling lamps, instructions for operation with description of ways of checking the parallel adjustment of sighting mechanism and luminous intensity axis.

1.4 DIVISION OF SIHPS INTO GROUPS

1.4.1 All ships, independently of their purpose and area of navigation, are subdivided, according to their equipment with signal means (except for pyrotechnic signal means), into the following two groups:

.1 Group I including power-driven ships of 20 m in length and more as well as sailing and non-propelled ships of 12 m in length and more;

.2 Group II including power-driven ships of less than 20 m in length as well as sailing and non-self-propelled ships of less than 12 m in length.

2. EQUIPMENT OF SHIPS WITH SIGNAL MEANS

2.1 GENERAL

2.1.1 Signal means considered in the present Part of the Rules include:

.1 navigation lights;

.2 flashing lights;

.3 sound signal means;

.4 signal shapes;

.5 pyrotechnic signal means;

.6 radar reflectors.

2.1.2 The equipment of lifeboats, rescue boats and liferafts with all kinds of signal means shall meet the requirements of Part II "Life-Saving Appliances".

2.1.3 The technical requirements for radar reflectors are specified in 3.7.8 and 5.8, Part V "Navigational Equipment".

2.1.4 Equipment of unmanned objects being towed with sound and pyrotechnic signal means, daylight signalling lamp and radar reflectors is not required.

2.2 EQUIPMENT OF GROUP I SHIPS

2.2.1 The basic set of signal means of Group I ships, other than pyrotechnic signal means, shall comply with Table 2.2.1.

Additional signal means for towing or pushing ships, ships restricted in their ability to maneuver, pilot, fishing and air cushion ships are given in Table 2.4.1, and the equipment of ships with pyrotechnic signal means shall comply with Table 2.5.1.

2.2.2 Ships of Group I may be provided with electric or oil navigation lights. If a set of navigation lights comprises electric lights, provision shall be made for an additional set of spare lights, the number of which is given under 2.2.4. The spare* set may be either electric or oil lights.

In power-driven ships spare masthead lights, side lights and stern lights shall be installed in regular positions or duplicated electric lights (navigation lights with two light sources one of which is supplied from the ship's mains and the other from an emergency source of power) shall be used.

Power supply of electric lights shall comply with the requirements of 6.8.2, 9.3.1 and 19.1.2.1, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

In ships engaged in international voyages and provided with electric generator sets, except for sailing ships, the basic set shall be composed of electric lights.

Ships having a basic set composed of oil lights shall be provided with a spare set of lights, the number of which is given under 2.2.4.

2.2.3 Oil tankers and other ships intended for carrying petroleum products or other flammable cargoes as well as ships intended for towing and servicing the above ships shall be provided with electric lights only.

Table 2.2.1. **Basic set of signal means for ships of Group I**

Nos.	Types of ships	Navigation lights						Flashing lights	
		Masthead	Sidelight starboard	Sidelight port	Stern	All-round		Maneuvering	Daylight signalling lamp
						White	Red		
1	2	3	4	5	6	7	8	9	10
1	Power-driven ships	2/1[2]	1	1	1	2/1[2]	2	1	One lamp for every ship of more than 150 gross tonnage, and for passenger ships, ships carrying dangerous goods[9] irrespective , of their gross tonnage
2	Sailing ships[5] and also non-self-propelled ships being towed[8] or pushed ahead	–	1[6]	1[6]	1[7]	2/1[2]	2	–	Ditto

Continue of Table 2.2.1.

Nos.	Types of ships	Sound signals			Signal shapes			Radar reflec-tors
		Whistle	Bell	Gong	Ball	Cone	Diamond[1]	
1	2	11	12	13	14	15	16	17
1	Power-driven ships	1	1[3]	One gong for every ship of 100 m in length and more[3]	3	One cone for every power-driven ship under sail[4]	1	One for every ship of less than 150 gross tonnage

2	Sailing ships[5] and also non-self-propelled ships being towed[8] or pushed ahead	1	1[3]	Ditto	3	Ditto	1[7]	Ditto

End of Table 2.2.1.

[1] May be replaced by two cones joined at their bases.

[2] Indicated in the numerator is the number for ships of 50 m in length and more, in the denominator, for ships of less than 50 m in length. Ships of less than 50 m in length may be provided with two lights.

[3] Refer to 2.2.8.

[4] Not required if, instead of the diamond (refer to Note 1), two cones 'joined at their bases are used.

[5] Refer to 2.2.6.

[6] Refer to 2.2.7.

[7] Not required for ships being pushed ahead.

[8] Slightly conspicuous, partly submerged ships or objects being towed or combination of such ships and objects shall exhibit: two all-round white lights, if the breadth of the above objects is less than 25 m;
four all-round white lights, if the breadth of the above objects is 25 m and more; five all-round white lights, if the length of the tow is 100 m and more; in addition, one diamond shape, if the length of the tow is over 200 m.

[9] Not required for ships sailing in inland water areas of Ukrainian ports, except fishing.

2.2.4 A set of spare lights comprises:

.1 masthead, side, stern, except for the use of lights as the main duplicated electric lights, white and red all-round lights ("Ship not under command" signal and anchor);

.2 all-round white, red and green lights indicating the occupation of the ship (trawling, fishing, pilot), "Ship restricted in her ability to maneuver" signal, towing (white) and towing (yellow) lights.

2.2.5 Every ship shall be provided with the following spare parts and materials for the lights depending on the set of basic and spare navigation lights installed:

.1 one light filter for each light ("Ship not under command" and "Ship restricted in her ability to maneuver" signals, side, towing (yellow), fishing and air-cushion) unless a coloured lens is fitted in the light;

.2 two electric lamps for each electric light of the basic set;

.3 six chimneys, provided that all oil lights have chimneys of the same size. If not, two chimneys shall be provided for each light;

.4 one wick for each oil light;

.5 fuel mixture for spare oil lights in a quantity sufficient to ensure burning of the whole set of lights during at least 32 h.

2.2.6 Sailing ships may, in addition, be equipped with two lights, the upper being red and the lower green. Characteristics of these lights shall conform to those given in item 8 of Table 3.1.2.

2.2.7 In Group I sailing ships of less than 20 m in length the stern light and side lights may be replaced by a combined three-colour light.

2.2.8 A bell or gong may be replaced by other devices having similar sound characteristics. In this case, the manual operation of the required signal shall be possible at all times.

2.2.9 A ship constrained by her draught, in addition to the lights required for power-driven ship in Table 2.2.1, may be provided with three red lights having the characteristics specified in item 8 of Table 3.1.2 and also a cylinder (refer to Table 3.4.1).

When a ship is provided with the above lights, they may be used at the same time as the lights of "Ship not under command" signal required by Table 2.2.1.

2.3 EQUIPMENT OF GROUP H SHIPS

2.3.1 The basic set of signal means to be provided for ships of Group II, apart from pyrotechnic signal means, shall be in compliance with Table 2.3.1.

Additional signal means for towing or pushing ships, ships restricted in their ability to maneuver, pilot, fishing and air-cushion ships are given in Table 2.4.1. The equipment of ships with pyrotechnic signal means shall comply with Table 2.5.1.

Daylight signalling lamp is provided according to Table 2.2.1.

2.3.2 Ships of Group II may use either electric or oil lights. These ships are not required to have a set of spare lights (except for a spare oil anchor light, in case of no emergency source of power on board the ship, as well as the masthead, side and stern lights on board power-driven ships). In power-driven ships spare masthead lights, sidelights and stern lights shall be installed in regular positions or duplicated electric lights (navigation lights with two light sources one of which is supplied from the ship's mains and the other from an emergency source of power) shall be used.

2.3.3 Ships of Group II may carry, in lieu of the sidelights, a combined two-colour light.

In sailing ships of Group II sidelights and a stern-light may be replaced by a combined three-colour light.

2.3.4 The equipment of Group II ships with spare parts and materials for the lights shall comply with the requirements of 2.2.5.

2.3.5 A ship of less than 12 m in length shall not be obliged to carry a whistle or bell, but if she does not, she shall be provided with some other means of making an efficient sound signal.

2.3.6 A power-driven ship of less than 7 m in length whose maximum speed does not exceed 7 knots, in lieu of the masthead light, sidelights and sternlight, may be provided with an all-round (360°) white light.

Such ship shall, if practicable, also exhibit sidelights or a combined two-colour light.

Table 2.3.1. **Basic set of signal means for ships of Group II**

Nos.	Types of ships	Navigation lights						Sound signals		Signal shapes			Radar reflectors
		Masthead	Sidelight starboard[1]	Sidelight port[1]	Stem[1]	Круговий		Whistle[2]	Gong[2]	Ball	Cone	Diamond	
						White	Red						
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Power-driven ships[3]	1[4]	1	1	1[4]	1	2[4]	–	–	3	1[8]	–	1
2	Sailing ships[5] and also non-self-propelled ships being towed or pushed ahead	–	1	1	1[6]	1	2[4]	–	–	3	Те ж саме	1[7]	1

[1] Refer to 2.3.3.

[2] Refer to 2.3.5.

[3] Refer to 2.3.6 and 2.3.7.

[4] Not required for ships of less than 7 m in length whose maximum speed does not exceed 7 knots.

[5] Refer to 2.2.6, taking into account that it does not refer to ships provided with a combined three-colour light according to 2.3.3.

[6] Not required for ships being pushed ahead.

[7] Only for ships being towed. May be replaced by two cones joined at their bases.

[8] For power driven ship provided with sails.

2.3.7 A power-driven ship of less than 12 m in length, in lieu of the mast-head light and sternlight, may be provided with the light specified in column 7 of Table 2.3.1.

2.4 ADDITIONAL SIGNAL MEANS FOR TOWING OR PUSHING SHIPS, SHIPS RESTRICTED IN THEIR ABILITY TO MANOEUVRE, PILOT, FISHING AND AIR-CUSHION SHIPS

2.4.1 Towing or pushing ships, ships restricted in their ability to maneuver, pilot, fishing and air-cushion ships shall, in addition to signal means required by Table 2.2.1 or 2.3.1, be provided with signal means according to Table 2.4.1.

Table 2.4.1. **Additional signal means for towing or pushing ships, ships restricted in their ability to maneuver, pilot, fishing and air-cushion ships**

Nos.	Types of ships	Lights						Signal shapes	
		Towing	All-round			Towing	All-round flashing	Cone	Diamond
		white	white	red	green	yellow	yellow		
1	2	3	4	5	6	7	8	9	10
1	Towing or pushing ships	2/1[1]	–	–	–	1[2]	–	–	–
2	Ships restricted in their ability to maneuver[3,4]	–	1	2[5]	–	–	–	–	1
3	Pilot ships	–	1	1	–	–	–	–	–
4	Fishing ships engaged in trawling[6]	–	1	–	1	–	–	2	–
5	Fishing ships (except for ships engaged in trawling) with nets or lines extending horizontally in the water not more than 150 m[7]	–	1	1	–	–	–	2	–
6	Fishing ships (except for ships engaged in trawling) with nets or lines extending horizontally in the water more than 150 m	–	2	1	–	–	–	3	–
7	Air-cushion ships	–	–	–	–	–	1	–	–

[1] Indicated in the numerator are the towing ships of Group I, in the denominator, all pushing and towing ships of Group II; if a ship of Group I is engaged in towing, the length of the tow, measured from the stern of the towing ship to the stern of the last ship towed, being not more than 200 m, she may carry one towing light; if a ship of Group II is engaged in towing and the length of the tow exceeds 200 m, she shall carry two towing lights.

[2] Not required for ships pushing ahead or towing alongside.

[3] Refer to 2.4.2.

[4] Lights and signal shapes are not required if the ship's length is less than 7 m.

[5] May be employed as the lights of "Ship not under command" signal as required in column 8 of Tables 2.2.1 and 2.3.1.

[6] Ships of less than 50 m in length may be additionally provided with a masthead

light complying with the requirements of item 1 of Table 3.1.2.

[7] Ships engaged in fishing with purse seine gear in close proximity to other ships shall be equipped with two lights according to the requirements of item 10 of Table 3.1.2.

2.4.2 Ships engaged in dredging or underwater operations shall, in addition to the lights required by Table 2.4.1 for ships restricted in their ability to maneuver, exhibit two red and two green lights having the characteristics specified in item 8 of Table 3.1.2 as well as two balls and two diamonds.

2.4.3 When a pushing ship and a ship being pushed are rigidly connected in a composite unit, they shall be regarded as a power-driven ship and shall be equipped with signal means according to item 1 of Table 2.2.1 or 2.3.1.

2.5 EQUIPMENT OF SHIPS WITH PYROTECHNIC SIGNAL MEANS

2.5.1 The equipment of ships with pyrotechnic signal means shall comply with the requirements of Table 2.5.1.

Table 2.5.1. **Equipment of ships with pyrotechnic signal means**

Area of navigation	Ship's parachute rocket	Sound signal rocket or shell[2]	Distress signal hand flare, red [1,2]	Hand flare, white [1,2]	One-star rocket, green[2]	One-star rocket, red[2]
Unrestricted and Restricted **R1**	12	12	12	12	12	12
Restricted **R2**, **R2-RSN**, **R3-RSN**	12[3]	6	6	6	6	6
Restricted **R3**	12[3]	–	6	3	–	–

End of Table 2.5.1

[1] It is not permitted to use hand flares in oil tankers and other ships intended to carry petroleum products and continuously operating in oil harbour water areas. Instead of hand flares, such ships shall be provided with a 50 per cent greater number of parachute rockets or sound signal shells than that specified in this Table.

[2] Recommended.

[3] Ships not engaged in international voyages shall be provided with not less than six parachute rockets.

2.5.2 Passenger sea and mixed (sea-river) navigation ships engaged in domestic voyages (sea cabotage) of unrestricted and restricted areas of navigation **A**, **A-R1**, **A-R2**, **A-R2-RSN** shall be equipped with pyrotechnic signal means, as for ships of unrestricted and restricted **R1** areas of navigation according to Table 2.5.1, and restricted areas of navigation **B-R3-RSN**, **C-R3-RSN** and **D-R3** shall be equipped with pyrotechnic signal means, as for ships of unrestricted and restricted **R1** areas of navigation according to Table 2.5.2.

Table 2.5.2 **Equipment of passenger sea and mixed (sea - river) navigation ships engaged in domestic voyages (sea cabotage) with pyrotechnics**

Ship's class	**B-R3-RSN**		**C-R3-RSN**		**D-R3**	
Number of persons on board (N)	> 250	≤ 250	> 250	≤ 250	> 250	≤ 250
Ship's parachute rocket[1]	12	12	12	12	6	6

[1] Parachute rockets shall be stored on the navigation bridge or in the station, where the ship is controlled from.

2.6 BERTH-CONNECTED SHIPS

2.6.1 A berth-connected ship shall be equipped with all-around white lights:

if the length of the ship is less than 50 m — one light on either side;

if the length of the ship is 50 m and over but less than 100 m — two lights on either side, spaced 50 m apart;

if the length of the ship is 100 m and over, the number of lights shall be such that one light is provided for each 50 m of the ship length. Where more than two lights are fitted on either side of a berth-connected ship, they shall be equally spaced.

If a berth-connected ship is designed so that she can be moored one side only, all-around lights may be fitted only on the offshore side.

2.6.2 Стоянкове судно при його буксируванні у відкритих морях і з'єднаних з ними водах повинне забезпечуватися бортовими і кормовим ліхтаря A berth-connected ship when towed in open seas and waters connected therewith, shall be equipped with side and stern lights ми.

2.6.3 A berth-connected ship, when towed through in-land waterways, shall be equipped with lights in accordance with Inland Navigation Rules of Ukraine and/or The basic regulations on navigation on the Danube.

3. CONSTRUCTION OF SIGNAL MEANS

3.1 NAVIGATION LIGHTS

3.1.1 Categories of lights.

This Part of the Rules specifies requirements for three basic categories of navigation lights:

.1 lights of Category I intended for ships of 50 m in length and more;

.2 lights of Category II intended for ships of 12 m in length and more but under 50 m;

.3 lights of Category III intended for ships of less than 12 m in length..

3.1.2 Main characteristics of lights.

Main characteristics of various navigation lights are given in Table 3.1.2.

Table 3.1.2. **Main characteristics of navigation lights**

Nos.	Ліхтарі	Колір вогню	Minimum range of visibility, in miles	Arc of visibility in horizontal plane

			Lights of category I	Lights of category I	Lights of category II	Total angle, deg	Position
1	2	**3**	4	5	6	7	8
1	Masthead Towing	White	6	5[1]	2	225	112,5° from right ahead on either side
2	Sidelight, starboard	Green	3	2	1	112,5	112,5° from right ahead on starboard side
3	Sidelight, port	Red	3	2	1	112,5	112,5° from right ahead on port side

Continue of Table 3.1.2

1	2	3	4	5	6	7	8
4	Combined two-colour	Green Red	–	2	1	225	112,5° from right ahead on either side: green sector on starboard side, red sector on port side
5	Combined three-colour	Green Red White	–	–	1[2]	360	Green sector — 112,5° from right ahead on starboard side; red sector — 112,5° from right ahead on port side; white sector — 135° to 67,5° from right aft on either side
6	Sternlight	White	3	2	2	135	67,5° from right aft on either side
7	Towing	Yellow	3	2	2	135	67,5° from right aft on either side
8	All-round	White Red Green	3	2	2	360	All round the horizon
9	All-round flashing	Yellow	3	2	2	360	All round the horizon
10	Additional all-round lights for fishing ships engaged in trawling and	White Red, Yellow	1	1	1	360	All round the horizon

	fishing with purse seine gear in close proximity to other ships [3]						
11	All-round for slightly conspicuous, partly submerged ships or objects being towed	White	3	3	3	360	All round the horizon

End of Table 3.1.2

[1] In ships of less than 20 m in length the minimum range of visibility is 3 miles.

[2] The minimum range of visibility of white sector is 2 miles.

[3] The range of visibility shall be at least 1 mile, but less than that of other al1-round lights exhibited by a ship.

3.1.3 General technical requirements.

3.1.3.1 The navigation lights listed in Table 3.1.2 may be fitted with electric or oil source of light (refer to 3.1.7).

3.1.3.2 Lights shall be so constructed as to prevent water from getting into contact with current-carrying parts in the electric lights, or with chimney, burner or other parts affecting the operation of the oil lights when such lights are being sprayed with water.

3.1.3.3 The light shall reliably operate at variations of ambient temperature from —30 to +45 °C.

Lights intended for icebreakers of ice classes **Icebreaker1, Icebreaker2**, **Icebreaker3, Icebreaker4** and ships of ice classes **Ice5** and **Ice6** (refer to 2.2.3, Part I "Classification" of Rules for the Classification and Construction of Sea-Going Ships) shall be adapted to operate at a negative temperature down to — 40 °C.

3.1.3.4 The lights shall be reliable in operation under vibration and shaking such as may occur in the ship, at a trim of not less than 10° and periodic heeling up to 45°.

3.1.3.5 Oil lights shall be so constructed as to ensure burning under a wind velocity of up to 30 m/s.

3.1.3.6 The electric navigation lights shall maintain lighting characteristics under variations from the rated supply voltage for long periods as specified in 2.1.3.1, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.1.4 Light case.

3.1.4.1 The light case and its parts shall be manufactured of materials resistant to sea water, or materials with an adequate anticorrosive protective coating. The electric light shall be of watertight design (IP 56).

3.1.4.2 The electric and oil lights shall be so constructed as to prevent such heating of the optical parts and of the light case which would result in damage to optical parts or deformation of the case, owing to temperature variations which may be encountered in any climatic conditions.

3.1.4.3 The light case shall be of such a design as to allow rapid change of electric or oil lamps. Oil lights shall be so constructed as to enable a lamp with its chimney fitted to be inserted into them.

3.1.4.4 The lights shall be of such a design as to ensure drainage of condensate and fresh air inflow to the extent related to the required degree of protection.

3.1.4.5 The cases of basic and spare lights shall be so constructed as to provide for their efficient securing in the working position as well as rapid removal and fitting in the regular places.

Lights of all-round visibility (360°) in a horizontal plane, which are hoisted one above the other, shall be fitted with handles for hoisting.

3.1.5 Lenses and plain glasses.

3.1.5.1 The navigation lights may be fitted with lenses or plain glasses provided the minimum range of visibility meets the requirements specified in Table 3.1.2 and the curve of vertical light distribution of the light — requirements of 3.1.5.3.

3.1.5.2 The inner and outer surfaces of the lenses and plain glasses shall be smooth, and the glass shall be free from foreign inclusions, blisters and chippings impairing the light characteristics.

3.1.5.3 The lenses of the electric navigation lights shall be of such a design that the curve of vertical light distribution of the light will ensure:

.1 luminous intensity not less than that prescribed in 3.1.7.1 within the range of visibility in vertical plane up to 5° on either side from the horizontal plane of symmetry of the lens;

.2 not less than 60 per cent of the prescribed luminous intensity within the range of visibility up to 7,5° on either side from the horizontal plane of symmetry of the lens; and for lights of sailing ships under way, not less than 50 per cent of the prescribed luminous intensity within the range of visibility up to 25° on either side from the horizontal plane of symmetry of the lens.

3.1.5.4 The curve of horizontal light distribution of the sidelights shall be such that lights fitted in the ship have the luminous intensity from right ahead, as prescribed in 3.1.7.1. The intensity shall decrease and disappear between 1 and 3° outside the prescribed sectors.

For sternlights and masthead lights and also at 22,5° abaft the beam for sidelights, the specified luminous intensity shall be maintained up to 5° within the limits of sectors prescribed in Table 3.1.2. From 5° within the prescribed sectors the intensity may decrease by 50 per cent up to the prescribed limits; then it shall decrease steadily to reach practical cut-off at not more than 5° outside the prescribed limits.

3.1.6 Coloured light filters.

3.1.6.1 The colouring of the navigation lights may be obtained with the use of appropriate light filters or coloured lenses. Plain coloured glasses may be used provided that the chromaticity of the filter is ensured over their whole surface.

3.1.6.2 The coloured light filters used in the navigation lights may be manufactured of glass coloured throughout its entire thickness or over the surface only (cover plates).

The light filters may be manufactured of plastics provided all their characteristics are in all cases not inferior to those of the glass filters.

3.1.6.3 Corner coordinates *x, y* of the allowable zones for each colour are given in Table 3.1.6.3.

Here the colour of light is considered as a result obtained in the light filter — source of light optical system.

The luminous transmissivity of the coloured light filters shall have such values as to ensure the specified range of visibility of the lights according to Table 3.1.2 and to the requirements of 3.1.5.3.

Table 3.1.6.3. **Corner coordinates of chromaticity zones**

Light colour	chromaticity zones	Points					
		1	2	3	4	5	6
Red	*x*	0,680	0,660	0,735	0,721	–	–
	y	0,320	0,320	0,265	0,259	–	–
Green	*x*	0,028	0,009	0,300	0,203	–	–
	y	0,385	0,723	0,511	0,356	–	–
White	*x*	0,525	0,525	0,452	0,310	0,310	0,443
	y	0,382	0,440	0,440	0,348	0,283	0,382
Yellow	*x*	0,612	0,618	0,575	0,575	–	–
	y	0,382	0,382	0,425	0,406	–	–

3.1.6.4 The height and the length of the arc of a coloured light filter shall be such as to cover the whole inside surface of the lens.

3.1.6.5 The inner and outer surfaces of the light filters shall be free from notches and indentations, and the filter glass shall be free from blisters, foreign inclusions and drops which impair the characteristics of the lights.

3.1.6.6 The light filters shall be fixed in the lights in such a way as to preclude their spontaneous shifting in the course of their use on board the ship.

3.1.6.7 The fastening arrangements of the light filters in the side and combined two-colour and three-colour navigation lights shall be so constructed as to prevent the possibility of placing the red filter instead of the green one, and vice versa.

3.1.7 Sources of light.

3.1.7.1 The source of light in the electric lights shall be an electric lamp, and in the oil lights — an oil lamp. For the range of visibility required by Table

3.1.2, the luminous intensity *I*, in cd, of the electric light shall not be less than that determined by the formula

$$I = 3{,}43 \cdot 10^6 TD^2 k^{-D}, \qquad (3.1.7.1)$$

where $T = 2 \cdot 10^{-7}$ – threshold factor, in lux;

D – range of visibility of the light, in nautical miles;

$k = 0{,}8$ – atmospheric transmissivity corresponding to meteorological visibility of approximately 13 miles.

The luminous intensity determined by Formula (3.1.7.1) is given in Table 3.1.7.1.

Maximum allowable luminous intensity of lights may be up to 1,7 times the values given in Table 3.1.7.1, but shall not exceed 150 cd. It shall not be achieved by regulation of luminous intensity.

For non-electric lights, the luminous intensity shall correspond to that determined by the formula, to a maximum possible degree.

Table 3.1.7.1. **Luminous intensity of light**

Range of visibility *D*, nautical miles	1	2	3	4	5	6
Luminous intensity of light *I*, cd, for A; = 0,8	0,9	4,3	12	27	52	94

3.1.7.2 The sources of light shall be fitted in the lights in a vertical position, so that the horizontal plane of symmetry of the lens shall divide the luminous part of the light source into two nearly equal parts.

3.1.7.3 The fixing arrangement for the source of light in the light shall be so constructed as to permit the placing of this in only one fixed position, so that no spontaneous change in this position can occur during the use of the light on board the ship, and suitable provisions shall be made for ready replacement of the source of light in the light.

3.1.7.4 Electric lights shall be fitted with sockets and marine type lamps having devices for prevention of their spontaneous loosening.

3.1.7.5 The use in the electric lights, except for twin lights, of more than one lamp or of one two-filament lamp (one filament being for permanent service and the other for emergency use) is not permitted.

3.1.7.6 Burners used in the oil lights may be with a signal flat wick, with two flat wicks or with a round wick. The burners and wicks shall have such dimensions as to ensure the luminous intensity of the light specified in 3.1.7.1.

3.1.7.7 The wicks shall be of such a quality as to form minimum carbon deposit and to ensure an equal luminous intensity when burning during not less than 6 h without trimming the wick and the carbon removal.

3.1.7.8 Oil cistern in the oil light shall be so constructed and fitted as to secure its immobility and to prevent the lamp from being placed in a wrong way. The cistern capacity, irrespective of the purpose of the light, shall be such that burning of the lamp is maintained during not less than 16 h.

3.1.7.9 The fuel to be used in the oil lights is a mixture with a radiation temperature of not less than 1900 K.

3.1.7.10 The lamp chimney shall be made of a colourless glass having as few foreign inclusions, blisters and indents as possible, which, if present, shall not reduce the luminous intensity of the lights, specified in 3.1.7.1.

3.1.7.11 Reflectors in masthead, side or stern oil lights shall be manufactured of corrosion-resistant material and be of such a design and dimensions as to ensure the proper direction of reflected rays falling onto the lens. The reflector shall be so placed in the light that its curvature centre coincides with the optical centre of the lens.

The application of reflectors in electric navigation lights is not permitted.

3.2 FLASHING LIGHTS

3.2.1 Maneuvering lights.

3.2.1.1 Maneuvering lights shall be all-round white ones. The range of visibility shall be not less than 5 miles.

3.2.1.2 Materials and construction of maneuvering lights shall comply with the relevant requirements and the horizontal luminous intensity of one flash shall not be less than:

$$I_f = \frac{0{,}2 + t_f}{t_f} I \quad , \qquad (3.2.1.2)$$

where t_f – flash duration, in s;

I – luminous intensity according to 3.1.7.1, in cd.

3.2.1.3 The manoeuvring light shall be an electric one and shall send flashing light signals whilst the manoeuvre is being carried out. The duration of each flash and the interval between flashes shall be about 1 s, and the interval between successive signals shall not be less than 10 s.

3.2.2 Daylight signalling lamps.

3.2.2.1 The main characteristics of daylight signalling lamps shall comply with the following requirements:

.1 by day and with an atmospheric transmission of 0,8, the visibility of light signals emitted by daylight signalling lamps shall be at least 2 miles, equalling a required luminous intensity of 60000 cd;

.2 the axial luminous intensity of daylight signalling lamps shall reach at least 90 per cent of the maximum luminous intensity;

.3 the luminous intensity of daylight signalling lamps shall have its maximum in the centre of the luminous intensity distribution. It shall decrease evenly from the centre of luminous intensity distribution;

.4 the half angle of divergence a_h shall not exceed 9°, the tenth angle of divergence a_z shall not exceed 14°;

.5 the chromaticity of the white signal light shall lie within the corner coordinates, as specified in Table 3.1.6.3;

.6 the effective light emission sectors of daylight signalling lamps shall be circular. The sum of switch-on and switch-off times shall not exceed 500 ms;

.7 daylight signalling lamps shall be provided with an indication of their operational status;

.8 daylight signalling lamps and any battery required for operation shall be designed in such a way that safe handling in the intended application is ensured. The daylight signalling lamp shall be capable of being operated be personnel wearing gloves.

3.2.2.2 Daylight signalling lamps shall comply with the following technical requirements:

.1 the illuminant shall be safely fitted in the daylight signalling lamp; use of screwed sockets shall be avoided;

.2 daylight signalling lamps shall be designed in such a way that the illuminant can be easily replaced also in the dark;

.3 the sighting mechanism shall be mounted in a fixed attitude, parallel to the optical axis;

.4 all parts of daylight signalling lamps shall be made of anti-magnetic material;

.5 daylight signalling lamps shall be so constructed that the accumulation of condensed water is avoided;

.6 the materials used shall withstand heat generation during operation;

.7 daylight signalling lamps shall be resistant to environmental conditions;

.8 each daylight signalling lamp shall be provided with at least three spare illuminants complying with the type-tested illuminant;

.9 the outer parts of daylight signalling lamps shall not reach temperatures during operation, which restrict their manual use;

.10 where applicable, daylight signalling lamps shall be protected against short circuit to prevent damage to the lamp or injury to the operator.

3.2.2.3 The power supply shall comply with the following requirements:

.1 operation of the daylight signalling lamps shall not be solely dependent upon the ship's main or emergency sources of electrical power;

.2 daylight signalling lamps shall be provided with a portable battery with a complete weight of not more than 7,5 kg;

.3 the portable battery shall have sufficient capacity to operate the daylight signalling lamp for a period of not less than 2 h;

.4 daylight signalling lamps shall continue to operate satisfactorily in the presence of variations of power supply normally to be expected in a ship;

.5 means shall be incorporated for the protection from the effects of excessive current and voltage, transients and accidental reversal of the power supply polarity;

.6 if provision is made for operating daylight signalling lamps from more than one source of electrical power, arrangements for rapidly changing from one source to the other shall be provided but not necessarily incorporated in the equipment;

.7 daylight signalling lamps shall be reliable in operation, as specified in 5.1.41, Part IV "Radio Equipment".

3.2.2.4 Marking and identification.

3.2.2.4.1 Daylight signalling lamps shall be marked clearly and durably with the following data:

identification of the manufacturer;

equipment type number or model identification under which it was type tested;

serial number of the unit.

3.2.2.4.2 On the illuminant, the manufacturer's label and the voltage and power consumption shall be marked clearly and durably.

3.3 SOUND SIGNAL MEANS

3.3.1 Main characteristics of whistles shall be in accordance with Table 3.3.1.

The fundamental frequency of the signal shall lie within the range 70 to 700 Hz. The range of audibility of the signal from a whistle shall be determined by those frequencies, which may include the fundamental and/or one or more higher frequencies within the range 180 to 700 Hz (± 1 %) for ships of 20 m and more in length, and within 180 to 2100 Hz (± 1 %) for ships less than 20 m in length, which provide the sound pressure levels specified in Table 3.3.1.

3.3.2 A bell and gong shall produce a sound pressure level of not less than 110 dB at 1 m.

3.3.3 The sound signals of the ship shall be reliable in operation and shall produce the required sound intensity, duration and clear sounding of each blast.

3.3.4 The sound made on a whistle shall be of even tone with no vibration, hissing or other distortions. The beginning and the end of each signal, no matter how long it may sound, shall be distinct and abrupt.

The whistle shall be so designed that compliance with the requirements of 4.6.2.1 is ensured.

For sounding on the whistle in fog it is recommended to provide for special automatic controls ensuring time regulation of signal sounding and also to provide for possible manual actuation of signals with automatic cutting-off of the automatic controls at the moment of manual actuation.

3.3.5 The bell shall give a loud and clear sound and be manufactured of material not requiring protection against corrosion. No painting of the bell is permitted.

The bell intended for ships of 20 m in length and more shall have an outer diameter at the bell mouth of not less than 300 mm. The mass of the striker shall not be less than 3 per cent of the mass of the bell.

Table 3.3.1. **Main characteristics of whistles**

Length of ship, m	Range of fundamental frequencies, Hz	⅓[1] octave band level at 1 metre dB, referred to 2×10^{-5} N/m^2	Audibility range, miles[2]
$200 \le L$	70–200	143	2,0
$75 \le L < 200$	130–350	138	1,5
$20 \le L < 75$	250–700	130	1,0
$L < 20$	180-450	120	0,5
	450-800	115	
	800-2100	111	

[1] A whistle fitted in a ship shall provide in the direction of the maximum intensity of the whistle and at a distance of 1 m from it a sound pressure level, in at least 1 /3-octave band within the range of frequencies 180 to 700 Hz (± 1 %) or ships of 20 m and more in length, and within 180 to 2100 Hz (± 1 %) for ships less than 20 m in length, of not less than the appropriate value given in the Table.

[2] The range of audibility given above is for information and is approximately the range at which a whistle may be heard on its forward axis with 90 per cent probability in conditions of still air on board a ship having average background noise level at the listening posts (taken to be 68 dB in the octave band centred on 250 Hz and 63 dB in the octave band centred on 500 Hz).

3.3.6 The gong shall be manufactured of steel, bronze or other equivalent material.

The gong shall be provided with a beetle and a device for its suspension on the stanchion or holding in hands if it is of portable type

A steel gong shall have anticorrosive coating. Painting of the gong is not permitted.

3.3.7 Power supply of electric drives of sound signal means and control means thereof shall be provided from the main and emergency sources of power in compliance with 4.3, 9.3.1 and 19.1.2.1, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.4 SIGNAL SHAPES

3.4.1 The signal shapes shall be of black colour and shall have the dimensions not below those specified in Table 3.4.1.

3.4.2 The signal shapes shall be provided with suitable devices for fixing them to halyards on which they are hoisted, and for joining with other shapes. Folding shapes shall be fitted with the devices retaining them in open position and preventing the shapes from spontaneous folding.

Devices for joining the shapes one to another (except the cones) shall provide for maintaining the proper distance between them, which shall not be less than 1,5 m for ships of 20 m in length and more and not to be less than 1 m for ships of less than 20 m in length.

The cones shall be provided with devices for joining them directly one to another with their points or bases together.

Table 3.4.1. **Dimensions of signal shapes**

Nos.	Сигнальна фігура	Dimensions, in m, for ships	
		of 20 m in length and more	of less than 20 m in length
1	Ball	0,6 in diameter	0,3 in diameter
2	Cone	Base diameter and height 0,6	Base diameter and height 0,3
3	Diamond	Smaller diagonal 0,6 Greater diagonal 1,2	Smaller diagonal 0,3 Greater diagonal 0,6
4	Cylinder	0,6 in diameter and 1,2 in height	–

3.5 PYROTECHNIC SIGNAL MEANS

3.5.1 General.

Pyrotechnic signal means shall have the characteristics specified in Table 3.5.1 and meet the following requirements:

.1 not to be damaged in stowage throughout the air temperature range — 30°Cto +65°C;

.2 to be contained in a water-resistant casing not subject to corrosion;

.3 to be indelibly marked with brief instructions or diagrams clearly illustrating how it shall be operated;

.4 if hand operated, to be operated from bottom or to contain an operational safety delay of 2 s;

.5 to have a simple means of ignition which requires the minimum of preparation and can be readily operated in adverse conditions without external aid and with wet, cold or gloved hands;

.6 to have integral means of ignition (for rocket parachute flares and hand flares);

.7 to be indelibly marked with means for determining its age;

.8 the packing of pyrotechnic signal means shall allow the marking to be visible on the pyrotechnic device itself. Otherwise, the marking complying with the requirements of 3.5.1.7 shall be positioned on the packing as well.

3.5.2 The rocket parachute flares, hand flares and buoyant smoke signals shall comply with the requirements of 6.7, Part II "Life-Saving Appliances".

Table 3.5.1. **Characteristics of pyrotechnic signal means**

Nos.	Pyrotechnic signal means	Light colour	Luminous intensity[1] (min), cd	Altitude (min), m	Range of audibility [2] (min), miles	Burning time (min), s	Purpose
1	2	3	4	5	6	7	8
1	Rocket parachute flare (marine)	Red	30000	300	–	40	To be used as a distress signal
2	Sound signal rocket or shell	–	–	–	5	–	Ditto
3	Hand flare	Red	15000	–	–	60	Ditto
4	Hand flare	White	10000	–	–	20	To attract attention
5	One-star rocket	Green	3000	80	–	6	Life-saving signals
6	One-star rocket	Red	3000	80	–	6	Ditto
7	Buoyant smoke signal	Orange				180	To be used as a distress signal

[1] To be determined in laboratory conditions.

[2] To be determined over sea surface at wind force up to 1 and clear atmosphere and at background noise of at least 45 dB.

4. FITTING OF SIGNAL MEANS ON BOARD

4.1 GENERAL

4.1.1 The signal means shall be fitted or stored on board in such a manner as to be at all times ready for use.

4.1.2 The basic and spare sets of lights shall be placed on board in regular positions provided for them.

4.1.3 In placing the lights the vertical distances between them, specified in this Section, shall be deemed to be minimum. They shall be increased accordingly where some superstructures or hull fittings may obstruct the visibility of the lights. However, the increase of these distances shall not exceed the values set up in this Section.

4.1.4 In ships equipped with electric navigation lights supplied in accordance with 6.8.2, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships, provision shall be made in the wheelhouse for indication on switching of navigation lights and visual and sound alarms warning of a light failure.

In ships less than 50 m in length and in non-self-propelled ships, visual and sound alarms may not be provided if position of navigation lights is such that they are visible from the steering control station or, where there is no such station, from the watch-keeping position.

4.1.5 The placing of the electric signal means and protection of radio equipment from electrical interference produced by them shall comply with the requirements of 2.2, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

4.1.6 In floating cranes and similar ships where it is impracticable to fulfil all the requirements of this Chapter due to particular construction of deck equipment a different positioning of navigation lights may be accepted which shall, however, be as close as possible to the requirements laid down below.

4.1.7 Lights of all-round visibility (360°) in horizontal plane, except for anchor lights, shall be so located as not to be obscured by masts, topmasts or superstructures within sectors of more than 6°.

In this case, the light shall be considered as an all-round source of light with the diameter equal to the outside diameter of the source of light (filament of the lamp, flame of the burner).

4.1.8 When fulfilment of the requirements of 4.1.7 by means of fitting of one all-round light is not feasible, two all-round lights shall be installed. They shall be located or provided with shields in such a way as to be visible, as far as practicable, as one all-round light at a distance of 1 mile and over.

The screening of each all-round light shall close not more than 180° of the light.

4.1.9 When two or three lights shall be carried in a vertical line one over the other, they shall be spaced as follows:

.1 on a ship of 20 m in length and more such lights shall be spaced not less than 2 m apart, and the lowest of these lights shall, except where a towing (yellow) light is required, not be less than 4 m above the hull;

.2 on a ship of less than 20 m in length such lights shall be spaced not less than 1 m apart, and the lowest of these lights shall, except where a towing (yellow) light is required, not be less than 2 m above the gunwale;

.3 when three lights are carried, they shall be equally spaced;

.4 the lower of the two all-round lights prescribed for a ship engaged in fishing shall be at a height above the sidelights not less than twice the distance between the two all-round vertical lights.

4.2 MAIN NAVIGATION LIGHTS IN SHIPS OF GROUP I

4.2.1 Masthead lights.

4.2.1.1 The forward masthead light shall be placed on or in front of the foremast, or if a ship is without a foremast, then in the fore part of the ship in a line with and over the keel at a height above the hull of not less than 6 m.

If the breadth of the ship exceeds 6 m, then this light shall be placed at a height above the hull not less than such breadth, however, not at a greater height above the hull than 12 m.

4.2.1.2 The after masthead light shall be placed in the fore and aft centreline of the ship.

The vertical distance between the forward and after masthead lights shall not be less than 4,5 m and, also under all normal conditions of trim the after light shall be seen over and separate from the forward light at a distance of 1000 m from the stem when viewed from sea level.

The horizontal separation of forward and after masthead lights shall not be less than one half of the length of the ship, but need not be more than 100 m. The forward masthead light shall not be more than one quarter of the length of the ship from the stem.

If a ship of less than 50 m in length carries only one masthead light, it shall be placed at the height specified in 4.2.1.1.

4.2.1.3 The masthead lights shall be placed above all other lights except for the lights specified in 4.2.5 and 4.5.2, forward all-round white lights specified in 4.2.4.1 and, in exceptional cases, the lights specified in 4.4.5.1 and 4.4.8, and also above the obstructing superstructures so that each of them is distinctly visible over the arcs of the horizon assigned to them.

4.2.1.4 Electric masthead lights shall be fitted in a stationary position.

Oil masthead lights shall be fitted with suitable devices for hoisting the light to its regular position and for lowering it onto the deck. Such device shall be so constructed as to ensure the correct and stable position of the light when hoisted to its regular position.

4.2.1.5 Horizontal screens of a sufficient size shall be installed under the masthead lights so as to prevent these lights from illuminating the navigation bridge and other decks.

4.2.1.6 If only one masthead light is prescribed for a power-driven ship, this light shall be placed to the bow from the midship.

4.2.1.7 The masthead light of high-speed craft may be placed at a height related to the breadth of the craft lower than that prescribed in 4.2.1.1, provided that the base angle of the isosceles triangles formed by the sidelights and masthead light, when seen in end elevation, is not less than 27°.

4.2.2 Sidelights.

4.2.2.1 A light containing a green light shall be carried on the starboard side, another one containing a red light shall be carried on the port side, both lights being placed in parallel, in one line perpendicular to, and at the same distance from, the centreline of the ship.

In power-driven ships which carry two masthead lights the side lights shall be placed abaft the forward masthead light and above the hull at a height of not greater than three quarters of the height of the forward masthead light, their positions being chosen so that the lights of side lights are not mixed with deck lights and so as to most prevent the light s from being flooded with water.

On power-driven ships the sidelights shall be placed at a distance of not more than 10 per cent of the breadth of the vessel inboard from the side plating, up to a maximum of 1 m.

The ships, where application of the above requirement is impracticable, e.g. small ships with superstructure of reduced width, may be exempted from this requirement by special agreement with the Register.

If a ship carries one masthead light, sidelights may be placed in front of it.

When due to constructional features it is not possible to locate the sidelights on the navigation bridge wings, they shall be fitted on the other deck of the ship in compliance with the other relevant requirements of 4.2.2.

4.2.2.2 The sidelights shall be protected by inboard shields with two transverse screens (fore and aft) perpendicular to the shield.

The breadth of the fore and aft transverse screens shall be such that the light would practically fade within 1° to 3° beyond the sectors stipulated under items 2 and 3 of Table 3.1.2. In the forward direction, the minimal distance of the light visibility shall be ensured, as required in Table 3.1.2.

In is recommended that shields of such a length shall be fitted that the distance from the outer edge of the light lens or plain glass to the after edge of the fore transverse screen will be 0,9 m at least, and that the breadth of the forward transverse screen shall be chosen such that a line connecting its outer edge to the inner edge of the filament or the light burner will be parallel to the ship centre line.

The height of the shield and of the screens shall not be less than that of the light case.

The shields shall be painted matt black on the inside.

4.2.2.3 The shields of the sidelights shall be placed in such a position that their outer edge will not project beyond the line of the side of the ship.

The sidelight shall be firmly secured on the shield.

The sidelight shields shall not generally be secured to the standing rigging of the ship. Such arrangement may be permitted only in sailing and sailing motor ships provided the above requirements are met and nothing, the sails including, obstructs the visibility of the lights within their respective arcs of visibility.

4.2.2.4 When sidelights of inboard retractable type are used, there shall be provided a suitable device to positively lock the lights in their correct working position.

4.2.2.5 In lieu of the shields, it is permitted to use side walls of the navigation bridge or wheelhouse provided all other requirements set forth in 4.2.2.1 to 4.2.2.4 are met.

4.2.2.6 Ships being pushed ahead shall carry sidelights fixed in the fore part of the hull.

When installing electric lights, provision shall be made for structural means enabling during operation to take account of the following:

.1 when a number of ships is being pushed as a group, the sidelights shall only be lighted in the leading ship;

.2 when a number of ships is being pushed as a group consisting of coupled ships, each of the leading ships being pushed ahead shall be lighted with one sidelight only, i.e. the ship on the extreme right shall exhibit a starboard sidelight and the ship on the extreme left, a port sidelight.

4.2.3 Sternlight.

A sternlight shall be carried as near as possible to the stern and the centreline of the ship in agreement with the Register.

Towing ships may carry a sternlight fixed on the funnel at a level higher than the towing arrangement but, if possible, not higher than the sidelights.

4.2.4 All-round white light.

4.2.4.1 All-round white lights shall be fixed in the fore and after parts of the ship. The stern all-round white light shall be placed not less than 4,5 m lower than the same forward light. In ships of 50 m in length and more the forward all-round white light shall be carried at a height of not less than 6 m above the hull.

4.2.4.2 Ships of less than 50 m in length may, in lieu of the lights prescribed in 4.2.4.1, carry one all-round white light where it can best be seen. Such ships shall not be required to carry a stern all-round white light but they may do so, and in case such ships carry two all-round white lights, they shall be fixed as prescribed in 4.2.4.1.

4.2.4.3 The all-round white lights may be either of stationary type fixed on special stanchions, or they may be hoisted to their regular position by means of a hoisting device. The all-round white lights shall be carried at the ends of the ship in a position where they can best be seen.

4.2.5 Lights of "Ship not under command" signal.

Two all-round red lights shall be fixed in a stationary position or shall be fitted with suitable device for hoisting in a position where they can best be seen, vertically one below the other in accordance with the requirements of 4.1.7 and 4.1.9.

When fulfilling these requirements, lights of red colour specified in 4.4.5 may be used as the lights of this signal, in this case the all-round white light of the "Restricted Ability to Maneuver" signal shall be switched on independently from the all-round red lights of this signal.

4.3 MAIN NAVIGATION LIGHTS IN SHIPS OF GROUP II

4.3.1 Masthead light.

4.3.1.1 On a power-driven ship of 12 m in length and more the masthead light need not be placed to the bow from the midship, however it shall be placed as far in the bow as is practicable.

The masthead light shall be fitted in accordance with the requirements of 4.2.1.3, 4.2.1.4 and 4.2.1.5.

4.3.1.2 Power-driven ships of less than 12 m in length may carry the masthead light or a light as prescribed in 2.3.7 at a height less than 2,5 m above the

gunwale, but not less than 1 m above the sidelights or the combined two-colour light.

The masthead or all-round white light may be displaced from the fore and aft centreline of the ship when its centreline arrangement is impracticable provided that the sidelights are combined in one light which shall be located in the fore and aft centreline or as near as possible to the fore and aft arrangement of the masthead or all-round white light.

4.3.2 Sidelights.

4.3.2.1 Installation of the sidelights and their shields shall comply with the requirements of 4.2.2.1 to 4.2.2.5. It is not required that these lights be installed behind the masthead light at a distance approximating to the breadth of the ship. The shield length may be reduced so that the distance from the outer edge of the plain glass or lens to the rear edge of the forward transverse screen is not less than 0,6 m.

4.3.2.2 If the ships of Group II carry, instead of sidelights, a combined two-colour light, it shall be placed in the centreline of the ship not less than 1 m below the masthead light (refer to 4.3.1.2) and in such a position as to show its green light from right ahead to 22,5° abaft the beam on starboard side and its red light from right ahead to 22,5° abaft the beam on the port side.

With a combined light using a single vertical filament and a very narrow division between the green and red sectors, external screens need not be fitted.

4.3.2.3 When a sailing ship is provided with a combined three-colour light (refer to 2.3.3), it shall be exhibited at or near the top of the mast, where it can best be seen. In other respects, the combined three-colour light shall be fixed in the same manner as specified for the combined two-colour light in 4.3.2.2.

4.3.3 Sternlight.

The sternlight shall be fixed so as to comply with the requirements of 4.2.3. For installation of the combined three-colour light instead of the stern and sidelights, see 4.3.2.3.

4.3.4 All-round white light.

The all-round white light shall be placed in compliance with the requirements of 4.2.4.2 and 4.3.1.2.

4.3.5 Light of "Ship not under command" signal.

Two all-round red lights shall be fixed so as to comply with the requirements of 4.2.5.

4.4 ADDITIONAL LIGHTS IN TOWING OR PUSHING SIHPS, FISHING AND PILOT SHIPS, SHIPS RESTRICTED IN THEIR ABILITY TO MANEUVRE AND AIR-CUSHION SHIPS

4.4.1 Towing lights and towing.

4.4.1.1 Ships of Group I engaged in towing another ships shall carry on the fore or after mast three lights, one of which shall at the same time fulfill the function of the forward or after masthead light and two others having the same characteristics (refer to item 1 of Table 3.1.2) shall be placed above and/or be-

low the forward or after masthead light in a vertical line one over the other and separated by a distance prescribed in 4.1.9.1.

In other respects, the towing (white) lights shall be fixed in the same manner as specified for the masthead lights in 4.2.1 and it shall be borne in mind that when three towing (white) lights are placed on the after mast, the lowest light shall be at least 4,5 m vertically higher than the forward masthead light.

4.4.1.2 Ships engaged in pushing another ships shall carry on the foremast two towing (white) lights, one of which shall at the same time fulfill the function of the forward masthead light. The other light shall be carried as required by 4.4.1.1.

4.4.1.3 Ships of Group II shall carry two towing (white) lights to be placed as prescribed in 4.4.1.1 and 4.4.1.2, so that the vertical distance between them shall not be less than that specified in 4.1.9.2 (refer also to Note 1 to Table 2.4.1).

4.4.1.4 The towing (yellow) light (refer to item 7 of Table 3.1.2) on towing ships shall be carried above the sternlight in a vertical line at a distance prescribed in 4.1.9.

4.4.2 All-round lights for ships engaged in trawling.

4.4.2.1 Ships engaged in trawling shall carry two all-round lights placed in a vertical line one above the other, the upper being green and the lower white. Both all-round lights shall be fixed in accordance with the requirements of 4.1.7 and 4.1.9.

4.4.2.2 Both lights described in 4.4.2.1 may be of either stationary or hoistable type with proper devices for their simultaneous hoisting and lowering down.

4.4.2.3 In ships of 50 m in length and more engaged in trawling the after masthead light shall be positioned abaft of and higher than the all-round light of green colour. In ships of less than 50 m in length the light shall be carried in the same position if the masthead light mentioned in Note 6 to Table 2.4.1 is fixed.

4.4.2.4 In ships engaged in trawling in close proximity to other ships or in pair trawling additional lights shall be placed where they can best be seen at a distance at least 0,9 m from the lights prescribed in 4.4.2.1 and below them, and the vertical distance between the additional lights shall be not less than 2.

4.4.3 All-round lights for ships engaged in fishing.

4.4.3.1 Ships with outlying gear extending not more than 150 m horizontally from the ship shall carry two all-round lights (one with red light and the other with white light) to be placed as specified in 4.4.2.1 and 4.4.2.2 for the lights in ships engaged in trawling, the upper of these two lights being red. The lower light shall be placed above the sidelights at a height of not less than twice the distance between the all-round lights (red and white).

4.4.3.2 Ships with outlying gear, extending more than 150 m horizontally from the ship shall carry three all-round lights, two of which (one with red light and another with white light) shall be fixed as prescribed in 4.4.3.1, while the third light (with white light) shall be placed at a horizontal distance of not less

than 2 m nor more than 6 m away from the vertical lights in the direction of the outlying gear. This all-round light with white light shall be placed not higher than the all-round white light placed in pursuance of 4.4.3.1 and not lower than the sidelights.

4.4.3.3 Ships engaged in fishing with purse seine gear in close proximity to other ships may place two all-round yellow lights in a vertical line where they can best be seen and at least 0,9 m apart but at a lower level than lights prescribed in 4.4.3.1.

These lights shall flash alternately every second and with equal light and occultation duration.

4.4.4 All-round lights for pilot ships.

Pilot ships shall carry two all-round lights in a vertical line one over the other, the upper being white and the lower red. The upper light shall be placed at .or near the top of the foremast. Both all-round lights shall be fitted in a stationary position in accordance with the requirements of 4.1.7 and 4.1.9.

4.4.5 Lights of "Ship restricted in her ability to maneuver" signal.

4.4.5.1 Ships restricted in their ability to maneuver shall exhibit three lights in combination in a vertical line one over the other. The highest and the lowest of these lights shall be red and the middle light shall be white. These all-round lights shall be placed in a position where they can best be seen according to the requirements of 4.1.7, 4.1.9 and 4.2.1.3.

When the arrangement of these all-round lights below the masthead lights is impracticable, they may be placed above the after masthead light provided the requirements of 4.1.9 are complied with, or at a height between the forward and after masthead lights. In the second case, they shall be carried at a horizontal distance of not less than 2 m from the centreline.

4.4.5.2 Additional all-round lights on ships engaged in dredging or underwater operations prescribed in 2.4.2 for indication of the obstructed side (two all-round lights of red colour) and the side on which it is safe to pass (two all-round lights of green colour) shall be placed at the maximum practical horizontal distance, but in no case less than 2 m from the all-round lights prescribed in 4.4.5.1. On each side the all-round lights shall be placed vertically one over the other, and in no case shall the upper of these lights be at a greater height than the lower of three all-round lights prescribed in 4.4.5.1.

4.4.6 Lights of the signal for sailing ships.

When a sailing ship carries the all-round lights prescribed in 2.2.6, they shall be placed at or near the top of the foremast where they can best be seen. The all-round lights shall be placed vertically one over the other and spaced as specified in 4.1.9, the upper light being red and the lower green. These all-round lights shall not be placed in conjunction with the combined three-colour light.

4.4.7 Light of the signal for air-cushion ships.

The light having the characteristics specified in item 9 of Table 3.1.2 shall be fitted in air-cushion ships so as to be visible all round the horizon. This light shall be of stationary type.

4.4.8 Lights of the signal for ships constrained by their draught.

When a ship carries the all-round lights prescribed in 2.2.9, they shall be exhibited where they can best be seen, vertically one over the other, and spaced as specified in 4.1.9.

When it is impracticable to place these all-round lights below the masthead lights, they may be placed above the after masthead light (lights), provided the prescribed vertical distance between them is observed, or vertically between the forward masthead light (lights) and after masthead light (lights); in the second case, these all-round lights shall be placed at a horizontal distance of not less than 2 m from the fore and aft centreline of the ship.

4.4.9 Lights for ships or objects being towed.

Inconspicuous, partly submerged ships or objects being towed or combination of such ships and objects shall exhibit all-round white navigation lights.

4.4.9.1 When the breadth of the ship or object being towed is less than 25 m, one all-round light shall be placed at or near both fore and after extremities, except for flexible floating containers, for which the installation of the all-round light at or near the fore extremity is not required.

4.4.9.2 When the breadth of the ship or object being towed is 25 m and more, two additional all-round lights are placed at the side extremities so that the distance between them closely approximates to the breadth of the ship or object.

4.4.9.3 When the length of the ship or object being towed exceeds 100 m, additional all-round lights shall be exhibited between the lights prescribed in 4.4.9.1 and 4.4.9.2 so that the distance between them is not more than 100 m.

4.5 FLASHING LIGHTS

4.5.1 Daytime signalling lamp.

A daytime signalling lamp shall be kept in the wheel-house or chartroom, always ready for immediate use.

4.5.2 Maneuvering light.

The maneuvering light shall be placed in the same fore and aft vertical plane as the masthead lights and, where practicable, at a ininfmum height of 2 m above the forward masthead light, provided that it shall be carried not less than 2 m vertically above or below the after masthead light.

On a ship where only one masthead light is carried the manoeuvring light shall be placed where it can best be seen not less than 2 m vertically apart from the masthead light.

The maneuvering light shall be so fixed that its light is visible all round the horizon.

If flashes are sent simultaneously with operation of sound signals, the possibility shall also be provided to show the light signals independently.

4.6 SOUND SIGNAL MEANS

4.6.1 General.

4.6.1.1 The sound signal means shall be so placed that the sound they produce could not be intercepted ,or its intensity and clearness impaired by any parts of the structure or equipment of the ship.

4.6.1.2 Sound signal means drives shall be so constructed as to exclude their spontaneous sounding under the action of wind, snow, icing-up, etc.

4.6.2 Whistles.

4.6.2.1 The whistles shall be so fixed that the centre of the sound source is at the height of not less than 2,5 m above the uppermost deck extending from side to side and at least 0,5 m above the deckhouse and any other structures on this deck, which can obstruct the propagation of sound.

The sound pressure level of the ship's own signal measured at listening posts of the passing ship (navigating and top bridges, wheelhouse and bridge wings) shall not exceed 110 dB and, as far as it is practicable, be not more than 100 dB. The whistle installed on a ship shall meet the requirements of Table 3.3.1.

A single whistle shall be so installed on a ship that its maximum intensity is directed straight ahead.

In the horizontal plane within ±45° of the forward axis of the whistle (in the straight ahead direction) the sound pressure level of the whistle shall be not more than 4 dB below the prescribed sound pressure level on the forward axis. In any other direction in the horizontal plane the sound pressure level shall not be more than 10 dB below the prescribed sound pressure level on the forward axis, so that the audibility range in any direction will be at least half the range on the forward axis.

4.6.2.2 The system of conveying steam or air shall be so designed as to ensure the supply of these media without condensation at all times and under any weather conditions.

4.6.2.3 The control buttons or handles to actuate the whistle shall be located at the steering stations of the ship. In ships of unrestricted service and in ships of restricted area of navigation **Rl** and **A-R1** there shall be provided at least one button (handle) in the wheel-house and one button (handle) on each of the bridge wings (if any), outside the wheelhouse. Other ships shall be provided with at least one button (handle) on each side of the bridge; ships of less than 20 m in length may have only one control button (handle).

4.6.2.4 If whistles are fitted at a distance of more than 100 m apart, they shall be so arranged that they are not sounded simultaneously. If due to the presence of obstructions the sound field of a single whistle or one of the whistles is likely to have a zone of greatly reduced signal level, it is recommended that a combined whistle system be fitted so as to overcome this reduction. A

combined whistle system shall be regarded as a single whistle. The whistles of this system shall be located at a distance of not more than 100 m apart and arranged to be sounded simultaneously. The frequency of any one whistle shall differ from that of the others by at least 10 Hz.

4.6.2.5 In ships sailing in regions where icing of whistle might occur, provision shall be made for its heating.

4.6.3 Bell.

The bell shall be placed stationarily on the clear part of the forecastle deck, near the windlass or capstan and shall provide the sound pressure level not less than 110 dB at a distance of 1 m therefrom.

The bell shall be hung up in such a manner as to permit its free swinging through an angle of not less than 50° each way without touching any part of the structure or equipment of the ship.

4.6.4 Gong.

The gong shall be such that its tone and sounding differ distinctly from those of the bell of the ship and shall provide the sound pressure level not less than 110 dB at a distance of 1 m therefrom.

The gong shall be placed as near the after end of the ship as possible and at such a place where nothing will intercept the propagation of sound, and shall be hung up so as to comply with the requirements of 4.6.3.

A gong of up to 5 kg in mass needs not be fixed in a stationary position, but a special storage place shall be provided in the after part of the ship.

The gong beetle shall be kept in a special pocket to be fitted close to the gong.

4.7 DEVICES FOR HOISTING AND STORING SIGNAL SHAPES

4.7.1 The ships shall be provided with proper devices (masts, stays with sufficient number of signal halyards) for hoisting the signal shapes.

4.7.2 The signal shapes shall be stored near the navigation bridge or the devices for hoisting them to their regular positions.

The signal shapes of the non-self-propelled unmanned ships may be stored in the towing or service ships.

4.8 ARRANGEMENTS FOR STORING PYROTECHNIC SIGNAL MEANS

4.8.1 For storing the pyrotechnic signal means, the ship shall be provided with special watertight metal lockers built into the deckhouse on the navigation bridge, or a metal box firmly secured on the bridge deck.

4.9 ARRANGEMENTS FOR STORING SPARE LIGHTS

4.9.1 For storing the set of spare lights the ships of Group I shall be provided with a specially fitted storage room or a special light locker.

4.9.2 The storage arrangements for oil lights and fuel mixture required by 2.2.5.5 shall comply with the requirements set forth in 2.1.5 and item 6 of Table 3.1.2.1, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships.

5. ADDITIONAL SIGNAL MEANS FOR SHIPS OF RIVER-SEA NAVIGATION

5.1 GENERAL

5.1.1 The river-sea ships shall, in addition to the signal means required by Sections 2, 3 and 4, be provided with signal means in accordance with the present Section.

5.1.2 The list, disposition and order of exhibiting the navigation lights and daytime signal means are specified in the Rules of Navigation in Inland Waters of Ukraine and/or The basic provisions on navigation on the Danube.

5.2 EQUIPMENT OF SHIPS WITH SIGNAL MEANS

5.2.1 Ships of river-sea navigation shall, in addition to signal means required by Tables 2.2.1, 2.3.1 and 2.4.1, be provided with signal means required by Table 5.2.1.

5.2.2 Navigation lights shall be electric. They shall be supplied in compliance with 6.8.2, 9.3.1 and 19.1.2.1, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.2.3 Each ship shall be provided with spare parts for navigation lights:

.1 one light filter for each coloured light, provided no coloured lens is used in the light;

.2 one electric bulb for each electric light.

Table 5.2.1

Ships	Navigation lights					Daytime signal means	
	Masthead	Sternlight [1]	Light impulsive flashing lamp[2]	All-round red [3]	Side anchorage lights[4]	Signal flag "Б" (shield)[5]	White arm signal flag
Self-propelled	1	3	4	1	2	1	1

[1] Ships of 5 m in breadth and less are allowed to have one sternlight in the centreline.

[2] It is recommended to fit additionally electric flashing lamps with incandescent lamps.

[3] Required for ships carrying dangerous goods (explosives and noxious substances) or petroleum products.

[4] Required for ships of more than 5 m in breadth.

[5] Required for ships carrying petroleum products or dangerous goods.

5.3 TECHNICAL REQUIREMENTS FOR SIGNAL MEANS

5.3.1 Main characteristics of navigation lights shall comply with the requirements of Table 5.3.1.

5.3.2 Signal flags shall be manufactured of woollen flag cloth (bunting) of sufficient strength and fast colour. The flags may be of synthetic materials.

5.3.3 Signal flags shall be of square shape. The square side size shall not be less than 1000 mm, and square side size of arm signal flags shall not be less than 700 mm. For ships of less than 20 m in length, a square side size of a flag shall not be less than 500 mm.

Table 5.3.1

Nos.	Light and colour	Range of visibility not less than, km	Arc of visibility in horizontal plane	
			Total angle, deg.	Position
1	2	3	4	5
1	Masthead, white	8	225	112,5° from right ahead on either side from the fore and aft centreline of the ship.
2	Sternlight, white	3,7	135	67,5° from right aft on either side
3	All-round red	1,85	360	All round the horizon
4	Side anchorage light, white	3,7	180	90° from the beam to right ahead and right aft
5	Light-impulsive flashing lamp: by day by night	 2 4	112,5 + +112,5	From the beam to the bow with overlapping the fore and aft centreline by 22,5° and from the beam to the aft with overlapping the fore and aft centreline by 22,5°
6	Light flashing lamp	4	112,5 + +112,5	From the beam to the bow with overlapping the fore and aft centreline by 22,5° and from the beam to the aft with overlapping the fore and aft centreline by 22,5°

5.4 FITTING OF SIGNAL MEANS ON BOARD

5.4.1 When several lights are fitted at the mast (one over the other), lighted simultaneously, the spacing of lights shall not be less than 1 m. In ships of less than 20 m in length they shall be spaced not less than 0,5 m apart.

5.4.2 Masthead lights.

5.4.2.1 The masthead lights shall be carried in the fore and aft centreline of the ship. The vertical separation of masthead light and sidelights shall not be less than 1 m (in ships of less than 20 m in length — 0,5 m).

5.4.2.2 In self-propelled ships of 50 m in length and more the masthead lights shall be placed in the after and fore parts of the ship at a distance of not less than 20 m from one another. The vertical separation of them shall be such that in all normal conditions of trim the forward light was carried at least 1 m lower than the after one; and the forward masthead light may be located below the sidelights, and the after one — behind the sidelights and at least 1 m higher.

5.4.2.3 In the ship which for passing under bridges shall have collapsible masts the reserve masthead light may be placed in the fore part of the ship and, in this case, it may be located below the sidelights. In ship of 50 m in length and more this light may be permanently used as a forward masthead light provided the requirements of 5.4.2.2 are satisfied.

5.4.2.4 All masthead lights shall have protective shields from below to prevent blinding the persons on the navigation bridge and deck.

5.4.3 Sidelights.

5.4.3.1 Sidelights (red light on port side, green light on starboard side) shall be visible for head-on ships and ships to be overtaken within the specified angles of visibility. Lights and their protective shields shall not extend outside the greatest breadth of the ship.

5.4.3.2 Sidelights shall be carried in a horizontal line symmetrically to the fore and aft centreline of the ship and shall be placed as follows:

.1 in undecked ship — at a height of not less than 0,5 m above the gunwale (in well-grounded cases, it is permitted to place them at the gunwale level);

.2 in ships with single-tier superstructure (deckhouse) — in its upper part;

.3 in ships with two- (or more) tier superstructure — not below the navigation bridge deck.

5.4.3.3 Every sidelight shall be protected by inboard shield with two transverse screens (fore and aft).

In ships of 20 m in length and more the distance from outer edge of the protective glass or lens of the light to the aft edge of the fore transverse screens shall not be less than 915 mm. The length of shield for these lights shall be not less than 1 m.

Fore transverse screen shall be of such breadth that a line joining its outer edge and the centre of light source is parallel to the fore and aft centreline of the ship. Aft transverse screen shall be of such breadth as to mask completely the light from being seen across the stern, but not hinder showing its light to 22,5° abaft the beam.

5.4.3.4 Sidelights may be placed in the recesses of superstructures and deckhouses. The dimensions of the recesses shall correspond to the dimensions of the light shields, and the recesses shall be fitted with the screens similar to those of light shield.

5.4.3.5 Inner surfaces of the light shields shall be painted matt black.

5.4.3.6 In ships of less than 20 m in length as well as in air-cushion ships and hydrofoil ships the dimensions of the shields may be reduced or the shields need not be installed in case the required angles of visibility are provided.

5.4.4 Sternlights and towing (yellow) light.

5.4.4.1 In ships which carry one sternlight this light shall be fitted behind the funnel or superstructure in the fore and aft centreline of the ship and if practicable, at the same height as the sidelights, but not higher. In well-grounded cases, in ships of less than 20 m in length it is permitted to place a sternlight higher than the sidelights.

5.4.4.2 In ships which carry three sternlights the highest light shall be placed as required by 5.4.4.1, and two lower lights shall be placed at bulwark or stern exposed bulkhead of superstructure as nearly as practicable to the sides in a horizontal line symmetrically to the fore and aft centreline of the ship.

5.4.5 All-round and side anchorage lights.

5.4.5.1 All-round white light on self-propelled ships used at anchorage shall be placed in the fore part of the ship. The light may be fitted at the mast, flagstaff or may be raised at stay.

5.4.5.2 All-round red light shall be placed above the all-round white light where it can best be seen and its all-round visibility is ensured. The light is not permitted to be fitted in a vertical line with anchorage lights.

5.4.5.3 Side anchorage lights shall be placed on sides along the edge of the navigation bridge.

5.4.6 Light-impulsive (light) flashing lamps.

5.4.6.1 Light-impulsive (light) flashing lamps shall be installed in a stationary position on each side of the ship in pairs (fore and aft) above the sidelights at a height of not less than 0,5 m from them.

5.4.6.2 Light-impulsive flashing lamps shall be switched on separately**.**

5.5 STORAGE OF SIGNAL FLAGS

5.5.1 For storage of signal flags, provision shall be made for special shelves with separate clearly indicated cell for each flag. The shelves shall be placed in the wheelhouse or at the navigation bridge in a position protected from precipitation and direct sunlight.

PART IV. RADIO EQUIPMENT

1. GENERAL

1.1 APPLICATION

1.1.1 The requirements of the present Part of the Rules apply to:

.1 sea-going self-propelled ships engaged and not engaged in international voyages, including fishing vessels, subject to the supervision of a classification society;

.2 ships of river-sea navigation;

.3 non-self-propelled ships intended for towing and pushing at sea or for prolonged anchorage outside the water area of ports and roads, having people on board;

.4 non-self-propelled ships intended for towing and pushing at sea or for prolonged anchorage at sea without providing telephone cable communication with the coastal services within the water area of ports and roads, having people on board.

To ships of mixed (river-sea) navigation and small crafts, according to the definitions of these terms in accordance with Part I Classification of the Rules for the Classification and Construction of Ships, these Rules shall be applied in accordance with the references to them in the Rules for the Classification and Construction of Mixed Navigation Ships and the Rules for the Classification and Construction of Small Crafts.

1.1.2 The requirements of the present Part of the Rules apply to radio equipment which is subject to survey by the Register and intended for installation on board ships.

1.1.3 The present Part of the Rules defines the technical requirements which the radio equipment shall comply with and specifies the list of such equipment, its arrangement on board and the maintenance and repair methods.

1.1.4 The requirements of the present Part of the Rules apply to the ships and radio equipment whose technical documentation was submitted to the Register for review and approval after the entry into force of the Rules.

Ships under construction and the radio equipment whose technical documentation was approved by the Register prior to the entry into force of the Rules shall be subject to the Rules in force at the time of approval of the documentation unless specified otherwise in the relevant sections and chapters of the Rules.

1.1.5 No provision in this part of the Rules shall prevent the use by any ship, survival craft or person in distress, of any means at their disposal to attract attention, make known their position and obtain help.

1.1.6 Confirmation of a passenger ship with a sign **A**, **A-R1**, **A-R2**, **A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN** and **D-R3** in the ship's class notation compliance with provisions of Council Directive 98/18 / EC of 17 March 1998 on

safety rules and standards for passenger ships of inland (sea cabotage) navigation shall be done according to the requirements of 2.6.1 "Confirmation of compliance with the European Council Directive" of General activities on technical supervision with application to ships of special requirements of part IV "Radio Equipment" hereof, depending on the sign, as to new (constructed on July 1, 1998 and thereafter) or existing (constructed before 1 July 1998 .) ship, namely:

- new and existing ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3**, which carry more than 36 passengers - 11.1;
- new ships with a sign **B-R3-RSN**, **C-R3-RSN** and **D-R3**, which carry more than 36 passengers - Table 2.3.4.

1.2 DEFINITIONS AND EXPLANATIONS

1.2.1 Definitions and explanations relating to general and technical terminology of the Rules are given in Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships 1.2.1, in Part I "General Regulations for Technical Supervision" of the Rules for Technical Supervision.

1.2.2 For the purpose of the present Part of the Rules, the following definitions have been adopted:

Emergency position-indicating radio beacon (EPIRB) is a station of the mobile service the emissions of which serve to facilitate search and rescue.

Continuous watch means that the radio watch concerned shall not be interrupted other than for brief intervals when the ship's receiving capability is impaired or blocked by its own communications or when the radio equipment is under periodical maintenance, repair or checks.

Locating means the finding of ships, aircraft, units or persons in distress.

Radiated interference is interference radiated by the casings of equipment, except for radiation of aerials.

Narrow-band direct-printing telegraphy (NDPT) is a communication technique using automated telegraphy facilities which comply with the relevant recommendations of the International Telecommunication Union (ITU).

Global Maritime Distress and Safety System (GMDSS) is an international radio communication system developed' by the International Maritime Organization (IMO) whose requirements are brought to Amendments 1988-1989 to Chapter IV "Radio Communication" of the International Convention for the Safety of Life at Sea, 1974, and in present Part of the Rules. GMDSS entered into force on 1 February 1992.

Two independent actions to initiate the distress alert: lifting of the protective lid or cover is considered as the first inde-

pendent action. Pressing the dedicated button for initiating the distress alert is considered as the second independent action.

Additional channel is the channel which is used in the absence of a signal at the priority channel.

Secondary means of alerting is the means of initiating the transmission of ship-to-shore distress alerts by a separate and independent system.

Effective radiated power is the product of the power supplied to the aerial and the gain of this aerial with reference to a half-wave dipole in the prescribed direction.

Satellite radio communication facilities are radio communication facilities intended for transmitting or receiving messages within the frequency range of 1500 to 1700 MHz, with the use of artificial earth satellites as relays of the transmitted radio signals.

Bridge-to-bridge communications means safety communications between ships from the position from which the ships are normally navigated.

Global Maritime Distress and Safety System Identifiers – an identifier in the maritime mobile services, a ship's call sign, identifiers in the INMARSAT system and a serial number identifier that can be transmitted by ship radio equipment and used to identify the vessel.

INMARSAT is the Organization established by the Convention on the International Maritime Satellite Organization (INMARSAT) adopted on 3 September 1976. Since 9 December 1994 International Mobile Satellite Organization.

Maritime safety information (MSI) means navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcast to ships.

Gain of aerial is the ratio, usually expressed in decibels, of the power required at the input of a loss-free reference aerial to the power supplied to the input of the given aerial to produce, in a given direction, the same field strength or the same power flux-density at the same distance. When not specified otherwise, the gain refers to the direction of maximum radiation. The gain may be considered for a specified polarization.

Public address system is an installation enabling the broadcast of the ship's officers instructions into accommodation, service and public spaces as well as the ship's open decks.

Conducted interference is interference from equipment at the electric power supply terminals.

COSPAS-SARSAT is an international search and rescue system using polar orbitory satellite service for ships and aircraft in distress.

METAREA is a marine geographical area established to coordinate the transmission of meteorological information over the radio equipment.

International NAVTEX Service means the coordinated broadcast and automatic reception on 518 kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language.

International voyage of a fishing vessel is a voyage with a call at a port of another Flag State.

Navigation bridge is the position from which the ship is normally navigated.

Sea area A1 is an area within the radiotelephone coverage of at least one VHF coast station in which continuous digital selective calling (DSC) alerting is available.

Sea area A2 is an area, excluding sea area Al, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available.

Sea area A3 is an area, excluding sea areas Al and A2, within the coverage of an INMARSAT geostationary satellites in which continuous alerting is available.

Sea area A4 is an area outside sea areas Al, A2 and A3.

Information for sea area definition is placed in the Appendix.

Multiplexing is the ability of the ship security surveillance TV system to simultaneously reproduce information from several TV cameras on the video display unit.

NAVAREA a marine geographical area established to coordinate the transmission of navigational warnings by radio equipment.

Interference is the influence of unwanted energy on reception in the radio communication system resulting in impaired quality, errors or loss of information that could have been avoided in the absence of influence of such unwanted energy.

Mobile radiotelephone station is a radiotelephone station, providing operation while carrying and being fixed, and supplied from own source of electrical power.

Equivalent isotropically radiated power is the product of the power supplied to the aerial and the amplification factor of this aerial in the prescribed direction about the isotropic aerial.

Carrier power of a radio transmitter is the average power supplied to the aerial transmission line by a transmitter during high frequency cycle under conditions of no modulation.

This definition does not apply to pulse modulated emissions.

Rated power of radio transmitter is the minimum power within the frequency range of the transmitter transferred to the aerial or to the artificial aerial under normal operating and climatic conditions.

Peak envelope power of radio transmitter is the power supplied to the aerial transmission line by a transmitter averaged during one radio frequency cycle at the highest crest of the modulation envelope under normal climatic conditions.

Mean power of radio transmitter is the power supplied to the aerial transmission line by a transmitter averaged over the time sufficiently long compared with the lowest frequency encountered in the modulation under normal operating conditions.

Interruption (termination) of the distress alert initiation at any time means the interruption of the retry of the distress alert. This action shall not interrupt the distress alert transmission or distress message during its transmission but shall preclude the retry of the distress alert.

Priority channel means the channel which is listened to during the whole period of reception of a signal at the additional channel.

General radiocommunication means operational and public correspondence traffic, other than distress, urgency and safety messages, conducted by radio.

Existing radio equipment is radio equipment which is not new radio equipment.

New radio equipment is radio equipment developed in compliance with the technical documentation submitted after the date of coming into force of the Rules.

Radio Regulations means the Radio Regulations annexed to, or regarded as being annexed to, the most recent International Telecommunication Convention which is in force at any time.

Enhanced group calling (EGC) means the system for broadcast transmit of urgency, distress and safety messages by mobile satellite communication system of INMARSAT.

Rescue unit is a unit with full complement of trained persons and equipment available for rapid carrying out search and rescue operations.

Polar orbiting satellite service means a service which is based on polar orbiting satellites which receive and relay distress alerts from satellite EPIRBs and which provides their position.

Ship security alert system is a system, which provides the generation and transmission of covert security alert or report to indicate a competent organization designated by the Flag State Administration that the security of the ship is under the threat.

A dedicated distress alert button is an unique clearly indicated button physically separated from the controls (buttons, keys of keyboards

used for normal operation of equipment and not intended for any other purposes except distress alert initiation.

This button shall be red in colour and marked "DISASTER" (or "DISTRESS"). If the button is protected from the unintended activation by opaque cap or cover, an inscription "DISASTER" (or "DISTRESS") shall be also made on it.

Ships constructed are ships at the following stage of the construction:

the keel is laid;

construction identifiable with a specific ship is started;

assembly of that ship has commenced comprising at least 50 tons or 1 per cent of the estimated mass of all structural material, whichever is less.

Ship Earth Station is a mobile earth station of the Maritime Mobile Satellite Service fitted on board a ship.

Ship security surveillance TV system is a video surveillance system capable of displaying and storing video information received from TV cameras.

Two-way VHF radiotelephone apparatus is an apparatus intended for communication between survival craft, between survival craft and ship, between survival craft and rescue unit, and between ship and aircraft.

Digital selective calling (DSC) means a technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations, and complying with the relevant recommendations of the International Telecommunication Union (ITU).

Starting period is the time necessary for radio equipment to become operational as measured from the moment of switching on the source of electrical power.

1.3 SCOPE OF SURVEY

1.3.1 General provisions for the procedure of survey of the radio equipment, as well as the requirements for the technical documentation to be submitted for review and information on documents for radio equipment are set out in General Regulations for the Classification and Other Activity, 4.2 (refer to 4.2.5.4), Part I “Classification” of the Rules for Technical Supervision during Construction of Ships and Part I "Survey Regulations" of these Rules.

1.3.2 The Register carries out technical supervision during design and survey during manufacture, installation and operation of the following shipboard radio equipment.

1.3.2.1 Radio communication facilities:

.1 VHF radio installation:

DSC encoder,

DSC watch receiver,
radiotelephone station;
.**2** MF radio installation:
DSC encoder,
DSC watch receiver,
radiotelephone station;
.3 MF/HF radio installation:
DSC encoder,
DSC watch receiver,
telephony and narrow-band direct-printing (NBDP) receiver,
telephony and NBDP transmitter,
direct-printing apparatus of improved fidelity,
terminal printing device;
.4 INMARSAT ship earth station;
.5 main, operational and portable VHF radiotelephone station in the frequency bands of 300,025 to 300,500 MHz and 336,025 to 336,500 MHz;
.6 two-way VHF radiotelephone apparatus for communication with aircraft;
.7 radiotelephone station intended for internal service communication.
1.3.2.2 Facilities for reception of maritime safety information:
.1 NAVTEX service receiver;
.2 enhanced group calling (EGC) receiver;
.3 HF direct-printing telegraph receiver.
1.3.2.3 COSPAS-SARSAT satellite EPIRB.
1.3.2.4 VHF EPIRB.
1.3.2.5 Ship's search and rescue locating device:
.1 ship's radar search and rescue transponder (ship's SART);
.2 ship's AIS search and rescue transmitter (ship's AIS-SART).
1.3.2.6 Public address system.
1.3.2.7 Survival craft radio equipment:
.1 survival craft search and rescue locating device:
survival craft radar search and rescue transponder (survival craft SART);
survival craft AIS search and rescue transmitter (survival craft AIS-SART);
.2 two-way VHF radiotelephone apparatus.
1.3.2.8 Ship security equipment:
.1 ship security alert system;
.2 ship security surveillance TV system.
1.3.2.9 Facsimile receiving device.
1.3.2.10 Source of electrical power.
1.3.2.11 Automatic battery charger.
1.3.2.12 Uninterruptible power supply unit.
1.3.2.13 Aerial.
1.3.2.14 Cabling.

1.3.2.15 Earthing.

1.3.2.16 Systems, radio equipment and arrangements other than those stated above if required by the Register.

1.3.3 Technical supervision during design and survey during manufacture of shipborne radio equipment by the Register covers:

.1 review of technical documentation for radio equipment;

.2 review of the programme and procedure of works tests of an experimental model;

.3 survey during works tests of the experimental model;

.4 review of the programme and procedure of shipboard tests of the experimental model;

.5 survey during shipboard tests of the experimental model;

.6 review of technical documentation reflecting changes made upon results of the works and shipboard tests of the experimental model;

.7 survey during the manufacture of radio equipment under serial production.

1.3.4 The technical documentation for radio equipment submitted to the Register for review shall contain (where applicable) the following information:

.1 technical description;

.2 block diagram;

.3 general view drawing;

.4 installation manual and installation drawing;

.5 list of spare parts;

.6 test program.

1.3.5 The experimental model of radio equipment, developed and manufactured in compliance with the technical documentation, shall be subjected to works and shipboard tests for the purpose of verifying the performance characteristics being in compliance with the Rules and the technical documentation. The tests shall be carried out under the technical supervision of the Register.

1.3.6 On completion of the works and shipboard tests of the radio equipment experimental models, all test reports and records as well as photos of new radio equipment shall be submitted to the Register. All these materials are kept at the Register and they serve as a basis for conclusion whether this radio equipment may be applied on ships with the relevant documents being issued.

The technical documentation for the acceptance to the use of radio equipment (technical specifications) shall be submitted for approval by the Register in at least two copies.

1.3.7 Acceptance of new and existing radio equipment developed not under the technical supervision of the Register is carried out on the ground of review of technical documentation (description, diagrams, test records, etc.) and performance of the tests in compliance with the requirements specified in the present Part of the Rules.

1.3.8 When new radio equipment is fitted or outdated (broken-down and unrepairable) equipment is replaced on ships in service, the installation technical design and working drawings shall be submitted to the Register for review prior to the commencement of survey of the radio equipment.

The technical design shall contain information on the sea areas where the ship is intended to operate and on the radio equipment maintenance and repair methods.

After the approval of the technical design and working drawings, the radio equipment fitted on board shall be surveyed and tested in operation.

1.3.9 On ships under construction, the operation tests of radio equipment and the tests for electromagnetic compatibility with other electrical and electronic equipment shall be carried out during mooring and sea trials according to the programs approved by the Register.

2. FUNCTIONAL REQUIREMENTS FOR RADIO EQUIPMENT, ITS COMPOSITION, MAINTENANCE AND REPAIR

2.1 FUNCTIONAL REQUIREMENTS

2.1 Every ship, while at sea, shall be capable:

.1 of transmitting ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service.

If the serviceability of the radio equipment fitted on board is ensured by a means such as duplication of equipment, the above requirements shall be considered fulfilled (refer also to Note 1 to Table 2.2.1);

.2 of receiving shore-to-ship distress alerts;

.3 of transmitting and receiving ship-to-ship distress alerts;

.4 of transmitting and receiving search and rescue coordinating communications;

.5 of transmitting and receiving on-scene communications;

.6 of transmitting and receiving signals for locating;

.7 of transmitting and receiving maritime safety information, also having regard to the need for reception of such information by ships in port;

.8 of transmitting and receiving general radio-communications to and from shore-based systems or networks;

.9 of transmitting and receiving bridge-to-bridge communications.

2.2 In fulfilling the functional requirements for radio equipment, care shall be taken to preclude the transmission of false distress signals.

2.2 LIST OF RADIO EQUIPMENT

2.2.1 The minimum list of radio equipment is determined by the sea areas where the ship is intended to operate: Al; Al and A2; Al, A2 and A3; Al, A2, A3 and A4.

Every ship, except for the ships mentioned in 2.2.4 and 2.2.5 according to the navigation areas shall be fitted with the radio equipment in compliance with Table 2.2.1.

Passenger sea and mixed (sea-river) navigation ships operating on domestic voyages (sea cabotage), with the sign A, A-R1, A-R2, A-R2-RSN, B-R3-RSN, C-R3-RSN and D-R3 in the ship's class notation, shall be equipped with radio equipment in accordance with Table 2.2.1.

Table 2.2.1

Nos.	Radio equipment[1]	Sea areas			
		A1	A1 and A2	A1, A2 and A3	A1, A2, A3 and A4
		Amount of equipment for ships			
1	2	3	4	5	6
1	VHF radio installation[2]:				
	DSC encoder	1	1	1	1
	DSC watch receiver	1	1	1	1
	radiotelephone station[3]	1	1	1	1
2	MF radio installation[2, 4]:				
	DSC encoder	–	1	1	–
	DSC watch receiver	–	1	1	–
	radiotelephone station	–	1[5]	1	–
3	MF/HF radio installation [2]:				
	DSC encoder	–	–	1[6]	1
	DSC watch receiver	–	–	1[6]	1
	telephony and NBDP receiver	–	–	1[6,7]	1[7]
	telephony and NBDP transmitter	–	–	1[6,7]	1[7]
	direct-printing apparatus of improved fidelity	–	–	1[6]	1
	terminal printing device	–	–	1[6]	1
4	INMARSAT ship earth station	–	–	1[4]	–
5	Ship security alert system	1[8]	1[8]	1[8]	1[8]
6	NAVTEX service receiver	1[9]	1[9]	1[9]	1[9]
7	EGC receiver	1[10,11]	1[10,11]	1[10,11]	1[10,11]
8	HF direct-printing telegraph receiver for reception of maritime safety information	1[12]	1[12]	1[12]	1[12]
9	COSPAS-SARSAT satellite EPIRB [13]	2[14]	2[14]	2[14]	2
10	VHF EPIRB	1[15]	–	–	–
11	Ship's search and rescue locating device: ship's radar search and rescue transponder (ship's SART) or ship's AIS search and rescue transmitter	1[16]	1[16]	1[16]	1[16]

	(ship's AIS-SART)				
12	Two-way VHF radiotelephone apparatus for communication with aircraft [17]	1[18]	1[18]	1[18]	1[18]
13	Public address system [20]	1	1	1	1
14	Survival craft search and rescue locating device: survival craft radar search and rescue transponder (survival craft SART) or survival craft AIS search and rescue transmitter (survival craft AIS-SART)	–[19]	–[19]	–[19]	–[19]
15	Two-way VHF radiotelephone apparatus	–[19]	–[19]	–[19]	–[19]

[1] In addition to the radio equipment required under 2.2.1, every ship shall be fitted with the second independent facility of transmission of distress alerts.

If a ship is engaged in voyages in sea area Al, then for this area a second VHF radio installation using DSC without a special receiver capable of maintaining a continuous DSC watch on channel 70, or a VHF EPIRB, or a MF radio installation using DSC (if a ship is engaged in voyages in the sea area covered by shore-based MF stations using DSC), or a HF radio installation using DSC, or an INMARSAT ship earth station, or a COSPAS-SARSAT satellite EPIRB may be used as a second independent facility of transmission of distress alerts.

If a ship is engaged in voyages in sea areas Al and A2 or Al, A2 and A3, then for these sea areas an additional INMARSAT ship earth station, or COSPAS-SARSAT satellite EPIRB, or a HF radio installation using DSC (unless it is installed as the basic one required under 2.2.1 for sea areas Al, A2 and A3) may be used as a second independent facility of transmission of distress alerts.

If a ship is engaged in voyages in sea areas Al, A2, A3 and A4, then for these sea areas a COSPAS-SARSAT satellite EPIRB may be used as a second independent facility of transmission of distress alerts.

If the serviceability of the equipment fitted in accordance with 2.2.1. is ensured by its duplication, the second independent facility of transmission of distress alerts need not be fitted (reference is made to 2.6.3) provided that there is a second independent facility in the duplicated equipment.

[2] A combined radio installation or in the form of separate devices may be permitted.

[3] Continuous listening watch on channel 16 shall not be limited by any date of discontinuation.

[4] Not required with the MF/HF radio installation.

[5] If the radiotelephone station is not capable of transmitting and receiving general radiocommunications on working frequencies within the range of 1605 to 4000 kHz, a separate radio installation or MF/HF radio installation capable of transmitting and receiving general radiocommunications using radiotelephony or direct-printing telegraphy, or an INMARSAT ship earth station shall be provided..

[6] Not required with an INMARSAT ship earth station.

[7] If the MF/HF radio installation is not capable of transmitting and receiving

general radiocommunications on working frequencies within the range of 1605 to 4000 kHz and 4000 to 27500 kHz, a separate radio installation capable of transmitting and receiving general radiocommunications using radiotelephony and direct-printing telegraphy shall be provided.

[8] Required for the following types of ships engaged on international voyages: all passenger ships including high-speed passenger craft, cargo ships including high-speed craft, of 500 gross tonnage and upwards.

[9] Installation of the receiver is obligatory if the ship is engaged in voyages in any area in which an International NAVTEX service is provided.

[10] Allowed as a part of an INMARSAT ship earth station.

[11] Installation of the receiver is obligatory if the ship is engaged in voyages in any area within coverage of an INMARSAT geostationary satellites in which an International NAVTEX service is not provided. Installation of the receiver is not obligatory if the ships are engaged exclusively in the areas where an International NAVTEX service is provided and which may be announced by means of individual calling.

[12] It is allowed to install this receiver instead of the EGC receiver on the ships engaged exclusively in voyages in an area in which a HF direct-printing telegraphy maritime safety information service is provided.

[13] One of them shall be float-free.

[14] Single EPIRB may be installed (see 3.6.2) if the position from which the ship is normally navigated is capable of transmitting distress alerts by at least two separate and independent facilities, each using different types of communication suitable for the ship's navigation area (see Note 1).

[15] It is allowed on the ships engaged exclusively on voyages in sea area Al, upon agreement with the Register, to install a VHF EPIRB in lieu of the COSPAS-SARSAT EPIRBs.

[16] Ship's SART capable of operating either in the 9 GHz band, or ship's AIS-SART capable of operating on international frequencies dedicated for AIS may be used as ship's search and rescue locating device.

Ship's search and rescue locating device may be one of these survival craft search and rescue locating devices (survival craft SART or AIS-SART) required by Part II "Life-Saving Appliances".

[17] Required for passenger ships.

[18] Two sets are recommended, one set being mobile.

[19] Provisions for fitting the ships with radio equipment for survival craft (survival craft search and rescue locating device and two-way VHF radiotelephone apparatus) are specified in Part II "Life-Saving Appliances".

[20] Cargo ships are exempted from the requirement for installation of public address system.

2.2.2 Each ship flying the flag of Ukraine, which does not carry out international voyages, except for passenger sea and mixed (sea-river) navigation ships carrying out domestic voyages (sea cabotage), with sign A, A-R1, A-R2, A-R2 -RSN , in-R3-RSN, c-R3-RSN D-R3 in the ship's class notation, depending on the area of navigation, shall be equipped with radio equipment in accordance with Table 2.2.2.

Table 2.2.2

Nos.	Radio equipment	Amount of equipment for ships								
		Port		Pas[3] 1 mile	≤ 5 miles		A1 ≤ 20 миль		A1+A2 ≥ 20 миль	
		IN[1]	PA[2]		NP[4]	Pas[5]	NP[6]	Pas[7]	NP[8]	Pas[9]
1	2	3	4	5	6	7	8	9	10	11
1	VHF radio installation:									
	DSC encoder	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]
	DSC watch receiver	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]	1[11,27]
	radiotelephone station	1[24]	1[24]	1[24]	1[24]	1[24]	1[24]	1[24]	1[24]	1[24]
2	MF/HF radio installation[16,23]:	–	–	–	–	–	–	–	1	1
	DSC encoder	–	–	–	–	–	–	–	1[27]	1[27]
	DSC watch receiver	–	–	–	–	–	–	–	1[27]	1[27]
	telephony and NBDP receiver	–	–	–	–	–	–	–	1	1
	telephony and NBDP transmitter	–	–	–	–	–	–	–	1	1
	direct-printing apparatus of improved fidelity	–	–	–	–	–	–	–	1	1
	terminal printing device	–	–	–	–	–	–	–	1	1
3	INMARSAT ship earth station[13]	–	–	–	–	–	–	–	1	1
4	EGC receiver	–	–	–	–	–	1[19,20]	1[19,20]	1[19,20]	1[19,20]
5	HF direct-printing telegraph receiver for reception of maritime safety information	–	–	–	–	–	–	–	1[21]	1[21]
6	NAVTEX service receiver[22]	–	–	–	–	1	1[26]	1	1	1
7	EPIRB complying with the requirements of GMDSS	–	–	–	1	1	1	2[14]	2[14,17]	2[14]

8	Radar transponder [28]	–	1	2	1[15]	2	1[15]	2	1[15]	2
9	Two-way VHF radiotelephone apparatus [10]	1	1	2	2	2	2	3	2	3
10	Mobile two-way VHF radiotelephone apparatus using frequencies 121,5 MHz and 123,1 MHz	–	–	–	–	–	–	1	–	1[12]
11	Public address system[25]	1	1	1	1	1	1	1	1	1

[1] Vessels navigating exclusively in the internal waters of sea ports and on the river Danube (IN[1]).

[2] Ships navigating on the outer water areas of sea ports (PA[2]).

[3] Passenger ships navigating within a 1-mile distance from the coast in the area of coastal VHF stations (Pas[3]).

[4] Ships, with the exception of passenger, navigating within a 5-mile distance from the shore (NP[4]).

[5] Passenger ships, navigating within a 5-mile distance from the shore (Pas[5]).

[6] Ships, with the exception of passenger, navigating within a 20-mile distance from the shore (NP[6]).

[7] Passenger ships, navigating within a 20-mile distance from the shore (Pas[7]).

[8] Ships, with the exception of passenger, navigating outside a 20-mile distance from the shore and coastal VHF stations (NP[8]).

[9] Passenger ships, navigating outside a 20-mile distance from the shore and coastal VHF stations (Pas[9]).

[10] Equipment shall comply with the requirements of the IMO Resolution A.809(19).

[11] The DSC equipment may be used if the navigation area is not equipped with A1 area GMDSS coastal equipment.

[12] Two sets are recommended, one set being mobile.

[13] Not required with the MF/HF radio installation.

[14] One of the EPIRBs shall be installed in the central control room and may not be fitted with an automatic release unit.

[15] Ships, with the exception of fishing, with a gross tonnage of 500 or more, shall be equipped with two radar transponders.

[16] Not required with an INMARSAT ship earth station.

[17] The second EPIRB without an automatic release unit is not required with an INMARSAT-C ship earth station.

[18] Ships not engaged on international voyages and which are operated outside the coastal points A2 GMDSS zone may be equipped with MF/HF radio installation without DSC.

[19] Allowed as a part of an INMARSAT ship earth station.

[20] Installation of the receiver is obligatory if the ship is engaged in voyages in any area within coverage of an INMARSAT geostationary satellites in which an

International NAVTEX service is not provided.

[21] It is allowed to install this receiver instead of the EGC receiver on the ships engaged exclusively in voyages in an area in which a HF direct-printing telegraphy maritime safety information service is provided.

[22] Except for ships constantly operating outside the NAVTEX coastal area.

[23] Combined radio installation or in the form of separate devices is allowed.

[24] Continuous auditory observation on the 16th channel is not limited to the date of its termination.

[25] Cargo ships are exempted from the requirement for installation of public address system.

[26] Not required for fishing vessels.

[27] Fishing vessels shall be equipped with the DSC equipment until 1 February 2007 or another date determined by the Maritime Administration.

[28] Fishing vessels shall be equipped with one radar transponder

2.2.3 Non-self-propelled ships intended for towing in the sea within the water area of ports and roads that have people on board are provided by a VHF radio installation (refer to 1 of Table 2.2.2).

Non-self-propelled ships intended for long-term anchoring in the sea without providing telephone cable communication with shore services within the water area of ports and roads that have people on board are provided with one VHF two-way radiotelephone installation (refer to 9 of Table 2.2.2).

2.2.4 In addition to the requirements of Tables 2.2.1 and 2.2.2 every ship of river-sea navigation engaged in voyages along inland waterways shall be fitted with:

.1 operational VHF radiotelephone station (300,025 -300,500 MHz; 336,025 - 336,500 MHz);

.2 portable VHF radiotelephone station (300,025 to 300,225 MHz) — 3 sets;

.3 public address system.

The type of the VHF radiotelephone station shall be determined by the shipowner based on the system of communications established in the ship's operational area.

2.2.5 In addition to the requirements of Table 2.2.1, it is recommended that ships shall be equipped with security surveillance TV system and facsimile receiving equipment.

2.2.6 Every ship which after completion of construction shall undertake a single voyage to the place of its supplementary outfitting may be exempted from the requirement for installation of the full complement of the statutory radio equipment, if it is capable of transmitting shore-to-ship distress alerts by at least two separate and independent facilities, each using different types of radio communication

In this case, its composition is in each case the subject of special consideration of the Register.

2.2.7 In oil tankers (irrespective of a flash point of oil products), oil recovery vessels (irrespective of a flash point of oil products), gas carriers and chemical tankers, the aerial power of transmitters on carrier frequency shall not exceed 500 W. In this case, the peak power of the transmitter shall not exceed 1000 W.

Portable radio equipment (two-way VHF radiotelephone apparatus with a replaceable accumulator battery, VHF radiotelephone station, VHF radiotelephone station for service communication) used in the following ship types shall be of intrinsically safe type:

.1 oil tankers intended for the carriage of oil products having a flash point of 60 °C and below or for the carriage of oil products having a flash point over 60 °C, which shall be heated up to a temperature less than by 15 °C below the flash point;

.2 oil recovery vessels intended for the recovery and transportation of crude oil and/or oil products spread over the sea surface;

.3 gas carriers;

.4 chemical tankers intended for the carriage of cargoes having a flash point of 60 °C and below.

The two-way VHF radiotelephone apparatus, wherein replaceable accumulator batteries are not used, of a type other than intrinsically safe may be fitted in the above ships, provided that it is used as the radio equipment of life-saving appliances only. In this case, such equipment shall be stored in a way to preclude its use onboard the ship, and the route to the life-saving appliance outside dangerous areas shall be developed, agreed with the Register and prominently displayed near the storage area.

2.2.8 Radio equipment not specified in this Section may be accepted for installation on board ships as additional equipment, provided that it complies with the requirements of 5.1 and its operation does not affect the operation of the main radio equipment or impair safety of navigation. The installation of additional equipment is, in each case, the subject of a special consideration by the Register.

2.2.9 Every ship, while at sea shall maintain a continuous watch:

.1 on VHF DSC channel 70, if the ship, in accordance with the requirements of the Rules for all sea areas, is fitted with a VHF radio installation;

.2 on the distress and safety DSC frequency 2187,5 kHz, if the ship, in accordance with the requirements of the Rules for sea areas Al and A2 or Al, A2 and A3, is fitted with a MF radio installtion;

.3 on the distress and safety DSC frequencies 2187,5 kHz and 8414,5 kHz and also on one of the distress and safety DSC frequencies 4207,5 kHz, 6312 kHz, 12577 kHz or 16804,5 kHz, appropriate to the time of the day and the geographical position of the ship, if the ship, in accordance with the requirements of the Rules for sea areas Al, A2 and A3 or Al, A2, A3 and A4, is fitted

with a MF/HF radio installation. This watch may be kept by means of a scanning receive;

.4 for shore-to-ship distress alerts, if the ship, in accordance with the requirements of the Rules for sea areas Al, A2, A3 and A4, is fitted with an INMARSAT ship earth station.

2.2.10 Every ship, while at sea, shall maintain a radio watch for broadcasts of maritime safety information on the appropriate frequency or frequencies on which such information is broadcast for the sea area in which the ship is navigating.

2.2.10 Every ship while at sea shall maintain, when practicable, a continuous listening watch on VHF Channel 16. This watch shall be kept at the position from which the ship is normally navigated.

2.3 SOURCES OF POWER

2.3.1 There shall be available at all times, while the ship is at sea, a supply of electrical energy sufficient to operate the radio equipment as well as to charge a reserve source of electrical power.

2.3.2 Conditions for providing power supply of radio equipment from an emergency source of power in cases when the supply of electrical power from the main sources of power is discontinued are regulated in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

2.3.3 A reserve source of electrical power shall be provided on every ship to supply radio installation, for the purpose of conducting distress and safety radio-communications, in the event of failure of the ship's main and emergency sources of electrical power.

In this case, the provision shall be made for visual and audible signalling system for switching to a reserve source of electrical power at the position from which the ship is normally navigated.

Electrical power shall be supplied to this signalling system by means of the emergency source of electrical power.

The signalling system shall be non-disconnectable and capable of being automatically reset after the power supply from the ship mains has been restored. Provision shall be made for manual acknowledgement of audible signals.

Where a manual switch is used for changing-over to a reserve source of electrical power to supply radio installation, it shall be fitted at the position from which the ship is normally navigated and shall be distinctly marked and readily accessed.

Changing-over to a reserve source of electrical power shall not result in the loss of data stored in the equipment memory.

The reserve source of electrical power shall be independent of the

propelling power of the ship and the ship's electrical network.

A rechargeable accumulator battery with an automatic charging device or a source of uninterruptable power supply may be provided as the reserve source of power.

2.3.4

The sources of electrical power for radio equipment shall comply with the requirements specified in Table 2.3.4.

Table 2.3.4

Nos.	Radio equipment	Main source	Emergency source	Reserve source to supply radio installation	Feed source integrated in radio equipment built in radio equipment
1	2	3	4	5	6
1	VHF radio installation:				
	DSC encoder	+	+[1,2]	+	–
	DSC watch receiver	+	+[1,2]	+	–
	radiotelephone station	+	+[1,2]	+	–
2	MF radio installation:				
	DSC encoder	+	+[1,2]	+	–
	DSC watch receiver	+	+[1,2]	+	–
	radiotelephone station	+	+[1,2]	+	–
3	MF/HF radio installation: DSC encoder	+	+[1,2]	+	–
	DSC watch receiver	+	+[1,2]	+	–
	telephony and NBDP receiver	+	+[1,2]	+	–
	telephony DSC and NBDP transmitter	+	+[1,2]	+	–
	direct-printing apparatus of improved fidelity	+	+[1,2]	+	–
	terminal printing device	+	+[1,2]	+	–
4	INMARSAT ship earth station	+	+[1,2]	+	+
5	Ship security alert system	+	+	+[3]	–
6	NAVTEX service receiver	+	+	–	+
7	EGC receiver	+	+	–	+
8	HF direct-printing telegraph receiver for reception of MSI	+	+	–	+
9	COSPAS-SARSAT satellite EPIRB	–	–	–	+[4]
10	VHF EPIRB	–	–	–	+[4]
11	Two-way VHF radiotelephone	–	–	–	+[6]

	apparatus, fixed two-way VHF radiotelephone apparatus				
12	Public address system[5]	+	+	–	–
13	Ship's and survival craft search and rescue locating device: radar search and rescue transponder (ship's and survival craft SART) AIS search and rescue transmitter (ship's and survival craft AIS-SART)	–	–	–	+[7]
14	Main and operational VHF radiotelephone stations	+	+[8]	+[9]	–
15	Portable VHF radiotelephone station	–	–	–	+[10]
16	Portable two-way VHF radiotelephone apparatus intended for communication with aircraft	–	–	–	+[6]
17	Fixed two-way VHF radiotelephone apparatus intended for communication with aircraft	+	+	–	–
18	Ship Security Surveillance TV System	+	+[11]	–	–

[1] If an accumulator battery is used as an emergency source of electric power, feeding from the reserve power source shall be provided in accordance with 2.3.5.2, 2.3.5.3, 2.3.13.

[2] The emergency source of electrical power shall be capable of operating the radio equipment for a period required by Sections 9 and 19, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

[3] Required if the radio equipment supplied, according to 2.3.4, from a reserve source of power is used for transmitting an alert on the ship security threat.

[4] The source of electrical power shall have sufficient capacity to operate the EPIRB for a period of at least 48 h..

[5] The supply from the emergency transient source of electrical power shall be also provided if such source is required in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

[6] Primary power supply batteries shall have sufficient capacity to ensure 8 h operation at its highest rated power with a duty cycle of 1:9. This duty cycle is defined as 6 s — transmission, 6 s — reception above squelch opening level and 48 s — reception below squelch opening level.

[7] The source of electrical power integrated in SART shall have sufficient capacity to operate in the stand-by condition for 96 h and, in addition, following the stand-by period, to provide transponder transmissions for 8 h when being continuously interrogated with a pulse repetition frequency of 1 kHz.

The AIS-SART shall have sufficient battery capacity to operate for 96 h within a temperature range of —20 °C to +55 °C, and to provide for testing of the functions on

the equipment.

[8] Not required if supplied from the reserve source of electrical power.

[9] The source of electrical power shall have sufficient capacity to provide operation of the transmitter at full power for a period of at least 1 h and of the receiver for a period of 24 h. It is required for the main VHF radiotelephone station only. It is required for the main VHF radiotelephone station only, if provision is not made for the power supply from the reserve electrical power source.

[10] The source of electrical power shall have sufficient capacity to ensure 4 h operation at its highest rated power with a duty cycle of 1:9..

[11] Refer to 7.2.17.

2.3.5 The reserve source of electrical power shall be capable of simultaneously operating the radio equipment in compliance with Table 2.3.4 and, as appropriate, for the sea area or sea areas for which the ship is equipped and any of the additional loads mentioned in 2.3.8 and 2.3.9 for a period of at least:

.1 one hour on ships where emergency generator is a source of emergency electrical power ;

.2 six hours on ships where an accumulator battery is a source of emergency electrical power;

.3 one hour on all ships intended for navigation within the inner and/or outer road of the port basin, if an accumulator battery is a source of emergency electrical power.

2.3.6 Capacity of accumulator battery used as reserve source of electrical power shall be determined proceeding from the minimum required period of power supply required by the equipment connected (during 1 h or 6 h) and the maximum possible current utilized by all the equipment connected to the battery (refer to Table 2.3.4) with regard to the sum of three values:

.1 1/2 of the current consumed for transmission mode;

.2 current consumed for reception mode;

.3 current consumed by additional loads.

To consider possible reduction of the battery capacity during its operation (battery ageing), an extra 40 per cent capacity shall be added to the calculated battery capacity.

2.3.7 The capacity of the accumulator battery shall be checked using a relevant method at intervals not exceeding 12 months, when the ship is not at sea.

When installed on board, accumulator batteries shall always have a clear marking containing the following data:

.1 type of the battery or a construction;

.2 date when the battery or construction was installed;

.3 capacity at l h discharge rate;

.4 capacity at 5 h discharge rate.

In way of the accumulator batteries of a non-tight type that are installed, there shall be a plate warning of explosion.

2.3.8 If, in addition to the VHF radio installation, two or more radio installations for which the reserve supplying is required, can be connected to the reserve source of electrical power, it shall be capable of simultaneously supplying for the period specified in 2.3.5.1 or 2.3.5.2, the VHF radio installations in compliance with Table 2.3.4 and:

.1 all other radio installations which can be connected to the reserve source of electrical power at the same time; or

.2 whichever of the other radio installations will consume the most power, if only one of the other radio installations can be connected to the reserve source of electrical power at the same time as the VHF radio installation.

2.3.9 The reserve source of electrical power may be used for the electrical lighting of the controls of the VHF radio installation as well as the radio installation complying with the sea area in which the ship is navigating.

2.3.10 If the reserve source of electrical power consists of rechargeable accumulator battery, an automatic charging device shall be provided, which shall be capable of recharging the accumulator battery within 10 h (refer to 2.3.13).

The automatic charging device shall be operational within five seconds of switching on or after interruption of power supply from the main and/or emergency shipboard source of electrical power.

The automatic charging device shall be designed and constructed so that it is protected against damage resulting from disconnecting the batteries or, with the battery disconnected, short-circuiting the battery connections. If this protection is provided by electronic means it shall reset automatically following the removal of the open or short-circuit conditions.

In the automatic charging device provision shall be made for light indication of the device operation, as well as indication of the battery charging/ discharging voltage and current intensity.

In the automatic charging device provision shall be made for audible and visual alarms, indicating when the charging voltage or current is above the limits determined by the accumulator battery manufacturer. A protection shall be provided against overcharging or discharging of accumulator batteries due to possible faults in the charging device.

Alarm shall be non-disconnectable and capable of being automatically reset after the normal charging conditions of accumulator battery has been restored. Provision shall be made for manual acknowledgement of the audible alarm.

Failure of the said alarms shall not interrupt charging or discharging of the accumulator battery.

The above-mentioned alarms shall be provided at the position, from which the ship is normally navigated.

2.3.11 Where the automatic charging device for accumulator battery charging is used in ships in which the equipment is maintained operative by skillful maintenance and repair at sea, it shall provide at least automatic regulation of charging current. In ships where the equipment is maintained operative by means of other than skillful maintenance and repair at sea (duplication of the equipment and/or shore-based maintenance) the automatic charging device shall provide unattended charging of the accumulator batteries at sea.

2.3.12 No failure of accumulator batteries or the battery charging device shall impair the operating capability of any radio equipment being charged from the ship's source of electrical power.

2.3.13 If the serviceability of the equipment is ensured by its duplication on ships engaged on voyages in sea areas Al, A2 and A3, as well as Al, A2, A3 and A4, the main radio equipment fitted in accordance with Table 2.2.1 and duplicating equipment may be supplied from one reserve source of the electrical power where the automatic charging device is applied. The reserve source of electrical power shall provide power supply to the equipment during at least 1 h, and the emergency source of electrical power shall totally comply with all the relevant requirements Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships, as well as the requirements for power supply of radio installations contained in Table 2.3.4.

In case the emergency source of electrical power is not totally in line with the appropriate requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships as stated above, the main radio equipment to be installed in accordance with Table 2.2.1 and the duplicating equipment shall be supplied from two independent sources of power, using their own automatic charging devices. The main radio equipment to be installed according to Table 2.2.1 shall be supplied from the reserve source of electrical power during 6 h and the duplicating equipment during 1 h.

On ships navigating in sea areas Al, as well as Al and A2 the main radio equipment to be installed according to Table 2.2.1 and duplicating equipment, if any, may be supplied from one reserve source of electrical power, using one automatic charging device.

The reserve source of electrical power shall meet the requirements of 2.3.6 to 2.3.9.

2.3.14 If a source of an uninterruptable power supply is used as a reserve source of electrical power the alarms required by 2.3.3 and 2.3.10 shall be activated also in case of faults in the source of the uninterruptable power supply itself.

In case of failure of the source of the uninterruptable power supply provision shall be made for connection of radio installation to the second source of the uninterruptable power supply or for the direct connection of radio

installation to the main or emergency source of electrical power.

Rated current of the charging device shall be determined by the sum of four values as follows:

.1 1/10 of the current consumed for transmission;

.2 current consumed for reception;

.3 current consumed for additional loads;

.4 rated battery charging current.

2.3.15 If an uninterruptable input of the ship's coordinates from the ship radio navigation system receivers as well as the data from the ship's navigation or other equipment to a radio installation required by this Section is needed to ensure its proper work, this equipment shall be supplied from the main, emergency and reserve sources of electrical power.

2.4 AERIALS

2.4.1 In every ship there shall be erected the following aerials to provide the operation of the radio equipment required by 2.2.1:

.1 aerial of a VHF radiotelephone station, where necessary, aerial of a fixed two-way VHF radiotelephone apparatus for communication with aircraft, as well as separate aerials of the main and operational VHF radiotelephone stations for ships of river-sea navigation;

.2 aerial of a VHF DSC watch receiver. It is allowed to use common aerial (except aerials of a two-way VHF radiotelephone apparatus for communication with aircraft, as well as aerials of the main and operational VHF radiotelephone stations for ships of river-sea navigation) provided that the independent operation of equipment specified in 2.4.1.1 and 2.4.1.2 is ensured;

.3 aerial of a MF radiotelephone station;

.4 aerial of a MF DSC watch receiver. It is allowed to use common aerial if it is capable to provide independent operation of the equipment specified in 2.4.1.3 and 2.4.1.4;

.5 aerial of a MF/HF radio transmitter for radiotelephony and NBDP (MF-band aerial and HF-band aerial);

.6 aerial of a MF/HF DSC watch receiver and MF/HF radio receiver for radiotelephony and NBDP.

It is allowed to use common aerial if it is capable to provide independent operation of the equipment specified in 2.4.1.5 and 2.4.1.6;

.7 aerial of an INMARSAT ship earth station;

.8 aerial of EGC receiver;

It is allowed to use common aerial if it is capable to provide independent operation of the equipment specified in 2.4.1.7 and 2.4.1.8;

.9 aerial of a NAVTEX receiver and HF direct-printing radiotelegraph receiver for reception of MSI;

2.4.2 As far as practicable, one common aerial shall be provided for all

general broadcasting receivers fitted on board ship. The use of aerials assigned for radio communication and radionavigational facilities as aerials for general broadcasting receivers is not allowed.

2.5 SPARE PARTS AND SUPPLY

2.5.1 The necessary complement of spare parts, tools, materials and measuring instruments shall be provided on every ship, irrespective of the radio equipment maintenance and repair methods.

The composition and number of spare parts for each type of radio equipment, as well as equipment containing modules, boards, integrated circuits, etc., are subject to special consideration by the Register.

If the serviceability of the equipment fitted in accordance with 2.2.1 is ensured by its duplication, the list and amount of spare parts for each type of the radio equipment may be minimum (reference is made to 2.6.3) established by manufacturer.

2.5.2 For wire-type MF-band aerial the spare aerial shall be provided, completely assembled for immediate erection.

2.6 MAINTENANCE AND REPAIR OF RADIO EQUIPMENT

2.6.1 On ships engaged in voyages in sea area Al, as well as in sea areas Al and A2, the serviceability shall be ensured by one of the following ways: duplication of equipment, shore-based maintenance and repair or at-sea electronic maintenance and repair capability, or a combination of these.

2.6.2 On ships engaged in voyages in sea areas Al, A2 and A3 as well as Al, A2, A3 and A4, the serviceability shall be ensured by using a combination of at least two methods such as duplication of equipment, shore-based maintenance and repair or at sea electronic maintenance and repair capability.

2.6.3 If the serviceability of the equipment fitted in accordance with 2.2.1 is ensured by its duplication, the list of duplication intended for sea area Al shall be included: the second VHF radio installation with DSC watch receiver, for sea areas Al and A2, in addition to the list of equipment, the second MF radio installation or INMARSAT ship earth station (subject to sea areas and under RS consideration).

Installation of INMARSAT ship earth station shall not relieve ships of having the DSC watch receivers on 2187,5 kHz among the radio equipment while navigating in sea areas Al, A2.

The scope of duplication for sea areas Al, A2 and A3, as well as Al, A2, A3 and A4 is given in Table 2.6.3.

Table 2.6.3

Nos.	Duplicating radio equipment	A1, A2 i A3	A1, A2, A3 i A4
1	VHF radio installation:		
	DSC encoder	1	1
	radiotelephone station	1	1
2	MF/HF radio installation [1]:		
	DSC encoder	1	1
	DSC watch receiver	1	1
	radio receiver for telephony and NBDP	1	1
	radio transmitter for telephony, DSC and NBDP	1	1
	direct-printing apparatus of improved fidelity	1	1
	terminal printing device	1	1
3	INMARSAT ship earth station	1[2]	1[2,3]

[1] It is not required on ships making voyages in sea areas Al, A2 and A3 if INMARSAT ship earth station is fitted as a backup equipment.

[2] It is not required if MF/HF radio installation is fitted as a backup equipment.

[3] For ships engaged only episodically on voyages in sea area A4 and fitted with MP/HF radio installation, backup MF/HF radio installation may be replaced by INMARSAT ship earth station.

2.6.4 All duplicating equipment shall be connected to the separate aerials, to the main, emergency and reserve power sources and be ready for the immediate use.

2.6.5 If the serviceability of the equipment fitted in compliance with 2.2.1 is ensured by the shore-based maintenance and repair, there shall be on board the agreement for these services with the equipment manufacturer or with the works authorized for those by the manufacturer or a written declaration/plan showing how shore-based maintenance is to be carried out. In addition, in sea areas where ships are engaged in voyages, the opportunity for equipment maintenance and repair shall be provided.

Shore-based maintenance centres shall be recognized by the Register.

2.6.6 In the shore-based maintenance centers and in organizations engaged in on board installation of radio equipment the radiooperators shall be properly instructed on how to use the installed radio equipment and familiarized with the maintenance and repair principles prior to putting the equipment in operation.

2.6.7 If the serviceability of the equipment fitted in compliance with 2.2.1 is ensured by at sea electronic maintenance and repair, these services shall be provided by the radiooperator holding a relevant Certificate of Competence.

2.6.8 All the ships engaged on voyages in sea areas Al, A2 and A3, as well as Al, A2, A3 and A4, irrespective of the radio equipment maintenance and repair methods, shall always have on board:

.1 specifications and users manuals for all radio equipment and battery chargers in English (Russian);

.2 specifications and battery capacity calculations for the installed batteries;

.3 antenna arrangement drawings (plan and profile);

.4 radio arrangement drawings (at least in two views);

.5 wiring diagram.

Technical documentation specified in items 2.6.8.3, 2.6.8.4 and 2.6.8.5 shall be corrected for compliance with all the amendments introduced during operation of the ship and approved by the Register;

.6 tools, instruments and spare parts for all radio equipment complying with the specified maintenance method(s);

.7 international guidelines (ITU edition):

List of coast stations (перелік IV) - Перелік берегових станцій;

List of ship stations (перелік V) - Перелік суднових станцій;

List of radiodetermination and special service stations (перелік VI) - Перелік станцій радіовизначення і спеціальних служб;

List of call sign and numerical identities (перелік VIIA) - Перелік позивних сигналів і цифрових ідентифікаційних номерів, що використовуються в Морській рухомій і в Морській рухомій супутниковій службах.

The amount of technical documentation, tools, instruments and spare parts shall be approved by the Register.

2.6.9 On ships engaged on voyages in sea areas Al, A2 and A3, as well as Al, A2, A3 and A4, if serviceability of the radio equipment is ensured by a combination of methods, including the skillful maintenance and repair at sea, then the relevant additional technical documentation, tools, instruments and spare parts shall be available on board to enable maintenance, surveys and detection and elimination of any faults. The amount of additional technical documentation, tools, instruments and spare parts to be kept on board shall comply with the installed equipment and be approved by the Register..

2.6.10 On ships engaged on voyages in sea areas Al or Al and A2 the amount of technical documentation, tools, instruments and spare parts shall be approved by the Register and determined based on the requirements of 2.6.8 and 2.6.9, depending on the operating conditions of the ship, composition of radio equipment and methods of its maintenance and repair.

2.6.11 On all the ships radio communication in distress and for safety shall be ensured by the skillful radiooperators. These operators shall hold relevant Certificates of Competence; any of them may be assigned responsible for radio communication in distress.

2.6.12 A ship station radio license issued in accordance with established procedure shall be available on all ships.

2.7 DOCUMENTING (RADIO LOG)

2.7.1 On all the ships provision shall be made for a radio log for registration of all events (with indication of date and time) relevant to radio exchange in distress, urgency or safety and are of high importance for the protection of

human life at sea, as well as the records related to operation of the ship station.

3. SPACES FOR RADIO EQUIPMENT, ITS ARRANGEMENT, CABLING

3.1 GENERAL

3.1.1 Every radio installation shall:

.1 be so located that no harmful interference of mechanical, electrical or other origin affects its proper use, and so as to ensure electromagnetic compatibility and avoidance of harmful interaction of radio installation with other equipment and systems;

.2 be so located as to ensure the greatest possible degree of safety and operational reliability;

.3 be protected against harmful effects of water, extremes of temperature and other adverse environmental conditions;

.4 be provided with safe and uninterruptable illumination, independent from the main and reserve source of electrical power intended for sufficient illumination of the radio installation controls;

.5 be placed considering the safe distance from magnetic compas.

.6 be so located as to ensure on passenger ships compliance with the requirements of 2.2.6 - 2.2.8, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships where the necessity is determined to maintain operability of the radio equipment providing communication by means of GMDSS installation or VHF radiotelephone stations.

3.1.2 To comply with the requirements for radio equipment arrangement, provision shall be made for a workstation for radio communication complying with the rule requirements for the bridge design, equipment arrangement and bridge procedures set forth in Appendix to Part V "Navigational Equipment" or a special space for radio equipment (radio room) with remote controls of the equipment installed in the navigation bridge on all ships.

Provision shall also be made for special spaces intended for arrangement of command broadcast centre, if public address system are required by 2.2.1, and for the accumulator batteries of the reserve source of electrical power.

In some ships where it is impossible to provide a command broadcast centre the arrangement of the equipment for public address system is allowed on the navigation bridge.

Main and emergency lighting shall be provided at command microphone posts of public address system in compliance with the requirements of 2.3.4.

In some ships where it is impossible to provide a separate accumulator

battery room, it is allowed to arrange accumulator batteries in accumulator battery boxes (cabinets) provided the requirements specified in 3.3 are observed.

3.1.3 All radio equipment shall be so located in a ship that its operational efficiency is in no way impeded by the ship being submerged to the level of the deck where it is arranged.

3.1.4 All ship spaces intended for installation of radio receiving and transmitting apparatus shall have metal or metal-coated bulkheads. Ceilings and decks shall be electrically connected with one another and to the hull of a ship, with continuity of screening being preserved. In non-metal ships the screening metal sheathing shall be electrically connected to a keel plate or to specially made earthing arrangement.

3.1.5 All radio equipment shall be so installed that it is readily accessible for maintenance and repair on board ship. Radio equipment shall be securely fastened and shall not shift notwithstanding the angles of heel and trim of the ship or severe bumps and shaking likely to occur under service conditions..

3.2 SPECIAL SPACE FOR ARRANGEMENT OF RADIO EQUIPMENT (RADIOROOM)

3.2.1 In ships on which radioroom is provided it shall be located on the navigation bridge deck in close proximity to the place from which the ship is normally navigated.

It is not allowed to locate the radioroom in an explosive area.

3.2.2 The position of a radioroom aboard ship shall, as far as practicable, provide for:

.1 direct outside lead-in of the aerials;

.2 minimum length of cables leading to the accumulator battery room and navigation bridge;

.3 maximum distance of aerial from large metal objects (funnels, masts, ventilators, etc.);

.4 maximum distance of the radioroom from electrical devices and networks;

.5 maximum distance of the radioroom from installations and compartments causing noise (winches, cranes, ventilators, exhaust pipes, coal loading trunks, shops, etc.);

.6 maximum distance of the radioroom from compartments and objects evolving a considerable amount of heat (galleys, bakeries, steam pipes, etc.);

.7 most favourable conditions for spacing radio equipment;

.8 most favourable conditions for normal work and safety of operating personnel.

3.2.3 The radioroom shall be such as to give no access into any other compartments bearing no relation to radio equipment and exclude any

possibility of the radioroom being used as a permanent living compartment. The chief radio officer's cabin shall be adjacent to the radioroom. If the fulfilment of this requirement is impracticable, it is allowed to locate the cabin not more than 20 m from the radioroom and not lower than one deck below.

3.2.4 The total floor space of the radioroom shall be not less than twice as large as the floor space occupied by the radio equipment and furniture together, and the clear height of the radioroom shall be not less than 2 m.

3.2.5 Bulkheads, ceilings and, if required, doors of the radioroom shall be lined from the inside with sound and heat-resistant insulating materials and sheathed with electroinsulating materials. The floor of the radioroom shall be covered with insulating material.

3.2.6 The mechanical noise level in the radioroom under service conditions shall not exceed 60 dB.

3.2.7 There shall be two exits in the radioroom: one leading directly to the open deck and the other to the interior spaces of a ship.

If there is no direct exit to the open deck, the provision shall be made for two means of access to and exit from the radioroom, one of which can be an illuminator or a window of sufficient dimensions or another means approved by the Register.

3.2.8 The radioroom shall be fitted with electric heating appliances in addition to the air conditioning system provided, capable of maintaining the inside temperature within the range from +18 to +23 °C during cold seasons.

3.2.9 The radioroom shall be fitted with efficient ventilation system capable of providing reliable operation of the radio equipment under all service conditions.

3.2.10 The radioroom shall be provided with adequate natural and artificial lighting. The main lighting shall comply with the requirements specified in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships. The emergency lighting shall be supplied from the reserve source of electrical power of the radio equipment and shall provide for an illumination intensity of not less than 50 lx on the clock dials (or supply of electronic clock) and on controls for operating the radio communication equipment providing radio exchange in distress and for safety. The use of fluorescent lamps is subject to special consideration by the Register.

3.2.11 Two-way switches shall be fitted in two places for switching on and off the lighting from the reserve source of electrical power. One switch shall be fitted at the main exit out of the radioroom and the other switch at the operating position of the radio-operator. The switches shall operate independently of each other. Each switch shall be provided with clear marking designating its purpose. The fitting of a switch at the operating position of the radiooperator is not obligatory if the operating position is situated in close proximity to the main exit.

3.2.12 Laying of transit electric cables and wires as well as transit pipelines through the radioroom is not allowed.

3.2.13 The radioroom shall be provided with sufficient number of plug sockets connected to the ship's source of electrical power.

3.2.14 The radioroom shall be provided with an efficient two-way system of calling and voice communication with the navigation bridge independent of all other communication systems of the ship and capable of providing possibility for talks only between these two points.

3.2.15 If the ship is fitted with an automatic telephone station, the radioroom and the cabin of a radiooperator shall be provided with telephone sets.

3.2.16 The radioroom shall be provided with the furniture and equipment as follows: operating table, working chair secured on the deck, divan, marine clock with a second-hand or electronic clock, a signal lamp of the alarm bells, cabinet for storing spare parts and supplies.

3.1.17 The clock mounted in the radioroom shall provide the indication of hours, minutes and seconds clearly distinguished from the operating position of the radiooperator under any lighting conditions.

3.2.18 The plate with the call sign of the ship, the ship station identity and other codes as applicable for the use in the radio installation shall be posted up in a prominent place in a radioroom.

3.3 ACCUMULATOR BATTERY ROOM

3.3.1 The accumulator battery room which is intended for installation of the accumulator batteries used for feeding the reserve source of electrical power, shall be located on or above the navigation bridge deck level in such a place that the length of cables leading to radio equipment does not exceed 15 m. The accumulator battery room shall be provided with an exit to the open deck of the ship.

3.3.2 The construction of the accumulator battery room as well as its systems of heating and ventilation shall comply with the requirements specified in Part VIII "Systems and Piping" and in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.3.3 The accumulator battery room shall be provided with electric lighting complying with the requirements specified in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.3.4 The installation of the accumulator batteries, not relating to the radio equipment, in the accumulator battery room is allowed only if it causes no radio interference.

3.3.5 The accumulator battery room shall be provided with racks for placing accumulator batteries and sectional recess for storing distilled water and electrolyte. The top surface of the first row rack shall be at least 100 mm above

the deck. The arrangement of accumulator batteries shall comply with the requirements set forth in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.3.6 Degree of protection of accumulator battery boxes (cabinets) installed on the open deck of the ship shall not be below IP56 and placed at a height of at least 100 mm above the deck.

The design, heating and ventilation systems of accumulator battery boxes shall comply with the requirements specified in Part VIII "Systems and Piping" and Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.3.7 The accumulator batteries shall be electrically insulated from the ship's hull.

3.3.8 The accumulator batteries shall be so located and installed as to ensure:

.1 the highest degree of service; **.2** a reasonable lifetime; **.3** a reasonable safety;

.4 that when charged to the rated capacity, the accumulator batteries will provide the hours of operation required by the present Part under all weather conditions.

3.3.9 The accumulator battery temperature shall remain within the manufacturer's specifications whether under charge, discharge or idle.

3.4 ARRANGEMENT OF RADIO EQUIPMENT ON NAVIGATION BRIDGE

3.4.1 The workstation intended for installation of radio equipment in compliance with 3.1.2 shall be located in the aft of the navigation bridge so that the watch officer assistants have an over all view of the navigation while operating the radio equipment.

If the workstation and the rest of the navigation bridge are separated by a bulkhead, it shall be made of glass or fitted with windows.

There should be no lockable door between the workstation and the navigation bridge.

When the work station is being used during night-time, a curtain separating it from the rest part of the navigation bridge shall be provided in order to avoid dazzling effect from the lights to the watch-keeping personnel and the pilot.

The radio work station shall be provided with the furniture and equipment as follows: operating table, the clock complying with the requirements of 3.2.17, working chair secured on the deck as well as the main lighting and lighting from the reserve source of power.

3.4.2 The radio equipment shall be so arranged and installed that the magnetic field produced by it will not influence the ship magnetic compass readings in compliance with 5.1.47.

3.4.3 Radio equipment fitted on the navigation bridge as an additional equipment shall be so arranged that its functioning or technical condition could not adversely affect normal operation or cause failure of radio, navigational or other equipment required by the Rules.

3.4.4 The VHF radio installation with the controls of the radiotelephone channels providing generation and transmission of the distress and safety alert in the DSC and radiotelephony mode shall be located forward of the navigation bridge near the radar display station so that immediate access and priority is possible at all times, if additional control units are provided, and while using them the officer of the watch shall face the ship's bow.

When there is more than one control unit, indication shall be given to the other units that the radio station is in operation.

Where necessary, facilities for radio communications from the wings of the navigation bridge shall be provided. Portable VHP radio equipment may be used to meet the latter requirement.

3.4.5 The MF radio installation with controls providing generation and transmission of the distress alert in the DSC and radiotelephony mode, as well as communication in distress and for safety in the radiotelephony mode shall be located at workstation for radio communication.

3.4.6 The MF/HF radio installation with controls providing generation and transmission of the distress alert in the DSC mode as well as communication in distress and for safety in the radiotelephony and NBDP modes shall be located at workstation for radio communication.

3.4.7 The MF/HF radio installation with controls providing generation and transmission of the distress alert in the DSC mode as well as communication in distress and for safety in the radiotelephony and NBDP modes shall be located in the place from which the ship is usually navigated.

3.4.8 The VHF, MF, MF/HF-radio installations and the INMARSAT ship earth station with the controls providing generation and transmission of the distress alert as well as communication in distress and for safety (refer to 3.4.4, 3.4.5, 3.4.6, 3.4.7), fitted for duplication, shall be located at workstation for radio communication.

3.4.9 If the radioroom is provided, then after transmission the distress alert from workstation for radio communication in compliance with 3.4.5, 3.4.6 and 3.4.7, the radio communication in distress and for safety may be performed from the radioroom.

On ships built before 1 February 1992, with a radioroom located below the navigation bridge deck, distress signals, as well as distress and safety communications, shall be provided from the place from which the vessel is normally operated, using remote control panels of radio communication equipment installed in the radioroom.

3.4.10 The COSPAS-SARSAT satellite EPIRB shall be located in

compliance with the requirements of 3.6 and Tables 2.2.1 and 2.2.2.

3.4.11 NAVTEX service, EGC, INMARSAT receivers as well as HF NBDP receiver for reception of MSI shall be located at workstation for radio communication and shall be capable of providing light and audible signalling system in case of reception of distress or urgent messages or those having distress category.

3.4.12 The plate with the call sign of the ship, the ship station identity and other codes as applicable for the use of the radio equipment shall be posted up in close proximity to the controls of radio installations providing transmission of the distress alert as well as communication in distress and for safety.

3.4.13 Illuminating lamps built in the radio equipment and intended for the arrangement on the navigation bridge shall be provided with luminous intensity control facilities.

3.4.14 The following requirements shall be complied with on passenger ships:

.1 the distress panel shall be located at workstation for radio communication. This panel shall have either one button which activates transmission of the distress alert by all radio installations intended for that purpose on board, or one button for every separate radio installation. There shall be clear visual indication on that panel that the button or buttons were pushed.

The button or buttons shall be protected against inadvertent operation.

When the COSPAS-SARSAT satellite EPIRB is used as the second independent means of distress alert transmission and not provided with remote activation, provision shall be made for the additional COSPAS-SARSAT system EPIRB placed in close proximity to workstation for radio communication (refer to 3.6.1);

.2

the relevant radio communication equipment shall be continuously and automatically provided with the ship's position data for inclusion in the original distress message when the button or buttons on the panel initiating a distress alert are pushed;

.3 panel signalling a distress alert shall be installed at the position, from which the ship is normally navigated. The panel initiating a distress alert shall be provided

visual and audible warning to indicate receipt of any distress alert, as well as indication of the radio service, via which the distress alert was received.

3.4.15 To comply with the Rule requirements for passenger ships with regard to transmitting ship-to-shore distress alerts by at least two separate and independent means, when connecting the radio equipment to the distress panel, one shall follow the requirements set out in Table 3.4.15.

3.4.16 Radio equipment installed for duplication on ships engaged on voyages in sea areas Al, A2 and A3, as well as Al, A2, A3 and A4 does not need to be connected to the distress panel, if this equipment transmits the distress alert and is installed in close proximity to the panel.

Таблиця 3.4.15

Морські райони	Радіообладнання
A1	VHF radio installation, a VHF EPIRB or a COSPAS-SARSAT satellite EPIRB
A1 and A2	VHF radio installation, MF radio installation, a COSPAS-SARSAT satellite EPIRB
A1, A2 and A3 (variant 1)	VHF radio installation, MF radio installation, INMARSAT ship earth station, a COSPAS-SARSAT satellite EPIRB
A1, A2 and A3 (variant 2)	VHF radio installation, MF/HF radio installation, a COSPAS-SARSAT satellite EPIRB
A1, A2, A3 and A4	VHF radio installation, MF/HF radio installation, INMARSAT ship earth station, a COSPAS-SARSAT satellite EPIRB

3.4.17 An audible and light signalling system shall be provided in order to indicate reception of distress or urgency calls, or a call having distress category, as well as those not being urgency or distress calls.

The signalling system shall be non-disconnectable. Provision shall be made for manual acknowledgement of signals. Possibility of checking the audible and light signalling system shall be provided.

3.4.18 DSC operation procedures should be posted near the DSC equipment on the navigation bridge. Emergency procedures should be posted near the relevant equipment on the bridge.

"GMDSS operating guidance for masters of ships in distress situations" and the procedure "False alerts", both drawn up by IMO, shall be posted on the navigation bridge.

3.5 ARRANGEMENT OF TWO-WAY VHF RADIOTELEPHONE APPARATUS AND TWO-WAY VHF RADIOTELEPHONE APPARATUS INTENDED FOR COMMUNICATION WITH AIRCRAFT

3.5.1 The two-way VHF radiotelephone apparatus shall be kept in the navigation bridge or in any other compartment which is kept unlocked while the ship is at sea, if such compartment provides quicker and more convenient transfer of the apparatus to any lifeboat or any liferaft.

The apparatus shall be kept at a prominent place. All fastenings, if any, intended for securing the apparatus at the place of storage shall be designed for urgent releasing without applying tools.

A clearly visible symbol complying with the requirements of Part II "Life-Saving Appliances" shall be fitted near each position where the two-way VHF

radiotelephone apparatus is located.

3.5.2 Lifeboat fixed two-way VHF radiotelephone apparatus shall be located in accordance with the requirements of Part II "Life-Saving Appliances" so that its operational capacity is not affected if the boat is flooded by water taken in up to the level of upper seat pans.

3.5.2.1 When accumulator batteries are provided as external source of electrical power for fixed two-way VHF radiotelephone apparatus, they shall be placed in the watertight boxes (IP68) complying with the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

Electric lighting ensuring equipment control panel lighting not less than 50 lux shall be fed from the above stated accumulator batteries.

3.5.2.2 Accumulator batteries charging from generator, coupled to lifeboat engine, and from ship source of electrical power shall be provided. Flexible cable connecting batteries to charger, fed from the ship source of electrical power, shall ensure its immediate release in case of lifeboat quick launching.

3.5.3 The two-way VHF radiotelephone apparatus intended for communication with aircraft shall be kept in the navigation bridge at a prominent place.

3.5.4 The fixed two-way VHF radiotelephone apparatus intended for communication with aircraft shall be located in the navigation bridge at a prominent place.

3.6 LOCATION OF EMERGENCY POSITION-INDICATING RADIO BEACONS

3.6.1 A COSPAS-SARSAT satellite emergency position-indicating radio beacon (EPIRB) intended as the second independent mean of distress alert transmission (refer to 2.2.1) and not provided with remote activation shall be installed in close proximity to the workstation for radio communication on the navigation bridge so that immediate access is possible at all times for initiating the distress alert as well as it shall be manually released and easily placed in any lifeboat or liferaft by a single person.

3.6.2 A free floating COSPAS-SARSAT satellite EPIRB or a VHF EPIRB intended for installation in the ship shall be stowed on the open deck of the ship so that it does not move during ship's extreme conditions and floats free in case of sinking of the ship (refer to Section 13). Meanwhile, an immediate access shall be arranged for manual release and initiating the distress alert and possibility of fast and easy placement in any lifeboat or liferaft by a single person.

3.6.3 At any place of EPIRB installation the highly visible symbol marked in accordance with the requirements of Part II "Life-Saving Appliances" shall be provided.

3.7 LOCATION OF SHIP'S AND SURVIVAL CRAFT SEARCH AND RESCUE LOCATING DEVICE

3.7.1 Location of ship's and survival craft search and rescue locating device (SART or AIS-SART) shall be in compliance with the requirements of Part II "Life-Saving Appliances".

3.7.2 At any place of installation of ship's and survival craft search and rescue locating device (SART or AIS-SART) the highly visible symbol shall be marked in accordance with the requirements of Part II "Life-Saving Appliances".

3.8 ARRANGEMENT OF EQUIPMENT AND CABLING OF PUBLIC ADDRESS SYSTEM

3.8.1 Public address system shall be capable of relaying command broadcasts from the command microphone posts to all accommodation and public spaces as well as to the open decks of the ship.

Measures shall be provided in the public address system to prevent electrical and acoustic feedback or other interference.

Public address system shall be protected from unauthorized use.

3.8.2 The main command broadcast microphone post and the amplifiers of the public address system, as well as general radio broadcast receivers, record players and sound-recording apparatus relating to the post shall be installed in a special room — the command broadcast centre (refer to 3.1.2).

3.8.3 Heating, lighting and ventilation of the ship command broadcast centre shall comply with the similar requirements specified for the radioroom.

3.8.4 Every passenger ship shall be provided with at least three main broadcasting lines each of them shall have at least two loops of flame-retarding cable, sufficiently removed along the whole length and connected to two separate and independent amplifiers:

3.8.1 deck line intended for operating loudspeakers installed on the open decks of the ship;

3.8.2 service line intended for operating loudspeakers fitted in service, accommodation and public spaces of the ship's crew (cabins, messrooms, dining rooms, libraries, reading rooms, etc., including corridors and platforms adjacent to these compartments);

3.8.4.3 passenger line intended for operating loudspeakers fitted in passenger accommodation and public spaces (cabins, dining rooms, libraries, reading rooms, restaurants, saloons, verandahs, bars etc., including corridors and platforms adjacent to these compartments).

In enclosed spaces, cables and wires of public address system shall, as far as possible, run clear of galleys, laundries, machinery spaces of category "A" and other enclosed spaces of high fire risk, if not intended for these spaces.

Cables shall be laid so as to prevent their failure caused by bulkhead heating

due to the fire in adjacent spaces.

All areas of each fire zone shall be provided with cabling of at least two loops sufficiently separated throughout their length and connected to two separate and independent amplifiers.

3.8.5 Every cargo ship shall be provided with the broadcasting lines specified in 3.8.4.1 and 3.8.4.2.

3.8.6 Every passenger ship shall be provided with at least two remote command broadcast microphone posts. One post shall be fitted on the navigation bridge and the other in the room intended for keeping watch while the ship is in harbour. In ships not provided with special rooms for watch keeping, the second command broadcast microphone post shall be fitted in the most convenient place close to the gangway ladder.

3.8.7 Measures shall be taken to avoid the disfunctioning of broadcasting line in case of short-circuiting in the loudspeaker branch (refer also to Part II "Life-Saving Appliances" of the Rules and Part XI "Electrical Equipment" of the Rules the for the Classification and Construction of Sea-Going Ships).

3.9 CABLING

3.9.1 All cabling of the radio equipment and protection measures against radio interference caused by the ship's electrical installations shall comply with the requirements specified in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships as well as with additions and amendments set forth in the present Chapter.

3.9.2 The protection measures against radio interference caused by the ship's electrical devices fitted with means of protection according to the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships shall provide for such reception conditions that switching on and operating of such devices shall not increase the output voltage of each receiver by more than 20 per cent of the voltage value caused by internal noises.

3.9.3 Radio equipment shall be supplied from the distribution board of the radio equipment in compliance with the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

The distribution board of the radio equipment shall be supplied from the main distribution board and from emergency distribution board by two independent feeders.

The distribution board of the radio equipment shall be provided with the switching and protective equipment for connection and protection of the appropriate radio equipment in each outgoing feeder.

Connection of any consumers not relating to the radio equipment to the distribution board of the radio equipment is not allowed.

3.9.4 The space intended for radio equipment shall be provided with a light indicator or measuring instrument for continuous checking of the ship's mains voltage.

3.9.5 All cabling included into the cabling network of shipboard radio communication facilities and public address system shall be made by means of screened cables, with continuity of screening being preserved.

3.9.6 All cabling in the compartments equipped with shipboard radio communication facilities and radio-navigational facilities shall be made by means of screened cables, with continuity of screening being preserved. It is not allowed to use at such places any radio equipment and electrical devices without adequate screening.

The armour of cables shall be earthed at those places where the cables enter the ship spaces in which radio-receiving apparatus is installed.

3.9.7 Metal cases of radio apparatus shall be electrically connected to the ship's hull as directly as possible. The screening armour of cables, where the cables enter the equipment, shall be electrically connected to the cases of the equipment.

3.9.8 The coaxial cables shall comply with the following requirements:

.1 coaxial cables shall be fitted in separate cable runs laid at least 10 cm away from power cables;

.2 crossing of cables shall be done at right angles (90°);

.3 where there is one bend in one place, bending radius shall exceed external diameter of the cable 5 times;

.4 where there are several bends in one place, bending radius shall exceed external diameter of the cable 10 times;

.5 where flexible cables are used, bending radius shall exceed external diameter of the cable 20 times.

Coaxial cables in cargo holds, on the open deck and on masts shall be laid in compliance with the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.9.9 In cabling connecting panels for remote transmission of distress alert, DSC encoders, structurally made as separate units, plug connectors shall not be used.

3.9.10 Insulation resistance of every laid cable disconnected at both ends from the radio equipment shall not be less than 20 MOhm, irrespective of the cable length.

4. AERIALS AND EARTHING

4.1 GENERAL

4.1.1 It is allowed to fit a ship with an aerial of any type which provides the highest operational efficiency of the radio equipment in accordance with its purpose.

Aerials shall be capable of withstanding the effects of mechanical and climatic factors encountered under the ship's service conditions.

4.1.2 All ship aerials shall be capable of withstanding a pressure of air flow having speed of 60 m/s in any directions, the ship's speed and other factors being not considered.

4.1.3 Wire aerials shall be manufactured of flexible stranded aerial wire made of copper or copper-based alloy. To satisfy the requirements of 4.1.2, when calculating the minimum diameter of the aerial wire, the aerial sag shall be taken as equal to 6 per cent of the aerial span.

4.1.4 Each horizontal aerial wire shall be made of one-piece stranded wire. Where the construction of the aerial does not permit to make the down-lead and the corresponding horizontal aerial of one-piece wire, the connection of the horizontal aerial wire with the down-lead shall be made by means of splicing or by means of compression couplings providing the reliable electrical contact.

4.1.5 For the purpose of increasing durable and reliable operation of wire T-type aerial, the main mechanical load of its down-lead shall not apply directly to the place of the down-lead connection with the horizontal wire.

It is recommended to apply this requirement during the assembling of Γ-type aerials.

4.1.6 The down-lead wire of an aerial shall be secured at the lead-in to a guy fitted with insulators; then the down-lead wire shall be connected to the lead-in by means of copper or brass thimble. The connection of the thimble with the down-lead wire shall be effected by soldering or cold pressing.

4.1.7 The aerial rigging shall ensure the possibility for quick lowering and hoisting as well as tension regulation of the wire aerial without man hoisting to the mast tops.

4.1.8 As far as is practicable, every wire of multiwire aerial shall be capable of being hoisted and lowered separately. The span between the wires shall not be less than 700 mm.

4.1.9 Halyards used for hoisting wire aerials shall be flexible halyards made of the material approved by the Register. Hoisting halyards used in ships carrying readily flammable cargoes shall be made of non-combustible materials and their securing positions shall be outside a dangerous space. If steel halyards are used in this case, they shall be reliably electrically connected to the ship's hull.

4.1.10 Special high frequency insulators rated for corresponding operational voltage and mechanical load shall be used for the aerial insulation.

4.1.11 The aerial insulation resistance in relation to the ship's hull under normal climatic conditions shall not be less than 10 MOhm, and under excessive humidity, not less than 1 MOhm.

4.1.12 Mast-type aerials and aerials of other types consisting of some separate conducting units shall be so constructed that the value of contact

resistance of any electrical connection does not change under the influence of mechanical loads and climatic factors encountered under service conditions.

4.1.13 The transmitting aerials shall be designed for operation of any transmitter connected to them at maximum values of its output power and impressed voltage.

The construction of the transmitting aerials shall exclude any possibility of the corona-effect.

4.1.14 The receiving aerials shall be so constructed and arranged that their interaction with all transmitting aerials and with one another is minimum.

4.1.15 Individual lengths of the horizontal and down-lead wires of the aerials shall be located at a distance not less than 1 m from funnels, masts and other metal objects of the ship. The aerials shall be arranged so as to prevent touching the metal structures of the ship under any service conditions.

4.1.16 Separate elements of the mast-type aerials such as wires, pins and insulators shall be easily replaceable.

It is recommended to provide the collapsible mast-type aerials.

4.1.17 The aerials of general radio broadcasting and television receivers shall be arranged as far apart from all service purpose aerials as possible.

4.1.18 If the portable VHF radiotelephone station for service interior communications is stationary mounted, its aerial height shall not exceed 3,5 m above the navigation bridge deck.

4.1.19 In oil tankers and oil recovery vessels, gas carriers and chemical carriers all steel rigging of masts (shrouds, stays, whistle/tyfon, etc.) shall be broken up with insulators. The distance between the insulators shall be not more than 6 m, and the lowest insulator shall be not less than 3 and not more than 4 m from the deck. It is recommended to break up the rigging of every ship with insulators in order to minimize power losses while operating transmitters.

4.1.20 The lower ends of the standing steel rigging of masts and funnels shall be electrically connected to the ship's hull in compliance with the requirements specified in 4.8.8. All other rigging shall be insulated from the ship's hull or, if the fulfilment of this requirement is impracticable, shall be reliably electrically connected to the ship's hull by means of bronze or steel stranded wire of the adequate crossection.

4.1.21 The HF transmitter and the receiving aerial may be of any type satisfying the requirements of this Part of the Rules.

The HF transmitter aerials shall provide adjustments throughout the operating range.

4.2 MF AND MF/HF-AERIAL

4.2.1 The aerial shall provide the possibility of tuning transmitters to any frequency of the required frequency range, and the necessary radio

communication. The receiving aerials may be of any type complying with the requirements of the Rules.

4.2.2 The T- or inverted-Γ aerial shall be provided with means for its quick replacement by a spare aerial and shall have a device capable of preventing an aerial break caused by severe mechanical tension, for example, it may be a safety loop with a mechanical safety device fitted in the aerial halyard. The breaking force of the mechanical safety device shall be equal to not more than 0,3 of the breaking force of the aerial wire. The mechanical safety device shall be capable of ensuring sufficient slackening of the aerial tension, simultaneously preventing the aerial from touching superstructures, rigging and the ship's hull.

A device capable of preventing an aerial break need not be provided if the aerial length is not over 25 m and the aerial is suspended between the supports not subjected to the abrupt vibrations.

4.3 VHF-AERIAL

4.3.1 The VHF-aerial shall have a vertical polarization and be placed in a position which is as elevated and free as possible, with at least 2 m horizontal separation from constructions.

4.3.2 The VHF-aerial shall be fitted at the maximum possible height so as to ensure effective radiation and reception of signals at all operating frequencies.

4.4 GENERAL REQUIREMENTS TO ANTENNA SYSTEM OF INMARSAT SHIP EARTH STATION

4.4.1 Antenna system shall be placed in a position which is as elevated as possible from other purpose aerials and at places of the lowest vibration.

It shall be installed at readily accessible place.

4.4.2 The sitting of the antenna system shall be so selected as to provide constant satellite tracking in all directions at positive angles up to — 5° relative to the horizon plane. Antenna system shall be installed at the top of the radar mast or at the mast specially installed for this purpose.

For directional antenna system measures shall be taken to avoid shadow sectors of greater than 6° caused by ship structures within a radius of 10 m from the antenna.

For nondirectional antenna system measures shall be taken to avoid shadow sectors of greater than 2° caused by ship structures within a radius of lm from the antenna.

4.4.3 Antenna system shall not be installed on the same level as the radar aerial.

4.4.4 When installing the antenna system the following safe distances to other purpose aerials and magnetic compass shall be provided for:

.1 to HF-aerial — more than 5 m;

.2 to VHF aerial — more than 4 m;

.3 to magnetic compass — more than 3 m.

4.5 ANTENNA SYSTEM OF ESMARSAT-C SHIP EARTH STATION AND EGC RECEIVER

4.5.1 Antenna system shall be so installed as to avoid shadow sectors impairing the performance of equipment in the bow and the stem direction of the ship up to —5° and in the starboard and port directions up to —15° relative to the horizontal plane.

Measures shall be taken to avoid shadow sectors greater than 2 °, caused by ship structures within a radius of 1 m from the antenna.

4.5.2 When installing two antenna systems of INMARSAT-C ship earth station the vertical distance between them shall be not less than:

1 m — in horizontal plane; 2,5 m — in vertical plane.

4.5.3 If a stabilized directional antenna is used, it shall be so installed, to avoid obstructions that obscure the antenna and may significantly impair the performance of the equipment at any azimuth at an elevation angle greater than 5°.

Measures shall be taken to avoid shadow sectors of greater than 6° caused by ship structures within a radius of 10 m from the antenna.

4.6 LEAD-IN AND INTERIOR WIRING OF AERIALS

4.6.1 Wiring of the transmitting aerials into interior spaces of the ship shall be effected through special lead-in fitted with insulators capable of withstanding the corresponding operational voltage, except when the interior wiring of an aerial is made by means of an coaxial cable.

4.6.2 The construction of the lead-in of the transmitting aerial shall provide for the possibility of easy and ready connection and disconnection of the aerial, preferably, without applying any tools. The construction of the lead-in shall exclude any possibility of the corona-effect during the operation of the transmitter.

4.6.3 The leads-in of the transmitting aerials shall be, preferably, fitted at such places where they provide for the shortest possible run of aerial wiring in interior compartments from the lead-in to transmitters. When installed at readily accessible place, the lead-in and the aerial connected thereto shall be completely guarded against the possibility of accidental touching within 1800 mm above the appropriate deck, a stairway (ladder) or any other place where people may be present. When installing the protection casings or using the hollow mast-type aerials the provision shall be made for removing the condensate from the inner cavities of the structure.

4.6.4 To eliminate energy losses, it is recommended to use precaution guards made of insulating materials. If metal precaution guards are used, they

shall be reliably earthed to the ship's hull. The precaution guard shall not cause a dead angle for visual bearing taking.

4.6.5 Feeders of transmitting MF-aerials, laid in interior compartments, shall be, preferably, as short as possible.

4.6.6 Feeders of transmitting aerials shall be screened; the aerial switches (commutators) shall be of a screened type.

4.6.7 Feeders of the receiving aerials shall be made with coaxial screened cables, with continuity of screening being preserved. In this case, all commutators, change-over switches, lightning arresters and other devices connected to such cables shall be of a screen type. Feeders shall not induce signal attenuation over 3 dB.

4.6.8 The coaxial screened cables of the feeders of receiving aerials shall be led directly to the open deck and connected to the receiving aerials at the sufficient height. This connection shall be made by means of special contact device of waterproof or hermetic design, providing for reliable electrical connection and access for control over its condition.

4.6.9 Every aerial not intended for constant switching to operational position shall be provided with a special commutating device fitted inside the compartment and capable of switching the aerial into operational, isolated and earthed positions.

4.6.10 Every receiving aerial shall be provided with a special device capable of protecting the receiver lead-in against atmospheric discharges.

4.6.11 If the matching system or the devices capable of protecting against atmospheric discharges are fitted between the receiving aerial and coaxial cable, they shall be connected on the aerial side.

4.6.12 Unshielded transmitters of transmitting antennas, antenna switches and switches of an unprotected design located in a radioroom shall be located in places that exclude accidental exposure to them during operation of the radio equipment, and the distance from them to the working place of the radio operator shall not be less than 1 m.

4.6.13 Communicating devices of aerials.

4.6.13.1 The circuit and design of the communicating devices of aerials shall prevent accidental electrical connection of the antenna circuit of the transmitter to the antenna circuit of a receiver or other transmitter.

4.6.13.2 The communicating device of aerials shall be connected to the transmitter output or to the antenna tuner.

4.6.13.3 The communicating device of aerials shall provide the following:

.1 connection of antennas with each transmitter connected to it with the corresponding indication;

.2 installation of antennas into an isolated condition;

.3 installation of antennas in earthed condition;

.4 connecting transmitters to antenna equivalents.

The communicating device of aerials with remote control shall be fitted with a suitable device for manual switching of antennas.

4.6.13.4 The communicating device of aerials shall be designed to work with each transmitter connected to it at the maximum values of the power that is given to them, and the voltage that is supplied.

4.6.13.5 The communicating device of aerials shall not be damaged in the event of a short circuit or break in the antenna.

4.7 EARTHING

4.7.1 Operational (high-frequency) earthing intended for ensuring normal operation of shipboard transmitters installed in the radioroom shall be made with the help of a copper busbar and shall run as directly as possible from the aerial commutator to a metal bulkhead or deck reliably electrically connected to the ship's hull. The busbar shall have tappings leading to the earthing terminals of transmitters. The length of the bus-bar from the transmitter to the place where connection with the bulkhead or deck is effected shall not exceed 1000 mm. Depending upon the power of transmitters, the sectional area of busbars and tappings shall be not below values indicated in Table 4**.7**.1.

In all cases, where practicable, it is allowed to effect the operational earthing of each transmitter separately by connecting the earthing terminals of a transmitter to the nearest metal bulkhead by means of a copper busbar or a flexible conductor of adequate sectional area.

Table 4.7.1

Power of transmitter, W	Below 50	From 50 to 500	Above 500
Busbar sectional area, mm^2	25	50	100

4.7.2 In transmitters with emissive power above 50 W, the electric connection of the earthing busbar (flexible conductor) to the transmitter case shall be made in at least two placed most widely apart.

4.7.3 Operational earthings of radio receivers installed in the radioroom shall be effected by means of a copper busbar or a flexible bronze (copper) stranded wire with a sectional area of not less than 6 mm^2 run as directly as possible from each receiver to the main earthing busbar of transmitters or directly to the nearest metal bulkhead reliably connected to the ship's hull.

4.7.4 Operational earthings of radio communication facilities, public address system and other radio apparatus shall be carried out in compliance with the requirements of the present Part for operating earthings of receivers or transmitters.

4.7.5 In non-metal ships the operational earthing shall be common for the shipborne radio equipment. In this case, the electrical contact of the earthing with water shall be effected by means of a tinned copper or brass plate of at least **4** mm thick and having an area of not less than 0,5 m^2 secured to the

outside surface of the hull below the lightest draught of the ship. It is recommended to provide two such earthings; in such a case, the contacting surface of each earthing plate may be reduced to half the above value.

Metal keel binding or anti-teredo metal plating of wooden ships may be used instead of specially provided earthing gear.

4.7.6 On non-metal lifeboats the earthing of the radio station shall be made with two tinned copper tapes of not less than 1 mm thick and having the common area of not less than 0,1 m^2, fitted to the right and to the left of the keel near the middle frame of the boat.

4.7.7 The connecting wires of protective earthing of the apparatus cases shall be as short as possible, but not more than 150 mm long.

4.7.8 Protective earthing of lower ends of standing rigging of masts and funnels shall be made with flexible metal conductors. Such conductors shall be provided with special soldered thimbles which shall be secured to the metal hull of the ship by means of two screws or by welding. The spots of connection with the hull shall be painted.

4.7.9 The total resistance of all electric connections of any earthing shall not exceed 0,02 Ohm.

4.7.10 It is not allowed to use the earthing gear of radio equipment as a lightning arrester.

5. PERFORMANCE STANDARDS AND FUNCTIONAL REQUIREMENTS FOR RADIO EQUIPMENT

5.1 GENERAL

5.1.1 Radio equipment shall be so designed and arranged that easy operation in compliance with the technical documentation requirements for it, access for survey, maintenance and repair is provided.

Each type of radio equipment shall be designed for being operated by one person.

5.1.2 Radio equipment shall be so designed that replacement of its main units can be easily made without special tuning.

5.1.3 In case any equipment unit is connected to one or several units of other equipment, the technical and operation requirements for all equipment shall be maintained.

5.1.4 Easy, quick and efficient operation shall be provided by the amount of controls, their design, functioning, arrangement, construction and dimensions.

5.1.5 The controls shall be so located as to eliminate the possibility of accidental use.

5.1.6 The controls not used in the normal operation mode shall not be easily accessible.

5.1.7 The controls, inadvertent operation of which may cause switching off or damage to the equipment as well as nonadequate signalling, shall be

specially protected against unauthorized access.

5.1.8 The construction of all controls shall prevent spontaneous changing of their preset positions.

5.1.9 Controls of radio apparatus shall be protected against mechanical damage likely to occur when the face panel is put on the plane surface.

5.1.10 The diagram and construction of equipment shall exclude any possibility of damage or any harm to service personnel as a result of wrong sequence in operating the controls.

5.1.11 The controls and measuring instruments of radio apparatus shall be provided with distinct nameplates or conventional symbols designating their purpose and operation.

5.1.12 In all cases, the position of the controls indicating "on", "start", "increase", etc., shall correspond to the setting of control handles upwards and from or to the right of the operator, turning the control knobs clockwise and pressing the upper or right-hand buttons. The position indicating "off, "stop", "decrease", etc. shall correspond to the setting of control handles down, towards or to the left of the operator, turning the control knobs counter-clockwise and pressing the lower or left-hand buttons.

The "on" position shall have light indication.

5.1.13 Provision shall be made for adjustable lighting of the equipment itself or a ship allowing for the distinct discerning the controls and facilitating the display unit reading at any time.

5.1.14 Calibration of principal dials, inscriptions, marks and positions of indicators and controls fitted on the apparatus shall be distinctly visible at a distance of 700 mm under standard illumination intensity and normal eyesight.

5.1.15 The dials of basic instruments intended for measuring the current intensity in the aerial and in output stage of the transmitter as well as for measuring the ship's mains voltage shall be so calibrated as to make any correction factor unnecessary.

5.1.16 Radio apparatus in which a cathode-ray indicator is used shall be capable of providing possibility for image viewing in daylight.

5.1.17 It is recommended that special turn locks, wing nuts or latches, capable of being loosened without any tools applied, be used instead of threaded fastenings for the purpose of securing drop and sliding frames, removable panels to the cases of radio apparatus.

5.1.18 Non-secured drop and sliding frames of radio apparatus shall be fitted with safety locks capable of operating in both directions to prevent possible falling of frames out of the cases.

Opening doors shall be fixed in the open position.

5.1.19 Securing gear of removable and drop-type panels of radio apparatus shall be of non-falling-out construction.

5.1.20 Access to all current-carrying parts of radio apparatus, except aerial

leads-in and earthing wires shall be permitted only after opening the case.

Where the opening of the case is carried out without applying any tools, then, after each opening, no unprotected conductor of radio apparatus shall remain under the voltage over 50 V relative to any other conductors or "earth". The capacitors mounted in the circuits of more than 50 V shall be automatically discharge to the voltage of 50 V and less.

5.1.21 The circuit and construction of radio apparatus shall not exclude the possibility of carrying out the tests of it while in operation, with the case remaining open using special tools. Adequate protection of the operating personnel against electric shock in circuits of more than 50 V shall be provided. The construction of radio apparatus shall provide possibility for opening the cases only after disconnecting the voltage over 50 V.

5.1.22 All fixed radio equipment cases shall be fitted with terminals for connecting the earthing wire. The number and arrangement of earthing terminals on the cases of radio apparatus shall ensure removal of high-frequency voltage from the cases.

Opening doors, plug-in units and folding-back panels containing measuring instruments and other components of radio equipment shall be properly grounded by at least one flexible jumper.

5.1.23 All metal parts mounted on the outside of the radio apparatus case shall be reliably electrically connected to the case.

5.1.24 The connection of all cables to the radio apparatus shall be carried out, with continuity of screening being preserved. The screening metal sheathings of cables shall be electrically connected to the apparatus cases. Provision shall be made for mechanical securing of cable to the apparatus case.

5.1.25 It is recommended to provide the radio apparatus and remote controls with devices capable of signalling any failure or critical operating conditions in essential circuits of radio equipment as well as switching on the power supply and voltage over 50 V. The colours adopted for light signalling system shall comply with the requirements specified in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.1.26 All interior wiring electric connections of radio apparatus shall be of screw, socket outlet or non-acid hot soldering kind, or of any other kind approved by the Register.

5.1.27 All screw-type connections of the interior wiring as well as of the structural parts of radio apparatus the loosening of which is likely to disturb the apparatus parameters shall be strong and provided with special locking devices to prevent their getting loose. These locking devices shall be capable of withstanding multiple loosening of nuts and screws without any damage being sustained by screw threads or the devices themselves.

5.1.28 Interior components of radio apparatus shall have distinct and indelible markings corresponding to those of schematic and wiring diagrams. It

is allowed to label the markings of small components on the frames (chassis) and screens of corresponding units as well as on enlarged photos attached to the description. Output terminals of radio apparatus shall be clearly labelled to indicate their purpose; power supply circuits shall have voltage and polarity markings.

5.1.29 Inscriptions characterizing technical parameters and other data fixed on the radio apparatus shall be located at prominent places.

5.1.30 The construction of plug-and-socket connections used in radio apparatus shall exclude any possibility of their wrong connection. Measures shall be taken to prevent wrong insertion of plugs into sockets not intended for their connection. Projecting contacts of plug-and-socket connections shall be not live when being in "off position.

5.1.31 If a forced cooling system is used in the radio equipment, it shall be provided with the dust filters being readily changeable.

5.1.32 Facilities shall be provided to protect all operational software incorporated in the radio equipment. Any software required in equipment to facilitate operation in accordance with technical documentation, including that for its initial activation/reactivation, shall be permanently installed within the equipment, in such a way that it is not possible for the radiotelephone station personnel to have access to this software.

It shall not be possible for the operator to amend, augment or erase any software in the equipment required for operation in accordance with technical documentation.

Means shall be provided to monitor the operational software of the equipment automatically at appropriate regular intervals, as indicated in the equipment technical documentation, and to activate an alarm in the event of non-automatically recoverable failure.

5.1.33 If the digital keyboard for digital input is provided, the digits shall be arranged in compliance with the recommendations of the International Radio Consultative Committee.

Where a letter-digital keyboard is provided for, the figures from "0" to "9" may alternatively be ranged in compliance with the ISO regulations.

5.1.34 The display devices used within the radio equipment.

.1 The display devices used within the radio equipment, with the screen diagonal not more than 0,5 m (with the exception of devices displaying not more than four information lines) shall not produce magnetic induction exceeding 200 nT within frequency band of 5 Hz to 2 kHz and exceeding 25 nT within frequency band of 2 to 400 kHz at a distance of 50 cm from the device. In this case the magnetic induction level at a distance of 30 cm from the face of the display screen shall not exceed 200 nT within frequency band of 5 Hz to 2 kHz. The strength of the magnetic field induced by the display device at a distance of 50 cm in all directions from the device shall not exceed 10 V/m

within frequency band of 5 Hz to 2 kHz and 1 V/m within frequency band of 2 to 400 kHz. Along with that, at a distance of 30 cm from the face of the display screen the strength of the induced electromagnetic field shall not exceed 1 V/m within frequency band of 2 to 400 kHz. The electrostatic field strength at a distance of 10 cm from the face of the display screen shall not exceed 5,0±0,5 kV/m.

.2 For the display devices with screen diagonal more than 0,5 m, higher field levels are accepted. In this case, the technical documentation for such devices shall state the minimum distances at which:

magnetic induction does not exceed 250 nT within frequency band of 5 Hz to 2 kHz and does not exceed 150 nT within frequency band of 2 to 400 kHz;

electromagnetic field strength does not exceed 15 V/m within frequency band of 5 Hz to 2 kHz and does not exceed 10 V/m within frequency band of 2 to 400 kHz;

electrostatic field strength does not exceed 5,0±0,5 kV/m м.

5.1.35 Radio equipment shall generally be designed for power supply from the ship's mains having a voltage not exceeding 250 V and the construction of the power switchboard as well as that of basic apparatus shall comply with the requirements of 5.1.20.

Design of the radio equipment shall ensure keeping of technical parameters at continuous variation of alternating current mains voltage by ±10 per cent and frequency by ±5 per cent as well as when power supply varies by +30 % and -10 per cent or — 10 per cent from the rated value if fed by accumulator battery or direct current mains.

Radio equipment shall remain operable at short voltage deviations in mains by ±20 per cent within 1,5 s and frequency by ±10 per cent within 5 s. Meanwhile, alarm shall not activate.

5.1.36 Provision shall be made for protection of radio equipment against current inrushes and over-voltage as well as accidental change in polarity of the source of power and wrong sequence of phases within 5 minutes.

5.1.37 Earthing (connection to the hull) of the ship's mains and accumulator batteries in circuits of radio equipment is not allowed.

5.1.38 The voltage value between the contacts of microphones and headphones (between wires) as well as between them and the earth shall not exceed 50 V.

5.1.39 Insulation resistance of feeding circuits of radio equipment measured between conductors and the case of the apparatus as well as between the windings of transformers shall not be below the rates given:

Normal climatic conditions	20
Temperature 55 ± 3 °C, relative humidity below 20 %	5
Temperature 40 ± 2 °C, relative humidity 95 ± 3 %	1

5.1.40 All feeding circuits of radio apparatus shall be fitted with readily replaceable fuses or circuit breakers. The construction of fuse cartridges shall exclude any possibility of accidental touching of current-carrying parts by the operating personnel while replacing fuses. The time necessary for access to fuses shall not exceed 5 s.

5.1.41

All radio equipment shall be designed for shipboard operation under any service conditions and shall be capable of withstanding mechanical and climatic tests to at least standards given below:

.1 at rolling, pitching and prolonged inclinations up to 45° with a rolling and pitching period of 7 to 9 s in two interperpendicular operational positions during 5 min;

.2 under vibration conditions in the frequency range of 2 to 100 Hz with an amplitude of ±1 mm for frequencies from 2 to 13,2 Hz and an acceleration of *0,1 g* (7 m/s^2) for frequencies from 13,2 to 100 Hz in three interperpendicular positions;

.3 under shock loads with an acceleration of lOg (100 m/s^2), a pulse duration of 10 to 15 ms and a frequency of 40 to 80 bumps/min in three interperpendicular positions with the total number of bumps not less than 1000.

Necessity to perform the shock tests depends on the type of equipment, place of its installation and sea area;

.4 at a temperature of 55 ± 3 °C for the equipment designed to operate in the interior spaces and on the open decks of the ship during 10 to 16 h in the operating condition, and at a temperature 70 ± 3 °C in the idle condition during 10 to 16 h;

.5 at a relatively humidity of air 95 ± 3 per cent and a temperature of 40 ± 2 °C during 10 to 16 h;

.6 at a temperature of -15 ± 3 °C and –40 ± 3 °C interior spaces of the ship and on the open decks of the ship respectively) during 10 to 16 h in the operating conditions and at a temperature of – 60 ± 3 °C in the idle condition during 2 h.

Radio equipment shall be capable of resisting the brine (sea) fog.

Radio equipment shall be mould growth resistant and capable of withstanding the effect of hoarfrost, dew and icing (for the equipment designed to operate on the open decks of the ship).

Portable radio equipment shall be capable of resisting the solar radiation.

Portable radio equipment shall be capable of resisting oil.

Materials used for the manufacture of shipborne radio equipment shall ensure its long-term operation under the above conditions.

The mast-type aerials and other aerials of self-supporting type shall satisfy the tests within the limits of possible use of the test benches and chambers.

5.1.42 The degree of protection of the radio equipment arranged in ship spaces shall be not lower than that indicated in Table 5.1.42.

Table 5.1.42

Nos.	Type of radio apparatus и	Installation site	Degree of protection
1	Leads-in of aerials	Anywhere in ship	IP00
2	Communicating devices of aerials and apparatus containing no high-frequency circuits	Enclosed spaces	IP20
3	Radio apparatus, except apparatus specified in items 1 and 2	Enclosed spaces	IP21
		Navigation bridge, radioroom	IP22
4	Radio apparatus, except apparatus specified in item 1	Open decks	IP56
5	Two-way VHP radiotelephone apparatus and ship's search and rescue locating device (ship's radar search and rescue transponder or ship's AIS search and rescue transmitter)	Survival craft	IP68
6	Emergency radio beacon (in operational condition)	Open decks	IP68

5.1.43 Radio apparatus shall comply with the following requirements which ensure the electromagnetic compatibility (EMC) on board ship.

5.1.43.1 The voltage level of conducted interference from radio equipment at the electric power supply terminals shall not exceed values shown in Fig. 5.1.43.1.

5.1.43.2 The intensity level of radiated interference field produced by radio equipment at a distance of 3 m from the casing shall not exceed values shown in Fig. 5.1.43.2.

5.1.43.3 Radio equipment (except for the portable equipment) shall be immune to conducted low-frequency interference when the following additional test voltages are imposed on supply voltage within the frequency range from 50 to 10 kHz:

.1 for equipment with D.C. power supply — sine voltage the actual value of which is 10 per cent of the rated supply voltage;

.2 for equipment with A.C. power supply — sine voltage the actual value of which, in relation to the rated supply voltage, varies with the frequency as shown in Fig. 5.1.43.3.3.

5.1.43.4 Radio equipment, except for the portable equipment shall be immune to conducted radio frequency interference when the following sine voltage are applied to input terminals of the power supply sources, signalling and control circuit of equipment:

.1 with an actual voltage value of 3 V at the frequency which varies from 10 kHz to 80 MHz;

.2 with actual voltage value of 10 V at the points with frequencies: 2 MHz; 3 MHz; 4 MHz; 6,2 MHz; 8,2 MHz; 12,6 MHz; 16,5 MHz; 18,8 MHz; 22 MHz and 25 MHz.

Modulation frequency of the test signal shall be 400 Hz ± 10 per cent with modulation depth of 80 ± 10 per cent;

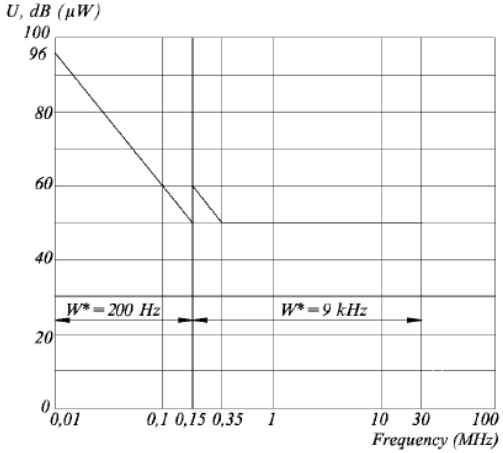


Fig.5.1.43.1.
Curve of the permissible level of conducted interference voltage *U*, measured at the electric power supply terminals:
*W** is the meter bandwidth

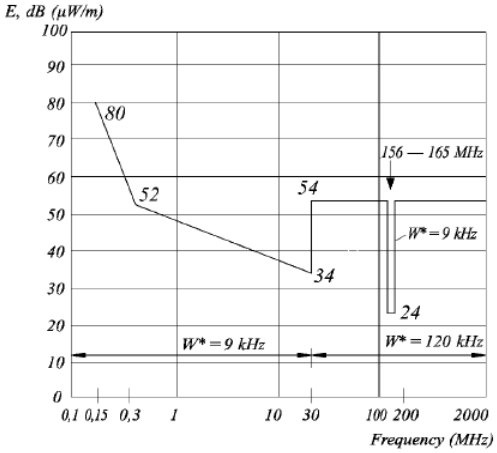


Fig. 5.1.43.2
Curve of the permissible intensity level of radiated interference field measured at a distance of 3 m from the equipment casing:
*W** is the meter bandwidth

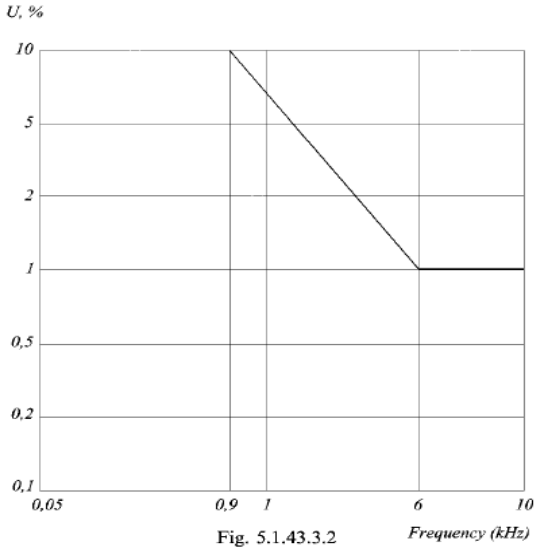


Fig. 5.1.43.3.2

Curve of the test voltage used to check the equipment for immunity to low - frequency conducted interference

5.1.43.5 Radio equipment shall be immune to radiated radio frequency interference, where located within a modulated electric field with an intensity of 10 V/m when the test signal frequency varies from 80 MHz to 2 GHz. Modulation frequency of the test signal in this case shall be 400 Hz ± 10 per cent with modulation depth of 80 ± 10 per cent;

5.1.43.6 Radio equipment, except for the portable equipment, shall be immune to nanosecond pulse interference induced by fast transients when the following test pulse voltages are applied to input terminals of the power supply sources, signalling and control circuits of the equipment:

.1 with an amplitude of 2 kV and repetition frequency of 2,5 kHz — at the differential inputs of A.C. power supply sources;

.2 with an amplitude of l kV in relation to the common earthed input and with a repetition frequency of 5 kHz — at the inputs of signalling and control circuits.

The test signal rise time in this case shall be 5 ns (at 10 to 90 per cent amplitude level), pulse duration shall be 50 ns (at 50 per cent amplitude level).

5.1.43.7 Radio equipment, except for the portable equipment, shall be immune to microsecond pulse interference induced by slow transients when a test pulse voltage with amplitudes: 2 kV — line/earth, 1 kV — line/line is applied to its A.C. power supply circuits.

The test signal rise time in this case shall be 1,2 mcs (at 10 to 90 per cent amplitude level), duration — 50 mcs (at 50 per cent amplitude level), repetition frequency — 1 pulse/min.

5.1.43.8 Radio equipment, except for the portable equipment, shall remain operative at power supply voltage during 60 s. In this case, the possibility of failure of the software and loss of the on-line data shall be ruled out.

5.1.43.9 Radio equipment shall be immune to electrostatic discharges at the voltage levels of test discharge: 6 kV — for contact discharge, 8 kV — for air discharge.

5.1.44 The ambient noise level produced by radio equipment during its operation (with the sound alarm switched off) shall not exceed 60 dB at a distance of 1 m from any part of the equipment.

The acoustic noise level produced by the sound alarm at a distance of 1 m from the noise source, except for the sound alarm for reception of distress alert, shall be within the range from 75 to 85 dB.

The sound alarm for reception of distress alert shall be audible in any location of the navigation bridge at any noise level possible in operation of the ship, and along with that, the acoustic noise level produced by this alarm at a distance of 1 m from the noise source shall be not lower than 75 dB.

5.1.45 The X-radiation level induced by individual units of the radio equipment (cathode-ray indicators, transceiver components, etc.) shall not exceed 5 mcJ/kgh (0,5 mrem/hour) at a distance of 5 cm from the surface of the devices.

5.1.46 The radio equipment to be installed near the magnetic compass shall be provided with clear inscriptions indicating the minimum safe distance, at which it can be located away from the compass. The minimum safe distance to the magnetic compass shall be deduced by recognizing that at this distance the influence of the specific radio equipment (or individual unit) in "on" position is such that the deviation of the magnetic compass does not exceed $5{,}4°/H$ for magnetic compasses installed on the upper bridge and not less than $18°/H$ for magnetic compasses installed inside the navigation bridge where H, in mcT, is the horizontal component of the Earth magnetic field induction).

5.1.47 Each radio equipment unit shall be arranged at a prominent place and have distinct markings containing the following information, at prominent places:

.1 manufacturer data;

.2 radio equipment type number or the name under which the radio equipment has passed type tests;

.3 radio equipment serial number, assigned by manufacturer;

.4 year of manufacture;

.5 safe distance between radio equipment and magnetic compass;

.6 type of current and supply voltage.

5.1.48 Spare parts for radio equipment shall be kept under the conditions preventing any probability of their damage and ensuring the possibility of their convenient transfer as well as for their ready identification in respect to the type of equipment they are designed to serve.

5.2 REQUIREMENTS FOR EQUIPMENT OF RADIO COMMUNICATION FACILITIES

5.2.1 The equipment of radio communication facilities shall be capable of transmitting and receiving radio alerts for distress, urgency and safety in the shortest possible time. To fulfill the above purpose the equipment shall comply with the following requirements.

5.2.1.1 Switching on the power supply of the equipment providing distress alert as well as communication in distress and for safety, shall be performed by one step manipulation only.

5.2.1.2 Starting period of transmitters and receivers shall not exceed 1 min.

5.2.1.3 Frequency retiming period of radio apparatus shall be as short as possible, but it shall not exceed 15 s. Emissions shall not be produced during the frequency retuning period.

5.2.1.4 Switching over from transmission to reception and vice versa, while using shipboard radio communication facilities, shall be effected automatically. The level of radio interference produced by the transmitter shall not exceed the permissible rates accepted in the national standards.

5.2.1.5 Switching over from one class of emissions to another shall be performed by one step manipulation only.

5.2.1.6 Radio installations shall include means of automatic data input for correction of the ship's coordinates, the date and the time of their determination from electronic navigational aids for detection of locations which may be a constituent part of radio installations.

Radio installations, where electronic navigational aids for detection of locations are not installed, shall include the special device (interface) intended for digital interface with electronic navigational aids for detection of locations for compliance with the above requirement.

Besides, radio installations shall include means for manual input of the ship's coordinates, the date and the time of their determination.

Audible and visible signalling operating in cases when the data from the electronic navigational aids for detection of locations have not been received or in cases of manual input when these data have not been updated during 4 h shall be provided. Any information on the ship's coordinates not being updated during more than 23,5 h shall be automatically deleted.

For INMARSAT ship earth station, information on the ship coordinates not being updated during more than 24 h shall be clearly indicated.

5.2.1.7 Any distress alert initiation shall be carried out by two independent

actions only by means of a dedicated button. This button shall be clearly identified (of red colour) and protected against inadvertent operation.

The distress alert initiation button shall be enclosed by a spring loaded lid or cover permanently attached to the equipment (e.g. by hinges).

It is not necessary for the user to remove seals or to break the lid or cover for the distress alert initiation.

The operation of the distress alert initiation button shall be accompanied by audible and visible indication.

The distress alert initiation button shall be pressed during at least 3 s. The flashing light and an intermittent signal shall start immediately. In 3 s the distress alert shall be initiated and the indication (audible and visible) shall become steady.

The equipment shall indicate the status of the distress alert transmission. It shall be possible to interrupt and initiate distress alerts at any time (refer to 1.2).

5.2.2 Radio equipment for transmission of the distress alert shall be designed in a way preventing its inadvertent operation.

The panel for radio equipment emergency operation shall be isolated from the panel for regular operation and closed with a cover. Switches on the emergency panel shall be clearly coloured.

5.2.3 The construction of the apparatus intended for transmitting distress alerts as well as communication in distress and for safety shall provide for rapid detection and elimination of any faults. To fulfill this purpose the opening of cases for providing access to interior parts of apparatus shall be effected in the shortest possible time and without applying any tools, considering 5.1.20.

5.2.4 Frequency tolerance of transmitters and receivers shall not exceed the values given in Table 5.2.4.

Table 5.2.4

Nos.	Frequency range(including upper and excluding lower limit)	Radio communication facilities	Permissible frequency tolerance	Permissible relative frequency tolerance
1	1605-4000 kHz	MF radio installation	40 Hz [1,2,3]	–
2	4000-29700 kHz:	HF radio installation		
	for emission class A1A		–	10×10^{-6}
	for other classes		50 Hz [1,2]	–[4]
3	156-174 MHz	VHF radio installation Two-way VHF radiotelephone apparatus	–	10×10^{-6}
4	Outside the range 156-174 MHz	Two-way VHF radiotelephone apparatus for communication with aircraft	–	50×10^{-6}
		VHF radiotelephone station	–	50×10^{-6}
		Radiotelephone station for internal service communication	–	5×10^{-6}
5	470-2450 MHz	Ship earth station	–	20×10^{-6}

[1] For narrow band phase-shift keying - 5 Hz; For transmitters with frequency-shift keying - 10 Hz.

[2] Permissible deviation for transmitters of ship earth radio installations shall be 10 Hz.

[3] For emission class A1A permissible relative deviation of frequency shall be 50 x 10^{-6}.

[4] For transmitters of ship earth stations installed on small boat operated in coastal area and working in a frequency range of 26175 to 27500 kHz, power of carrier frequency up to 5 W and using emission class A3E or F3E and G3E, permissible relative deviation of frequency shall be 40 x 10^{-6}.

5.2.5 All shipboard VHF, MF/HF transmitters shall be designed for continuous operation during at least 6 h, the ratio of the total emission duration to the pause duration being 2:1.

The two-way VHF radiotelephone apparatus intended for communication with survival craft and two-way VHF radiotelephone apparatus intended for communication with aircraft shall be capable of continuous operation during 8 h, when operating cycle being 1:9 (refer to Footnote 6, Table 2.3.4).

5.2.6 The mean power of any spurious emission supplied to the aerial feeder of a transmitter operating within the frequency range below 30000 kHz shall be at least 40 dB less than the mean power on the base emission frequency and in no case shall exceed 50 mW. For frequency-modulated maritime mobile

radiotelephone equipment which operates above 30000 kHz, the mean power of any spurious emission falling in any other international maritime mobile service channel, due to products of modulation, shall not exceed a level of 10 mkW and the mean power of any other spurious emission on any discrete frequency within the international maritime mobile service band shall not exceed a level of 2,5 mkW.

Where, exceptionally, transmitters of mean power above 20 W are employed, these levels may be increased in proportion to the mean power of the transmitter.

Average power of any side emission of all ship transmitters in a standby mode shall not exceed 2 nW.

5.2.7 The upper sideband shall be used for classes of emission H3E and J3E.

5.2.8 For class of emission J3E the degree of carrier suppression shall be at least 40 dB.

For class of emission H3E the degree of carrier suppression shall be 5 ± 1 dB.

5.2.9 Unwanted frequency modulation of the carrier frequency shall be sufficiently low to prevent harmful distortion.

5.2.10 When using classes of emission H3E and J3E the power of unwanted emissions supplied to a transmitting aerial on any discrete frequency shall, when the transmitter is driven to full peak power, be in accordance with Table 5.2.10. The difference between emitted power in pause (B) and sending (Y) shall not exceed 2 dB.

5.2.11 The audio-frequency bandwidth of transmitters operating on classes of emission H3E and J3E shall be from 350 to 2700 Hz with permissible amplitude tolerance not exceeding 6 dB.

Table 5.2.10

Separation Δ kHz, between the frequency of the unwanted emissions and the assigned frequency[1]	Minimum attenuation below peak power, dB
$1,5 < \Delta \leq 4,5$	31
$4,5 < \Delta \leq 7,5$	38
$7,5 < \Delta$	43, without exceeding the power of 50 mW

[1] Assigned frequency of a single-band channel shall be 1400 Hz higher than the carrier frequency

5.2.12 The depth of modulation of transmitters operating on classes of emission H3E shall not be less than 80 per cent. The depth of modulation caused by extraneous voltage sources shall not exceed 5 per cent.

Modulation of transmitters operating on emissions of class J3E shall be such that the components of mutual modulation are lower than relative highest level of one of two tones by 25dB.

5.2.13 All transmitters with rated power above 20 W shall be provided with measuring instrument capable of continuously monitoring, under operating conditions, the availability of aerial current. Failure of such measuring instrument shall not cause the disconnection of the aerial circuit. Every transmitter shall be provided with a reserve tuning indicator. Transmitters with the rated power of 20 W and less shall be provided with at least one tuning indicator.

5.2.14 If the transmitter is provided with the automatic frequency tuning device, it shall ensure:

.1 automatic tuning of the transmitter output with the parameters of the aerial connected;

.2 visual indication of readiness of the transmitter for operation, any fault in the automatic tuning device or the aerial parameters deviating from the predetermined values;

.3 tuning during 5 s.

In case of short-circuiting or a break of the aerial a tuning device shall not fail or cause the transmitter damage.

5.2.15 A break of the aerial or its earthing to the ship's hull shall not cause any damage of the equipment.

5.2.16 The controls mounted directly on the transmitter case shall include the controls which provide possibility for emission of single-band monosignal with frequency within 450 to 1000 Hz while operating on class J3E.

5.2.17 Intermediate frequency shall not cause interference in guard bands of international distress and safety frequencies.

5.2.18 Unless expressly provided otherwise, the bandwidth of a low frequency channel of a receiver shall be not less than 350 to 2700 Hz provided the tolerance of the receiver output level relating to frequency 1000 Hz is — 6 dB.

5.2.19 All feeding circuits of receivers shall be fitted with devices for protection against radio interference produced by the ship's electronic equipment.

5.2.20 Input circuits of receivers shall be protected against voltage induced by operating shipboard transmitters at 30 V e.m.f. within 15 min.

5.2.21 Back radiation intensity value of receivers shall not exceed the permissible rates accepted in the national standards.

5.2.22 The tuning indicators of receivers shall comply with the following requirements:

.1 indicators shall be provided with distinct contrast calibration visible under any lighting conditions of spaces;

.2 indicators shall be calibrated in kHz or MHz depending on the portion of the frequency range;

.3 international distress, safety and call frequencies in the radiotelephony mode shall be specially marked;

.4 indicators shall be protected against mechanical damage.

5.2.23 Receivers shall be provided with measuring instruments capable of checking their operating performances.

5.2.24 The construction of shipboard receivers shall provide possibility for connecting a coaxial screened cable to the aerial terminal, with continuity of screening being preserved.

5.2.25 Receivers shall be capable of receiving radio signals during the pause in manipulation of their own transmitter. The time necessary for restoring full sensitivity of a receiver after manipulation shall not exceed 0,1 s, with automated gain control being disconnected.

5.2.26 Loudspeakers mounted in the receivers shall be provided with switches.

5.2.27 All shipboard receivers shall be capable of 24-hour continuous operation.

5.2.28 If radio equipment intended for distress alert as well as for communication in distress and for safety has additional functions, this shall not affect the main functions of the equipment.

5.2.29 Ship's complex radio stations and remote control units of ship's radio communication facilities shall meet the requirements listed below:

.1 when developing ship's complex radio stations incorporating radio communication facilities housed in one sectionalized cabinet combined with the radiooperator's table and combined remote control desks of ship radio communication facilities, the relevant requirements of 5.1 and 5.2 as well as requirements given below, shall be met;

.2 controls and indicators of the complex radio station shall generally be concentrated on the front side of the common control panel to be preferably positioned at a height of 800 to 1200 mm above the deck, provided the top surface of the radiooperator's table is at a height of 750 mm above the deck. Control panels of ship transmitters shall be incorporated in the common control panel as its sections;

.3 in complex radio stations with a vertically arranged common control panel of a board type, a part of the table top surface against the radio-operator's position shall remain free within the semicircle the radius of which is 520 mm;

In complex radio stations with an inclined common control panel of a desk type, a part of the table top surface against the radiooperator's position shall remain free within the semicircle the radius of which is 450 mm. The angle of inclination of the common control panel from the vertical shall not exceed 30°;

.4 clearly marked boundaries of sections intended for controls of each type of equipment shall be provided on the common control panel of the complex radio station. Controls of each equipment type shall be arranged in the sequence of their use from left to right or from up to down;

.5 access to the interior parts of the equipment incorporated in each section shall be possible without use of any tools;

.6 controls shall be arranged within the section of each type of equipment by separate groups at a certain distance from one another. Each group shall incorporate only such controls, which are functionally consistent with, or dependent on, one another.

In so doing, if any control is not consistent with other controls or does not functionally depend on them, it shall be considered as separate group.

All control grips shall be of the same type, size and shape within each group. However, in no group use is permitted of the grip types utilized in any other group;

.7 there shall be no need to operate controls of the equipment using two hands simultaneously. Exception may be made only for controls intended for opening and closing housings of the equipment;

.8 buttons of the complex radio station relating to one group shall differ in colour from those belonging to any other group;

.9 all controls of the complex radio station shall be provided with clear inscriptions indicating their purpose. Provision shall be made for each button for inscriptions, symbols or digits specifying their application..

5.2.30 The remote control desk of radio communication facilities shall comply with the following requirements:

.1 all controls shall be provided allowing for the radio communication without using the controls fitted directly on a receiver, transmitter or radio station;

.2 signalling system shall be provided to control the operation and give warning of faults of the apparatus;

.3 it shall not cause the apparatus parameters lying outside the limits specified by the present Part and produce interference.

5.2.31 Radio equipment in addition to the requirements specified in the present Part shall comply with the relevant requirements of ITU.

5.2.32 In case of using the computer systems in the radio installations they shall comply with the requirements of Part XV "Automation" of the Rules for the Classification and Construction of Sea-Going Ships.

5.2.33 Radio equipment shall be capable of interfacing to other radio and navigational equipment.

Formats used for numerical information exchange shall be in compliance with the International Standard on Interface of Marine Radio and Navigational Equipment.

6. RADIO COMMUNICATION FACILITIES

6.1 VHF RADIO INSTALLATION

6.1.1 The radio installation shall provide for the following categories of calls using radiotelephony and digital selective calling for the purposes:

.1 distress, urgency and safety;

.2 ship operational requirements; and

.3 public correspondence.

6.1.2 The radio installation shall provide for the communications using radiotelephony for the purposes:

.1 distress, urgency and safety;

.2 ship operational requirements; and

.3 public correspondence.

6.1.3 The radio installation shall comprise:

.1 a transmitter/receiver including antenna;

.2 an integral control unit or one or more separate control unit(s);

.3 a microphone with a press-to-transmit switch, which may be built in a handset;

.4 an internal or external loudspeaker;

.5 an integral or separate digital selective calling facility;

.6 a dedicated DSC watchkeeping facility to maintain a continuous watch on channel 70.

The radio installation may also include additional receivers.

6.1.4 Пристрій ЦВВ повинний забезпечувати роботу на 70-му каналі і включати:

.1 DSC facility shall provide operation on channel 70 and shall comprise:

.1 means to decode and encode DSC messages;

.2 means necessary for composing the DSC messages;

.3 means to verify the prepared message before it is transmitted;

.4 means to display the information contained in a received call in plain language;

.5 means for entry of ship's position information and the time at which the position was determined (refer to 5.2.1.6);

.6 sufficient capacity of memory to enable at least 20 received distress messages to be stored in the DSC refer to facility (if the received messages are not printed immediately).

These messages shall be stored in memory until readout and shall be erased 48 h after they have been received;

.7 initiation of distress alerts shall supersede any other operation of the facility;

.8 self-identification data shall be stored in the DSC unit. It shall not be possible for the user easily to change these data;

.9 means to enable routine testing of the DSC facilities without radiation of signals.

.10 With a DSC modulated input signal having a level of 1 mkV e.m.f. to its associated VHF receiver — decoding the received message with a maximum permissible output character error rate of 10^{-2}.

6.1.5 Radiotelephone station belonging to VHF radio installation shall comply with the following requirements:

6.1.5.1 the radio station shall be designated for maintaining radio communication on frequencies of the Maritime Mobile Service in the band 156 to 174 MHz using following classes of emission:

.1 G3E - on the radiotelephone channels;

.1 G2B - DSC channel 70.

Frequency range between channels shall be 25 kHz.

6.1.5.2 radio station shall be capable of operating:

.1 within the frequency range of 156,3 to 156,875 MHz on simplex channels;

.2 within the frequency range of 156,025 to 157,425 MHz for transmission and within the frequency range of 160,625 to 162,025 MHz for reception on duplex channels.

6.1.5.3 the radio station shall have sufficient number of channels, but not less than five, including channel 70 (156,525 MHz); channel 6 (156,3 MHz); channel 13 (156,65 MHz); channel 16 (156,8 MHz).

6.1.5.4 the maximum deviation of frequency corresponding to 100 per cent depth of modulation shall be as close to ±5 kHz as practicable. Frequency instability shall vary within the limits ±1,5 kHz.

6.1.5.5 frequency modulation shall have a preemphasis of 6 dB per octave with subsequent deemphasis in the receiver.

6.1.5.6 the audio frequency bandwidth shall not exceed 3000 Hz.

6.1.5.7 the radio station shall be provided with a vertically polarized antenna. As far as practicable, an emission shall be omnidirectional in the horizontal plane.

6.1.5.8 the rated power of a transmitter shall be not less than 6 W and not more than 25 W.

The transmitter shall be provided with a device capable of reducing power to 1 W or less except for 70 (156,525 MHz) channel.

6.1.5.9 the sensitivity of the receiver shall be equal to or better than 2 uV e.m.f for an output signal-to-noise ratio of 20 dB. Blocking shall be at least 90 dBmkV.

6.1.5.10 the bandwidth of the receiver on high (intermediate) frequency at a level of 6 dB shall be sufficient for receiving a signal with the maximum frequency deviation of ±5 kHz.

6.1.5.11 adjacent-channel selectivity of the receiver shall be not less than 75 dB.

6.1.5.12 intermodulation selectivity of the receiver shall be not less than 70 dB.

6.1.5.13 non-linear distortion factor of the receiver shall be not more than 7 per cent.

6.1.5.14 radio station receiver's output shall be designed for a loudspeaker power at least 2 W and a handset power 1 mW. Provision shall be made for

connecting the loudspeaker without influence on the output sound power of handset;

6.1.5.15 the receiver shall be provided with a manual volume control by which the audio output may be varied;

6.1.516 the 16th channel shall be fitted with a device capable of providing the minimum power of the loudspeaker equal to 50 mW when the manual volume control is set in zero position;

6.1.5.17 a squelch control shall be provided on the face panel of the radio station;

6.1.518 an on/off switch shall be provided for the entire VHF installation with a visual indication that the installation is switched on;

6.1.5.19 the radio station shall indicate the channel number to which it is tuned. It shall allow the determination of the channel number under all conditions of lighting. Where practicable, channels 16 and 70 shall be distinctively marked;

6.1.5.20 a visual indication that the carrier frequency is being transmitted shall be provided.

6.1.5.21 В комплекті радіостанції рекомендується передбачати пристрої, які дозволяють вести радіозв'язок безпосередньо з крил ходового містка.

6.1.5.22 the radio station is recommended to include devices permitting radio communication to be maintained from the navigation bridge wings;

6.1.5.22 the radio station shall not be able to transmit during channel switching operation;

6.1.5.23 operation of the transmit/receive control shall not cause unwanted emissions;

6.1.5.24 provision shall be made for changing from transmission to reception by use of a press-to-transmit switch. Additionally, facilities for operation on duplex channels without manual control may be provided;

6.1.5.25 change of channel shall be capable of being made within 5 s.

The time taken to switch from the transmit to the receive condition, and vice versa, shall not exceed 0,3 s;

6.1.5.26 during duplex operation (emission) the loudspeaker shall be switched off automatically. Provision shall be made for prevention of electric and acoustic feedback in handset;

6.1.5.27 switching over from simplex to duplex operation and vice versa shall be effected automatically with the transition to the corresponding channels;.

6.1.5.28 in the transmit condition during simplex operation, the output of the receiver shall be muted;

6.1.5.29 in the absence of the scanning condition a device shall be provided capable of switching over the radio station to the 16th channel when a handset is in its regular position;.

6.1.5.30 the radiotelephone station having multichannel watch (scanning) facilities shall comply with the following requirements:

.1 it shall be provided with the automatic scanning of a priority channel and an additional channel;

2 if selection of a priority channel is not provided, the priority channel shall be the 16th channel;

.3 the channel numbers of both channels being scanned shall be clearly indicated simultaneously;

.4 when the scanning facility is operating, transmission shall not be possible;

.5 when the scanning facility is switched off, both transmitter and receiver shall be tuned automatically to the selected additional channel;

.6 provision shall be made for a manual control in order to switch for operation on the priority channel by a single control unit;

.7 scanning characteristics:

the priority channel shall be scanned with a sampling frequency of not less than once per two seconds;

if a signal is received on the priority channel, the receiver shall remain on this channel for a duration of that signal;

if a signal is received on the additional channel, the scanning of the priority channel shall continue, thus interrupting reception on the additional channel for periods as short as possible and not greater than 150 ms. Receiver shall be so constructed that its reliable operation was maintained during scanning the priority channel;

in the absence of a signal on the priority channel and during reception of a signal on the additional channel; the duration of each listening period on this channel shall be at least 850 ms;

means shall be provided to indicate the channel on which a signal is being received.

6.2 MF RADIO INSTALLATION

6.2.1 The radio installation shall provide for the following categories of calling using both radiotelephony and digital selective calling (DSC) for the purposes:

.1 distress, urgency and safety;

.2 ship operational requirements;

.3 public correspondence.

6.2.2 The radio installation shall provide for the following categories of communication using radiotelephony for the purposes:

.1 distress, urgency and safety;

.2 ship operational requirements; and

.3 public correspondence.

6.2.3 If the radio installation is intended for distress alerts only or also for communication in distress and for safety, the requirements of 6.2.1.2, 6.2.1.3, 6.2.2.2 and 6.2.2.3 are not obligatory.

6.2.4 The radio installation shall comprise: **.1** a transmitter/receiver including antenna;

.2 an integral control unit or separate control unit (units) with a telephone handset and an internal or external loudspeaker;

.3 an integral or separate digital selective calling facility;

.4 a dedicated DSC watchkeeping facility to maintain a continuous watch on the frequency 2187,5 kHz.

6.2.5 Передавач повинний забезпечувати роботу в діапазоні частот 1605–4000 кГц. Кількість фіксованих робочих частот повинна бути не менше двох: 2182 кГц і 2187,5 кГц.

6.2.6 The transmitter shall be capable of transmitting within the frequency range of 1605 to 4000 kHz. Number of fixed frequencies shall be not less than two: 2182 and 2187,5 kHz.

6.2.6 The transmitter shall be capable of transmitting using classes of emission J3E and either J2B or FIB.

6.2.7 Means shall be provided to prevent over-modulation automatically.

6.2.8 During normal modulation, the peak envelope power in the class of J3E emission, or the mean output power of transmitter in the classes of J2B or FIB emissions, shall be at least 60 W and not more than 400 W at any frequency within operating range of frequencies.

6.2.9 If the mean output power of transmitter exceeds 150 W, provision shall be made to reduce it to 60 W or less except frequencies 2182 kHz and 2187,5 kHz at which the value of the mean output power of transmitter shall be at least 60 W.

6.2.10 The transmitter shall be provided with a standard artificial aerial: C=250 pF, R =10 Ohm with series connection.

6.2.11 The receiver shall be capable of being tuned throughout the bands between 1605 and 4000 kHz. Tuning shall be either continuous, or by incremental steps, or by their combination. It is allowed to use the receiver tuned to the fixed frequencies which shall be at least two: 2182 and 2187,5 kHz.

6.2.12 The receiver shall be capable of receiving signals of the following classes of emission: J3E, H3E, J2B and FIB.

6.2.13 The receiver frequency shall at all times remain within 10 Hz of the required frequency following the warming-up period.

6.2.14 For classes of emission J3E and FIB the sensitivity of the receiver shall be equal to or better than 6 mkV e.m.f. at the receiver input for a signal-to-noise

ratio of 20 dB. For DSC an output character error rate of 10^{-2} or less shall be obtained for a signal-to-noise ratio of 12 dB.

6.2.15 Adjacent-channel selectivity of the receiver shall exceed values given in Table 6.2.15.

Selectivity on spurious channels shall be not less than 60 dB.

Inter-modulation selectivity shall be not less than 70 dBmkV for the class of emission FIB and not less than 80 dBmkV for the class of emission J3E.

Blocking shall be not less than 65 dB when interference tuning out is ± 20 kHz.

Non-linear distortion factor of the receiver shall not exceed 7 per cent.

6.2.16 The receiver shall be provided with an automatic gain control of which effectiveness ensures alteration of the output voltage no more than by 10 dB if the input voltage varies by 70 dB.

6.2.17 Radio station receiver's output shall be designed for a loudspeaker power at least 2 W and a handset power 1 mW. Disconnection of a loudspeaker shall not affect the output sound power of a handset.

6.2.18 An unearthed output shall be provided for DSC signals if the corresponding facility is not integrated. Output signal shall be 0 dB at a load of 600 Ohm regulated to the precision of ± 10 dB.

Table 6.2.15

Class of emission	Carrier frequency of unwanted signal distant from carrier frequency of valid signal by, kHz	Adjacent channel selectivity
J3E	-1 + 4	40 dB
	-2 + 5	50 dB
	-5 + 8	60 dB
H3E	-10 + 10	40 dB
	-20 + 20	50 dB
F1B	-0,5 + 0,5	40 dB (analogue output) ;
	-0,5 + 0,5	character error ratio $\leq 10^{-2}$ (digital output)

6.2.19 The DSC facility shall be capable of decoding and encoding DSC formats, their composing and verifying.

6.2.20 Indication in clear for understanding form shall be provided for the DSC formats received and being entered.

The size of the means to display information shall be such as to contain at least 160 characters in two or more lines.

6.2.21 Means shall be provided for entry of ship's position information, the date and the time at which the position was determined (refer to 5.2.1.6).

6.2.22 If the received messages are not printed immediately, sufficient capacity of memory shall be provided to enable at least 20 received distress messages to be stored in the DSC facility. These messages shall be stored until readout.

These messages shall be erased 48 h after they have been received.

6.2.23 Self-identification data shall be stored in the memory of the DSC unit. It shall not be possible for the user easily to change these data.

6.2.24 Means shall be provided for periodic checking the DSC facility without signal emission.

6.2.25 Control of the radio installation shall be possible from an integrated control unit or separate control unit (units).

If two separate control units are available, control unit at the position from which the ship is normally navigated shall have priority.

6.2.26 A control system for the radio installation shall provide:

.1 switching on the DSC distress alert.

Transmission of the DSC distress alert shall have priority regarding any other operations;

.2 possibility acknowledgement of DSC distress alert reception;

.3 relay of the DSC distress alert;

.4 switching on the frequency 2182 and 2187,5 kHz. Tuners and controls for these frequencies shall be clearly marked;

.5 selecting the classes of emission J3E automatically when switching to the frequency 2182 kHz;

.6 selecting the classes of emission J2B or FIB automatically when switching to the frequency 2187,5 kHz;

.7 possibility of independent selecting transmission and reception frequencies of any receiver setting. This does not preclude the use of transceivers.

6.2.27 Controls operation shall not cause unwanted emissions.

6.2.28 Indication of transmission and reception frequencies shall be provided.

6.2.29 Radio installation with manual tuning shall have a sufficient number of indicators providing fine and fast tuning.

6.2.30 If the radio installation is required to be heated in order to operate correctly, the power supplies to the heating circuits shall be so arranged that they can remain operative when supplies to or within the installation are switched off.

A switch for the heating circuits shall be clearly indicated. It shall be protected against inadvertent switching on.

The correct operating temperature shall be reached within a period of 30 min after power supply.

6.2.31 If it is necessary to delay power supply to any part of the transmitter after switching on, this delay shall be provided automatically.

6.3 MF/HF RADIO INSTALLATION

6.3.1 The radio installation shall provide for the following categories of calls using both radiotelephony and digital selective call (DSC) for the purposes:

.1 distress, urgency and safety;

.2 ship operational requirements; and

.3 public correspondence.

6.3.2 The radio installation shall provide for the communication using both radiotelephony and narrow-band direct printing (NBDP) for the purposes:

.1 distress, urgency and safety;

.2 ship operational requirements;

.3 public correspondence.

6.3.3 If the radio installation is intended for distress alerts only or also for communication in distress and for safety, the requirements of 6.3.1.2, 6.3.1.3, 6.3.2.2 and 6.3.2.3 are not obligatory.

6.3.4 The radio installation shall comprise:

.1 a transmitter/receiver, including antenna;

.2 an integral control unit or one or more separate control units with a telephone handset and an internal or external loudspeaker;

.3 an integral or separate narrow-band direct-printing facility;

.4 an integral or separate digital selective calling facility;

.5 special receiver providing constant DSC watching on the frequencies 2187,5, 8414,5 kHz and at least on one of the distress frequencies and providing the safety in DSC system: 4207,5, 6312, 12577 or 16804,5 kHz.

In any time the receiver shall be capable to select any of these distress frequencies and to provide the safety in DSC system.

6.3.5 The transmitter shall be capable of transmitting within the frequency range of 1605 kHz to 27,5 MHz. Number of fixed frequencies shall be not less than 18:

for radiotelephony — 2182; 4125; 6215; 8291; 12290; 16420 kHz;

for NBDP — 2174,5; 4177,5; 6268; 8376,5; 12520; 16695 kHz;

for DSC — 2187,5; 4207,5; 6312; 8414,5; 12577; 16804,5 kHz.

6.3.6 The transmitter shall be capable of transmitting using classes of emission J3E and either J2B or FIB.

6.3.7 The transmitter of radio installation shall be provided with a standard artificial aerial: C = 250 pF, R =10 Ohm with series connection for MF range; R = 50 Ohm for HF range.

6.3.8 During normal modulation, the peak envelope power in the class of J3E emission, or the mean output power of transmitter at the class of emission J2B or FIB shall be:

at least 60 W at any frequency within operating range of frequencies;

not more than 400 W for MF range; not more than 1500 W for HF range.

6.3.9 If the mean output power of transmitter exceeds 400 W, provision shall be made for an automatic reduction to 400 W or less when transmitter is switched to MF range.

6.3.10 The receiver shall be capable of being tuned within the frequency range of 1605 kHz to 27,5 MHz. Tuning shall be either continuous, or by incremental steps or by their combination. It is allowed to use the receiver tuned to the fixed frequencies which shall be not less than 18:

for radiotelephony — 2182; 4125; 6215; 8291; 12290 and 16420 kHz;

for NBDP — 2174,5; 4177,5; 6268; 8376,5; 12520 and 16695 kHz;

for DSC — 2187,5; 4207,5; 6312; 8414,5; 12577 and 16804,5 kHz.

6.3.11 The receiver shall be capable of receiving signals of the following classes of emission: J3E, H3E, J2B and FIB.

6.3.12 The receiver frequency shall remain within 10 Hz of the required frequency following the warming-up period.

6.3.13 For classes of emission J3E and FIB the sensitivity of the receiver shall be equal to or better than 6 mcV e.m.f at the receiver input for a signal-to-noise ratio of 20 dB. For NBDP and DSC an output character error rate of 10^{-2} or less shall be obtained for a signal-to-noise ratio of 12 dB.

6.3.14 Adjacent-channel selectivity of the receiver shall exceed values given in Table 6.3.14.

Selectivity on spurious channels shall be not less than 60 dB.

Inter-modulation selectivity shall be not less than 70 dBmV for the class of emission FIB and not less than 80 dBmV for the class of emission J3E.

Blocking shall be not less than 65 dB when interference tuning out is ± 20 kHz.

Non-linear distortion factor of the receiver shall not exceed 7 per cent.

Table 6.3.14

Class of emission	Carrier frequency of: unwanted signal distant from carrier frequency of valid signal by, kHz	Adjacent-channel selectivity
J3E	-1 + 4	40 dB
	-2 + 5	50 dB
	-5 + 8	60 dB
H3E	-10 + 10	40 dB
	-20 + 20	50 dB
F1B	-0,5 + 0,5	40 dB (analogue output)

	-0,5 + 0,5	character error ratio $\leq 10^{-2}$ (digital output)

6.3.15 The receiver shall be provided with an automatic gain control which effectiveness ensures alteration of the output voltage no more than by 10 dB if the input voltage varies by 70 dB.

6.3.16 Radio installation receiver's output shall be designed for a loudspeaker power at least 2 W and a handset power 1 mW. Disconnection of a loudspeaker shall not affect the output sound power of a handset.

6.3.17 If DSC encoder and NBDP device are not built-in, then additional unearthed outputs shall be provided for DSC and NBDP signals.

Output signals shall be 0 dB at a load of 600 Ohm regulated to the precision of ± 10 dB.

6.3.18 The DSC facility shall be capable of decoding and encoding DSC formats, their composing and verifying.

6.3.19 Indication in clear for understanding form shall be provided for the DSC formats received and being entered.

The size of the means to display information shall be such as to contain at least 160 characters in two or more lines.

6.3.20 Provision shall be made for the means of automatic input of the ship's coordinates, the date and the time of their determination (refer to 5.2.1.6).

6.3.21 If the received messages are not printed immediately, sufficient capacity of memory shall be provided to enable at least 20 received distress messages to be stored in the DSC facility. These messages shall be stored until read-out.

These messages shall be erased 48 h after they have been received.

6.3.22

Self-identification data shall be stored in the DSC unit. It shall not be possible for the user easily to change these data.

6.3.23 Means shall be provided to enable routine testing of the DSC facilities without radiation of signals.

6.3.24 If the receiver with a scanning device capable of maintaining a continuous watch on more than one DSC distress channel is used, all selected channels shall be scanned within 2 s and the time of watching on each channel shall be sufficient for detecting a sequence of dots preceding to each DSC. Scanning shall only be terminated as soon as dots transmitted at a speed of 100 Baud are detected.

6.3.25 The NBDP device shall be capable of operating in the circular and selective call modes on the single-frequency channels allocated for distress NBDP operation.

6.3.26 The NBDP facility shall comprise:

.1 means to decode and encode messages;

.2 means for composing and verifying messages to be transmitted;

.3 means for providing a record of received messages..

6.3.27 Self-identification data shall be stored in the NBDP unit. These data shall be protected against accidental changing.

6.3.28 Possibility of controlling the radio installation from an integral control unit or separate control unit(s) shall be provided.

If two separate control units are available, priority shall be provided for the control unit at the position from which the ship is normally navigated.

6.3.29 A control system for the radio installation shall provide:

.1 switching on the DSC distress alert. Transmission of the DSC distress alert shall have priority regarding any other operations;

.2 possibility of acknowledgement of DSC distress alert reception;

.3 relay of the DSC distress alert;

.4 switching on the frequency 2182 and 2187,5 kHz. Tuners and controls for these frequencies shall be clearly marked;

.5 automatic selecting the class of emission J3E when switching to the frequency 2182 kHz;

.6 automatic selecting the classes of emission J2B or FIB when switching to the DSC and NBDP distress and safety frequencies specified in 6.3.5 and 6.3.10;

.7 possibility of selecting transmission and reception frequencies independent of any receiver setting. This does not preclude the use of transceivers;

6.3.30 Controls operation shall not cause unwanted emissions.

6.3.31 Indication of transmission and reception frequencies shall be provided.

6.3.32 Radio installation with manual tuning shall have a sufficient number of instruments providing fine and fast tuning.

6.3.33 If the radio installation is required to be heated in order to operate correctly, the power supplies to the heating circuits shall be so arranged that they can remain operative when supplies to or within the installation are switched off.

A switch for the heating circuits shall be clearly indicated. It shall be protected against inadvertent operation.

The correct operating temperature shall be reached within a period of 30 min after the application of power.

6.3.34 If it is necessary to delay power supply to any part of the transmitter after switching on, this delay shall be provided automatically.

6.4 INMARSAT SHIP EARTH STATION

6.4.1 The ship earth station INMARSAT shall provide radio communication in the telephony mode and/or in the data (not voice data) transmission mode for the purposes of:

.1 distress, urgency, safety and general radio-communications;

.2 coordination of search and rescue operations;

.3 transmitting navigational safety data.

6.4.2 No controls external to the ship earth station shall be available for alteration of the ship station identity.

6.4.3 It shall be possible to initiate and make distress alerts in the telephony mode and or in the data transmission mode from the position from which the ship is normally navigated and also from any other position designated for initiating of distress alerts. Where the space dedicated for radio communications is provided, the means for initiating a distress alert shall be installed in it.

The means for initiating a distress alert be as required in 5.2.1.7.

If no other receivers of the distress alerts, urgency and safety calls or devices for the distress alerts retry are provided, and the sound alarm level of telephone and printer during reception of these alerts is not sufficient, the ship earth station shall provide audible and visual signalling of the necessary level.

6.4.4 If the ship earth station comprises the enhanced group calling (EGC) system its characteristics shall comply with the requirements for the EGC equipment specified in 8.2.

6.4.5 The ship earth station shall be fitted with a self-monitoring system and capable of automatically initiating the audible and/or visual signalling in the following cases:

.1 loss of observing the satellite by aerial;

.2 failure of operability of the ship earth station;

.3 loss of power supply or starting an emergency source of electrical power.

6.4.6 The ship earth station shall provide the possibility of checking the distress alerting functions without transmitting the alerts.

6.4.7 In addition to the requirements of the present Part of the Rules, the ship earth station shall meet the requirements and specifications of the INMARSAT and be of the type approved by the INMARSAT.

6.5 DIRECT-PRINTING APPARATUS OF IMPROVED FIDELITY

6.5.1 The direct-printing apparatus of improved fidelity (DPAIF) shall provide conversion from 5-character International Telegraph Alphabet ITU-T No. 2 to a 7-character code. DPAIF shall provide operation in the Forward-Error-Correcting (FEC) mode "B" and the Automatic error correction using an Automatic Request for Repeat or Retransmission "A" (ARQ) on the frequency channels allocated for distress and NBDP.

6.5.2 Self-identification data shall be stored in the DPAIF unit.

6.5.3 These data shall be protected against accidental changing.

6.5.4 DPAIF shall comprise:

.1 means to decode and encode messages;

.2 means for composing and verifying messages intended for transmission;

.3 means for providing a record of received messages.

6.5.5 DPAIF shall provide exchanging information between the mobile station and the subscribers of TELEX network.

6.6 TERMINAL PRINTING DEVICE

6.6.1 Terminal printing device shall use International Telegraph Alphabet No. 2 (ITU-T No. 2).

6.6.2 Terminal printing device shall be provided with an apparatus recording all the signals transmitted or received. These signals may be not displayed if provided.

6.6.3 Rated speed of operation of the terminal printing device shall be 50 or 100 Baud.

6.6.4 Auto-reply code shall be transmitted by the apparatus capable to identify the signal "Who is there?" in the International Telegraph Alphabet No. 2 (ITU-T No. 2).

6.7 FACSIMILE TERMINAL DEVICE

6.7.1 Facsimile terminal device shall perform reception/transmission of the section-lined messages, graphical and text materials.

6.7.2 Facsimile terminal device shall be able to self-copy the documents when the transmitter used.

6.7.3 The image may be recorded both on a paper roll and on separate sheets of paper.

6.7.4 Minimum allowable format of documents is A4.

6.7.5 Surface of message shall be scanned in one direction both on a receiver and on a transmitter, if any.

6.7.6 Facsimile terminal device shall be designed for round the clock operation.

6.7.7 The device may be fitted with a memory.

6.8 INTEGRATED RADIO COMMUNICATION SYSTEM WHEN USED IN THE GMDSS

6.8.1 The Integrated Radio Communication System (IRCS) is a system where individual radio communication equipment and installations are used as sensors i.e. without the need of their own control units providing outputs to and accepting commands from spaces called workstations for radio communications.

Such workstations are called GMDSS workstations, if they include control and monitoring of all equipment and installations provided on a ship for the GMDSS which are also suitable for general radio communication..

6.8.2 The integrated radio communication system shall comply with the following requirements:

.1 The integrated radio communication system when used in the GMDSS (GMDSS IRCS) shall meet the following requirements:

.1 functional requirements of the GMDSS. Along with that all functional requirements for each individual type of communication equipment and installation integrated in the IRCS shall be available.

No functional requirements for individual types of the communication equipment and installation shall impede fulfillment of any other functional requirements for other communication equipment or installation integrated in the radio communication system;

.2 all functional requirements for the equipment integrated on the IRCS shall conform to the relevant performance standards and functional requirements for this equipment;

.3 no single fault shall impair the operation of more than one radio communication sensor or more than one workstations for radio communication.

6.8.3 The IRCS shall:

.1 comprise at least two workstations for radio communication each connected to each GMDSS radio communication sensor over a network or connecting system;

.2 comprise at least two printers;

.3 have facilities for automatic updating of the ship's position and time, in addition to manual input of these data;

.4 have a power supply arrangement which ensures that it is not possible to switch off inadvertently any part of the IRCS;

.5 have means providing fault detection in any part of the IRCS and alarm generation;

.6 be provided with antivirus software protection.

6.8.4 GMDSS workstations shall:

.1 have an identical user interface and an identical access to each function for different radio communication sensors;

.2 operate independently of one another;

.3 be capable of allowing simultaneous operation of at least two radio communication sensors;

.4 be capable of the transmission of distress alert initiated only by means of a dedicated button for each radio communication sensor and that button shall be used for no other purpose.

Each button shall be clearly identified and protected against inadvertent operation. The distress alert shall be initiated by two independent actions producing an indication that the alert has been activated.

Each button of the distress alert shall be electrically separated from the IRCS network or connecting system. It shall be possible to interrupt or initiate alerts at any time (refer also to 1.2).

6.8.5 Integration of VHF radio telephone in the GMDSS IRCS is permitted only if it does not prevent compliance with the requirement of 3.4.4.

6.8.6 Additional workstations for radio communication intended for general radio communications only shall have no access to the distress alerting functions and shall not impair the distress alerting.

The GMDSS workstations shall have priority access over additional workstations.

6.8.7 Additional sensors not required for the GMDSS radio communication shall neither impair nor slow down the distress alerting and alarm functions..

6.9 VHF RADIOTELEPHONE STATION WITH FREQUENCY BAND OF 300,025 TO 300,500 MHZ AND 336,025 TO 336,500 MHZ

6.9.1 The main VHF radiotelephone station shall ensure the radio communication within the frequency band of 300,025 to 300,500 MHz and 336,025 to 336,500 MHz.

Portable VHF radiotelephone station may operate within the frequency band of 300,025 to 300,225 MHz and 336,025 to 336,225 MHz.

6.9.2 The class of emission shall be G3E.

6.9.3 The maximum deviation of frequency corresponding to 100 per cent depth of modulation shall be as close to ±5 kHz as practicable and in no event shall exceed ±5 kHz.

6.9.4 The audio frequency bandwidth shall not exceed 3000 Hz.

6.9.5 The rated power of a transmitter shall not be more than 15 W.

The transmitter shall be provided with a device capable of reducing power to 1 W.

6.9.6 The sensitivity of the receiver shall be equal to or better than 1,5 mcV for a signal-to-noise ratio of 20 dB.

6.9.7 The output of the receiver shall be designed for connecting a loudspeaker with power of at least 0,5 W and a telephone handset. The loudspeaker shall be integrated in the ratio station case.

6.9.8 Non-linear distortion factor of the receiver shall be not more than 7 per cent.

6.9.9 The attenuation of signal reception on image frequency, intermediate frequency as well as that of other unwanted signals shall be not less than 80 dB.

6.9.10 The bandwidth of the receiver on high (intermediate) frequency at a level of 6 dB shall be sufficient for receiving a signal with the maximum frequency deviation of 5 kHz.

6.9.11 A device shall be provided capable of switching over the radio station on frequency 300,2 MHz (channel 5) when the microtelephone handset is placed in its regular position.

6.9.12 The facility operating on frequency 300,2 MHz shall be provided ensuring the minimum power of 50 mW to the loudspeaker when a volume control is in zero position.

6.9.13 The VHF radiotelephone station shall be provided with a squelch (mute) control.

6.9.14 The VHF radiotelephone station shall be provided with a vertically polarized antenna.

6.9.15 It is recommended to include in the VHF radiotelephone station set the devices permitting to maintain radio communications from the navigation bridge wings.

6.9.16 Some technical requirements to the portable VHF radiotelephone station.

6.9.16.1 VHF radiotelephone station shall be capable of being used for on-scene communication between survival craft, between survival craft and ship and between survival craft and rescue unit. It may also be used for on-board communications when capable of operating on appropriate frequencies.

6.9.16.2 The station shall have at least three frequencies, including call and distress frequency 300.2 MHz.

6.9.16.3 The power of the transmitting frequency shall be between 50 mW and 1.5 W.

6.9.16.4 Simplex radiotelephone channels shall be used in the apparatus.

6.9.16.5 The receiver shall be provided with a volume control.

6.9.16.6 A squelch (mute) control and a channel selection switch shall be provided.

6.9.16.7 Channel selection shall be easily performed and the channels shall be clearly discernible.

6.9.16.8 Determining the chosen 5th (300.2 MHz) channel in all lighting conditions shall be provided.

6.9.16.9 The effective radiated power of transmitter shall be at least 0,25 W. Where the effective radiated power exceeds 1 W, a power reduction switch to reduce the power to 1 W or less is required. When this equipment provides for on-board communications, the output power of transmitter shall not exceed 1 W.

6.9.16.10 The apparatus shall comprise at least:

.1 an internal transmitter/receiver, including antenna and source of power.

The source of electrical power shall be integrated in the apparatus. In addition, provision may be made to operate the apparatus using an external source of electrical power.

.2 an integral control unit with a press-to-transmit switch;

.3 a microphone and loudspeaker.

6.9.16.11 The apparatus shall:

.1 be capable of being operated by unskilled personnel;

.2 withstand drops on to a hard surface from a height of 1 m;

.3 be capable of being operated by personnel wearing gloves;

.4 be capable of single-handed operation except for channel selection;

.5 be watertight;

.6 not be unduly affected by water or oil;

.7 be of small size and light weight;

.8 be capable of operating in the ambient noise level likely to be encountered during rescue operations;

.9 be provided with device for use of external microphone/head phone;

.10 provide operation on frequencies from 300,025 to 300,225 MHz;.

Its class of emission shall be G3E;

.11 be provided with on/off switch and a visual indication that the radiotelephone is switched on;

.12 provide easy channel selection and the channels shall be clearly discernible;

.13 be ready for operation not later than 5 s after activation.

.14 have provisions for its attachment to the clothing of the user and also be provided with a wrist or neck strap. For safety reasons, the strap shall include a suitable weak link.

.15 be resistant to deterioration by prolonged exposure to sunlight;

.16 be of a colour different to colour of the two-way VHF radiotelephone apparatus (refer to 12.2.3.13);

6.9.16.12 The apparatus shall be so designed as to operate over the temperature range –10°C to +35 °C and in storage throughout the temperature range –20 °C to +55 °C.

6.9.16.13 In addition to the applicable requirements of 5.1.47 brief operating instructions shall be clearly indicated on the exterior of the equipment;

6.10 RADIOTELEPHONE STATION FOR INTERIOR COMMUNICATION

6.10.1 The radio station operating within the frequency band of 450 to 470 MHz shall ensure the radio communication on operating frequencies of 457,525 MHz; 457,550 MHz; 457,575 MHz; 467,525 MHz; 467,550 MHz; 467,575 MHz with the interval between frequencies equal to 25 kHz, using the emission of G3 class.

Where the intervals between frequencies equal to 12,5 kHz the additional operating frequencies shall be as follows: 457,5375 MHz; 457,5625 MHz; 467,5375 MHz; 467,5625 MHz.

6.10.2 If the relay station is needed on board, the following frequencies pairs shall be used:

457,525 MHz and 467,525 MHz; 457,550 MHz and 467,550 MHz; 457,575 MHz and 467,575 MHz.

6.10.3 The rated power of a transmitter shall not be more than 2 W.

The transmitter shall have a device for reducing the power up to 0,2 W.

6.10.4 The deviation of frequency shall not exceed ±5 kHz with the interval between frequencies equal to 25 kHz and ±2,5
kHz with the interval between frequencies equal to 12,5 kHz.

6.10.5 A permissible relative deviation of frequency shall not exceed 5×10^{-6} with the interval between frequencies equal to 25 kHz and $2{,}5\times10^{-6}$ with the interval between frequencies equal to 12,5 kHz.

6.10.6 The audio frequency bandwidth shall not exceed 3000 Hz with the interval between frequencies equal to 25 kHz and 2600 Hz with the interval between frequencies equal to 12,5 kHz.

6.11 TWO-WAY VHF RADIOTELEPHONE APPARATUS FOR COMMUNICATION WITH AIRCRAFT

6.11.1 The apparatus shall be portable and capable of being used for on-scene communication between ship and aircraft.

6.11.2 The apparatus shall comprise at least:

.1 an internal transmitter/receiver, including antenna and source of power;

.2 an integral control unit with a press-to-transmit switch;

.3 a microphone and loudspeaker.

6.11.3 The apparatus shall:

.1 be capable of being operated by unskilled personnel;

.2 withstand drops on to a hard surface from a height of 1 m;

.3 be of small size and light weight;

.4 be capable of operating in the ambient noise level likely to be encountered during search and rescue works using aircraft;

.5 be of a colour different to colour of the two-way VHF radiotelephone apparatus (refer to 12.2.3.13);

.6 be capable of operation on the frequency 121,5 MHz and 123,1 MHz.

Its class of emission shall be A3E;

.7 have an on/off switch with a visual indication that the installation is switched on;

.8 have a manual volume receiver control by which the audio output may be varied;

.9 provide an easy channel selection switch.

Channel shall be clearly discernible;

.10 be ready for operation not later than 5 s after activation.

6.11.4 The carrier power of a radio transmitter shall be between 50 mW and 1,5 W.

6.11.5 The audio output shall be sufficient to be heard in the ambient acoustic noise level likely to be encountered during search and rescue works using aircraft.

6.11.6 In the transmit condition the receiver output sound signal shall be muted.

6.11.7 The source of electrical power shall be a primary power supply battery integrated in the equipment, which may be replaced during operation.

In addition, it may be possible to operate the apparatus from an alternative source of electrical power.

6.11.8 Primary power supply batteries shall have the period of storage not less than 2 years and shall be replaced if on the date of survey of the shipboard radio equipment carried out by the Surveyor to the Register the period of their storage left is at least 12 months.

6.11.9 In addition to the requirements of 5.1.48 the following shall be clearly indicated on the exterior of the equipment:

.1 brief operating instruction;

.2 the ship's name and call signal;

.3 expiry date for the primary battery stored;

.4 "Intended only for emergency communication with aircraft".

6.12 FIXED TWO-WAY VHF RADIOTELEPHONE APPARATUS FOR COMMUNICATION WITH AIRCRAFT

6.12.1 The apparatus shall be capable of being used for on-scene communication between ship and airborne rescue unit(s).

6.12.2 The apparatus shall comprise at least:

.1 transmitter/receiver;

.2 antenna which may be fitted on the equipment or isolated;

.3 a microphone with a press-to-transmit switch.

6.12.3 The apparatus shall:

.1 be capable of being operated by unskilled personnel;

.2 be capable of operating in the ambient noise level likely to be encountered onboard of a ship;

.3 have an on/off switch with a visual indication that the installation is switched on;

.4 have a manual volume receiver control by which the audio output may be varied;

.5 provide an easy channel selection switch. Channel shall be clearly discernible;

.6 be ready for operation not later than 5 s after activation;

.7 be capable of operation on the frequency 121,5 MHz and 123,1 MHz.

Its class of emission shall be A3E.

6.12.4 The carrier power of a radio transmitter shall be between 50 mW and 1,5 W.

6.12.5 The audio output shall be sufficient to be heard in the ambient acoustic noise level onboard a ship in a place of apparatus installation.

6.12.6 In the transmit condition, the receiver output sound signal shall be muted.

6.12.7 The apparatus shall be powered from the ship's main and emergency source of electrical power.

Instead of the aforesaid, the apparatus may be power supplied from the built-in primary power supply battery, which may be replaced when operating..

6.12.8 Primary power supply batteries shall have the period of storage not less than 2 years and shall be replaced if on the date of survey of the shipboard radio equipment carried out by the Surveyor to the Register the period of their storage left is at least 12 months.

6.12.9 In addition to the applicable requirements of 5.1.47 the following shall be clearly indicated on the exterior of the equipment:

.1 brief operating instructions;

.2 the ship's name and call signal;

.3 expiry date for the primary battery stored, if applicable;

.4 "Intended only for emergency communication with aircraft".

7. SHIP SECURITY EQUIPMENT

7.1 SHIP SECURITY ALERT SYSTEM

7.1.1 The ship security alert system, when activated, shall provide generating and transmitting to the shore a security alert or a special report indicating that the security of the ship is under threat or has been compromised.

The alert transmitted by the system shall be addressed only to a designated competent organization and shall not be received by other ships.

7.1.2 The functions of the ship security alert system may be effected using the following equipment:

.1 GMDSS installation;

.2 radio equipment installed in addition to that required in 2.2.1 and intended for general communications;

.3 systems specially designed for security alert purposes.

7.1.3 The mode of transmitting a ship security alert by the security alert system shall not cause any alarm or indication to be raised on the ship.

7.1.4 Provision shall be made for at least two activation points, one of which shall be located on the navigation bridge. The location of another one shall be known only for the limited number of the ship crew specified in the ship security plan.

A special button, handset, keyboard, switch or other technical means located and designed so as to protect them against inadvertent operation and actuating a false signal on the ship security threat may be used as the activation device of the ship security alert system.

7.1.5 In order to activate the ship security alert system, it shall not be necessary for the user to remove seals, to break any lid or cover, to switch on additional blocks.

7.1.6 The radio equipment transmitting the alert on a ship security threat shall be so designed that its bringing into operation by the signal of the security alert system activation device does not require the preliminary selection of operational modes, tuning of channels or setting of menu options.

The connection of the GMDSS installation to the ship security alert system for transmitting the alert on a ship security threat shall not impair the functionality of the GMDSS installation as required in this Part of the Rules.

7.1.7 The alert on a ship security threat generated with ship security alert system activation shall be continuously transmitted and include a unique code/ identity indicating that the alert has not been generated in accordance with the GMDSS distress procedures. The ship security alert shall be continuously transmitted until the ship security alert system is deactivated and/or reset.

7.1.8 The ship security alert shall include the ship identity and current position associated with a date and time.

7.1.9 The design of the ship security alert system shall provide for a possibility to periodically check operability without transmitting the ship security alert.

In all cases, the check shall not lead to unpredicted effects as the result of emergency response.

7.2 SHIP SECURITY SURVEILLANCE TV SYSTEM

7.2.1 The ship security surveillance TV system shall ensure remote surveillance within the guarded areas and/or outside the guarded spaces, the transmission of visual and, where needed, voice data on condition of the surveillance areas and spaces to the navigation bridge and/or to a space intended for watch keeping during the ship's stay at port, if it is provided in the ship security plan.

7.2.2 The ship security surveillance system may be used for visual surveillance of technological operations (loading, unloading, mooring, etc.) carried out within the guarded areas.

7.2.3 The ship security surveillance system shall include TV cameras as well as the following means:

.1 for displaying the visual information (visual display units);

.2 for recording and storing visual data (video recorders);

.3 for control and switching of visual signals;

.4 for motion detection (where necessary).

In addition to the above, the ship security surveillance system may include the means for recording, displaying and storage of the voice data.

7.2.4 The ship security surveillance TV system shall ensure, at least, the following:

.1 generation and transmission of visual data;

.2 distribution of visual signals and displaying the condition of guarded areas and spaces;

.3 processing the signals (multiplexing, video-recording and sound-recording (where provided));

.4 displaying the recorded data.

7.2.5 The ship security surveillance system may have a black-and-white or color display proceeding from the required information content level of the surveillance system as well as from the location and lighting of surveillance areas, physical state of the prospective mobile objects.

7.2.6 TV camera of the security surveillance TV system shall transmit a video signal with a signal-to-noise ratio of at least 50 dB.

7.2.7 Horizontal resolution capability of a TV camera shall be at least 300 television lines for a color and black-and-white image with the image dimension ratio complying with the standard ones (3:4; 9:16 and etc.).

7.2.8 The surveillance TV system camera shall be capable of transmitting a video signal with a minimum lighting of the TV surveillance area of not more than 5 lux, and with the maximum lighting not less than 50000 lux.

If the actual lighting of the surveillance area is less than the TV camera sensitivity, then this surveillance area or object shall be provided with an additional lighting, or the ship security surveillance TV system shall be provided with an infrared sensitive camera (cameras).

Where the color ship security TV surveillance system is used, infrared cameras are not recommended for use.

Object-detection sensitivity of TV cameras shall be such as to provide detection of objects of 30 x 30 cm within the surveillance area (the extreme edge of the detection area).

7.2.9 TV cameras shall ensure surveillance of the whole surveillance area and shall be so installed as to overlap the adjacent areas.

The design of TV cameras installed on the open deck shall provide the possibility to fit a protective cover or a camera lens cleanup device.

7.2.10 The design of the ship security surveillance TV system shall ensure full-time operation.

7.2.11 The size of black-and-white and color display shall be of at least 360 mm (diagonally). With that, horizontal resolution capability of cathode-ray identities shall be at least 500 television lines for a black-and-white image and at least 400 television lines for color image. For LCDs the resolution capability shall be of at least 640 x 480 pixels.

7.2.12 For the purpose of recording visual data video recorders or digital still stores shall be used. It is allowed to use audio recording, where needed, concurrently with the video recording.

7.2.13 The ship security surveillance TV system shall ensure search, displaying (viewing), copying and transmission of the information recorded on the external data medium.

7.2.14

Search and displaying of the recorded video data with no record interruption shall be carried out as follows:

.1 step-by-step search/ viewing of images in a "back", "forward" or "picture stop" mode;

.2 full-screen viewing of video data recorded by an individual TV camera on a display in the "back", "forward" or "stop image" mode; with adjustable zoom;

.3 simultaneous "picture-in-picture" viewing of video data recorded by the two individual TV cameras on a display in the "back", "forward" or "stop image" mode;

.4 simultaneous viewing of video data recorded by several TV cameras on a display in the "back", "forward" or "stop image" mode;

.5 full-screen sequential viewing of the video data recorded by the individual TV cameras on a display in the "back", "forward" or "stop image" mode.

7.2.15 Means of control and switching of video signals shall ensure the priority automatic displaying of a surveilled area (areas), where the motions have been detected (if a motion sensor is provided).

7.2.16 The ship security surveillance TV system shall ensure visual and audible signalling in cases of:

.1 motion detection in a surveilled area or space (if motion sensors are provided);

.2 failure of the ship's main source of electrical power or switching on the emergency source of electrical power;

3 failure of the ship security surveillance TV system;

.4 failure (short circuit, breaking of circuit) of a "TV camera — display" channel;

.5 failure of a TV camera;

.6 failure of motion sensors;

.7 failure of a video recorder and, where applicable, audio recorder.

7.2.17 The ship security surveillance TV system shall be provided with a complete set of a special emergency accumulator battery to be used in case of failure of the ship's main source of electrical power or the emergency source of uninterruptible electrical power ensuring off-line operation of the ship security surveillance TV system within at least 1 h.

8. FACILITIES FOR RECEPTION OF MARITIME SAFETY INFORMATION

8.1 NAVTEX RECEIVER

8.1.1 The equipment shall consist of two radio receivers, a signal processing device and one of the following devices:

.1 an integrated printing device; or

.2 a display facility with standard output port for printer and non-volatile message memory; or

.3 a connection to an integrated navigation system and a non-volatile message memory.

8.1.2 NAVTEX receiver shall provide the reception of information for areas covered by the service and for message categories excluded by the radio-operator from the reception and/or a display facility shall always be available.

8.1.3 The set of equipment shall contain one NAVTEX receiver operating on the frequency 518 kHz of the International NAVTEX service, and a second receiver capable of working at the same time as the first one on at least two other frequencies recognized for the transmission NAVTEX information.

The second receiver, simultaneously with the first one, shall provide operation on at least two other frequencies allocated for the transfer of NAVTEX service information.

8.1.4 The receiver operating on the frequency 518 kHz shall have priority in the display or printing of received information.

Printing or displaying of messages received by one of the two receivers shall not prevent reception by both receivers of NAVTEX equipment.

8.1.5 Each NAVTEX receiver shall ensure recording at least 200 messages of average length 500 characters in non-volatile message memory (printed and non-printed). It shall not be possible for the user to erase messages from memory. When the memory is full, the oldest messages shall be overwritten by new messages.

8.1.6 The user shall be able to tag individual messages for permanent retention. These messages may occupy up to 25 per cent of the available memory and shall not be overwritten by new messages. When no longer required, the user shall be able to remove the tag on these messages which may then be overwritten in normal course.

8.1.7 NAVTEX receiver shall be provided with a facility to test that the radio receiver, and proceeding from what equipment is available, the display facility, printer and non-volatile message memory are functioning correctly.

8.1.8 The equipment shall be capable of internally storing at least 200 message identifications for each receiver provided. When the time between 60 h and 72 h elapses, the message identification shall automatically be erased from

the store. If the number of received message identifications exceeds the capacity of the store, the oldest message identification shall be erased.

8.1.9 Only message identifications that are satisfactorily received shall be stored; a message is satisfactorily received if the character error rate is below 4 per cent.

8.1.10 The receipt of search and rescue information shall give an alarm at the position from which the ship is normally navigated. This alarm shall be reset (acknowledged) manually only.

8.1.11 Information for location and message designators in programmable memories shall not be erased by interruptions in the power supply of 6 h.

8.1.12 The receiver sensitivity shall be such that for a source with an e.m.f. of 2 mcV in series with a non-reactive impedance of 50 Ohm, the character error rate is below 4 per cent.

8.1.13 The display facility and/or printer shall be able to display a minimum of 32 characters per line.

8.1.14 If a display facility is used in NAVTEX receiver, the following requirements shall be met:

.1 an indication of newly received messages shall be immediately displayed until acknowledged by the staff or until 24 h after receipt;

.2 newly received messages shall also be displayed;

.3 where there is no printer, the display facility shall be located in the position from which the ship is normally navigated.

8.1.15 The display facility shall be able to display at least 16 lines of message text.

8.1.16 The design and size of the display facility shall be such that displayed information is easily read under all conditions by observers at normal working distances and viewing angles.

8.1.17 If automatic line feed entails division of a word, this shall be indicated in the displayed/printed text.

8.1.18 When displaying received messages on a display facility, a clear indication of the end of a message shall be given by automatically adding line feeds after the message or including some other form of delineation.

The printer or printer output shall automatically insert line feeds after completing print of the received message.

8.1.19 The equipment shall display/print an asterisk if the character is received corrupted.

8.1.20 Where the printer is not integrated, it shall be possible to select the following data to be put out to the printer:

.1 all messages as they are received;

.2 all messages stored in non-volatile message memory;

.3 all messages received on specified frequencies, from specified locations or having specified message designators;

.4 all messages currently displayed; and

.5 individual messages selected from those appearing on the display.

At the same time, NAVTEX receiver shall include a standard interface for connection with the printer.

8.1.21 NAVTEX receiver shall include at least one interface for the transfer of received data to other navigation or communication equipment.

8.1.22 All interfaces provided in NAVTEX receiver shall ensure compliance with the formats specified in relevant International Standards on Interface of Marine Radio and Navigational Equipment.

8.2 ENHANCED GROUP CALLING RECEIVER

8.2.1 The EGC receiver may be either separate or combined with other installations. Elements of other installations, e.g., the antenna, low noise amplifier and down-converter of the ship earth station, may be shared for the reception of EGC messages.

8.2.2 The equipment shall be capable of producing a printed copy of received information. Received EGC messages may be stored for later printing with an indication to the operator that the message has been received, except for the vital messages referred to in 8.2.4 and 8.2.7 which shall be printed out upon receipt.

8.2.3 Means shall be provided for:

.1 visual indication that the ship's position has not been updated during the last 12 h. It shall only be possible to reset this indication by revalidating the ship's position;

.2 entering the ship's position and current and planned NAVAREA/METAREA[1] codes manually so that area group calls can be received. Means shall also be provided to enter current and planned coastal warning service coverage areas and different classes of messages.

Optionally, the ship's position, as determined by the navigational equipment, may be entered automatically and the NAVAREA/METAREA code automatically derived therefrom.

[1] Refer to Resolution A.706 (17) "Global Navigational Warning Service"

8.2.4 Provision shall be made for a specific audible alarm and visual indication at the position from which the ship is normally navigated, to indicate receipt of a distress or urgency priority EGC message.

It shall not be possible to disable this alarm and it shall only be possible to reset it manually and only from the position where the message is displayed or printed.

8.2.5 The equipment shall indicate when it is not correctly tuned or synchronized to the EGC carrier.

8.2.6 Any message shall be printed regardless of the character error rate of its reception. The equipment shall print a low line mark if a character is received corrupted.

8.2.7 Acceptance or rejection of service codes shall be under the operator's control except that equipment shall always receive:

navigational warnings, meteorological warnings and forecasts;

search and rescue information; and

shore-to-ship distress alerts, which are directed to a fixed or absolute geographical area within which the ship is operating.

8.2.8 Means shall be provided to prevent the reprinting of a message once it has been received without error.

8.2.9 The printing device of the EGC receiver shall be able to print at least 40 characters per line.

8.2.10 The signal processor and printing device shall ensure that if a word cannot be accommodated in full on one line, it shall be transferred to the next line. The printing device shall automatically feed five lines after completing the printed messages.

8.2.11 The EGC receiver shall meet the requirements and specifications of the INMARSAT and be of the type approved by the INMARSAT.

8.2.12 Replacement of one power source to another or any power interruption within 60 s shall not require repeated manual entry of equipment into operation mode and result in loss of received messages stored in memory.

8.3 HF DIRECT-PRINTING TELEGRAPH RECEIVER FOR RECEPTION OF MARITIME SAFETY INFORMATION

8.3.1 The equipment of a narrow-band direct-printing telegraphy for reception of maritime safety information shall consist of a receiver, signal processing device, printer and means providing frequency retuning manually and automatically.

8.3.2 The receiver shall operate on the frequencies 4210; 6314; 8416,5; 12579; 16806,5; 19680,5; 22376; 26100,5 kHz. Additional frequencies may be provided intended for the International and National NAVTEX services (518, 490 and 4209,5 kHz).

8.3.3 Provision shall be made for operability check of the receiver, signal processing device, printer and means for automatic frequency retuning, if provided.

8.3.4 The equipment shall be capable of storing at least 255 message identifications. After between 60 and 72 h a message identification shall automatically be erased from the memory of equipment. If the number of received messages exceeds the memory capacity the oldest message identification shall be erased automatically.

8.3.5 An audible and visual signalling system shall be provided at the position from which the ship is normally navigated in order to indicate reception of search and rescue messages.

The signalling system shall be incapable of being switched off and have a possibility of manual resetting.

8.3.6 Information for areas covered by the service and for message categories stored in the equipment memory shall not be erased in the event of supply voltage failure during a period of up to 6 h.

8.3.7 The sensitivity of the receiver shall be so that for a source having an electromotive force of 6 mcV a character — error rate was not more than 10^{-2}.

8.3.8 The radiooperator shall control acceptance or rejection from printing service codes except for cases when the equipment shall have no possibility to reject relevant navigational and meteorological warnings, search and rescue information and certain special warnings which are transmitted by the shore-based radio station in the area of ship location.

8.3.9 Information for areas covered by the service and for message categories excluded by the radio-operator from reception shall be provided.

8.3.10 Only message identifications that are satisfactorily received shall be stored.

8.3.11 The equipment shall not print out the same message after it has been received without errors. The message is considered to be received correctly if the character to error rate is less than **4** per cent.

8.3.12 The printer shall be capable of printing not less than 32 characters per line.

8.3.13 The signal processing device and the printer shall be capable of transferring a word to the next line if it cannot be fully accommodated on one line.

Upon termination of message printing, the printer shall automatically provide sufficient multiplicity of line feed.

8.3.14 If a character is received in a mutilated form, the equipment shall print an asterisk.

8.3.15 Where the equipment comprises means for automatic retuning of the receiver's frequency, the universal coordinated time (UTC) clock shall be provided with an accuracy of ±1s, which shall be connected to a reprogrammable memory containing the frequency sequence and UTC broadcast schedules of all radio stations transmitting HF maritime safety information using NBDP.

9. EMERGENCY POSITION-INDICATING RADIO BEACON (EPIRB)

9.1 GENERAL

9.1.1 The emergency position indicating radio beacon (EPIRB) shall be automatically activated after floating free.

The EPIRB its mounting and releasing arrangements shall be reliable under extreme ship's conditions.

9.1.2 The EPIRB shall:

.1 be easily activated by unskilled personnel and transferred to the survival craft by one person;

.2 be fitted with adequate means to prevent inadvertent activation;

.3 be so designed that the electrical portions are watertight at a depth of 10 m for at least 5 min;

.4 be capable of withstanding temperature variation of 45 °C during its immersion.

The harmful effects of a marine environment, condensation and water leakage shall not affect the performance of the beacon;

.5 be capable of manual activation and manual deactivation;

.6 be provided with means to indicate that signals are being emitted;

.7 be capable of floating upright in calm water and have positive stability and sufficient buoyancy in all sea conditions;

.8 be capable of being dropped into the water without damage from a height of 20 m;

.9 be of highly visible yellow/orange colour and have a paint or stripes of retroreflecting material;

.10 be equipped with a buoyant lanyard suitable for use as a tether, which shall be so arranged and not attached to the ship's hull or EPIRB securing device as to prevent its being trapped in the ship's structure when floating free;

.11 be provided with a light (0,75 cd) automatically activated by darkness to indicate its position;

.12 be resistant to seawater and oil;

.13 be resistant to deterioration in prolonged exposure to sunlight.

9.1.3 The EPIRB shall be so designed as to operate under any of the following environmental conditions:

.1 ambient temperatures of —20 to +55 °C;

.2 icing;

.3 relative wind speeds up to 100 knot (51 m/s);

.4 after storage at temperatures between — 30 to + 70 °C.

9.1.4 The EPIRB shall be so constructed that it can be ready for the operation during at least one year without maintenance.

9.1.5 The installed EPIRB shall be designed to release itself and float free, when immersed to the depth of 4 m, at any angle of a list or trim.

9.1.6 The release and activation arrangements for EPIRB shall comply with the requirements of Section 13.

9.1.7 The installed EPIRB shall have local manual activation; remote activation may also be provided from the navigation bridge while the device is installed in the floatfree mounting.

9.1.8 Self-floating COSPAS-SARSAT satellite EPIRB shall be so designed as to be automatically activated when immersed to the water after being manually removed from the release mechanism; when manually activated it shall require two independent actions (refer to 1.2).

9.1.9 When the satellite EPIRB of the COSPAS-SARSAT and INMARSAT system is manually operated, a distress alert shall be initiated, as stated in 9.1.8, only by means of a dedicated distress alert activator and shall require two independent actions.

The dedicated activator shall be clearly identified and be protected against inadvertent operation.

The COSPAS-SARSAT satellite EPIRB shall not be automatically activated after being manually removed from the release mechanism.

9.1.10 For periodical testing of the EPIRB in action using an artificial aerial provision shall be made for connection to it of the external source of power.

9.1.11 The COSPAS-SARSAT satellite EPIRB shall:

.1 undergo annual overall operational efficiency testing with due regard to emission on working frequencies, encoding and recording within the following time limits:

on passenger ships — within 3 months before the expiry of validity of the Passenger Ship Safety Certificate;

on cargo ships — within 3 months before the expiry of validity of the Cargo Ship Safety Radio Certificate or within 3 months before or after annual expiry of validity of this Certificate.

The testing may be carried out on board or at the shore-based maintenance center recognized by the Register; and

.2 undergo maintenance and repair at the shore-based maintenance center recognized by the Register at least once every five years.

9.1.12 Primary batteries used as a source of electrical power for the EPIRB shall have the period of storage not less than 2 years and shall be replaced if on the date of survey of the shipboard radio equipment carried out by the Surveyor to the Register the period of their storage left is at least 12 months. Date of manufacture and maximum period of storage shall be indicated on the batteries.

9.1.13 In addition to 5.1.47, the following shall be clearly indicated on the exterior of the EPIRB:

.1 brief operating instructions in the English and in the national languages;

.2 expiry date for the primary battery stored;

.3 identification code;

.4 date of occasional shore-based maintenance;

.5 the ship's call signal.

9.2 COSPAS-SARSAT SATELLITE EMERGENCY POSITION-INDICATING RADIO BEACON

9.2.1 The satellite EPIRB shall be capable of transmitting a distress alert to

polar orbiting satellites.

9.2.2 Check of the EPIRB shall be provided without using the satellite system.

9.2.3 The satellite EPIRB distress alerting signal shall be transmitted on the frequency of 406,028 MHz ± kHz using GIB class of emission.

9.2.4 The satellite EPIRB shall be provided with a frequency of 121,5 MHz for aircraft homing.

The homing signal shall:

.1 be transmitted using class of emission. Carrier frequency shall be amplitude-modulated (minimum duty cycle of 33 per cent) with a minimum modulation index 0,85. The emission shall consist of a characteristic audio-frequency signal obtained by amplitude modulation of the carrier frequencies with a downward/ upward audio-frequency sweep within a range of not less than 700 Hz between 1600 Hz and 300 Hz and with a sweep repetition rate of 2 to 4 times per second;

.2 capacity of carrier frequency shall differ at least 30 per cent from that of sidebands and be within ± 30 Hz at any time;

.3 have an uninterruptible duty cycle which can be interrupted for 2 s maximum for the transmission of signal on 406,028 MHz.

9.2.5 Provisions shall be included for storing the fixed portion of the distress message in the satellite EPIRB using non-volatile memory.

9.2.6 A unique beacon identification code shall be made part of all messages, including three digits of the code of the country of registration followed by:

.1 a unique serial number; or

.2 a radio call sign; or

.3 six figures of the ship identity.

Preference shall be given to 9.2.6.3.

9.2.7 COSPAS-SARSAT satellite EPIRB, in addition to the requirements specified in the present Part of the Rules, shall comply with the COSPAS-SARSAT and be type approved by the COSPAS-SARSAT.

9.3 VHF EMERGENCY POSITION-INDICATING RADIO BEACON

9.3.1 The EPIRB shall be capable of transmitting a VHF distress alert and of providing a homing signal by means of a 9 GHz radar transponder. These two functions may be provided in an integral unit. The radar transponder shall comply with the requirements of 10.

9.3.2 The EPIRB shall be of an automatic, float-free type and shall be capable of being tested on board, without radiating an alerting signal.

9.3.3 The EPIRB shall comply with the following requirements:

.1 DSC distress alerting signal shall be transmitted on the frequency of 156,525 MHz using G2B class of emission;

.2 the frequency tolerance shall not exceed lO-lO^{-6};

.3 the bandwidth shall be less than 16 kHz;

.4 the output power shall be at least 100 mW;

.5 emission shall be vertically polarized;

.6 frequency modulation with a pre-emphasis characteristic of 6 dB/octave (phase modulation) with the modulating subcamer shall be used;

.7 a subcamer of 1700 Hz with frequency modulation between 1300 and 2100 Hz shall be used;

.8 the frequency tolerance of 1300 and 2100 Hz shall be within ±10 Hz;

.9 the modulation rate shall be 1200 Baud;

.10 the index of modulation shall be 2±10 per cent.

9.3.4 DSC format and sequence of DSC alerting shall comply with the following standards.

10. SHIP'S AND SURVIVAL CRAFT SEARCH AND RESCUE LOCATING DEVICE

10.1 SHIP'S AND SURVIVAL CRAFT RADAR SEARCH AND RESCUE TRANSPONDER (SART)

10.1.1

SART shall be capable of indicating the location of units in distress by transmitting signals which will appear on a radar display as a series of equally spaced dots.

10.1.2 SART shall:

.1 be capable of being easily activated by unskilled personnel;

.2 be fitted with means to prevent inadvertent activation;

.3 be equipped with a means which is either visual or audible, or both visual and audible, to indicate correct operation and to alert survivors to the fact that a radar has trigged the radar transponder;

.4 be capable of manual activation and deactivation; provision for automatic activation may be included.

If an on board test is performed using a shipbome 9 GHz radar, activation of the radar transponder shall be limited to a few seconds to avoid harmful interference to other shipborne or airborne radars and excessive consumption of source power;

.5 be provided with an indication of the stand-by condition;

.6 be capable of withstanding without damage drops from a height of 20 m into water;

.7 be watertight at a depth of 10 m for at least 5 min;

.8 maintain watertightness when subjected to a thermal shock of 45 °C under specified conditions of immersion;

.9 be capable of floating if it is not an integral part of the survival craft;

.10 be equipped with a buoyant lanyard, suitable for use as a tether, if it is capable of floating;

.11 be resistant to seawater and oil;

.12 be resistant to deterioration in prolonged exposure to sunlight;

.13 be of a highly visible yellow/orange colour on all surfaces where this will assist detection;

.14 have a smooth external construction to avoid damaging the survival craft.

10.1.3 SART shall be so designed as to be able to operate under temperatures of — 20 °C to + 55 °C. It shall not be damaged in storage throughout the temperature range of -30 °C to +65 °C C.

10.1.4 The height of the installed transponder antenna shall be at least 1 m above sea level.

10.1.5 Horizontal or pole polarization shall be used for transmission and reception.

10.1.6 SART shall operate correctly when interrogated at a distance of up to at least 5 miles by a navigational radar with an antenna height of 15 m.

It shall also operate correctly, when interrogated at a distance of not less than 30 miles by an airborne radar with at least 10 kW peak output power at a height of 1000 m.

10.1.7 In addition to 5.1.47, the following shall be clearly indicated on the exterior of SART:

.1 brief operating instructions;

.2 the ship's name and call sign;

.3 expiry date for storage of the primary battery used (refer to 9.1.12).

10.2 SHIP'S AND SURVIVAL CRAFT AIS SEARCH AND RESCUE TRANSMITTER (AIS-SART)

10.2.1 The AIS-SART shall be capable of transmitting messages that indicate the position, static and safety information of a unit in distress. The transmitted messages format shall be compatible with the format of existing AIS installations be recognized and displayed on operational display equipment (minimum displays), installed aboard the ships located in the reception range of AIS-SART.

The messages received from the AIS-SART and an AIS installation shall be clearly distinguishable.

10.2.2 Передавач AIC-САРТ для цілей пошуку і рятування повинний:

.1 The AIS-SART shall:

.1 be capable of being easily activated by unskilled personnel;

.2 be fitted with means to prevent inadvertent activation;

.3 be equipped with a means which is either visual or audible, or both visual and audible, to indicate correct operation;

.4 be capable of manual activation and deactivation; provision for automatic activation may be included;

.5 be capable of withstanding without damage drops from a height of 20 m into water;

.6 be watertight at a depth of 10 m for at least 5 min;

.7 maintain water tightness when subjected to a thermal shock of 45 °C under specified conditions of immersion;

.8 be capable of floating (not necessarily in an operating position) if it is not an integral part of the survival craft;

.9 be equipped with buoyant lanyard, suitable for use as a tether, if AIS-SART is capable of floating;

.10 not be unduly affected by seawater or oil;

.11 be resistant to deterioration in prolonged exposure to sunlight;

.12 be of a highly visible yellow/orange colour on all surfaces where this will assist detection;

.13 have a smooth external construction to avoid damaging the survival craft;

.14 be provided with an arrangement to bring the AIS-SART antenna to a level of at least 1 m above sea level, together with illustrated instructions;

.15 be capable of transmitting with a reporting interval of 1 min or less;

.16 equipped with an internal position source and be capable of transmitting its current position in each message;

.17 be capable of being tested for all functionalities using specific test information; and

.18 have unique identifier to ensure the integrity of VHF data link.

10.2.3 The AIS-SART shall be so designed as to be able to operate under ambient temperatures of —20 to + 55 °C. It shall not be damaged in stowage throughout the temperature range of — 30 to + 70 °C.

10.2.4 The AIS-SART shall be detectable at a range of not less than 5 miles.

10.2.5 The AIS-SART shall continue transmission even if the position and time synchronization from the navigational positioning system is lost or fails.

10.2.6 The AIS-SART shall transmit within 1 min of activation.

10.2.7 In addition to applicable requirements of 5.1.47, the following shall be clearly indicated on the exterior of the AIS-SART:

.1 brief operating and test instructions; and **.2** expiry date for the primary battery used (refer to 9.1.12).

11 PUBLIC ADDRESS SYSTEM

11.1 Public address system shall be capable of providing the possibility for transmitting the service orders from the command broadcast microphone posts to all service, accommodation and public spaces as well as to the open decks of the ship.

Public address system shall be capable of providing the possibility of interrupting any broadcasting from any command broadcast microphone post or the transmission of general radio broadcasting and sound-recording programs from the navigation bridge.

It is allowed to use the ship public address system for transmitting general radio broadcasting and sound-recording programs, if the priority of loud-speaking and command broadcasting is provided.

Automatic brake of transmitting general radio broadcasting and sound-recording programs shall be provided when ship's general alarm system is in operation.

11.2 For the transmission of the service orders all control of the public address system (switching on and off, commutation of the broadcasting relay lines, disconnection of programs and switching on a public address system) shall be carried out by remote control means directly from any of command broadcast microphone posts irrespective of the position of controls in all other command broadcast microphone posts.

11.3 The public address system shall be capable of being connected to at least three broadcasting lines.

11.4 The public address system shall include the main command microphone post intended for installation in the ship command broadcast centre, and at least two remote command broadcast microphone posts. The main command broadcast microphone post shall be provided with means for audio control of the quality of broadcast in each broadcasting line.

11.5 Every command broadcast microphone post shall be fitted with light signalling system which shall be switched on simultaneously with the starting of the public address system.

The diagram of the remote control switching system shall be as simple as possible, preferably, without using relays.

11.6 Loudspeakers installed in accommodation spaces of the ship shall be fitted with volume controls. Plugs are not allowed to be used.

12. SURVIVAL CRAFT RADIO EQUIPMENT

12.1 SURVIVAL CRAFT SEARCH AND RESCUE LOCATING DEVICES

12.1.1 Survival craft SART shall comply with the performance standards and functional requirements specified in 10.1.

12.1.2 Survival craft AIS-SART shall comply with the performance standards and functional requirements specified in 10.2.

12.2 TWO-WAY VHF RADIOTELEPHONE APPARATUS

12.2.1 The apparatus shall be capable of being used for on scene communi-

cation between survival craft, between survival craft and ship and between survival craft and rescue unit. It may also be used for on-board communications when capable of operating on appropriate frequencies.

12.2.2 The apparatus shall constitute an integral device and comprise at least the following:

.1 an integral transmitter/receiver including antenna and power source;

.2 a push-button control unit for receipt/transmission;

.3 an internal microphone and loudspeaker.

12.2.3 The apparatus shall:

.1 be capable of being operated by unskilled personnel;

.2 be capable of being operated by personnel wearing gloves, as specified for immersion suits in 6.4, Part II "Life-Saving Appliances";

.3 be capable of single-handed operation except for channel selection;

.4 withstand drops on to a hard surface from a height of 1 m;

.5 be watertight to a depth of 1 m for at least 5 min;

.6 maintain watertightness when subjected to a thermal shock of 45 °C under conditions of immersion;

.7 not be unduly affected by seawater or oil;

.8 have no sharp projections which could damage survival craft;

.9 be of small size and light weight;

.10 be capable of operating in the ambient noise level likely to be encountered on board ships or in survival craft;

.11 have provisions for its attachment to the clothing of the user and also be provided with a wrist or neck strap. For safety reasons, the strap shall include a suitable weak link;

.12 be resistant to deterioration by prolonged exposure to sunlight;

.13 be painted in highly visible yellow or orange colour or have an marking strip of yellow/orange colour around the apparatus.

12.2.4 The apparatus shall be capable of operation on the frequency 156,800 MHz (VHF channel 16) and on at least one additional channel.

12.2.5 Simplex radiotelephone channels shall be used in the apparatus.

12.2.6 The class of emission shall be G3E.

12.2.7 An on/off switch shall be provided with a visual indication that the radiotelephone is switched on.

12.2.8 The receiver shall be provided with a volume control.

12.2.9 A squelch (mute) control and a channel selection switch shall be provided.

12.2.10 Channel selection shall be easily performed and the channels shall be clearly discernible. Channel indication shall be in accordance with Appendix 18 of the Radio Regulations.

12.2.11 It shall be possible to determine that channel 16 has been selected in all ambient light conditions.

12.2.12 The apparatus shall be ready for operation not later than 5 s after activation.

12.2.13 The effective radiated power of transmitter shall be at least 0,25 W. Where the effective radiated power exceeds 1 W, a power reduction switch to reduce the power to 1 W or less is required. When this equipment provides for on-board communications, the output power of transmitter shall not exceed 1 W.

12.2.14 The sensitivity of the receiver shall be equal to or better than 2 uV e.m.f for a SINAD ratio of 12 dB at the output. The immunity to interference of the receiver shall be such that the unwanted signals do not effect adversely the wanted signal.

12.2.15 The antenna shall be vertically polarized and, as far as practicable, be omnidirectional in the horizontal plane.

12.2.16 The audio output shall be sufficient to be heard in the ambient noise level likely to be encountered on board ships or in a survival craft.

12.2.17 In the transmit condition, the output of the receiver shall be muted.

12.2.18 The apparatus shall be so designed as to operate over the temperature range —20 to +55 °C and in storage throughout the temperature range -30 to +70 °C.

12.2.19 The source of electrical power shall be integrated in the apparatus. A provision shall be made to replace the source of electrical power during operation of the apparatus. In addition, provision may be made to operate the apparatus using an external source of electrical power.

12.2.20 Two-way VHF radiotelephone apparatus, in which the source of electrical power shall be replaced during operation, shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a non-replaceable seal to indicate that it has not been used.

VHF apparatus, in which a replacement of the source of power is not needed during operation, shall be provided with a primary battery. VHF apparatus shall be fitted with a non-replaceable seal to indicate that it has not been used.

Primary power supply battery shall have the period of storage at least 2 years. The battery shall be marked with the manufacture date and maximum storage period. Primary power supply battery in the event of a distress situation shall be of colour or marking in compliance with 12.2.3.13.

Battery not intended for the use in the event of a distress situation shall be of colour or marking so that they can not be confused with batteries intended for such use.

12.2.21 In addition to 5.1.47, the following shall be clearly indicated on the exterior of the apparatus:

.1 brief operating instructions;

.2 the ship's name; and

.3 expiry date for the primary batteries stored.

12.3 FIXED TWO-WAY VHF RADIOTELEPHONE APPARATUS

12.3.1 Fixed VHF apparatus shall be capable of being used for on-scene communication between survival craft, between survival craft and ship and between survival craft and rescue unit.

12.3.2 Fixed VHF apparatus shall comprise the following:

.1 transmitter/receiver;

.2 antenna which may be fitted on the equipment or isolated;

.3 a microphone with press-to-talk switch and loudspeaker.

12.3.3 VHF apparatus shall:

.1 be capable of being operated by unskilled personnel;

.2 be capable of being operated by personnel wearing gloves provided for immersion suits in 6.4 of Part II "Life-Saving Appliances";

.3 withstand shocks and vibration as might occur in survival craft;

.4 be watertight to a depth of 1 m for at least 5 min;

.5 maintain watertightness when subjected to a thermal shock of 45 °C under conditions of immersion;

.6 not be unduly affected by seawater or oil;

.7 have no sharp projections which could lead to personnel injury;

.8 be capable of operating in the ambient noise level likely to be encountered in survival craft;

.9 be so designed as to provide its quick installation in survival craft.

12.3.4 VHF apparatus shall be capable of operation on the frequency of 156,8 MHz (channel 16) and on at least one additional channel.

12.3.5 Simplex radiotelephone channels shall be used in VHF apparatus.

12.3.6 The class of emission of VHF apparatus shall be G3E.

12.3.7 An on/off switch shall be provided with a visual indication that the radiotelephone is switched on.

12.3.8 The receiver shall be provided with a volume control. If microphone is used, volume control shall not affect the output power of a microphone.

12.3.9 A squelch (mute) control and a channel selection switch shall be provided.

12.3.10 Channel selection shall be easily performed and the channels shall be clearly discernible. Channel indication shall be in accordance with Appendix 18 of the Radio Regulations.

123.11 It shall be possible to determine that channel 16 has been selected in all ambient light conditions.

12.3.12 VHF apparatus shall be ready for operation not later than 5 s after activation.

12.3.13 The effective radiated power of transmitter shall be at least 0,25 W. Where the effective radiated power exceeds 1 W, a power reduction switch to

reduce the power to 1 W or less is required. When this equipment provides for on-board communications, the output power of transmitter shall not exceed 1 W.

12.3.14 The sensitivity of the receiver shall be equal to or better than 2 mkV e.m.f for a SINAD ratio of 12 dB at the output. The immunity to interference of the receiver shall be such that the unwanted signals do not affect adversely the wanted signal.

12.3.15 The antenna shall be vertically polarized and, as far as practicable, be omnidirectional in the horizontal plane.

12.3.16 The audio output shall be sufficient to be heard in the ambient noise level likely to be encountered on board ships or in a survival craft.

12.3.17 In the transmit condition, the output of the receiver shall be muted.

12.3.18 VHF apparatus shall be so designed as to operate over the temperature range — 20 to + 55 °C and in storage throughout the temperature range -30 to +70 °C.

12.3.19 The source of electrical power shall be integrated in the apparatus. A provision shall be made to replace the source of electrical power during operation of the apparatus. In addition, provision may be made to operate the apparatus using an external source of electrical power.

12.3.20 Fixed two-way VHF radiotelephone apparatus in which the source of electrical power shall be replaced during operation, shall be provided with a dedicated primary battery for use in the event of a distress situation. This battery shall be equipped with a nonreplaceable seal to indicate that it has not been used.

VHF apparatus, in which a replacement of the source of power is not needed during operation, shall be provided with a primary battery. VHF apparatus shall be fitted with a non-replaceable seal to indicate that it has not been used.

Primary power supply batteries shall have the period of storage of at least 2 years. The batteries shall be marked with the manufacture date and maximum storage period. Primary power supply batteries intended for the use in the event of distress shall be of colour or marking in compliance with 12.2.3.13.

Battery not intended for the use in the event of a distress situation shall be of colour or marking so that they can not be confused with batteries intended for such use.

12.3.21 In addition to 5.1.47, the following shall be clearly indicated on the exterior of the apparatus:

.1 brief operating instructions;

.2 the ship's name; and

.3 expiry date for the primary batteries stored.

13. FLOAT-FREE RELEASE AND ACTIVATION ARRANGEMENTS FOR EMERGENCY RADIO EQUIPMENT

13.1 GENERAL

13.1.1 Float-free release and activation arrangements enable the automatic release of emergency radio equipment from a sinking ship and its automatic activation.

13.1.2 The arrangement shall:

.1 be designed so that the release mechanism shall operate before reaching a depth of 4 m in any orientation of the ship;

.2 be capable of operating throughout the temperature range of — 30 to + 70 °C;

.3 be constructed of non-corrosive compatible materials, so as to prevent any deterioration which may cause malfunction of the unit. Galvanizing or other forms of metallic coating on parts of the float-free release mechanism shall not be accepted;

.4 be constructed to prevent release when seas wash over the unit;

.5 not be unduly affected by seawater and oil or prolonged exposure to sunlight;

.6 be capable of operating properly after exposure to shock, vibration and other severe environmental conditions encountered above deck on seagoing vessels;

.7 if the ship navigates in areas where icing may be expected, be so designed as to minimize the formation of ice and prevent its effects from hindering the release of the radio equipment as far as practicable;

.8 be mounted in such a way that the radio equipment, after being released, is not obstructed by the structure of the sinking ship;

.9 carry a label indicating clearly the operating instructions for manual release.

13.1.3 For radio equipment requiring external power or data connection, or both, the means of connection shall not inhibit the release or activation of the radio apparatus.

13.1.4 It shall be possible to assess the proper functioning of the automatic release mechanism by a simple method without activation of the radio equipment.

13.1.5 It shall be possible to release the radio equipment manually from the float-free mechanism.

13.1.6 The float-free release and activation arrangements for emergency radio equipment shall be marked on the exterior with the manufacturer's name, date of manufacture, type and serial number, as well as the date of next checking or expiration of service life.

ANNEX 1

INFORMATION FOR DETERMINATION OF AREAS OF NAVIGATION

Sea area Al is that sea area which is within a circle of radius "A", in miles, over which the radio propagation path lies substantially over the water surface. The radius "A" is equal to the transmission distance between a ship's VHF aerial at a height of 4 m and the aerial of the VHF coast station which lies at the centre of the circle.

The following formula shall be used to calculate the range "A":

$$A = 2{,}5(\sqrt{H} + \sqrt{h}),$$

where H = the height of installing the coast station receiving aerial above sea level, m; h = the height of installing the ship's transmitting aerial above waterline which is assumed to be 4 m.

The formula applies to line-of-sight cases only. The range of sea area Al shall be plotted on navigational charts and verified by field strength measurements.

Sea area A2 is that sea area which is within a circle of radius "B", in miles, over which the propagation path lies substantially over the water surface and which is not part of sea area Al.

The centre of the circle is the position of the coast station receiving aerial.

The range of sea area A2 shall be plotted on navigational charts and verified by field strength measurements under the following conditions:

Frequency 2182 kHz	
Class of emission J3E	
Bandwidth	3 kHz
Propagation	Groundwave
Season	Summer
Peak power of ship's transmitter	60 W
Ship's aerial efficiency	25%
S/N(RF)	9dB
Mean transmitter power	8 dB below peak power
Fading margin	3 dB

Sea area A3 is the area which is not part of any sea area Al or A2 within which the elevation angle of an INMARSAT satellite is 5 degrees or more.

Sea area A4 is the sea area which is not part of any sea area Al, A2 or A3.

PART V. NAVIGATIONAL EQUIPMENT

1. GENERAL

1.1 APPLICATION

1.1.1 The requirements of the present Part apply to ships constructed on or after 1 July 2002 whose navigational equipment is subject to survey by the Register, as well as to items of the above equipment intended for installation in these ships. The requirements of 5.7 of the present Part of the Rules apply to radars installed on or after 1 July 2008.

The requirements of 5.15 of the present Part apply to electronic chart display and information systems installed on or after 1 January 2009.

The requirements of the present Part apply to ships of less than 150 gross tonnage engaged in any voyages, to ships of less than 500 gross tonnage not engaged in international voyages, and to fishing vessels unless the Administration whose flag the ship is flying has decided otherwise to fit these categories of ships with navigational equipment.

1.1.2 Ships constructed before 1 July 2002 shall comply with the requirements of Part V of the Rules in force prior to 1 July 2002[1], and the requirements of 1.1.3 to 1.1.5 of the present Part.

These ships flying the flag of Ukraine: fishing and, with a gross tonnage of less than 150, engaged in any voyagess, and less than 500, which are not engaged in international voyages, not fishing, including berth-connected and non-self-propelled ships, shall in addition to Rules[1] comply with the requirements of the orders No. 107 and No. 912 (see the introduction, Part V, item 11), which is not taken into account in the Rules[1].

1.1.3[1] Ships constructed before 1 July 2002 shall be fitted with a radionavigation system or systems receiver complying with the requirements of 5.11 and suitable for use at all times in the ship's service area to establish and update the ship's position by automatic means, not later than the first survey after 1 July 2002.

1.1.4 All passenger ships irrespective of size and ships of 300 gross tonnage and upwards engaged in international voyages and constructed before 1 July 2002 shall be fitted with an automatic identification system (AIS), as follows:

in the case of passenger ships, not later than 1 July 2003;

in the case of tankers[2], not later than first survey of equipment and

[1] After fulfilling the requirements of 1.1.3, the direction finder is not needed.

outfit on or after 1 July 2003;

in the case of ships, other than passenger ships and tankers, of 50000 gross tonnage and upwards, not later than 1 July 2004;

in the case of ships, other than passenger ships and tankers, of 300 gross tonnage and upwards but less than 50000 gross tonnage, not later than first survey of equipment and outfit on or after 1 July 2004 or 31 December 2004, whichever is earlier;

All passenger ships irrespective of size and cargo ships, including tankers, of 500 gross tonnage and upwards not engaged in international voyages and constructed before 1 July 2002 shall be fitted with an automatic identification system (AIS) not later than 1 July 2008.

1.1.5 Passenger ships, engaged in international voyages, constructed before 1 July 2002 shall be fitted with a voyage data recorder (VDR) as follows:

ro-ro passenger ships not later than the first survey on or after 1 July 2002;

passenger ships other than ro-ro passenger ships not later than 1 January 2004.

Cargo ships, including tankers, engaged in international voyages and constructed before 1 July 2002 shall be fitted with a simplified voyage data recorder (S-VDR) as follows:

ships of 20000 gross tonnage and upwards, during first planned docking after 1 July 2006, but not later than 1 July 2009;

ships of 3000 gross tonnage and upwards but less than 20000 gross tonnage, during first planned docking after 1 July 2007, but not later than 1 July 2010.

1.1.6 Passenger ships, including high-speed passenger craft, irrespective of their size, and cargo ships, including high-speed craft, of 300 gross tonnage and upwards engaged in international voyages constructed on or after 31 December 2008 shall be fitted with a system of long range identification and tracking of ships (LRIT).

Passenger ships, including high-speed passenger craft, irrespective of their size, and cargo ships, including high-speed craft, of 300 gross tonnage and upwards engaged in international voyages constructed before 31 December 2008 and certified for operations in sea areas Al and A2 or in sea areas Al, A2, A3 shall be fitted with a LRIT system equipment not later than the first survey of the radio installation after 31 December 2008.

Passenger ships, including high-speed passenger craft, irrespective of

their size, and cargo ships, including high-speed craft, of 300 gross tonnage and upwards engaged in international voyages constructed before 31 December 2008 and certified for operations in sea areas Al, A2, A3 and A4 shall be fitted with a LRIT system equipment not later than the first survey of the radio installation after 1 July 2009. However, whilst these ships operate within sea areas Al, A2, A3 and A4, a LRIT system equipment shall be fitted on them not later than the first survey of the radio installation after 31 December 2008.

Ships, irrespective of the date of construction, fitted with an automatic identification system (AIS), and operated exclusively within sea area Al, shall not be required to comply with the provision of this regulation.

1.1.7 The present Part of the Rules specifies the requirements which navigational equipment shall comply with, as well as defines the compartments in which navigational equipment shall be located and the number of navigational instruments, appliances and devices and their arrangement aboard ship.

1.1.8 The requirements of the present Part also apply to ships under construction and in service irrespective of their dimensions, gross tonnage and date of construction whose equipment on the navigation bridge permits to ensure safe navigation by one man and for which distinguishing mark **NAV-1** has been introduced in accordance with 2.2.7 of Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships.

1.1.9 A rigidly connected composite unit of a pushing vessel and associated pushed vessel, when designed as a dedicated and integrated tug and barge combination, shall be regarded as a single ship for the purpose of the present Part.

1.1.10 Passenger sea and mixed (sea-river) navigation ships engaged in domestic voyages (sea cabotage), unrestricted and restricted areas of navigation **A, A-R1, A-R2, A-R2-RSN, B- R3-RSN, C- R3-RSN** and **D-R3**, when applying to them the requirements of this part of the Rules, are considered as such that shall meet the requirements of Chapter V, SOLAS 1974 in its modern version (engaged in international voyages). The provisions of Rule V / 12, Directive 96/98 / EC (Rules 19 and 20, Chapter V, SOLAS 1974) shall apply to the navigation equipment of these ships that is intended for use at sea. Navigation equipment that is intended for use at sea, as specified in Annex A (1) of Directive 96/98 / EC, and in accordance with the provisions of the latter, is considered as conforming to type approval requirements under rule V / 12 (r) (Rule 18, Chapter V,

SOLAS).

1.1.11 Confirmation of a passenger ship with a sign **A**, **A-R1**, **A-R2**, **A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN** and **D-R3** in the ship's class notation compliance with provisions of Council Directive 98/18 / EC of 17 March 1998 on safety rules and standards for passenger ships of inland (sea cabotage) navigation shall be done according to the requirements of 2.6.1 "Confirmation of compliance with the European Council Directive" of General activities on technical supervision with application to ships of special requirements of part V "Navigation Equipment" hereof, depending on the sign, as to new (constructed on July 1, 1998 and thereafter) or existing (constructed before 1 July 1998 .) ship, namely:

- new and existing ships with a sign **B-R3-RSN, C-R3-RSN** and **D-R3** *(on the date of the first periodic survey after July 1, 1998)* - 5.24.

1.2 DEFINITIONS AND EXPLANATIONS

1.2.1 Terms, definitions and explanations in relation to the general terminology of the Rules are given in Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships and in Part 1.2 of the "Regulations on Supervision" of these Rules.

1.2.2 The following definitions have been adopted for the purpose of the present Part:

Automatic Identification System (AIS) – is a marine navigation system including a ship (universal ship's transponder) and shore (radio equipment for seas) units and using radio communication between the ship and the ship traffic control service to transmit information about the ship, navigation parameters, cargo, voyage for monitoring ships at sea, and extending the area of ships traffic control service, performing the function of automatic dependent control.

Receiver autonomous integrity monitoring is a method or an algorithm by means of which all the information acquired by the receiving part of the radio navigational system(s) is automatically processed to control the integrity of the navigation signals.

Activation of an AIS target is activation of a sleeping AIS target for the display of additional graphical and alphanumerical information.

Activated AIS target is a target representing the automatic or manual activation of a sleeping target for the display of additional

graphically presented information.

A l m a n a c is a set of parameters of the navigation system satellites on the orbit.

D i s p l a y b a s e means the level of SENC information which cannot be removed from the display, consisting of information which is required at all times in all geographic areas and all circumstances. It is not intended to be sufficient for safe navigat.

W a t c h o f f i c e r is any person who is responsible for safe navigation, navigates, manoeuvres the ship and operates bridge equipment until he is relieved by another officer.

R e l a t i v e s p e e d is a speed of a target relative to own ship's speed data.

R e l a t i v e c o u r s e is a direction of motion of a target relative to own ship's direction.

R e l a t i v e b e a r i n g is a direction of a target position from own ship's reference location expressed as an angular displacement from own ship's heading.

D i s p l a y i n g means reproducing information from a navigational device, appliance or system on a display or other indicating device.

R o u t e m o n i t o r i n g means actions on navigation control along the pre-planned route.

R a d i a t e d i n t e r f e r e n c e means interference radiated by the casings of equipment (apart from direct radiation of aerials).

M a i n c o n n i n g p o s i t i o n means a workstation or the navigation bridge providing the watch officer with a commanding view and equipped with everything necessary for ship's manoeuvring and control.

D e p t h means the vertical distance from a sea level to the bottom.

W a t c h o f f i c e r f i t n e s s means an ability of any person keeping watch to perform his duties unassisted and to the full extent, and timely respond to all alarms/warnings and fitness verification signals as well.

D i s p l a y is the electronic means presenting visual information in the letter, digital or graphical form.

D_{ap}/ T_{ap} is distance to the closest point of approach/time to the closest point of approach. Limits are set by the radar operator related to own ship.

E l e c t r o n i c c h a r t d i s p l a y a n d i n f o r m a t i o n s y s t e m (E C D I S) means a system which with adequate backup arrangements can be accepted as complying with the uptodate chart, by displaying selected information from a system electronic navigational chart (SENC)

with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and, if required, display additional navigation related information.

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 officer. The ENC contains all the chart information necessary for safe navigation and may contain additional navigational information.

Target's predicted motion is the indication on a display of a liner extrapolation into the future of a target's motion based on measurements of the target's range and bearing in the recent past.

Lost target is a target representing the last valid position of a target before its data was lost. The target is displayed by a "lost target" symbol.

Totally enclosed bridge is a bridge without bridge wings, with the breadth of the wheelhouse equal to or exceeding the ship's breadth.

Voyage data recorder (VDR) means an appliance intended for collecting, recording and storage of voyage data and comprising: means for information encoding and recording, means for interfacing to data sensors, final recording medium placed in its capsule, ship's source of electrical power supply and built-in reserve power source.

Means ofdata presentation is a display or another indicator which comprises an integral part of navigational equipment system and provides for presentation of the navigation-related information.

Acquisition is the selection of those targets requiring a tracking procedure and the initiation of their tracking.

Acquisition of a radar target is a process of acquiring a target and initiating its tracking.

Field of vision is the horizontal angle within which no obstructions interfere in an observation of environment from a workstation on the navigation bridge.

Suppressed area is an area set by operator within which targets are not acquired.

Acquisition/activation zone is a zone set by operator in which the system shall automatically acquire radar targets and activate AIS targets.

Depth contour is a contour line connecting points of equal

water depths on a chart.

True course is a direction of motion relative to ground or to sea, of a target expressed as an angular displacement from north.

True bearing is a direction of a target from own ship's reference location or from another target's position expressed as an angular displacement from true north.

True motion is combination of true course and true speed.

True speed is a speed of a target relative to ground or to sea.

Conducted interference means interference from equipment at the electric power supply terminals.

Standard magnetic compass is a magnetic compass independent of any ship source of electrical power to determine the ship's heading and display the reading at the main steering position.

Spare magnetic compass is a stand-by magnetic compass to perform the function of the standard magnetic compass and interc hangeable with it.

Bridge wings are those parts of the bridge on both sides of th e ship's wheelhouse which, in general, extend to the ship's side.

Heading is the direction in which the bow of a ship is p ointing
expressed as an angular displacement from 0° to 360° from north.

Target bearing is the direction of a target from own ship's co nsistent common reference point measured as an angular displacem ent from 0° to 180° on starboard or portside, between the fore part of the longitudinal axis of the ship and the target direction.

Homing is manoeuvring to steer the ship for the course, corresponding to the bearing for the given target, and keeping it to that course.

Navigation is the process of deciding, executing and maintaining course and speed of the ship in relation to waters and traffic while moving from one place to another.

Navigational equipment means the ship facilities with which the ship is equipped for taking decisions on the navigational tasks.

Navigational appliance means the ship facility intended for taking decisions on one or more navigational tasks.

Navigational instrument means the ship's navigational device intended for manual operation while taking decisions on the navigational tasks.

Navigational device means a device intended to execute some functions on measuring navigational parameters as well as

processing, storage, transmission, displaying and recording of the data while taking decisions on the navigational tasks on board the ship.

T a n k e r – for the purposes of the present Part, is an oil tan ker, oil tanker (>60°C), oil tanker (>55°C), oil recovery vessel, oi l recovery vessel (>60°C), gas carrier[1], chemical tanker[1], combination c arrier, whose definitions are given in Part I "Classification" of the Rules for the Classification and Construction of Sea-Going Ships.

D a n g e r o u s t a r g e t is a target with a predicted CPA and TCPA that violates the values preset by the operator which is displayed by the relevant symbol (refer to column "Description" of Table 5.7.58-3).

N o r m a l c o n d i t i o n s (for NAV-1 ships) means a situation when ail systems and equipment on the navigation bridge operate within design limits, and environmental conditions such as weather and traffic do not cause excessive workload to the officer of the watch.

D a t a m e d i u m is a means for data storage and reading using appropriate equipment.

S e l e c t e d t a r g e t is a target selected manually for the display of detailed alphanumeric information in a separate data display area. The target is displayed by a "selected target" symbol.

O b s e r v a t i o n means a determination of the ship's position by measuring several navigational parameters.

P a s t p o s i t i o n s is equally time-spaced past position ma rks of a tracked radar target or activated AIS target and own ship. T he past positions' track may be either relative or true.

S l e e p i n g A I S t a r g e t is a target indicating the presence and orientation of a vessel equipped with AIS in a certain location. The target is displayed by a "sleeping target" symbol. No additional information is presented until activated.

T a r g e t s w a p is a situation in which the incoming radar data for a tracked target becomes incorrectly associated with another tracked target or a non-tracked radar echo.

R o u t e p l a n n i n g means actions performed while planning a route or making decisions on attendant navigational tasks.

C o n s i s t e n t C o m m o n R e f e r e n c e P o i n t is a location on own ship, to which all horizontal measurements such as target range, bearing, relative course, relative speed, closest point of approach (CPA) or time to closest point of approach (TCPA) are referenced, typically the conning position of the bridge.

T r i a l m a n o e u v r e is the facility used to assist the operator to perform a proposed manoeuvre for navigation and collision avoidance purposes, by displaying the predicted future status of all tracked and AIS targets as a result of own ship's simulated manoeuvres.

T r a n s m i t t i n g h e a d i n g d e v i c e is an electronic means to receive heading information from the sensor and to transmit it to other navigational equipment.

T r a n s m i t t i n g m a g n e t i c c o u r s e d e v i c e is an electronic means to receive magnetic course information and to transmit it to other navigational equipment.

D e s k means a device combining control, monitoring, data displaying and communication facilities necessary to carry out one or several tasks at a particular workstation.

R a d a r p l o t t i n g is the whole process of target detection, tracking, calculation of parameters and display of information.

R a d a r t a r g e t is any object fixed or moving whose position and motion are determined by successive radar measurements of range and bearing.

R a s t e r c h a r t d i s p l a y a n d i n f o r m a t i o n s y s t e m (RCDIS) means an operational mode of the electronic chart display and information system, which provides display of the raster navigational chart (RNC) and information on ships position from navigation sensors to assist the mariner in route planning and route monitoring, and, if required, display of additional navigation related information.

R a s t e r n a v i g a t i o n a l c h a r t (RNC) means facsimile copy of a paper chart or chart folio prepared and distributed by authorized hydrographic office.

B a c k - u p o f f i c e r means any person who is to be called if assistance is needed on the navigation bridge.

O p e r a t i o n a l d i s p l a y a r e a is an area of the display used to graphically present chart and/or radar information , excluding the areas allocated to present other information.

W o r k s t a t i o n means a position on fhe navigation bridge having the relevant equipment where the watch officer as well as the master or pilot carry out one or several tasks.

W h e e l h o u s e is the enclosed area of the navigation bridge where the main conning position of the ship is located.

W a t c h a l a r m means an alarm that is transferred from the navigation bridge to the master and the back-up officer in case of the watch

officer unfitness.

System raster navigational chart (SRNC) means a database incorporating: RNC databases, updates and additional navigational information.

The sound reception system (SRS) means a system capable of receiving outside sound signals from all directions in the audio band 70 Hz to 820 Hz, of reproducing those signals acoustically inside the wheelhouse indicating therewith the direction of the sound signals source.

System Electronic Navigational Chart (SENC) is a database, in the manufacturer's internal ECDIS format, resulting from the lossless transformation of the entire ENC contents and its updates. It is this database that is accessed by ECDIS for the display generation and other navigational functions, and is equivalent to an up-to-date paper chart. The SENC may also contain information added by the mariner and information from other sources.

Lookout is one of basic duties of the watch officer carried out by sight and hearing as well as by all available equipment so as to mak? a full appraisal of the situation and of the risk of collision.

Simplified voyage data recorder (S-VDR) means an appliance, including means for interfacing with the sources of input data, for processing and encoding the data, the final recording medium; the ship's power supply source and built-in reserve power source.

Sea stabilization is the display mode in which speed and course information are referred to the sea, using gyro and water speed log input as reference.

Ground stabilization is the display mode in which speed and course information are referred to the ground, using EPFS as reference.

Standard display is the level of information that shall be shown when a chart is first displayed on ECDIS. The level of the information it provides for route planning or route monitoring may be modified by the mariner according to the mariner's needs.

Steady state tracking is a tracking a target, proceeding at steady motion:
after completing of the acquisition process, or
without a manoeuvre of target or own ship, or
without target swap or any disturbance.

S h i p s c o n s t r u c t e d is definition given in 1.2, Part IV "Radio Equipment" of the Rules.

NAV-1 s h i p means the one man bridge operated ship.

T r a c k i n g is the process of observing the sequential changes in the position of a target to establish the parameters of its motion.

T a r g e t ' s m o t i o n t r e n d is the indication on a display with permissible errors of a linear extrapolation into the future of a target's motion in a minute after tracking initiation.

G e n e r a l i z e d d i s p l a y means overlapped reproducing on a display of information from several navigational devices or systems.

N a v i g a t i o n b r i d g e means an area from which the navigation and control of the ship are exercised, including the wheelhouse and bridge wings.

T i m e o f i m a g e r e c o n s t r u c t i o n o n t h e ECDIS d i s p l a y means the time interval between moments of image reconstruction starting and new image generation completing.

I n t e g r i t y is an ability of a radionavigational system to give a timely warning about the impossibility of using the system for the purpose of navigation.

A I S t a r g e t is a target generated from an AIS message.

T i m e o f i m a g e r e g e n e r a t i o n o n t h e E C D I S d i s p l a y means the time interval between moments of operator's appropriate actions executing and subsequent reconstruction completing.

T r u n k f o r l o g a n d/o r e c h o s o u n d e r is a special watertight compartment in the ship's hull below waterline provided with a watertight closure.

W a y p o i n t means a point on the pre-set ship's track whose symbol and co-ordinates are entered in a control program.

N a v i g a t o r (o p e r a t o r) is a specially trained person navigating and manoeuvring the ship using bridge equipment.

NAV-1 is a distinguishing mark for class notation, which means a control of a ship by one officer on a bridge.

1.3 SCOPE OF SURVEY

1.3.1 General provisions regarding the procedure of survey of navigational equipment, as well as the requirements for technical documentation to be submitted to the Register for consideration, and indication of documents on navigational equipment issued by the Register are specified in General Regulations for the Classification and Other Activity, in 4.2.5.5

and 4.3.4.5, Part I “Classification” of the Rules for Classification and Construction of Ships and Part I "Survey Regulations" of the Rules.

1.3.2 The Register carries out technical supervision during design and survey during manufacture, installation and operation of the following shipboard navigational equipment:

.1 standard, spare and lifeboat magnetic compasses, including those with distant reading systems;

.2 transmitting heading devices;

.3 gyrocompasses;

.4 gyromagnetic compasses and gyroazimuths;

.5 logs (water speed, bottom speed);

.6 echo sounders;

.7 rate-of-turn indicators;

.8 radars, including those with electronic plotting aids (EPA), automatic tracking aids (ATA) and automatic radar plotting aids (ARPA);

.9 radar reflectors;

.10 radiobeacon stations;

.11 various radionavigation system receivers;

.12 ship control desks;

.13 integrated navigation systems;

.14 unified ship's timing systems;

.15 electronic chart display and information systems (ECDIS) and their electronic duplication means;

.16 ship's heading control systems;

.17 ship's track control systems;

.18 apparatus of automatic identification system (AIS);

.19 outside sound signal reception system;

.20 voyage data recorders/simplified voyage data recorders; (VDR/S-VDR);

.21 bridge navigational watch alarm system (BNWAS);

.22 other not listed above navigational systems, equipment and devices, upon the Register request.

1.3.3 The technical requirements for navigational instruments and devices, their placement and installation on a ship not specified in this part of the Rules, as well as the scope of supervision of these instruments and devices in each case is subject to special consideration by the Register.

The navigational appliances and devices indicated in items 20–28 of

Table 2.2.1 are subject to the Register survey only in the form of checking their availability on board the ship.

1.3.4 Activity of the Register concerning navigation equipment.

1.3.4.1 Technical supervision by the Register during design and survey during manufacture of shipborne navigational equipment covers the following:

.1 review of technical documentation for navigational equipment;

.2 review of the programme and procedure of the prototype model factory tests;

.3 survey during the prototype model factory tests;

.4 review of the programme and procedure of the prototype model shipboard tests;

.5 survey during the prototype model shipboard tests;

.6 review of technical documentation reflecting changes made based on results of factory and shipboard tests of the prototype model;

.7 survey during manufacture of series of navigational equipment.

1.3.4.2 The technical documentation for navigational equipment submitted to the Register for review shall contain (where applicable) the following information:

.1 technical description;

.2 block diagram;

.3 general view drawing;

.4 installation manual and installation drawing;

.5 list of spare parts;

.6 test program.

The specified technical documentation shall be provided in at least two copies.

1.3.4.3 The prototype model of navigational equipment developed and manufactured in compliance with the technical documentation shall be subjected to factory and shipboard tests for the purpose of verifying the performance characteristics being in compliance with the Register Rules and technical documentation. The tests shall be carried out under the Register technical supervision.

On completion of factory and shipboard tests of the navigational equipment prototype model, the test reports and records as well as photos of new navigational equipment shall be submitted to the Register. All these materials are kept at the Register and they serve as the basis for concluding whether this navigational equipment may be applied on ships with the relevant documents being issued.

1.3.5 After installation on board ship, all navigational equipment shall be properly adjusted and subject to survey, tests in operation and electromagnetic compatibility tests.

After installation of new navigational equipment or renewal of outdated (which became inoperative and is not subject to repair) on ships in service the technical design of the installation and working drawings shall be submitted to the Register prior to commencement of survey of this equipment.

Upon approval of the technical design and working drawings the navigational equipment installed shall be surveyed on board ship and tested in operation.

On ships under construction tests of navigational equipment under operating conditions and electromagnetic compatibility tests of all radio and navigational equipment, fitted on the bridge or in the vicinity of the bridge, are conducted during mooring and sea trials in compliance with the programs approved by the Register.

1.3.6 The approval of equipment developed without survey by the Register may be given after detailed review of technical documentation (description, diagrams, test records, etc.) and carrying out the appropriate tests in compliance with the requirements of the present Part.

1.3.7 Technical documentation for NAV-1 ships.

1.3.7.1 Before the beginning of the construction

or conversion of a ship the following technical documentation shall be submitted to the Register for review:

.1 deck plan of the navigation bridge indicating the arrangement of the relevant equipment.

The plans shall show the dimensions of the wheelhouse as well as the arrangement, sizes and angles of inclination of the windows and spacing between them, the bridge wings and entrances to the wheelhouse;

.2 arrangement plan of consoles, front panels and their configuration with indication of all instruments and devices;

.3 drawing of workstations with indication of the equipment located there.

The drawings shall show the blind zones as well as horizontal and vertical field of vision from the workstation. The vertical field of vision shall be shown for the ship in ballast;

.4 arrangement plan of the equipment which is functionally connected with the navigation bridge but located outside its boundaries;

.5 arrangement plan of aerials and radio equipment;

.6 for systems on a computer basis the following shall be rprovided:

description of the computer system;

block diagram of the computer, reflecting connections with sensors, controls, panels, display, etc .;

accuracy of analog measurements;

description of the computer self-monitoring system;

description of work in an emergency.

For computer systems, failure of which can affect the safety of navigation, for which a reservation is necessary, in addition to the above, the following shall be submitted:

description of documentation procedures,

description of computer graphics,

description of procedures for allocating responsibilities between different control stations,

description of the test program;

.7 drawing of the navigation bridge communication system with accommodation and service spaces and of a signaling system;

.8 drawing of power supply of the whole equipment located on navigation bridge;

.9 drawing of the system used for calling the back-up officer and/or ship's master;

.10 specifications of the integrated navigation system;

.11 drawing of the BNWAS;

.12 list of equipment installed on the navigation bridge with indication of the information regarding the manufacturer, model type, valid Register's Type Approval Certificate, as well as safe distances to the magnetic compass.

1.3.8 Every ship shall be permanently provided with the following technical documentation:

.1 description and maintenance instructions for each kind of navigational equipment in Ukrainian/Russian or in English;

.2 circuit diagrams of the navigational equipment, corrected in accordance with all alterations made in the process of operation;

.3 the document issued by a firm authorized by the manufacturer or recognized by the Register confirming completion of the radar installation in full accordance with the manufacturer's technical documentation and design approved by the Register. This document shall contain the following information:

about blind sectors and possible performance limitations;

about radar means of interface with other systems and about displacement of the consistent common reference point.

2. NAVIGATIONAL EQUIPMENT OF SELF-PROPELLED SEA-GOING SHIPS

2.1 DIVISION OF SHIPS INTO GROUPS

2.1.1 For the purpose of the present Part all self-propelled ships are grouped according to their gross tonnage (refer to Tables 2.2.1-1 and 2.2.1-2).

2.1.2 For the purpose of the present Part special purpose ships are referred to as passenger ships.

2.2 СКЛАД НАВІГАЦІЙНОГО ОБЛАДНАННЯ

2.2.1 Navigational devices, appliances and instruments which shall be installed on board ship or with which the ship shall be supplied shall be provided depending on the gross tonnage of the ship, area of navigation and ship's purpose in accordance with Table 2.2.1-1.

The set of navigation devices, appliances and instruments that shall be installed on a ship under the Flag of Ukraine or which shall be provided by a ship under the Flag of Ukraine, taking into account the decisions taken by the Administration of Ukraine, is determined depending on its gross tonnage taking into account the areas of navigation and the purpose of the ship according to Table 2.2.1-2.

The definitions of the areas of navigation are given in 1.2, Part I "Survey Regulations".

2.2.2 In addition to the requirement of 2.2.1, it is recommended that ships shall be fitted with:

.1 a unified timing system;

.2 an integrated navigation system (in the case of ships of more than 10000 gross tonnage);

.3 rate-of-turn indicator (in the case of ships with the navigation bridge located forward as ships provided with an integrated navigation system);

.4 radiobeacon station (in the case of ships with helicopter equipment);

.5 electronic chart display information system (ECDIS).

2.2.3 The composition of navigational equipment of a special design

ships, not stipulated in the Rules for certain types of ships, is in each case subject to special consideration by the Register.

2.2.4 Navigational equipment as required in Tables 2.2.1-1 and 2.2.1-2 may be replaced by any recently invented, designed or modified equipment, provided it is equivalent in respect of its application, has the required or better operational and technical characteristics and is approved by the Register.

Table 2.2.1-1

Nos	Navigation equipment	Number of items for ships of gross tonnage							Remarks
		<150	≥150	≥300	≥500	≥3000	≥1000	≥5000	
1	2	3	4	5	6	7	8	9	10
1	Standard magnetic compass [2]	1	1	1	1	1	1	1	The compass shall be complete with a bearing device independent of any power supply to take bearings over an arc of the horizon of 360°
2	Spare magnetic compass	1[1]	1	1	1	1	1	1	Shall be interchangeable with the standard magnetic compass. Not required where complete doubling of standard magnetic compass is provided (refer to Note 6)
3	Radionavigation system/systems receiver [3]	1	1	1	1	1	1	1	The ship's position shall be established by automatic means
4	Radar[4] with:	1[1]	1[1]	1	1	2	2	2	One radar shall be

.1	electronic plotting aid (EPA)	1[1]	1[1]	1	–	–	–	–	a 9 GHz radar (wave length of 3 cm)
.2	automatic tracking aid (ATA)	–	–	–	1	2	1	1	
.3	automatic radar plotting aid (ARPA)	–	–	–	–	–	1	1	
5	Simplified voyage data recorder (S-VDR)	–	–	–	–	1[6]	1[6]	1[6]	–
6	Transmitting heading device [7,5]	1[1]	1[1]	1	–	–	–	–	
7	Rate of turn indicator	–	–	–	–	–	–	1	

Continue of Table2.2.1-1

1	2	3	4	5	6	7	8	9	10
8	Gyrocompass [8]	–	–	–	1	1	1	1	[9]The gyrocompass shall be complete with a repeater (repeaters) to take bearings over an arc of horizon of 360°
9	Echo sounder	1[1]	1[1]	1	1	1	1	1	
10	Speed and distance measuring device through the water (log)	1[1]	1[1]	1	1	1	1	1	Shall measure speed and the distance run through the water
11	Speed and distance measuring device over the ground (absolute log)[1 10]	–	–	–	–	–	–	1	Shall measure speed and the distance run over the ground in the forward and

									athwartship directions
12	Automatic identifications system (AIS)	1[1]	1[1]	1[11]	1	1	1	1	–
13	Heading or track control system	–	–	–	–	–	1	1	–
14	Sound reception system	1	1	1	1	1	1	1	Required in ships with totally enclosed navigation bridge and **NAV-1** ships
15	Voyage data recorder (VDR)[12]	–	–	–	–	1	1	1	Not required on ships not engaged in international voyages
16	Electronic chart display and information system (ECDIS)[13]	1	1	1	1	1	1	1	Back-up arrangements shall be provided in accordance with 5.15.90 to 5.15.107
17	Equipment of long range identification and tracking system (LRTT system)[18]	1[1]	1[1]	1	1	1	1	1	Not required on ships not engaged in international voyages
18	Indicators of:								The indicators shall be readable from the conning position
.1	rudder angle	–	–	–	1	1	1	1	
.2	propeller revolutions, the force and direction of thrust	–	–	–	1	1	1	1	

Continue of Table2.2.1-1

1	2	3	4	5	6	7	8	9	10
.3	pitch and operational mode of controllable pitch	–	–	–	1	1	1	1	

	propeller(s)[14]								
.4	force and direction of lateral thrust of the thruster(s)[15]	–	–	–	1	1	1	1	
19	Radar reflector [16]	1[17]	–	–	–	–	–	–	–
20	Hand lead, set	1	1	1	1	1	1	1	–
21	Navigational sextant	1	1	1	1	1	1	2	
22	Marine chronometer [19]	1	1	1	1	1	1	1	–
23	Stopwatch[19]	1[1]	1	1	2	3	3	3	–
24	Star globe or any equivalent instrument[20]	–	–	–	1	1	1	1	–
25	Prismatic binocular	1	1	1	2	3	4	4	–
26	Anemometer	1	1	1	2	2	2	2	Not required in ships of restricted area of navigation **R3**
27	Aneroid barometer	1	1	2	2	2	2	2	Not required in ships of restricted area of navigation **R3**
28	Inclinometer	1	1	1	2	2	2	2	–

[1]Including passenger ships irrespective of size.

[2]Remote transmission of the standard magnetic compass dial readings to the principal steering position is required.

[3]The radionavigation system used (global navigation satellite system or terrestrial radionavigation system) shall be available for use at all times throughout the intended voyage.

[4]Where two radars are required, they shall operate independently of one another.

[5]Provision shall be made for transmitting heading information for input to the equipment referred to in items 4, 4.1, 12 of the Table.

[6]Not required on ships constructed on or after 1 July 2002 (refer to 1.1.5 of this Part)

[7]Not required provided the ship is fitted with a gyrocompass to transmit heading information for input to the equipment referred to in items

4, 4.1, 12 of the Table.

[8]Provision shall be made for transmitting heading information for input to the equipment referred to in items 4, 4.2, 4.3, 12 of the Table, and for supplying heading information visually at the emergency steering position. The heading information shall be supplied visually at the emergency steering position by a gyrocompass repeater.

[9] Required in ships of less than 1600 gross tonnage as far as practicable.

[10] Measurement and indication of speed and distance relative to the ground shall be provided in the longitudinal and transverse directions.

[11]Not required in cargo ships not engaged in international voyages.

[12] Passenger ships irrespective of size shall be fitted with a voyage data recorder irrespective of the tonnage.

[13] ECDIS system is not required provided corrected paper nautical charts are available on board to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage.

[14] To be fitted where controllable pitch propeller(s) is/are provided.

[15] To be fitted where thruster(s) is/are provided.

[16] Not required where the ship's effective echoing area is sufficient to enable detection by radar at 9 GHz and 3 GHz (corresponding to a wave length of 3 and 10 cm, respectively).

[17] The provisions for the equipment are set out in Part III "Signal Means".

[18]Ships, equipped with automatic identification system equipment and intended for operation exclusively within the sea area A1, regardless of the date of their construction, are exempted from installation of LRIT system.

[19] Not required on ships navigating within 20 miles from shore.

[20] Required only on ships of unrestricted area of navigation **A**, restricted areas of navigation **R1** and **A-R1,** and **M** and **MR1** (small craft).

N o t e: 1. Non-self-propelled ships intended for being towed and pushed at sea, as well as for long period anchorage outside the port aquatorium or the roadstead and having people on board shall be provided with binoculars, hand lead and inclinometer.

2. The ships of river-sea navigation (marks for restricted areas of navigation in the character of classification of a ship are **R2-RSN** i **R3-RSN**, **A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN**), engaged on inland waterways

voyages shall be fitted with the additional radar meeting the requirements in 5.7.31. The additional radar is not required in case the radar ultimately complying with the requirements of 5.7 is installed on board such ships.

3. On ships with a gross tonnage of up to 3000, a second radar with a minimum working area diameter not less than required in 5.7.2 is permissible

4. In ships fitted with a radar with a plotting aid (EPA, ATA or ARPA) and/or a track control system, a speed and distance measuring device through the water (log) shall be provided.

5. In ships of 500 gross tonnage and upwards but less than 10000 constructed before 1 September 1984 no log is required, provided it has not been fitted according to the ship design during construction of the ship.

6. On ships contracted for construction on or after 1 January 2007, gyrocompass which shall be supplied from the main and emergency source of electrical power as well as from the transitional source of power which may be an accumulator battery may be used as a spare magnetic compass. In this case such gyrocompass cannot be considered as required by item 7 of the present Table for ships of 500 gross tonnage and more.

Table 2.2.1-2

Nos	Navigation equipment	Number of items for ships of gross tonnage							Remarks
		<150	≥150	≥300	≥500	≥3000	≥1000	≥5000	
1	2	3	4	5	6	7	8	9	10
1	Standard magnetic compass[2]	1	1	1	1	1	1	1	The compass shall be complete with a bearing device independent of any power supply to take bearings over an arc of the horizon of 360°
2	Spare magnetic compass	1[21]	1	1	1	1	1	1	Shall be interchangeable with the standard

									magnetic compass. Not required where complete doubling of standard magnetic compass is provided (refer to Note 6)
3	Radionavigation system/systems receiver [3]	1	1	1	1	1	1	1	The ship's position shall be established by automatic means
4	Radar[4] with:	1[22]	1[23]	1	1	2	2	2	One radar shall be a 9 GHz radar (wave length of 3 cm)
.1	electronic plotting aid (EPA)	1[21]	1[21]	1	–	–	–	–	
.2	automatic tracking aid (ATA)	–	–	–	1	2	1	1	
.3	automatic radar plotting aid (ARPA)	–	–	–	–	–	1	1	
5	Simplified voyage data recorder (S-VDR)	–	–	–	–	1[6]	1[6]	1[6]	–
6	Transmitting heading device [7,5]	–	1[1]	1	–	–	–	–	Refer to Note 7
7	Rate of turn indicator[24]	–	–	–	–	–	–	1	–
8	Gyrocompass [8]	–	–	–	1	1	1	1	The gyrocompass shall be complete with a repeater (repeaters) to take bearings over an arc of horizon of 360°
9	Echo sounder	1[21]	1[21]	1	1	1	1	1	
10	Speed and distance measuring device through the water	1[21]	1[21]	1	1	1	1	1	Shall measure speed and the distance run

	(log)								through the water
11	Speed and distance measuring device over the ground (absolute log)[1 10]	–	–	–	–	–	–	1	Shall measure speed and the distance run over the ground in the forward and athwartship directions
12	Automatic identifications system (AIS)	1[11]	1[11]	1[11]	1	1	1	1	–
13	Heading or track control system[24]	–	–	–	–	–	1	1	–
14	Sound reception system	1	1	1	1	1	1	1	Required in ships[25] with totally enclosed navigation bridge and **NAV-1** ships
15	Voyage data recorder (VDR)[12]	–	–	–	–	1	1	1	Not required on ships not engaged in international voyages
16	Electronic chart display and information system (ECDIS)[13]	–	1	1	1	1	1	1	Back-up arrangements shall be provided in accordance with 5.15.90 to 5.15.107
17	Equipment of long range identification and tracking system (LRTT system)[18]	–	1[1]	1	1	1	1	1	Not required on ships not engaged in international voyages
18	Indicators of:								The indicators shall be readable from the conning position
.1	rudder angle	–	–	–	1	1	1	1	
.2	propeller revolutions, the force and direction	–	–	–	1	1	1	1	

	of thrust								
.3	pitch and operational mode of controllable pitch propeller(s)[14]	–	–	–	1	1	1	1	
.4	force and direction of lateral thrust of the thruster(s)[15]	–	–	–	1	1	1	1	
19	Radar reflector [16]	1[17]	–	–	–	–	–	–	–
20	Hand lead, set	1	1	1	1	1	1	1	–
21	Navigational sextant	1	1	1	1	1	1	2	
22	Marine chronometer [19]	1	1	1	1	1	1	2	–
23	Stopwatch[19]	–	1	1	2	3	3	3	–
24	Star globe or any equivalent instrument[20]	–	1	1	1	1	1	1	–
25	Prismatic binocular	1	1	1	2	3	4	4	–
26	Anemometer	1	1	1	2	2	2	2	Not required in ships of restricted area of navigation **R3**
27	Aneroid barometer	1	1	1	2	2	2	2	Not required in ships of restricted area of navigation **R3**
28	Inclinometer	1	1	1	2	2	2	2	–

[1]Including passenger ships irrespective of size.

[2]Standard magnetic compass readings shall be fully transmitted to the main steering post. For ships other than fishing vessels, with a gross tonnage of up to 150, with a gross tonnage of up to 300, not engaged in international voyages, and a gross tonnage of 300 or more that navigate in the port waters, a road magnetic compass may be used.

[3]The radionavigation system used (global navigation satellite system or terrestrial radionavigation system) shall be available for use at all times throughout the intended voyage.

[4]Where two radars are required, they shall operate independently of one another.

[5]Provision shall be made for transmitting heading information for input to the equipment referred to in items 4, 4.1, 12 of the Table.

[6]Not required on ships constructed on or after 1 July 2002 (refer to 1.1.5 of this Part)

[7]Not required provided the ship is fitted with a gyrocompass to transmit heading information for input to the equipment referred to in items 4, 4.1, 12 of the Table.

[8]Provision shall be made for transmitting heading information for input to the equipment referred to in items 4, 4.2, 4.3, 12 of the Table, and for supplying heading information visually at the emergency steering position. The heading information shall be supplied visually at the emergency steering position by a gyrocompass repeater.

[9]Required in ships of less than 1600 gross tonnage as far as practicable.

[10] Measurement and indication of speed and distance relative to the ground shall be provided in the longitudinal and transverse directions.

[11]A-class AIS equipment. On ships not engaged in international voyages, with a gross tonnage of less than 300 and, except passenger and ships carrying dangerous goods, ships of 300 gross tonnage and upwards, but less than 500, AIS Class B equipment is permitted. For fishing vessels it is required only for ships with a gross tonnage of 300 or more engaged in international voyages.

[12]Passenger vessels engaged in international voyages with a gross tonnage of 150 or more shall be equipped with a voyage data recording device (VDR). Fishing vessels with a gross tonnage of 3,000 or more, built on or after July 1, 2002, shall be equipped with VDR regardless of performing international or coastal voyagess.

[13] ECDIS system is not required provided corrected paper nautical charts are available on board to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage. For fishing vessels regardless of gross tonnage, ECDIS is recommended for international voyages.

[14] To be fitted where controllable pitch propeller(s) is/are provided.

[15] To be fitted where thruster(s) is/are provided.

[16] Not required where the ship's effective echoing area is sufficient to enable detection by radar at 9 GHz and 3 GHz (corresponding to a wave length of 3 and 10 cm, respectively).

[17] The provisions for the equipment are set out in Part III "Signal

Means".

[18]Ships, equipped with automatic identification system equipment and intended for operation exclusively within the sea area A1, regardless of the date of their construction, are exempted from installation of LRIT system.

[19] Not required on ships navigating within 20 miles from shore.

[20] Required only on ships of unrestricted area of navigation **A**, restricted areas of navigation **R1** and **A-R1,** and **M** and **MR1** (small craft).

[21] Required for passenger ships and ships carrying dangerous goods.

[22] Required for passenger ships and ships carrying dangerous goods, tugs, pilot boats.

[23] Required for passenger ships and ships not engaged in international voyages: transporting dangerous goods, tugs, pilot boats, as well as fishing fleet vessels.

[24] Not required for fishing vessels.

[25] Including fishing vessels with a gross tonnage of less than 150, by agreement with Ukrderzhrybgospom.

N o t e: 1. Non-self-propelled ships intended for being towed and pushed at sea, as well as for long period anchorage outside the port aquatorium or the roadstead and having people on board shall be provided with binoculars, hand lead and inclinometer.

2. The ships of river-sea navigation (marks for restricted areas of navigation in the character of classification of a ship are **R2-RSN** і **R3-RSN**, **A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN**), engaged on inland waterways voyages shall be fitted with the additional radar meeting the requirements in 5.7.31. The additional radar is not required in case the radar ultimately complying with the requirements of 5.7 is installed on board such ships.

3. On ships with a gross tonnage of up to 3000, a second radar with a minimum working area diameter not less than required in 5.7.2 is permissible.

4. In ships fitted with a radar with a plotting aid (EPA, ATA or ARPA) and/or a track control system, a speed and distance measuring device through the water (log) shall be provided.

5. In ships of 500 gross tonnage and upwards but less than 10000 constructed before 1 September 1984 no log is required, provided it has not been fitted according to the ship design during construction of the ship.

6. On ships contracted for construction on or after 1 January 2007, gyrocompass which shall be supplied from the main and emergency

source of electrical power as well as from the transitional source of power which may be an accumulator battery may be used as a spare magnetic compass. In this case such gyrocompass cannot be considered as required by item 7 of the present Table for ships of 500 gross tonnage and more.

7. For passenger ships with a gross tonnage of ≥150 but <300 is required in the case of international voyages

2.2.5 Navigational equipment in excess of that required by the present Part may be installed on board ship as additional equipment, provided its arrangement and operation do not interfere with the normal use of required navigational devices and instruments, influence the readings thereof and diminish safety of navigation.

The navigational equipment fitted on board ship additionally to the mandatory equipment specified in Table 2.2.1 shall be of the type approved by the Register and meet the performance requirements imposed upon the mandatory equipment**.**

2.2.6 Where a speed and distance measuring device over the ground (absolute log) is fitted in a ship, it shall comply with the requirements of 5.4.

2.3 SOURCES OF POWER

2.3.1 All navigational equipment installed on board ship shall be provided with power supply from the main and emergency sources of electrical power.

2.3.2 The switchboard of navigational equipment shall be supplied from the main and emergency switchboards by two independent feeders (see Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships).

2.3.3 Power supply for the ship navigational equipment shall be provided in accordance with the requirements in Table 2.3.3.

It is recommended to provide a continuous power supply device on board to ensure operational integrity of navigational equipment and safety of navigational information in case the main and emergency sources of electrical power are out of order or for the time required to change over from the main source of electrical power to the emergency source or vice versa. In this case, audible alarm and visual indication shall be provided at the position from which the ship is normally navigated to indicate the change-over to the source of continuous power supply. It shall not be possible to disable this alarm and indication. Both the alarm condition and indication shall reset automatically when the ship's supply has been

restored. Provision shall be made for the manual acknowledgement of audible alarm.

Table 2.3.3

Nos.	Navigational equipment	Source of energy	Minimum number of hours[5]
1	2	3	4
1	Magnetic compass (standard and spare)	Main and emergency sources of electrical power (power supply from emergency source of electrical power may be substituted by that from accumulator batteries)	6
2	Gyrocompass	Main and emergency sources of electrical power	–
3	Log	Main and emergency sources of electrical power	–
4	Rate-of-tum indicator	Main and emergency sources of electrical power	–
5	Echo sounder	Main and emergency sources of electrical power	–
6	Radar	Main and emergency sources of electrical power	–
7	Automatic radar plotting aids	Main and emergency sources of electrical power	–
8	Radionavigation system receivers[1]	Main and emergency sources of electrical power (power supply from emergency source of electrical power may be substituted by that from accumulator batteries)	1
9	Unified timing system	Main sources of electrical power	–
10	Radiobeacon station	Main and emergency sources of electrical power (power supply from emergency source of electrical power may be substituted by that from accumulator batteries)	6
11	Electronic chart display and	Main and emergency sources of electrical power	–

	information system		
12	Back-up electronic chart display and information system	Main and emergency sources of electrical power	–
13	Sound reception system	Main and emergency sources of electrical power	–
14	Voyage data registrator, simplified voyage data recorder	Main and emergency sources of electrical power, accumulator batteries (integrated)[2]	2
15	Apparatus of the ship automatic identification system	Main and emergency sources of electrical power	–[3]
16	Heading control system	Main sources of electrical power	–
17	Ship's track control system	Main sources of electrical power	–
18	Transmitting heading device	Main and emergency sources of electrical power	–
19	Equipment of long range identification and tracking system (LRIT system)	Main and emergency sources of electrical power [4]	–

[1] Radio navigation system receivers used for automatic input into GMDSS radio installations of data concerning ship's position and time when it was fixed shall be also supplied from the reserve source of electrical power required by 2.3.3, Part IV “Radio Equipment”.

[2] In VDR/S-VDR provision shall be made for an automatic charging device to maintain the accumulator batteries in charged condition and to enable recharging of the completely discharged batteries during 10 h after the power supply of the VDR from the main source of electrical power has been restored.

[3] Where on ships constructed before 1 July 2002 an accumulator battery is an emergency source of electrical power, the capacity of this

battery shall be sufficient to provide operation during at least one hour.

[4] Refer also to 5.23.3.5.

[5] Minimum number of hours of continuous operation of equipment used for calculating the capacity of accumulator batteries.

2.3.4 All electrically operated navigational devices and instruments (except gyrocompasses and heading or track control systems) shall be supplied by separate feeders from one common switchboard of navigational equipment.

The gyrocompass shall be powered in accordance with 3.7.2.3.

Heading control system and track control system shall be supplied under 5.5.14, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

2.3.5 Where any kinds of navigational equipment are designed for being fed from various primary currents or various primary voltages, such equipment is exceptionally allowed to be fed from other switchboards, provided they are located close to the principal switchboard of the navigational equipment.

2.3.6 If any kinds of navigational equipment are fed from additional switchboards, such switchboards shall get the supply from the corresponding sources of power through separate feeders.

2.3.7 The switchboard (switchboards) of navigational equipment shall be provided with switches and fuses or with circuit-breakers. These devices shall be fitted in circuits leading to each kind of navigational equipment.

Connecting of consumers not associated with navigational equipment to the navigational equipment switchboard is not allowed.

2.3.8 Every accumulator battery, the use of which is allowed for supply of several consumers, shall have a capacity required in Table 2.3.3 which is sufficient for continuous and simultaneous operation of all consumers connected to it without recharging.

2.3.9 For NAV-1 ships:

.1 the radio and navigational equipment shall be sup-plied from the ship's mains in compliance with the requi-rements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships;

.2 the switchboards of radio and navigational equipment shall be supplied from the main and emergency switchboards by two independent

feeders equipped with automatic switch in case of stopping the power supply from the main switchboard. In this case, audible and visual alarms shall be operated;

.3 where computerized equipment are interconnected through a computer network, failure of this network shall not prevent individual equipment from performing their functions.

.4 bridge navigational watch alarm system (BNWAS) shall be supplied from the navigational equipment switchboard. Means of indication of power failure and malfunction, as well as means of immediate alarm of the second and third level for an emergency call of the backup officer and/or the master of the ship shall be powered by a battery for at least 1 hour.

2.4 AERIALS

2.4.1 In every ship there shall be erected some types of aerials which provide operation of the following navigational equipment:

.1 radar;

.2 radionavigation system receivers;

.3 radiobeacon station (where required);

.4 ship automatic identification system (AIS).

2.5 SPARE PARTS AND SUPPLY

2.5.1 Every ship of more than 500 gross tonnage and passenger ship of more than 300 gross tonnage shall be supplied with minimum amount of spare parts, portable measuring instruments, tools and materials assigned for normal operation of navigational equipment installed in these ships.

2.5.2 The composition and quantity of spare parts, portable measuring instruments, tools and materials is in each case subject to special consideration by the Register.

2.6 MAINTENANCE OF AND REPAIRS TO NAVIGATIONAL EQUIPMENT

2.6.1 Maintenance of and repairs to the shipborne navigational equipment shall be provided to ensure its working ability.

2.6.2 The manner of navigational equipment technical servicing and of making repairs to it shall be chosen by the Shipowner and agreed with

the Register.

2.6.3 The firms providing technical servicing and repairs to the navigational equipment shall be recognized by the Register for performing such task.

3. SPACES INTENDED FOR INSTALLATION OF NAVIGATIONAL EQUIPMENT. ARRANGEMENT OF NAVIGATIONAL EQUIPMENT AND CABLING

3.1 GENERAL

3.1.1 Every ship to be fitted with the navigational equipment shall be provided with the following spaces:

.1 wheelhouse and chartroom (combined or separated);

.2 spaces intended for installation of individual units of navigational equipment (generator room and/or operating room) — unless provision is made for fitting all navigational equipment directly on the bridge;

.3 accumulator battery room;

.4 compartment for installation of master gyro-compas (unless provision is made for installing the master gyrocompass in the wheelhouse);

.5 trunk for log and/or echo sounder.

3.1.2 All spaces intended for installation of the navigational equipment shall be provided with electrical lighting, heating (with the exception of trunk for log and/or echo sounder) and the plug sockets shall be fitted therein.

3.1.3 Navigational devices, appliances, cables and other equipment fitted on the navigation bridge shall be so arranged that the magnetic fields produced by such equipment shall not distort the magnetic compass readings by more than ±0,5°.

3.1.4 On passenger ships, navigational equipment shall be so arranged as to meet the requirements of 2.2.6 - 2.2.8, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships, which stipulate that this equipment shall remain operable in case of fire or flooding of any watertight compartment to ensure safety of navigation when the ship is on its way back to a port.

3.2 NAVIGATION BRIDGE[2]

3.2.1 Design of the navigation bridge and arrangement of the

[2] The requirements of 3.2.3 to 3.2.14 are applicable to ships with overall length 55 m and more constructed on 1 July 1998 or after this date. The requirements of 3.2.3 to 3.2.14 are

equipment thereon shall be such as to ensure the possibility of effective steering of the ship and to comply with the applicable requirements of the Appendix to this Part.

3.2.2 The navigation bridge shall be located above all deck constructions which are at the level of the freeboard deck or higher with exception of smoke funnels.

3.2.3 The view of the sea surface from the conning position shall not be obscured by more than two ship's lengths or 500 m, whichever is less, forward of the bow to 10° on either side under all conditions of draught, trim and deck cargo.

The maximum and minimum values of the forward and aft draught at which the present visibility requirement fails to be fulfilled shall be entered in the Stability Information in accordance with 3.4.1.6.4 of Appendix 1 to Part IV "Stability" of the Rules for the Classification and Construction of Sea-Going Ships.

3.2.4 Blind sectors, caused by cargo, cargo gear or other obstructions outside of the wheelhouse which obstruct the view of the sea surface ahead (in 180° sector) of the ship as seen from the conning position shall not exceed 10° each. The total blind sector of the obstructed view shall not exceed 20°. The clear sectors between blind sectors shall be at least 5°. However, in the view described in 3.2.3, each individual sector shall not exceed 5°.

3.2.5 The lower edge of the navigation bridge front windows shall be as low as possible for not to obstruct to the forward view.

The height of the desks arranged immediately adjacent to the fore bulkhead of wheelhouse shall not exceed 1300 mm.

3.2.6 The upper edge of the navigation bridge front windows shall be at a height not less than 2000 mm above the deck surface to provide a forward view from the conning position for a person with a height of eye of 1800 mm, when the ship is pitching up to 10°.

In ships where the forward view in the centreline is obstructed by masts, cranes and other deck structures, two additional positions giving a clear view ahead shall be provided, one on the port side and one on the

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applicable as far as practicable and expedient to ships with overall length less than 55 m. Ships of unconventional design, which on the opinion of the Flag State Administration cannot meet the requirements of 3.2.3 to 3.2.14 shall be provided with measures and arrangements to achieve a level of visibility from the bridge that is as near as practical to those requirements.

starboard side of the centreline, no more than 5 m apart.

3.2.7 The horizontal field of vision from the conning position shall be provided over an arc of at least 225°, that is from right ahead to not less than 22,5° abaft the beam on either side of the ship.

3.2.8 From each bridge wing the horizontal field of vision shall be provided over an arc of not less than 225°, that is from at least 45° on the opposite bow through right ahead and then from right ahead to right astern through 180° on the same side of the ship.

3.2.9 From the main steering position the horizontal field of vision shall be provided over an arc from right ahead to at least 60° on each side of the ship.

3.2.10 The ship's side shall be visible from the bridge wing.

The use of a remote camera system may be accepted for ships of unconventional design as means for achieving the view of the ship's side from the bridge wing, provided the above system meets the following requirements.

3.2.10.1 The installed remote camera system shall be redundant from the circuit breaker to the camera and screen, including communication cables, i.e. the system shall provide on each side of the ship redundancy of:

.1 power cables and automatic circuit breakers from the main switchboard to the camera and the screen;

.2 camera;

.3 screen;

.4 transmission lines from the camera to the display screen;

.5 components associated with these lines and cables.

3.2.10.2 The remote camera system is powered from the ship's main source of electrical power and is not required to be powered by the emergency source of electrical power.

3.2.10.3 The remote camera system is capable of continuous operation under environmental conditions as per 5.1 of the present Part.

3.2.10.4 The view provided by the remote camera system is regarded sufficient for the purpose and is also displayed at locations where the manoeuvering of the ship may take place.

3.2.10.5 The upper edge of the ship's side abeam shall be viewed visually from all locations where the manoeuvering of the ship may take place.

The solution on the permissibility of the use of remote camera system is accepted by the Flag State Administration (national authority).

3.2.11 Number of framings between navigation bridge windows shall be minimum and they shall not be installed immediately forward of workstation of watch officer assistant and helmsman.

3.2.12 For avoiding reflections the bridge front windows shall be inclined from the vertical plane top out, at an angle of not less than 10° and not more than 25°.

It is recommended that bridge rear and side windows shall be inclined in a similar manner (with the exception of doors).

3.2.13 Polarized and tinted glass for windows shall not be fitted.

To ensure a clear view in bright sunshine, it is recommended that removable sunscreens with minimum colour distortion shall be provided.

3.2.14 At all times regardless of weather condition, at least two of the navigation bridge front windows shall provide a clear view and depending on the bridge configuration, an additional number of windows shall be fitted with means of effective cleaning, anti-icing and anti-fogging devices.

3.2.15 The arrangement of navigational equipment in the wheelhouse and their design shall provide the possibility to effect steering of the ship under all operating conditions including emergency conditions.

3.2.16 Some navigational devices, instruments and ship manoeuvring control desks may be installed on navigation bridge wings.

3.2.17 Provision shall be made for free passage of not less than 1200 mm in width from one navigation bridge wing to the other.

3.2.18 The distance from the fore bulkhead of the wheelhouse to any control desk or device (instrument) located on the navigation bridge shall be not less than 800 mm. The distance between two desks shall be not less than 700 mm.

The combined ship control desk may be installed close to the fore bulkhead of the wheelhouse.

With any of the above arrangements of the desk provision shall be made for observation of the environmental conditions through the windows of the wheelhouse.

The requirements of this paragraph are applicable, as far as practicable and expedient, to the ships of less than 1600 gross tonnage.

3.2.19 The clear height between the bridge deck surface covering and the underside of the deck head beams shall be at least 2250 mm. The lower edge of deckhead mounted equipment shall be at least 2100 mm above the deck in open areas, passageways and at standing workstations.

3.2.20 All navigational information shall be presented to the operator in the interpreted and processed form so that he could save time for taking measures.

It is recommended that the integrated electronic indicators of navigational information be used.

3.2.21 Navigational devices and instruments used for direct steering control of the ship or connected with the controls shall be such that displayed data could be read at a distance not less than 1000 mm under all operating conditions.

All other devices and instruments located on the navigation bridge shall be such that their indications could be read at a distance not less than 2000 mm under normal lighting.

3.2.22 General requirements to the NAV-1 ship's navigation bridge.

3.2.22.1 The bridge configuration, the arrangement of consoles and equipment location shall enable the watch officer to perform its duties from one or several workstations.

3.2.22.2 The main conning position of the ship shall be arranged in a way to enable the ship's control and manoeuvring, and a proper lookout by one person under normal operating conditions.

All relevant instrumentation and controls shall be easily visible, audible and accessible from the watch officer workstation.

3.2.22.3 The field of vision from the ship's main conning position shall be such as to enable observation of all objects which may influence the ship's safety.

The main workstation on the navigation bridge shall have the field of vision according to the requirements in 3.2.3, 3.2.4, 3.2.7 and 3.2.9.

3.2.22.4 To perform one or several auxiliary functions, other workstations may be arranged on the navigation bridge. The field of vision from these workstations shall also comply with the foregoing.

3.2.22.5 The bridge layout design and workstations shall provide the coordinated performance of two people if needed under operational conditions.

3.2.22.6 External sound signals, that are audible on the open deck, shall also be audible inside the wheelhouse. For this purpose, the sound reception system complying with the requirements of 5.19 shall be installed aboard.

3.2.22.7 The navigation bridge and its equipment design shall comply with the requirements providing the watch officer with a safe

performance of its duties related to the ship's control. For this purpose:

.1 instruments and equipment shall not have sharp edges, corners and protuberances;

.2 hand-rails shall be fitted inside of the wheel-house and around consoles;

.3 the deck in the wheelhouse shall have anti-slip coating;

.4 doors to the bridge wings shall be easy to open, close and secure at the opened and closed positions;

.5 chairs at the navigation bridge workstations shall be movable, adjusted by height and secured on a deck at the set place.

3.2.23 NAV-1 ship's navigation bridge equipment.

3.2.23.1 The instrumentation and controls at the ship's main conning position shall be arranged to enable the watch navigator to:

.1 determine and plot the ship's position, course and speed;

.2 analyse the traffic situation in the water area;

.3 decide on collision avoidance manoeuvres;

.4 alter course;

.5 change speed;

.6 effect internal and external communications related to manoeuvring including communication on the VHF;

.7 give sound signals;

.8 hear sound signals being in the wheelhouse;

.9 monitor course, speed, track, propeller revolutions (pitch), rudder angle and depth of water;

.10 timely record voyage data.

3.2.23.2 The following equipment shall be installed on the navigation bridge of **NAV-1** ships. The following equipment shall be installed on the navigation bridge of:

.1 radar equipment which shall give warning on emergence of a dangerous target with a lead of 6 to 30 min depending on the permissible time of closing to a minimum distance;

.2 ship's heading and/or track control system giving alarm when the ship deviates from the pre-set course or track for a value exceeding the limits. An alarm shall be given by a device which is independent from a control system;

.3 pre-warning system to give a signal at the approach of the next waypoint (when following the planned track);

.4 alarm system to give a signal when approaching dangerous

soundings (the water depth beneath the ship is less than a predetermined value) or boundaries of a zone prohibited for ship's navigation;

.5 two independent electronic position fixing systems capable of a passing determination in data processed and of a warning alarm generation in case of a malfunction or failure of either system;

.6 electronic chart display and information system (ECDIS);

.7 voyage data recorder;

.8 automatic identification system;

.9 two independent radars; one of them shall operate within 3 cm range;

.10 magnetic compass;

.11 gyrocompass (repeater);

.12 log (repeater);

.13 echo sounder;

.14 propulsion plant remote control system;

.15 whistle control device;

.16 window wipe and wash control device;

.17 main workstation console lighting control device;

.18 steering gear pump selector/control switches;

.19 internal communication system;

.20 radio equipment in accordance with 2.2, Part IV "Radio Equipment";

.21 wheelhouse heating/cooling control system.

3.2.23.3 The alarm/warning and communication system (AWCS) shall be provided on the navigation bridge which generates audible and visual alarms in the following cases:

.1 the ship's approach to the pre-set minimum depth under a keel;

.2 detection of a dangerous target;

.3 deviation from a pre-set course and/or track;

.4 an approach to the next waypoint (when following a pre-set track);

.5 a gyrocompass malfunction;

.6 a sharp drop below a permissible level or failure of power supply for navigational equipment;

.7 a malfunction of a system verifying watch officer fitness;

.8 failure of navigation lights.

Devices to acknowledge AWCS signals shall be provided at all workstations on the navigation bridge. Any alarm/warning shall be automatically transferred to the master and, if he deems it necessary, to the back-up officer and to the public rooms, if not acknowledged on the bridge by

the watch officer within 30 s. The alarm/warning transfer shall be operated through a fixed system. Acknowledge of alarms/warnings shall only be possible from the bridge.

Under all operational conditions a watch officer shall have a possibility to call the master and back-up officer to the bridge. A bridge call signal given by a watch officer shall be clearly audible in the cabins of the master, back-up officer and all public spaces of the ship.

If the back-up officer may attend a location not connected to the fixed communication system, he shall be provided with a wireless portable device enabling both the alarm/warning transfer and the two way speech communication with the watch officer on the navigation bridge.

In case of loss of main source power supply for an alarm transfer system an automatic changeover to an emergency source shall be provided.

3.2.23.4 The **NAV-1** ship's navigation bridge shall have priority in the service telephone communication system.

3.2.23.5 The bridge navigational watch alarm system (BNWAS) shall be provided on the navigation bridge of the **NAV-1** ship which shall not affect the watch officer's duties performed.

The system shall be capable of setting a time period for fitness verification within 3 to 12 min, and arranged so that only the ship's master had access to the system components for setting appropriate intervals, and also shall have protection against an unauthorized intervention.

The system shall provide for the acknowledgement of a check signal at any workstation on the navigation bridge.

Any attempt to switch off a fitness verification system shall be recorded and if the system and its supply fail the relevant alarm shall be given through the AWCS.

If an integrated navigation system is fitted aboard the ship, the watch officer fitness may be verified with a special program which shall not cause an additional workload for a watch officer.

3.3 GENERATOR ROOM

3.3.1 The generator room which is intended for installation of converters used for the navigational equipment shall be located in close proximity to the wheelhouse or the operating room if the latter is available in a ship.

However, the generator room shall be so located that the acoustic noise caused by operating generators shall not be heard on the navigation

bridge.

3.3.2 The generator room shall be provided with heating, ventilation and electric lighting as to ensure effective operation of the equipment installed therein. Steam and hot-water heating is not allowed. The deck of the generator room shall be covered with linoleum or any other durable electric insulating material.

3.3.3 Rotary converters and various electrical devices shall be installed in the generator room in compliance with the requirements stated in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.4 ACCUMULATOR BATTERY ROOM

3.4.1 The accumulator batteries feeding the navigational equipment may be installed in the accumulator battery room of the radio communication facilities provided that they cause no radio interference during radio reception.

3.4.2 If a ship is equipped with the accumulator battery room which is intended solely for the navigational equipment, it shall comply with the requirements specified in 3.3, Part IV "Radio Equipment".

3.4.3 It is permitted to place accumulator batteries in special boxes complying with requirements of 3.3.6, Part IV "Radio Equipment".

3.5 COMPARTMENT INTENDED FOR INSTALLATION OF MASTER GYROCOMPASS

3.5.1 The compartment intended for installation of master gyrocompass shall comply with the following requirements:

.1 be as close as possible to the centreline of the ship and to the midship section at the level of one of the existing waterlines;

.2 be insulated against moisture and penetration of dust, soot, steam, water, smoke and noxious exhalations. It is recommended that air conditioning shall be provided;

.3 in addition to main lighting, be provided with portable and emergency electric lighting, as well as with means of two-way communication with the navigation bridge. The communication shall be of two-way system or be part of the ship's control communication system (automatic telephone station may be used as a duplicate means of communication);

.4 instruments or equipment not related to the technical aids of navigation shall not be installed in the compartment;

.5 it is not permitted to lay the pipelines through the compartment excepting the pipeline of gyrocompass cooling system.

3.6 LOG TRUNK AND/OR ECHO SOUNDER TRUNK

3.6.1 The log trunk and/or echo sounder trunk shall comply with the following requirements:

.1 the size of the trunk shall be sufficient to allow the access to the converters;

.2 the trunk shall be closed by a sliding door or have the manhole provided with a cover tightened with folding bolts. Control cock shall be fitted on the cover or on the coaming of the trunk;

.3 for the purpose of descent, the trunk shall be provided with an ordinary or spar ladder;

.4 the trunk shall be tested for tightness in compliance with the requirements specified in Appendix 9 to Section 2, Part V "Technical Supervision during Construction of Ships" of the Rules for Technical Supervision During Construction of Ships and Manufacture of Materials and Products for Ships;

.5 the trunk shall be provided with permanent electric lighting and a socket outlet for a portable electric lamp rated for a voltage of not more than 50 V.

3.6.2 In oil tankers where the log and/or echo sounder trunks are located in way of cargo tanks, the following requirements shall be complied with (refer also to 3.7.4.6):

.1 the trunk shall be separated from the cargo tanks by cofferdams;

.2 feeding cables and wiring inside the space shall be laid in gastight steel pipes (refer also to 3.8.3 of the present Part and 2.2.2.9, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships);

.3 effective ventilation of the space shall be provided;

.4 the construction of the tightening gear of the manhole shall not be of spark-formation type.

3.7 ARRANGEMENT OF NAVIGATIONAL EQUIPMENT ON BOARD SHIP

3.7.1 Magnetic compass.

3.7.1.1 Magnetic compass shall be so installed and secured that its vertical plane which passes through the lubber lines will not deviate from the

centre line of the ship or its parallel plane by more than 0,2°.

3.7.1.2 The standard magnetic compass shall be installed on the upper bridge in an open place which shall provide for taking visual bearings over an arc of the horizon of 360°.

All-round free access to standard compass shall be provided.

On ships with gross tonnage less than 150 with no compass bridge, installation of the standard magnetic compass shall be provided as far as practicable and expedient.

3.7.1.3 The place where the standard magnetic compass is installed and the main steering position shall be interconnected by means of a voice pipe or by any other means of two-way communication.

3.7.1.4 The main and emergency steering positions shall be interconnected by telephone or other means of two-way communication.

3.7.1.5 Any object in the vicinity of the standard magnetic compass, which was not provided in the original plan of the arrangement of the compass, may be fitted only if specially agreed with the Register (refer to 3.1.3).

3.7.1.6 A master magnetic compass shall be installed aboard ship when the ship is equipped with the magnetic compass with electric remote transmission of dial readings, operating from a special sensitive element, if the latter cannot be used as a master compass.

3.7.1.7 Special sensitive element of the magnetic compass with electric remote transmission of dial readings, which is not intended for use as a master compass shall be installed in ship in such a place where the effect of ship's magnetic fields is at its minimum and where the easy maintenance of the sensitive element by the navigator is ensured.

3.7.1.8 The complete sets of magnetic compasses intended for installation in ships of non-restricted area of navigation shall include spare compensating magnets.

3.7.1.9 Every ship shall be provided with the magnetic compass residual deviation table drawn up by a competent authorized body.

The Register fulfils no supervision functions of the procedure of timely and qualified determination and compensation of the deviation of magnetic compasses.

3.7.1.10 A standard magnetic compass with optical remote transmission of dial readings shall be installed on board in compliance with the requirements specified in 3.7.1.1 to 3.7.1.5. In addition, the following requirements shall be complied with:

.1 the periscope screen shall be preferably at eye level of a helmsman

and at a distance not exceeding 1,2 m;

.2 there shall be no dead angles of visibility in the periscope tube for a helmsman.

3.7.1.11 The track magnetic compass (if any) shall be installed at the main conning position in the wheelhouse and at the emergency steering station to provide determining the compass readings from the control point and access to the deviation device.

3.7.2 Gyrocompass.

3.7.2.1 The compartment intended for installation of the master gyrocompass shall comply with the requirements of 3.5.

3.7.2.2 It is allowed to install the master gyrocompass in the wheelhouse or in the chartroom, provided the overall dimensions of the master gyrocompass are not large.

3.7.2.3 Gyrocompass shall be supplied from the main and emergency switchboards by two independent feeders.

3.7.2.4 Automatic change-over device shall be provided capable of switching the gyrocompass power supply from the main switchboard to the emergency electric station switchboard (where an emergency diesel-generator is installed) in the event of failure of the main supply (refer also to Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships).

3.7.2.5 Free access to the master gyrocompass shall be provided. Easy and unhindered opening of lids and covers, as well as free access to terminal plates shall be provided.

3.7.2.6 Bearing repeater shall be installed on the upper bridge, the requirements of 3.7.1.2 being strictly complied with, or one repeater shall be installed at each wing of the navigation bridge, thus providing for the field of view at least 180° right ahead on each side of the ship when taking bearings.

3.7.2.7 Steering repeaters shall be installed at steering position of the ship. The location of steering repeaters shall provide for their convenient use by helmsman.

Where the wheelhouse is provided with the central control desk of the ship's heading and/or track control system with a built-in gyrocompass repeater, the installation of the separate steering gyrocompass repeater is not required.

If emergency rudder control station is provided on board the ship, gyrocompass repeater shall be fitted in close vicinity to it.

3.7.2.8 The 0 — 180° lines of the master gyrocompass and bearing repeaters shall lie in the ship's centre line plane or parallel to it with an accuracy specified in 3.7.1.1.

3.7.2.9 Power supply units and their starting and control apparatus shall be installed in the generator room, if any, or in the master gyrocompass compartment in a position which facilitates taking measurements of running speed of these units and maintenance of their bearings. Knobs for starting and remote control of the power supply unit shall be fitted in the same compartment where the master gyrocompass is installed or in the wheelhouse.

3.7.2.10 It is allowed to install in ships both a gyrocompass and a magnetic compass with electric remote transmission of dial readings and to use the same repeaters for both compasses. In this case, a light signal "Repeaters switched to magnetic compass" shall be provided in the wheelhouse. This signal shall automatically be switched on when the repeaters are connected to the operation from the magnetic compass impulser.

3.7.2.11 Water-cooled gyrocompasses the design of which provides for their normal functioning at the cooling water temperature up to 30 °C shall be supplied with cooling water from a special cooling arrangement installed on board.

3.7.2.12 The requirements of 3.5.1.4 do not apply to ships of less than 300 gross tonnage. The compliance with requirements of 3.5.1.1 to 3.5.1.3, 3.7.2.3 is recommended for such ships.

3.7.3 Log.

3.7.3.1 Primary speed transducers shall be installed in the bottom of the ship, preferably in the vicinity of the place of intersection of the base line and centre line of the ship in such a way that the transducers remain under water at the lightest draught of the ship and when the ship is rolling.

3.7.3.2 No projecting parts of the hull, suction and discharge openings likely to affect the parallelism of stream lines washing the ship shall be located forward of the primary transducers.

3.7.3.3 Electromagnetic transducers may be installed in sluice valves or they may be permanently fixed. Electromagnetic transducers shall be so installed that their longitudinal axes are parallel to the centre line of the ship with an accuracy not less than ±1°.

3.7.3.4 The sluice valves shall be fitted in a special trunk complying with the requirements of 3.6.

3.7.3.5 Fixed electromagnetic transducers in the openings cut in the ship's bottom shall be adequately secured in the appropriate welded boxes

being equivalent in strength to the ship's hull.

Ice protection of the Doppler log bottoms shall be equivalent in strength to or exceed the ship's hull structure in place of their installation.

3.7.3.6 Speed and distance repeaters shall be installed in the place where the navigational plotting is performed.

Speed repeaters shall be installed in the wheel-house and in the navigation bridge wings fitted with the steering posts of the main engine.

Where a main machinery control room is provided in the ship's engine room, installation of the speed repeaters in such control room is recommended.

3.7.3.7 Where the combined indicators of the navigational information of television type are available in the navigation bridge, some speed and distance repeaters need not be installed in the bridge except for the speed repeater in the automatic remote control desk or in close proximity to it.

3.7.4 Echo sounder.

3.7.4.1 The depth indicator shall be installed in the wheelhouse, and the depth recorder in the wheelhouse or in the chartroom, if any, in the place and at a distance providing their most convenient use and operation.

In certain cases, if agreed with the Register, it is allowed to install only one of these devices, it shall then be located in the wheelhouse.

3.7.4.2 The vibrators of the echo sounder shall be installed in the ship's bottom clear of its sides and ends in places least affected by ship's vibration and at a distance which prevents them from being emerged out of water when the ship is rolling.

It is recommended to install the vibrator at a distance of 0,2 to 0,75 of the ship's length from the bow, as measured along the plane of the waterline, which corresponds to the lightest service draught of the ship and close to the centre line of the ship.

3.7.4.3 In the vicinity of the vibrator there shall be no supersonic emitting devices of other instruments operating simultaneously with the echo sounder, as well as no projecting parts of the hull, discharge and suction openings, etc., which are likely to disturb the normal operation of echo sounders.

These requirements shall also be taken into consideration when portable vibrators are provided.

3.7.4.4 Measures shall be taken to prevent corrosion of the ship's hull as a result of the installation of the vibrators.

3.7.4.5 It is recommended to install vibrators in special spaces (trunks)

(refer also to 3.6).

3.7.4.6 It is allowed to install vibrators of echo sounders in cofferdams of cargo and oil fuel tanks, in double bottom tanks and in ventilated tunnels under cargo tanks of oil tankers, provided they are situated in a special gasproof recess which is an integral part of the hull structure (refer also to 3.8.3 of the present Part and 2.2.2.9, Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships). Feeding cables shall be mounted in gasproof steel pipes.

The vibrators installed in the above spaces shall be of unattended design.

3.7.4.7 The vibrators shall be so installed that their emitting and receiving surfaces are parallel to the horizontal plane and on one level when the ship is on even keel and is not inclined.

This requirement also applies to portable vibrators.

The deviation from the horizontal plane of not more than + 3° is permissible for vibrators installed in bottom slot.

3.7.4.8 The vibrators installed in bottom slots shall be so arranged that their emitting surface is on one level with the shell plating of the ship's hull. Where it is impossible to install the vibrators in horizontal plane due to the curvature of the ship's hull, it is recommended to use special streamliners arranged in bow — stern direction.

3.7.4.9 Additional strengthening measures shall be applied, where necessary, to increase the rigidity of the shell plating when the vibrators are installed in bottom slot.

3.7.4.10 Where the vibrators are installed in a special tank, without slotting the ship's bottom, the tank shall be filled up with the liquid having acoustic characteristics as similar to those of sea water as possible.

3.7.4.11 Special tanks intended for the installation of vibrators shall be, after the latter were fitted on board ships, tested for tightness in compliance with the requirements specified in Appendix 1 to Part II "Hull" of the Rules for the Classification and Construction of Sea-Going Ships.

3.7.4.12 In no case shall the emitting surface of the vibrators be painted or subjected to any mechanical effects (shocks, hard friction, etc.). Ice protection of the echo sounder bottoms shall be equivalent in strength to or exceed the ship's hull structure in place of their installation.

3.7.4.13 For the purpose of examining the cable boxes and checking the insulation of the vibrators free access to them shall be provided from the inside of the ship.

3.7.4.14 Power supply equipment of the echo sounder (converters,

transformers, etc.) shall be installed in the generator room or in a special recess located in the interior ship's compartments capable of being heated.

3.7.5 Rate-of-turn indicatorn.

3.7.5.1 The main instrument of the rate-of-turn indicator shall be fitted on the rigid base in the generator room or in the equipment room in the vicinity of the wheelhouse. The upper surface of the base shall be parallel to the main (horizontal) plane of the ship.

It is allowed to install the main instrument in the wheelhouse provided the requirements of 3.1.3 and the permissible acoustic level are fulfilled.

3.7.5.2 The repeaters of the rate-of-turn indicator shall be arranged in the wheelhouse in the vicinity of the steering station or in another place in the ship from which steering may be controlled, as well as on the wings of the navigation bridge.

3.7.5.3 The instruments of the rate-of-turn indicator shall be arranged on the navigation bridge in such a way as to ensure convenient observation of the range scales and easy access to the controls.

3.7.6 Radar.

3.7.6.1 The main radar display (means for presenting radar and additional navigation-related information) shall be installed near the navigation bridge forward bulkhead in such a way as not to impair visual observation ahead of the ship, along the ship's heading, and the display image shall not be impaired by any lighting conditions.

If an additional display is provided on board ship, it shall be installed near the place of performing navigational plotting.

If the radar control panel is a separate device, it shall be possible to monitor the radar equipment from all the work stations where radar displays and additional navigation-related information displays are installed.

3.7.6.2 It is allowed to install the transmitter and other equipment of the radar on the bridge, provided the flux density of the power of high-frequency emissions, mechanical noise level and the level of electric interference to radio reception caused by this equipment do not exceed the permissible rates. Otherwise, the above-mentioned equipment shall be installed in a special enclosed and well-screened compartment or in the operating room.

3.7.6.3 The diagrams indicating radar blind sectors shall be located near displays.

3.7.6.4 If a second radar is provided on the ship, its display shall also

be installed on the ship's navigation bridge.

In this case the main radar display shall be placed closer to the ship's starboard, and the second radar display — to portside.

3.7.6.5 Automatic radar plotting aid (ARPA).

.1 ARPA indicator may be autonomous or connected to a radar indicator. The requirements for placement on the bridge of the connected indicator are set out in 3.7.6.1 as for the main indicator.

.2 The autonomous ARPA indicator shall be installed in the wheelhouse in the immediate vicinity of the main radar indicator next to the ship control station.

.3 The ARPA indicator shall be installed in the wheelhouse to provide monitor of its screen simultaneously by at least two operators.

3.7.7 Bridge Navigational Watch Alarm System (BNWAS).

3.7.7.1 A Bridge Navigational Watch Alarm System (BNWAS) with a device intended for the BNWAS to return to its initial state shall be installed on the ship's navigation bridge in accordance with the requirements of the Rules for Bridge Design, Equipment, Arrangement and Procedures (refer to Appendix to this Part of the Rules).

3.7.7.2 The device structure shall ensure that it can be used only by the watch-keeping officer on the ship's navigation bridge and shall be protected from accidental use by unauthorized persons.

3.7.73 To facilitate ship's navigation and manoeuvring, a special "Emergency Call" key may be installed at the bridge workstation. The key is intended for immediate sounding, in case of necessity, an audible alarm signal of the second, and then, third level to call another watch-keeping officer and/or the master.

3.7.8 Radar reflector.

3.7.8.1 The radar reflector shall be fitted either on a rigid mount or suspended on a proper rigging at places not shaded by the superstructures and other metal structures.

The height of installation shall be not less than that indicated in 5.8.2.

3.7.8.2 For ships and floating facilities with gross tonnage less than 150 the maximum weight of radar reflector for mounting at 4 m shall not exceed 5 kg.

Radar reflectors designed for mounting at a height greater than 4 m shall be of respective weight recalculated pro rata. The overall dimensions of radar reflector shall be minimized and shall not exceed 0,05 m^3.

3.7.9 Universal automatic identification system.

3.7.9.1 The universal automatic identification system (AIS)

equipment shall be so installed in the wheelhouse that the AIS display (if any) and the controls, and the radar, ARPA, and ECDIS displays, may be used readily, and to allow observation of the situation around the ship.

3.7.9.2 Separate units comprising the universal automatic identification system which are not used frequently may be installed in the operating room or in a special enclosure in the vicinity of the wheelhouse.

3.7.9.3 Output contacts of relay initiated at the detection of the AIS failure, shall be connected to the audible alarm device.

As the audible alarm device, a loud speaker integrated in the AIS equipment, an independent external alarm or alarm system located on the navigation bridge may be used.

3.7.10 Radionavigation system receiver.

The radionavigation system receiver indicator shall be installed in close proximity to the place where the navigational plotting is maintained.

3.7.11 Combined ship control desk.

3.7.11.1 Combined ship control desks shall be arranged in the wheelhouse. In this case the requirements of 3.2 shall be met.

3.7.11.2 Depending on the design of the combined ship control desk adopted in compliance with the requirements of 5.12.4, it shall be arranged in the wheelhouse symmetrically to the centre line, or parts or sections of the desks may be installed to the right or to the left from the centre line, provided the requirements of 5.12.13 are met.

3.7.11.3 One of the steering gear remote controls shall be arranged in the centre line. Course and rudder blade indicators shall be so located that the possibility is provided for taking readings from any point of the wheelhouse.

3.7.11.4 In addition to the manual controls for whistles provided by 5.12.2.6 and arranged in compliance with 5.12.13, provision shall be made for similar manual controls at the extreme sections of the desk in the wheelhouse and at the sections located on the wings of the navigation bridge (refer also to 4.6.2, Part III "Signal Means").

3.7.12 Integrated navigation system.

3.7.12.1 Control panels of the navigational devices forming a part of the integrated navigation system, display units and input-output devices may be arranged in separate sections of the navigational desk.

3.7.12.2 Integrated navigation system shall be installed in the wheelhouse or in the chartroom so that the operator can use the navigational equipment and keep a proper look-out.

3.7.12.3 Separate kinds of navigational equipment forming a part of the integrated navigation system which do not require the constant observation and operational control may be installed in the equipment room or in specially enclosed compartment close to the wheelhouse (chartroom).

3.7.13 Unified timing system.

3.7.13.1 The unified timing system station shall be installed on the navigation bridge in such location as to permit its easy maintenance.

3.7.13.2 The controllable clock with the digital read-out provided for the service rooms shall be located in the wheelhouse and in the main machinery control room.

3.7.14 Navigational instruments and appliances. The navigational equipment specified in

Table 2.2.1, items 21 to 29, shall be arranged and stored in the places from which the steering control of the ship is effected (wheelhouse, chartroom).

3.7.15 Radiobeacon station.

Radiobeacon station the emissions of which are intended to enable a mobile station to determine its bearing or direction in relation to itself shall be installed in the space convenient for maintenance, in close proximity to aerial lead-in.

3.7.16 Electronic chart display and information system (ECDIS).

3.7.16.1 The electronic chart display and information system shall be installed in the wheelhouse so as to be convenient to use the system display and controls, radar and ARPA displays and observe the environment.

3.7.17 Heading and/or track control system (autopilot).

3.7.17.1 The control panel of the regular manual steering system shall be connected with manual control panel of a mechanical or electrical transmission and shall be installed next to it.

3.7.17.2 The combined manual and automatic control panel shall be installed on the navigation bridge in the centreline of the ship so as to provide easy maintenance and quick switching from automatic to manual control and vice versa.

The displacement of the control panel to the right of the centerline is allowed on ships where masts, cranes, other deck structures obscure visibility of the fore end. In this case special mark shall be provided in the fore end visible in the daytime and at night.

3.7.17.3 The remote control panels of the system shall be installed on the bridge wings or in places convenient for their use.

3.7.18 Sound reception system.

3.7.18.1 The receiving microphones shall be installed in such a way that the acoustic interference level from the ship's noise sources would be minimum.

3.7.18.2 The system display shall be visible from the ship's main conning position.

3.7.18.3 The system loudspeakers shall be installed so that incoming sound signals are audible at all positions of a wheelhouse.

3.7.19 Voyage data recorder/simplified voyage data recorder.

3.7.19.1 The voyage data recorder/simplified voyage data recorder units are arranged on the ship's navigation bridge or in close proximity to it.

3.7.19.2 The place where a special protected detachable container with the data carrier is installed shall be selected on the open deck in close proximity to the navigation bridge and centreline of the ship, as far as practical; thus, the necessity of its maintenance and its accessibility to the divers and remotely operated vehicles (ROV) in case of the ship flooding shall be considered.

The special protected float-free container of a simplified voyage data recorder shall be installed on the ship's open deck so as to ensure its free floating in any conditions of ship's sinking.

The long-term recording medium (refer to 5.20.4.3) shall be capable of being accessed from an internal, easily accessible area of the ship.

3.7.19.3 Microphones of VDR/S-VDR positioned on the navigation bridge shall be so placed that conversation near the conning stations, radar displays/ARPA, chart tables are adequately recorded. The positioning of microphones shall also capture audible alarms as well as voice orders transmitted through the public address system, intercom systems.

3.8 CABLING

3.8.1 All outer cabling of the shipboard navigational equipment shall be made by means of screened cables and laid in compliance with the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

3.8.2 Insulation resistance of every laid cable disconnected at both ends shall be not less than 20 MOhm, irrespective of the cable length.

3.8.3 To eliminate electromagnetic interferences in the echo sounder diagram, the line transducer-receiver-amplifier shall be distant from the line vibrator-radiator by not less than 1 m from other electrical equipment

and 0,5 m from the cables laid in parallel. Both lines shall be made by means of reliably screened cables. Cables running to the vibrators arranged in spaces below the bulkhead deck shall be laid in steel pipes.

3.8.4 For radar installation all shielded cables and all shielded coaxial cables shall be laid in accordance with the technical specifications of the radar manufacturer, and the requirements of 3.8.1 shall be considered.

3.8.4.1 To reduce the signal weakening, the cables shall be as short as possible.

3.8.4.2 To minimize the electromagnetic interference effect, all cables between the antenna and other radar blocks shall be laid in runs which are as straight as possible and, if necessary, cross each other at right angle.

3.8.4.3 No cables shall be laid near high voltage sources.

3.8.4.4 To prevent moist from penetrating into the cables, all connections on the ship's open deck shall be of waterproof (IP56) type.

3.8.4.5 When laying the cables and microwave transmitting feeders, minimum internal bending radii are to be maintained.

4. AERIALS AND EARTHING

4.1 GENERAL

4.1.1 It is allowed to fit a ship with aerials of any type which provide the highest operational efficiency of the navigational equipment in accordance with its purpose.

4.1.2 Aerials of the navigational equipment shall comply with the requirements of Section **4,** Part IV "Radio Equipment".

4.2 RADAR AERIALS

4.2.1 To ensure the maximum target location range and 360° observation, the radar antenna, if the ship's structure permits, shall be installed on a special mast.

The height at which the antenna is installed shall ensure the short range target location and minimize sea clutter and interference due to radiowaves reflection from the sea surface.

At the same time the height at which the antenna is installed shall be such that the flow density of its high frequency output signal at the ship's open decks where people can be present does not exceed the maximum permissible level.

4.2.2 If scanning is effected straight ahead of the ship, it is admissible that the sea surface will not be scanned at a distance of not more than 500 m or double length of the vessel, whichever is shorter, for any type of cargo,

ship's draught or trim.

Blind sectors shall be reduced to minimum and shall not be observed along an arch of horizon from straight ahead of the ship to the directions of 22,5° abaft the beam on each side of the ship.

Any two blind sectors separated from each other by an angle of 3° or smaller shall be regarded as one blind sector.

Separate blind sectors, the angle of which exceeds 5°, or the resultant arch of which exceeds 20° shall not be observed in the rest arch of horizon.

4.2.3 If two radars are installed on board, their antennas shall be installed in such a way as to minimize blind sectors and eliminate their mutual interference during their simultaneous operation.

4.2.4 If two radar antennas are installed close to each other, the angle between them in the vertical plane shall be at least 20°, and the minimum distance between them in the vertical plane shall be at least 1 m.

4.2.5 The radar antenna shall be installed in such a place on board where neither ship's structures nor deck cargo can reflect elecromagnetic radiation.

4.2.6 The radar antenna shall be installed far from the high frequency radiation sources and other transmitting/ receiving radio equipment antennas.

4.2.7 If the antennna is installled on a special mast, the platform for its technical servicing and repairing shall have an area of at least 1 m^2 and shall be provided with protective rails which do not restrict the antenna rotation. The radar antenna lower edge shall be situated at least 500 mm higher than any rail of the platform.

In all cases it shall be possible to inspect and repair any part of the antenna.

The structure of the mast with the antenna platform shall be designed so as to take into consideration the vessel's operational conditions, possible vibration and impacts.

4.2.8 If the antenna is installed at an easily accessible place, it shall be placed at least 1800 mm above the deck, ladder or any other place where people can be present.

4.2.9 The radar antenna shall be installed at a safe distance from the ship's magnetic compass.

4.2.10 All guys of the radar antenna mast shall be provided with insulators dividing the mast into unequal parts with lengths ranging from 2 to 6 m. If it is impossible to insulate the guys they shall be electrically bonded

to the ship's hull .

4.2.11 To avoid bends when laying the waveguide, the antenna shall be installed as far as possible over the transmitter.

If it is impossible to lay a direct waveguide, the number of bends shall be reduced to minimum.

4.3 AERIALS OF UNIVERSAL AUTOMATIC IDENTIFICATION SYSTEM (AIS)

4.3.1 The universal automatic identification system (AIS) aerials shall be installed at a maximum height so as to allow effective transmission and reception of signals at all operating frequencies, and to avoid obstructions to electromagnetic field propagation over the entire horizon as far as practicable.

The manufacturer's recommendations shall be taken into consideration.

4.4 AERIALS OF RADIONAVIGATION SYSTEM RECEIVERS

4.4.1 Receiver antennas shall not be installed lower than ship's large-size metal structures and shall be situated at a distance of at least 3 m from any transmitting antennas.

4.4.2 The antennas shall not be installed on the mast tops, at places subject to substantial vibration, under deck structures and rigging or near sources of heat or smoke.

4.4.3 The position for a GNSS system receiver antennas shall be chosen so as to ensure unrestricted tracking of a satellite constellation signal and be situated at least lm higher than other horizontal surfaces of the ship's structures.

4.4.4 The GNSS receiver antennas shall not be installed along the axis of the main lobe of the radar antenna direction diagram, nor shall they be installed in the same plane with the INMARSAT Ship Earth Station antennas.

The distance between the above mentioned antennas shall be at least 10 m.

4.4.5 If antennas are installed on small tonnage ships, the recommendations of the receiver Manufacturer are to be considered.

4.5 EARTHING

4.5.1 Navigational equipment installed in a ship shall have a protective earthing to the ship's hull which shall be made as short as possible.

4.6.2 When leading in the cables into the equipment, their screened sheathings shall be electrically connected to the ship's hull.

4.6.3 All radionavigational devices shall have the operational (high-frequency) earthing as well.

4.6.4 The total resistance of all electric connections of any earthing shall not exceed 0,02 Ohm.

5. PERFORMANCE STANDARDS AND FUNCTIONAL REQUIREMENTS FOR NAVIGATIONAL EQUIPMENT

5.1 GENERAL

5.1.1 Navigational appliances, devices and instruments shall be, so far as practicable, simple in design and electric wiring, easy for maintenance and safe in operation.

Navigational equipment shall be capable of continuous and consistent functioning under different sea states and ship's movement parameters, under conditions of vibration, humidity and temperature the ship may encounter in service.

5.1.2 All navigational equipment intended for being constantly under twenty-four-hours operating conditions shall be of appropriate protected design and shall operate reliably as specified in 5.1.41, Part ГУ "Radio Equipment". The working temperature for log primary speed transducers and echo-sounder vibrators in water shall range from — 4 °C to +40 °C.

5.1.3 Depending on the location of the navigational appliances, devices and instruments on board ship, the degree of their protection shall be at least:

.1 IP22 — for enclosed dry service spaces;

.2 IP56 — for open decks and cargo holds;

.3 IP68 — for double bottom recesses.

IP21 is permitted for the equipment installed in the enclosed dry service spaces at a distance more than 1 m from the doors and windows facing the open deck.

5.1.4 All navigational appliances, devices and instruments shall be provided with proper fittings for efficient securing in the regular places.

It is allowed to use adequate shock absorbing appliances.

5.1.5 Each navigational equipment unit shall have the marking containing manufacturer data, type number or the model, serial number and year of manufacture.

5.1.6 The navigational equipment to be installed near the magnetic

compass shall be provided with clear inscriptions indicating the minimum safe distance, at which it can be located away from the compass. The minimum safe distance to the magnetic compass shall be deduced by recognising that at this distance the influence of the specific navigational equipment (or individual unit) in "on" position is such that the deviation of the magnetic compass does not exceed *5,4°/H* for magnetic compasses installed on the upper bridge and not less than *18°/H* for magnetic compasses installed inside the navigation bridge where *H,* in mcT, is the horizontal component of the Earth magnetic field induction at the point of compass installation ca.

5.1.7 Number of the controls, their location and method of functioning, place and interlocation as well as their size shall be such as to permit their easy, quick and effective operation. Operations controls whose unintended use may result in switching-out, damage or incorrect functioning of equipment shall have the special protection against an unauthorized access.

Controls requiring frequent or accurate settings shall not be placed more than 700 mm from the front edge of the console/device, and they shall be located so that simultaneous operation of two controls will not necessitate a crossing or interchanging of hands.

5.1.8 Each complete set of navigational equipment shall be designed for being served by one operator only.

5.1.9 All housings of navigational equipment operating under voltages exceeding standard safety value, as well as other equipment which is likely to produce radio interference shall be provided with special terminals for connecting earthing conductors.

5.1.10 Special design precautions shall be provided to protect the operator against electrical shocks when replacing fuses.

5.1.11 The design and arrangement of plug sockets and other easily removable disconnecting devices shall exclude any possibility of their wrong connection.

5.1.12 All equipment shall be fitted with special devices or interlocks to protect the operating personnel against electrical shock caused by high voltage after opening the housing of a device or instrument for the purpose of inspection, cleaning, repair and replacement of interior parts.

On opening the housing of device or instrument, the voltage of capacitors being under high voltage shall automatically be reduced to the level not exceeding 55 V.

5.1.13 Navigational equipment shall be designed for being supplied

with electric current of one or several following voltages from the ship's mains:

.1 direct current — 24, 110 and 220 V;

.2 single-phase alternating current with frequency 50 Hz — 110, 127 and 220 V;

.3 three-phase alternating current with frequency 50 Hz — 220 and 380 V.

5.1.14 The design of all navigational appliances, devices and instruments shall ensure maintaining their technical parameters when the voltage and frequency of the ship's alternative current mains vary within ±10 per cent and 5 per cent respectively for a prolonged period of time and also when the supply voltage deviates from the rated voltage by + 30 per cent and — 10 per cent in the event of power supply from the accumulator batteries and ship's direct current mains.

Navigational equipment shall maintain its serviceability under the short-term deviations of the ship's mains voltage within ±20 per cent during 1,5 s and of the frequency within ±10 per cent during 5 s. In this case the alarm signalling system shall not start functioning.

The design of navigational equipment shall provide its protection against the accidental polarity reversal of the source of power.

5.1.15 Insulation resistance for separate circuits of devices or instruments shall be not below the values indicated in Table 5.1.15.

Table 5.1.15

Test conditions	Insulation resistance, MOhm
Normal climatic conditions	20
Temperature 50 ± 2 °C, relative humidity less than 20 %	5
Temperature 40 ± 2 °C, ±95 ± 3 %	1

5.1.16 Navigational equipment shall meet the following requirements which ensure the electromagnetic compatibility (EMC) on board ship:

5.1.16.1 The voltage level of conducted interference from navigational equipment at the electric power supply terminals shall notexceed values shown in Fig. 5.1.43.1, Part IV "Radio Equipment";

5.1.16.2 The intensity level of radiated interference field produced by navigational equipment (except for primary transducers of logs and transducers of echo sounders) at a distance of 3 m from the casing shall

notexceed values shown in Fig. 5.1.43.2, Part IV "Radio Equipment";

5.1.16.3 Navigational equipment shall be immune to conducted low-frequency interference when the following additional test voltages are imposed on supply voltage within the frequency range from 50 Hz to 10 kHz:

.1 for equipment with D.C. power supply — sine voltage the actual value of which is 10 per cent of the rated supply voltage;

.2 for equipment with A.C. power supply — sine voltage the actual value of which, in relation to the rated supply voltage, varies with the frequency as shown in Fig. 5.1.43.3, Part IV "Radio Equipment";

5.1.16.4 Navigational equipment shall be immune to conducted interference when the following test sine voltages are applied to input terminals of the power supply sources, signalling and control circuits of equipment::

.1 with an actual voltage value of 3V at the frequency which varies from 10 kHz to 80 MHz;

.2 with an actual voltage value of 10 V at the points with frequencies: 2; 3; 4; 6,2; 8,2; 12,6; 16,5; 18,8; 22 and 25 MHz.

Modulation frequency of the test signal shall be 400 Hz ±10 per cent with modulation depth of 80 ±10 per cent;

5.1.16.5 Navigational equipment except for primary speed transducers and vibrators of the echo sounders) shall be immune to radiated radio frequency interference, when located within a modulated electric field with an intensity of 10 V/m when the test signal frequency varies from 80 MHz to 2 GHz.

Modulation frequency of the test signal shall be 400 Hz ±10 per cent with modulation depth of 80 ±10 per cent;

5.1.16.6 Navigational equipment shall be immune to interference induced by fast transients when the following test pulse voltage are applied to input terminals of the power supply sources, signalling and control circuits of the equipment:

.1 with an amplitude of 2 kV and repetition frequency of 2,5 kHz — at the differential inputs of A.C. power supply sources;

.2 with an amplitude of 1 kV, in relation to the common earthed input, and with a repetition frequency of 5 kHz — at the inputs of signalling and control circuits.

The test signal rise time in this case shall be 5 ns (at 10 to 90 per cent amplitude level), 50 ns — pulse duration (at 50 per cent amplitude level);

5.1.16.7 Navigational equipment shall be immune to interference induced by slow transients when a test pulse voltage with amplitudes: 2 kV

— line/earth, 1 kV — line/line is applied to its A.C. power supply circuits.

The test signal rise time in this case shall be 1,2 us (at 10 to 90 per cent amplitude level), duration — 50 us (at 50 per cent amplitude level), repetition frequency — 1 pulse/min;

5.1.16.8 Navigational equipment shall remain operative at power supply failure that involves loss of supply voltage during 60 s. In this case, the possibility of failure of the software and loss of the on-line data shall be ruled out.

5.1.17 Fitted directly on navigational appliances and devices, fuses and switches or circuit-breakers shall be provided, these being installed in power supply circuits and designed for appropriate operational currents and voltages.

It is recommended to fit fuses, switches and circuit-breakers in such places where the replacement of fuses or manual switching on of circuit-breakers or switches may be effected by the operator without opening the housing of device or instrument.

5.1.18 Visual indicators of readings and built-in electromeasuring instruments of permanent operational use shall be mounted on the front panel of the navigational device or instrument.

The instrument means of control shall be mounted on the front panel or in some other readily accessible place.

5.1.19 Means of control and monitoring shall be provided with distinct inscriptions and/or generally accepted designations and markings showing their purpose and operation.

Indications of devices and inscriptions on operations controls shall ensure their readings at a distance not less than 1 m. All other information shall be read at a distance not less than 2 m.

5.1.20 Means of control and adjustment which are not used in routine everyday operation of the device or instrument may be mounted inside the housing, and/or they shall have spline adjustment.

5.1.21 Navigational appliances, devices and instruments shall be provided with proper lighting of front panels on which the means of control and adjustment are mounted; in this case, the requirements of 5.1.29 shall be complied with.

5.1.22 If the electron-ray indicator is provided in the navigational equipment, measures shall be taken to keep the indication under observation in the day-time.

5.1.23 The design of navigational appliances, devices and instruments

shall prevent the control handles from heating by the interior heat radiation to temperature exceeding the ambient temperature by more than 15 °C.

5.1.24 The diagram and design of navigational appliances, devices and instruments shall preclude any possibility of damage as a result of wrong sequence in manipulating the means of control.

5.1.25 All navigational appliances, devices and instruments shall be provided with proper visual signalling system to indicate their "on" position.

It is also recommended to provide a visual signalling system to indicate high-voltage "on" position and the most important switching of the equipment to various essential operations.

5.1.26 Navigational appliances and devices shall be provided with audible and/or visual signalling system capable of indicating any fault in the equipment operation.

It is recommended that such signalling system is automatically switched on when critical load level in the equipment operation is likely to lead to its being put out of action.

The acoustic noise level produced by the audible alarm at a distance of 1 m from the noise source shall be within the range from 75 to 85 dB.

5.1.27 Signal lamps and other means of visual control shall be fitted in the devices, instruments or control panels and shall be clearly visible to the operator in diffused daylight.

5.1.28 The colours of signal lamps used for each particular kind of signalling system shall comply with the colours adopted in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.1.29 Lighting intensity of the signal, indicator and illuminating lamps of navigational equipment installed on the navigation bridge shall not interfere with the work of the bridge team and the pilot.

The lighting intensity shall be adjustable to extinction, except that those warning and alarm indicators and indicators required for switching on/off or resetting the equipment shall be clearly visible in all appropriate conditions of ambient illumination likely to occur on the navigation bridge.

5.1.30 For manufacture of navigational appliances and devices the materials shall be used according to Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.1.31 Navigational devices shall be capable of interfacing to other radio and navigational equipment and also to an integrated navigation

system.

Formats used for numerical information exchange shall be in compliance with the International Standard on Interface of Marine Radio and Navigational Equipment.

5.1.32 Navigational equipment (except for primary speed transducers and vibrators of the echo sounders), shall not fail when electrostatic discharges aboard the ship act on its external surfaces (6 kV when contacted and 8 kV for a space dis-charge).

5.1.33 The ambient noise level produced by radio equipment during its operation (with the audible alarm switched off) shall not exceed 60 dB at a distance of lm from any part of the equipment.

5.1.34 Navigational devices with several modes of operation shall have an indication of a mode in use.

5.1.35 The operative software of navigational equipment shall be protected against an unintended access. If malfunctions arise, an automatic functioning control of software and alarm shall be provided.

5.1.36 The information in maintenance documentation shall be sufficient for proper use of navigational equipment by ship's personnel.

Navigational equipment, designed so that malfunctions diagnostics and the following repair are possible up to the circuitry, shall have a set of electric circuits and wiring diagrams and also equipment components specification.

Maintenance documentation for navigational equipment consisting of separate modules, whose repair on board the ship is not provided, shall include a procedure for detection and replacement of a failed module.

5.1.37 The display devices used within the navigational equipment, with the screen diagonal not more than 0,5 m (with the exception of devices which display not more than four information lines) shall not produce magnetic induction exceeding 200 nT within frequency band of 5 Hz to 2 kHz and exceeding 25 nT within frequency band of 2 to 400 kHz at a distance of 50 cm from the device, and in this case the magnetic induction level at a distance of 30 cm from the face of the display screen shall not exceed 200 nT within frequency band of 5 Hz to 2 kHz. The strength of the magnetic field induced by the display device at a distance of 50 cm in all directions from the device shall not exceed 10 V/m within frequency band of 5 Hz to 2 kHz and 1 V/m within frequency band of 2 to 400 kHz; along with that, at a distance of 30 cm from the face of the display screen the strength of the induced electromagnetic field shall not

exceed 1 V/m within frequency band of 2 to 400 kHz. The electrostatic field strength at a distance of 10 cm from the face of the display screen shall not exceed 5,0 ±0,5 kV/m.

For the display devices with screen diagonal more than 0,5 m, higher field levels are accepted, in this case, the technical documentation for such devices shall state minimum distances, at which:

magnetic induction does not exceed 250 nT within frequency band of 5 Hz to 2 kHz and does not exceed 150 nT within frequency band of 2 to 400 kHz;

electromagnetic field strength does not exceed 15 V/m within frequency band of 5 Hz to 2 kHz and does not exceed 10 V/m within frequency band of 2 to 400 kHz;

electrostatic field strength does not exceed 5,0 ±0,5 kV/m.

5.1.38 The X-radiation level induced by individual units of the navigational equipment (cathode-ray tubes, radar transceiver components, etc.) shall not exceed 5 mcJ/kgh (0,5 mrem/h) at a distance of 5 cm from the surface of the devices.

5.2 MAGNETIC COMPASS

5.2.1 Magnetic compass shall be capable of indicating the ship's heading with the following accuracy:

±1° — ship under way, no rolling;

±5° — ship under way, rolling in all directions up to ±22,5° with a period of 6 to 15 s.

5.2.2 The compass card of the magnetic compass shall be capable of indicating the reading with accuracy up to 0,5°. Graduation division of the compass shall not exceed 1°.

5.2.3 With the horizontal component of the Earth magnetic field *H,* in μT, at the point of compass installation and the temperature of ambient air + 20±3 °C, the magnetic compass card stagnation shall not exceed (3/H)° after deflecting the compass card from the magnetic meridian by ±2°.

5.2.4 The magnetic compass shall be provided with the relevant devices ensuring the compass card stability under the ship's vibrations and normal position of the compass bowl vertical axis under the ship's service conditions.

5.2.5 The compass bowl with gimbal suspension shall retain horizontal position at the binnacle inclination to 45° in any direction. The card shall remain free at the bowl inclination in any direction of at least:

10° for compass with gimbal suspension;

30° for compass without gimbal suspension.

5.2.6 The magnetic compass shall be provided with the devices for compensation of constant, semicircular, intercardinal, inclination and latitude deviation.

Where provision is made on board the ship for degaussing device, the magnetic compass shall be provided with a device for compensation of electromagnetic deviation.

Every such device shall be capable of compensating the corresponding deviation with accuracy up to ±0,2°.

5.2.7 The design of the devices specified in 5.2.6 shall provide for the compensation of deviation with maximum values of residual deviation not exceeding ±3° for the standard magnetic compass and ±5° for the spare one.

5.2.8 The magnetic compass shall be provided with binnacles and electric lighting sufficient to make the scale divisions of the compass card distinctly visible. The lighting intensity shall be capable of being adjusted.

Electric lighting of the compass card of the magnetic compass shall be supplied from the main and emergency sources of electrical power.

Power supply from the emergency source of electrical power may be substituted for power supply from the accumulator battery.

5.2.9 The height of the standard compass binnacle together with the pad it is installed on, shall provide for the plane of the compass bowl glass to be at the height of not less than 1300 mm from the deck.

The maximum height at which the compass may be installed is not restricted, but in any case, it shall not exceed the height providing for the most convenient operation of the compass.

5.2.10 Standard compass shall be fitted with bearing finders which shall be capable of taking bearing of all visible landmarks, objects and heavenly bodies with reading accuracy of ±0,5°.

Bearing finders of new type shall be capable of direct reading of bearings.

5.2.11 The magnetic compass card or projection tube periscope shall be capable of ensuring accurate indication of readings at a distance of not less than 1,4 m both at day and artificial lighting. The use of magnifying devices is permitted.

5.2.12 Magnetic compass with remote electric transmission of card

readings shall comply with the requirements of 5.2.1 to 5.2.10. Besides, it shall be capable of transmitting the true course information to other navigational equipment and to repeaters (refer also to 5.10).

5.2.13 Magnetic compass with remote transmission of compass course may consist of:

.1 a magnetic compass which does not require electrical power supply to operate the sensing part and is provided with the device for remote transmission of the corrected compass course (true course) to other navigational equipment.

When provision is made for remote optical transmission of the card readings to the main steering position such compass may be used as a standard magnetic compass;

.2 an electromagnetic compass which requires electrical power supply to operate the sensing part and provided with an electronic device to generate the corrected compass course and transmit it to other navigational equipment.

This compass may be used on board as a magnetic compass additional to the standard one.

5.2.14 Magnetic compass with remote transmission of compass course shall be provided with a devise for compensation of deviation within the following limits:

.1 the vertical component of the ship's magnetic field at the point of compass installation, including the inclination deviation: up to ± 75 uT;

.2 coefficient *A*: up to ±3°;

.3 coefficient *B:* up to ±(720/H)°;

.4 coefficient C: up to ±(720/H)°;

.5 coefficient ***D:*** up to ± 7°;

.6 coefficient *E*: up to ±3°,

where *H* is the horizontal component of the Earth magnetic field at the point of compass installation, in uT.

The set positions of controllers of the electronic devices for compensation of deviation shall be clearly marked and constantly active.

The device for compensation of deviation shall be protected against unauthorized access.

Magnetic compass with remote transmission of compass course shall have one output channel as a minimum to transmit the course to other navigational equipment in accordance with the requirements of 5.1.31.

5.2.15 Magnetic compass with remote transmission of compass course shall remain capable of normal operation under the following variations

of the ship's movement:

circulation with angular speed up to 6°/s; yawing with period of 10 to 20 s and maximum course deviation by ± 5°.

5.2.16 The design of the magnetic compass fitted with optical remote transmission of the card readings shall provide for the screen to present the direct reflected image of the card dial sector with clearly visible divisions of degrees on the arc of not less than 30° as well as the lubber's line fitted in the casing of the compass bowl.

It is recommended that a device capable of presenting the card dial image from fore and aft sides of the periscope shall be provided.

5.2.17 The length of the projection tube periscope of the magnetic compass fitted with optical remote transmission of card readings shall provide for the possibility of fitting the screen at eye-level of the helmsman, the height of the compass pad and passage of the periscope tube through the deck being taken into account.

The height of the screen shall be capable of being regulated by 100 to 150 mm up and down from the mean position.

5.2.18 The screen shall be provided with a device protecting it from bright sunshine or other source of light capable of distorting the image on the compass card screen by floodlighting. The image shall be distinctly visible on the screen by day and by night.

5.2.19 The design of the optical system shall provide for the image of dial sector to remain distinct and clear both during visual bearing taking and with the compass cap closed.

5.2.20 A suitable device for adjusting and fixing of the screen position shall be provided.

5.2.21 The enclosure of optical system shall be of waterproof IP56 design. Adequate measures shall be taken to prevent sweating and condensation of moisture in the enclosure. The easy access shall be provided to the optical system for the purpose of its maintenance.

5.2.22 The lifeboat magnetic compass shall comply with the following requirements:

.1 graduation division of compass card shall be 1°, 2° but shall not exceed 5°, depending on the diameter of the compass card;

.2 under conditions specified in 5.2.3, the compass card stagnation shall not exceed (9/H)°;

.3 provision shall be made for lighting of the compass card in accordance with the requirements of 6.13.8.1.5, Part II "Life-Saving

Appliances";

.4 fastening gear for securing the compass in the lifeboat and a box for storing the compass shall be provided;

.5 the diameter of the compass card shall be sufficient to provide normal taking of readings.

5.3 GYROCOMPASS

5.3.1 The gyrocompass positioned on a horizontal and stationary base in latitudes of up to 60° shall conform to the following requirements:

.1 the gyrocompass shall be brought into alignment with meridian within 6 h;

.2 the steady state error at any course shall not exceed ± 0,75° x secant latitude and the root mean square value of the differences between individual course indications and the mean shall be less than 0,25° x secant latitude;

.3 the permissible error from one run-up to another shall be within ± 0,25° x secant latitude;

.4 follow-up system performance speed shall be not less than 6°/s.

5.3.2 The gyrocompass mounted on board ship under operational conditions in latitudes up to 60° shall conform to the following requirements:

.1 under rolling and pitching harmonic motions of up to 5° with a period of 6 to 15 s at maximum acceleration of 0,22 m/s^2 the gyrocompass shall be brought into alignment with meridian within 6 h;

.2 the error of the master compass readings under service conditions, due to variations in ship's power supply parameters and possible alterations of magnetic fields shall not exceed ± 1° x secant geographical latitude;

.3 the error of readings due to a rapid alteration of ship's speed of 20 knots shall not exceed ± 2°;

.4 the error of readings due to a rapid alteration of course of 180° at a speed of up to 20 knots shall not exceed ±3°;

.5 the residual error at a straight course (after correction for speed and course and, if necessary, latitude influences) at a steady speed of up to 20 knots shall not exceed ± 0,25° x secant latitude;

.6 errors of readings due to rolling up to 20 °C, pitching up to 10° and yawing up to 5° with a period 6 to 15 s and the maximum horizontal accelerations not more than 1 m/s^2 shall not exceed 1° x secant latitude;

.7 the divergence in readings between the master compass and repeaters shall not exceed ±0,5°.

N o t e . The errors specified in 5.3.2.3 to 5.3.2.6 are taken to be the difference between the observed and the settle point heading values.

5.3. The complete set of gyrocompass shall be provided with a course recorder and also a corrector used for correction of compass readings in respect to ship's speed and latitude.

5.3.4 It is advisable to provide a course recording device (a course recorder), capable of recording ship's course in respect of time with accuracy of ± 1° in the complete set of gyrocompass.

5.3.5 The system of gyrocompass readings remote transfer shall be so designed as to ensure simultaneous operation of gyrocompass repeaters, fitted in other navigational equipment, the course recorder (when it is available), as well as transmission of information on the course to other navigational equipment.

5.3.6 The design of repeater cards, bearing taking devices, lighting fittings and other arrangements shall be capable of ensuring the indication of course and bearing readings in compliance with the requirements of 5.2.2, 5.2.4, 5.2.8 (except for the requirements as regards the reserve self-contained source of lighting, kind of electric current and voltage), 5.2.9 and 5.2.10.

5.4 LOG

5.4.1 Devices to indicate speed and distance (log) are intended for generating and displaying the ship's motion parameters data used for general navigation and ship manoeuvring.

As a compulsory parameter, the log shall be capable of measuring the longitudinal speed component of ship's motion forward speed through water or over the ground as well as the distance run in that direction. Additionally, the log may also measure the other components of ship's motion.

A log transmitting information about the ship's speed to a radar plotting aid (EPA, ATA, ARPA) and to the ship's track control system, shall be capable of measuring the ship's speed through the water in the fore direction.

5.4.2 The log shall normally function at forward speeds up to the maximum and in water beneath the keel of depth greater than the following values:

3 m for speed and distance measuring devices through the water;

2 m for speed and distance measuring devices over the ground.

5.4.3 Initial sensitivity of a log shall not be more than 0,1 knot.

5.4.4 Provied the ship is operating free from shallow effect and from the effects of wind, current and tides, in measuring the ship speed by the log, the error (3σ) shall not exceed, at normal probability law, the following values:

±2 per cent of the actual speed of the ship, or ± 0,2 knots, whichever is greater, for a digital display and for output data transmission;

± 2,5 per cent of the actual speed of the ship, or ± 0,25 knots, whichever is greater, for an analogue display.

5.4.5 In measuring the distance run through the water, the error shall not exeed ±2 per cent of the actual distance run by the ship in one hour or ± 0,2 miles in each hour, whichever is greater, provided the ship is operating free from shallow effect and from the effects of wind, current and tides.

5.4.6 The divergence in readings of speed repeaters and the main unit shall not exceed ±1,5 per cent of the upper limit of the measuring range of the log.

The divergence in readings of distance repeaters and the main unit shall not exceed ±0,01 of a mile and that of repeaters, ± 0,02 of a mile.

The distance repeaters and speed repeaters shall be capable of operating simultaneously.

Speed repeaters shall be of self-synchronized type. It is permitted to use digital display as speed repeaters. In this case, the direction of ship's movement shall be indicated unambiguously.

5.4.7 The logs shall comply with the following design requirements:

.1 the submerged retractable mechanism of logs shall provide for their quick setting in operation position and retracting inside the ship's hull by one person only;

.2 log components structure shall be so designed that neither the method of their attachment to the ship's hull, nor the preventive inspection and replacement on the ship afloat, nor damage to any part of the equipment penetrating the hull could result in the disturbance of the longitudinal strength of the ship's hull and in the ingress of water to the ship;

.3 where the mass of the retractable submerged mechanism exceeds 16 kg, a mechanical gear (winches, tackles, blocks) for lifting the movable parts inside the hull shall be provided. The time required for retracting shall not exceed 2 min.

Provision shall be made for a device for remote setting in operation position and retracting inside the hull of the submerged part of the log, the device being operated from the wheelhose. In this case, adequate limit

switches capable of restricting the lowering and retracting of the sliding tube, sealing in the sluice valves and a visual signal in the wheelhouse indicating the "lifted" or "lowered" position of the sliding tube as well as "sluice valve closed", if this is required by the design of the log, shall be provided;

.4 materials used for making the submerged parts of logs, their finishing and coating shall ensure longtime operation of the log in sea water;

.5 provision shall be made in the complete set of a log for a necessary number of speed and distance repeaters as required by 3.7.3.6 and 3.7.3.7.

The distance and speed repeaters may be incorporated in one common casing;

.6 logs shall be fitted with devices for adequate adjustments after the installation of these logs on board, as well as for the compensation of the inadmissible errors in log readings;

.7 speed information may be presented in analogue or digital form, or in both forms at the same time.

Where a digital is used, its incremental steps shall not exceed 0,1 knots at data renewal frequency once per second.

An analogue display shall be graduated at least every 0,5 knots and be marked with figures no greater than every 5 knots.

If the display is intended to present the ship's motion different components, the direction of movement shall be indicated unambiguously;

.8 distance run information shall be presented in the digital form. The display shall cover the range from 0 to not less than 9999,9 miles and the incremental steps shall not exceed 0,1 miles. On-line counter may be provided for resetting a read out to zero;

.9 the graduation dials of the main unit and repeaters shall be provided with interior adjustable lighting.

The display shall be easily readable by day and night;

.10 the interconnection of the repeaters shall be effected through appropriate fuses;

.11 it is recommended to provide logs with a signalling system capable of monitoring running by the ship of certain predetermined distances;

.12 it is permitted to use the transducers of logs both of sliding and fixed design.

Sliding and fixed transducers may protrude from the bottom or may be in flush position to the bottom of the ship;

.13 two primary electromagnetic transducers with appropriate

changing-over device are permitted to be installed.

5.4.8 The log translating device shall provide feeding distance run information to other equipment fitted on board. In this regard if the relay contact is used, the information shall be fed to external systems only for forward ship's movement. The information shall be in the form of one contact closure (or its electrical equivalent) for each 0,005 miles run. The minimum time of contact closure or duration of the equivalent impulse signal shall be at least 50 ms.

If the log is intended for feeding external systems with the information on speed, distance run and also on other ship's movement parameters, including directions, its translating device shall be provided with sufficient number of serial digital interfaces (also refer to 5.1.31).

5.4.9 If the log is capable of being operated in the speed through water and speed over the ground modes, mode selection and mode indication shall be provided.

If the two-component log has provision for indicating the longitudinal and transverse speed components, the unambiguous and clear indication of the operation mode and displayed parameters shall be provided.

As an additional option, the log display may provide information on the resultant speed vector (as to module and direction) of ship's movement at the place of a transducer location and also the calculated data of bow and stern motion parameters.

5.4.10 The primary electromagnetic transducers of the logs shall not produce interference to operation of other navigational equipment of the ship.

5.4.11 The log performance shall not deteriorate when the ship is rolling up to ±10° and pitching up to ±5°.

5.4.12 If the log performance is affected by certain conditions (sea state and its effects, water temperature, water salinity and aeration, sound velocity in water, the depth of water under the keel, heel, trim and draught of ship), details of possible effects shall be included in the ship's technical documentation.

5.5 ECHO SOUNDER

5.5.1 The echo sounder is intended for reliable measuring, visual presentation, recording and transmitting information on the depth of water under a ship to other ship's systems. The echo sounder shall function at all headway ship speeds from 0 up to 30 knots under conditions of heavy water aeration, of brash, broken ice and in areas with a sharp

change of the bottom contour, with the rocky, sandy and muddy bottom.

5.5.2 The echo sounder shall be capable of measuring any clearance under the transducer between 1 m and 200 m.

5.5.3 The echo sounder shall be provided with:

.1 shallow range scale covering 0,1 of the depth range (1 to 20 m);

.2 deep range scale covering the whole depth range (1 to 200 m).

The pulse repetition rate shall not be slower than 36 pulses per minute on the shallow range and 12 pulses per minute on the deep range.

5.5.4 Based on a sound speed in water of C = 1500 m/s, the tolerance of the indicated depth shall not exceed:

.1 ±0,5 m on the shallow range scale or ±2,5 per cent of the indicated depth, whichever is greater;

.2 ±5,0 m on the deep range scale or ±2,5 per cent of the indicated depth, whichever is greater.

The echo sounder performance shall not deteriorate when the ship is rolling ± 10° and pitching ±5°.

Some omissions in readings are permissible when the ship is rolling more than 10° and/or pitching more than 5°, the sea bed has rocky or steeply sloping character (over 15°).

5.5.5 The complete set of the echo sounder shall include one or more transducers, the main unit with built-in depth indicator, a depth recording device, remote repeaters and also the translating device for data transmitting to other ship's systems.

The echo sounder design shall provide for a possibility of displaying the immediate depth on the depth indicator and of recording the sounded depth in the depth recording device.

The depth recording device may be built into the echo sounder main unit.

5.5.6 More than one transducer fitted in different parts of the ship may be used in the echo sounder composition. In doing so, a clear indication of the transducer(s) in use shall be provided.

5.5.7 The echo sounder design shall simultaneously provide the presentation of depth information:

.1 in the graphical form displaying the depth profile along the ship's run;

.2 in the digital form displaying the immediate depth.

The graphical form of depth information display shall provide a visible record of soundings during at least 15 min.

5.5.8 The scale of depth display in a graphical form shall be not smaller

than:

.1 1 m: 5,0 mm per metre depth on the shallow range scale;

.2 1 m: 0,5 mm per metre depth on the deep range scale.

The graphical display shall be capable of automatic showing time marks at intervals not exceeding 5 min, and depth marks at intervals not larger than one-tenth of the range of a scale in use.

The indications of digital depth indicators shall be multiples to 0,1 m.

Other forms of depth information display may be used if they do not affect the reliability of graphical and digital information.

5.5.9 The echo sounder shall be provided with audible and visual alarm signals on ship's approach to the preset depth. Manual setting of the preset depth in the depth range from 1 m up to 100 m shall be continuous or in steps (5, 50, 100 m).

5.5.10 The echo sounder shall be provided with a device to allow a correction for determination of a depth under the most immersed part of the ship.

5.5.11 The echo sounder shall be provided with audible and visual alarms to indicate failures, affecting a reliability of information displayed, and also an interruption of power supply and the critical change of ship's mains parameters.

5.5.12 The echo sounder depth recording device shall provide recording of information about depth with time marks during previous 12 h. Moreover there shall be means for the shore-based retrieval of recorded information.

5.5.13 Recording of echo sounder indications may be carried out on the paper tape or other media.

If paper tape is used, the relevant marks shall be provided on its right side indicating when the paper remaining is less than 1 m.

5.5.14 Switching on of the echo sounder shall be effected by one manipulation.

The starting period shall not exceed 30 s.

5.5.15 Sounding in shoal water may be effected by an individual echo sounder installed on board the ship which is capable of measuring on the shoal water range scale and not less than on the half of the shallow water range scale.

5.6 RATE-OF-TURN INDICATOR

5.6.1 The rate-of-turn indicator shall operate independently of gyrocompass and radar operation and shall be capable of indicating the

direction and angular speed of the ships turn.

5.6.2 The rate-of-turn indicator shall be so constructed as to operate both with the automatic and manual ship steering.

5.6.3 With due regard for the influence of earth rate the indicated rate of turn shall not deviate from the actual rate of turn of the ship by more than 0,5°/min + 5 per cent of measured value.

The rate-of-turn indicator shall meet these accuracy requirements at ship's speed up to 10 knots.

5.6.4 Yawing of the ship at sea shall not change reliable operation of the rate-of-turn indicator on waves.

Periodic rolling motion of the ship with an amplitude of ±5° and period of up to 25 s and periodic pitching motion with an amplitude of ± 1° and period of up to 20 s shall not change the mean value of the indicated rate of turn by more than 0,5°/min.

5.6.5 The rate-of-turn indicator shall be ready for operation and shall meet the requirements of the present Chapter within 4 min of being switched on. Its operation shall be indicated on the display.

5.6.6 The number of repeaters of the rate-of-turn indicator shall meet the requirements of 3.7.5.2.

5.6.7 The rate of turn shall be indicated by a centre-zero analogue type indicator (preferably circular). Where a circular scale indicator is used, the zero shall be uppermost. Alphanumeric display may be permitted. In this case, positive indication of port and starboard shall be provided.

5.6.8 A turn of ship to port shall be indicated on the left of the zero point and a starboard turn to the right of the zero point. If the actual rate of turn exceeds full scale deflection, this shall be clearly indicated on the display.

5.6.9 The length of scale in either direction from zero shall not be less than 120 mm. The sensitivity of the system shall ensure that a change in the rate of turn of l°/min is represented by a distance of not less than 4 mm on its scale.

5.6.10 A linear range scale of not less than ±30°/min shall be provided. This scale shall be marked in intervals of l°/min on both sides of zero and with figures every 10°/min. Every 10°/min mark shall be significantly longer than the 5°/min mark which in turn shall be significantly longer than the l°/min mark. The marks and figures shall preferably be red or light colour on a dark background. Additional linear range scales may be provided.

5.6.11 Damping of the rate-of-turn indicator shall be provided with a time constant which may be varied during operation in the range zero to at least 10.

5.7 RADAR

5.7.1 The radar equipment shall assist in avoiding collision and safe navigation by providing a detection and indication of the positions of other ships, shoreline, buoys, surface objects and obstructions as well as navigation marks.

The radar shall perform the following functions: display of radar video;

indication of position and target tracking information;

positional data derived from own ship's position (EPFS);

display of AIS target information.

It is recommended to provide the capability of displaying data of system Electronic Navigation Charts for monitoring own ship's position.

5.7.2 Regardless of the type of ship on which the radar will be installed, frequency band used and indication device type the radar shall meet the requirements specified in Table 5.7.2.

5.7.3 The radar shall ensure operation in the following frequency bands:

X-band: 9,2 to 9,5 GHz (wave length of 3 cm) for high discrimination, good sensitivity with no clutter;

S-band: 2,9 to 3,1 GHZ (wave length of 10 cm) to ensure that target detection and tracking capabilities are maintained in adverse conditions of fog, rain and sea clutter.

The frequency band in use shall be clearly indicated.

Table 5.7.2

Radar Parameters	Gross tonnage of ship		
	< 500	500 < 10000	≥ 10000
Minimum operational display area diameter, mm	180	250	320
Minimum display area, mm	195×195	270×270	340×340
Auto acquisition of targets	–	–	+
Minimum acquired radar target capacity	20	30	40
Minimum activated AIS target capacity	20	30	40

Minimum sleeping AIS target capacity	100	150	200
Trial maneuvre	–	–	+

5.7. The radar shall be capable of operating satisfactorily in typical interference conditions and of measuring the following parameters:

range within 30 m or 1 % of the range scale in use, whichever is greater; bearing within 1°.

5.7.5 The capability of the radar of indicating the target in at least 8 out of 10 scans with a probability of radar detection false alarm not more than 10^{-4} shall be determined in the process of the aerial operation within "X-band" (3 cm) and "S-band" (10 cm) under the following conditions:

absence of clutter;

aerial height of 15 m above sea level.

The minimum detection ranges for various targets in clutter-free conditions are specified in Table 5**.7**.5. Minimum range target detection shall be achieved with the use of a regular aerial having the smallest aperture.

5.7.6 With own ship at the zero speed , absence of clutter, in calm conditions, an aerial height of 15 m above sea level the navigation buoy specified in Table 5**.7**.5 shall be detected at a minimum horizontal range of 40 m from the aerial position and up to a range of 1 mile, without the setting of control functions other than the range scale selector.

Compensation for any range error shall be automatically applied for each selected aerial, where multiple aerials are installed.

5.7.7 The radar shall provide consistent target detection performance on all the working range scales under sleeping clutter conditions.

The radar system shall provide the means to enhance the visibility of targets in adverse sleeping clutter conditions at close range.

Degradation of detection performance (related to the figures in Table 5**.7**.5) under the following conditions, shall be clearly stated in the technical documentation;

light rain (4 mm per hour) and heavy rain (16 mm per hour);

sea state 2 and sea state 5;

and a combination of these.

Possible degradation in performance due to a long transmission line, actual aerial height or any other factors shall be clearly stated in the technical documentation.

Table 5.7.5

	Target feature,	Detection range

Target description[1]	height above sea level, m	in NM^2	
		X-band 3 cm	S-band 10 cm
Shorelines	Rising to 60 m	20	20
Shorelines	Rising to 6 m	8	8
Shorelines	Rising to 3 m	6	6
Ships of > 5000 gross tonnage	10	11	11
Ships of > 500 gross tonnage	5	8	8
Small vessels with radar reflector[3]	4	5	3,7
Navigation buoy with corner reflector[4]	3,5	4,9	3,6
Navigation buoy[5]	3,5	4,6	3,0
Small vessels of length 10 m with no radar reflector[6]	2,0	3,4	3,0

[1] Reflectors are taken as point targets, vessels as complex targets and shore lines as distributed targets (typical values for a rocky shore line, but are dependent on profile).

[2] Detection ranges may be changed by various factors, including atmospheric conditions, target speed and aspect, target material and target structure.

[3] The Radar Cross Section (RCS) for the radar reflector shall be: 7,5 m^2 for X-band, 0,5 m^2 for S-band.

[4] RCS for the corner reflector shall be: 10 m^2 for X-band and 1 m for S-band.

[5] The navigation buoy shall have RCS of 5 m^2 for X-band and 0,5 m^2 for S-band.

For the channel markers with an RCS of 1,0 m^2 (X-band) and 0,1 m^2 (S-band) and height of 1 m their detection range shall be of 2,0 and 1,0 miles respectively.

[6] RCS for 10 m small vessel shall be of 2,5 m^2 for X-band and 1,4 m^2 for S-band..

5.7.8 Means shall be provided in the radar design for the adequate reduction of unwanted echoes, including sea clutter, rain and other forms of precipitation, clouds, sandstorms and interference from other radars.

Effective manual and automatic anti-clutter functions shall be provided. A combination of automatic and manual anti-clutter functions is

permitted.

A gain control function shall be provided to set smoothly the system gain and signal threshold level.

There shall be clear indication on the radar display of the level for gain and all anti-clutter functions.

5.7.9 Means shall be available in the radar design to enhance target presentation on the display.

The picture shall be updated in smooth and continuous manner with minimum latency.

The technical documentation shall explain the basic concept, features and limitations of any signal processing.

5.7.10 The X-band radar system shall be capable of detecting radar beacons, SARTs in the relevant frequency band.

It shall be possible to switch off those signal processing functions, including polarization modes, which may prevent a X-band radar beacon or SART from being detected.

The status of the signal processing mode used shall be indicated.

5.7.11 Range and bearing discrimination shall be measured in calm conditions, on the range scale of 1,5 miles or less and at between 50 per cent and 100 per cent of the range scale selected. In so doing the following requirements shall be met:

the radar system shall be capable of displaying two point targets on the same bearing, separated by 40 m or more in range , as two distinct objects;

the radar system shall be capable of displaying two point targets at the same range, separated by 2,5° in bearing, as two distinct objects.

5.7.12 The target detection performance of equipment shall not be impaired when own ship is rolling or pitching up to ±10°.

5.7.13 Means shall be available in the radar to monitor performance of the radar system. In the absence of targets, the possibility of monitoring the performance of the radar system shall be retained.

Where applicable to radar technology, manual tuning shall be provided and, additionally, automatic tuning may be provided.

Means shall be available in the radar to determine a significant drop in system performance relative to a calibrated standard established at the time of installation.

5.7.14 The radar equipment shall be fully operational (RUN status) within 4 min after switch on from cold.

A STANDBY condition shall be provided, in which there is no operational radar transmission.

The radar shall be fully operational within 5 sec from the standby condition.

5.7.15 Measurements from own ship (e. g. target range, variable range markers, target bearing, cursor, tracking data) shall be made with respect to the consistent common reference point of the own ship (e. g. conning position). Facilities shall be provided to compensate for the offset between the aerial position and the consistent common reference point on installation.

Where multiple aerials are installed, there shall be provision for applying different position offsets for each aerial in the radar system. The offsets shall be applied automatically.

Own ship's scaled outline shall be available on lower range scales. The consistent common reference point and the position of the selected radar aerial from which information is derived shall be indicated on this graphic.

Picture on the radar display shall be centred with respect to the consistent common reference point which shall be at the centre of the bearing scale.

Range measurements shall be in miles. In addition, facilities for metric measurements may be provided on lower range scales. All indicated values for range measurement shall be unambiguous.

Radar targets shall be displayed on a linear range scale and without delay in the display when the target position changes.

5.7.16 Range scales of 0,25; 0,5; 0,75; 1,5; 3; 6; 12 and 24 miles shall be provided. Additional range scales, including large-sized metric range scales, are permitted outside the mandatory set.

The range scale selected shall be permanently indicated.

5.7.17 An appropriate number of equally spaced fixed range rings shall be indicated on the radar display. The interval between the fixed range rings shall be continuously presented on the radar display.

The system accuracy of fixed range rings shall be within 1 per cent of the maximum range of the range scale in use or 30 m, whichever is the greater distance.

5.7.18 At least two variable range markers shall be provided, each variable range marker shall have a numerical readout.

The variable range marker shall enable the user to measure the range of an object with maximum system error of 1 per cent of the range scale

in use or 30 m, whichever is the greater distance.

5.7.19 A bearing scale around the periphery of the operational display area shall be provided. The bearing scale shall indicate the bearing as seen from the consistent common reference point of the own ship.

The bearing scale shall be numbered at least every 30 division and have division marks of 5 and 10 which shall be clearly distinguishable from each other. 1 division marks may be presented where they are clearly distinguishable from each other.

5.7.20 An electronic graphic line from the consistent common reference point to the bearing scale shall indicate the heading of the ship. Means shall be provided to align the electronic heading line to within 0,1.

If there is more than one radar aerial, the heading skew (bearing offset) shall be retained and automatically applied when each radar aerial is selected.

Provision shall be made to temporarily suppress the image of the heading line by the use of a switch with automatic reset to "on" position. This function may be combined with the suppression of other graphics.

5.7.21 At least two electronic bearing lines (EBLs) shall be provided to measure the bearing of any point object with a maximum system error of 1 at the periphery of the display.

The EBLs shall be capable of measurement relative to ship's heading and relative to true north. There shall be a clear indication of the bearing reference (i.e. true or relative).

It shall be possible to move the EBL origin from the consistent common reference point to any point of the operational display area and to reset the EBL to the consistent common reference point by a fast and simple action.

It shall be possible to fix the EBL origin at any point of the display or to move the EBL origin at the velocity of own ship.

Means shall be provided to ensure that the user is able to position the EBL smoothly in either direction and to maintain the appropriate system measurement accuracy requirements.

Each EBL shall have a numerical readout with a resolution adequate to maintain the system measurement accuracy requirements.

5.7.22 A minimum of four independent parallel index lines, with a means to truncate and switch off each individual line shall be provided. Means of setting the bearing and beam range of the parallel index lines shall be provided.

5.7.23 There shall be a means to measure the range and bearing of one position on the display relative to any other position on the operational display area.

5.7.24 A user cursor shall be provided to enable designation of any position on the operational display area. The cursor position shall have a continuous readout to provide the range and bearing, measured from the consistent common reference point, and/or the latitude and longitude of the cursor position presented either alternatively or simultaneously.

The cursor shall provide a means to select and deselect targets, graphics within the operational display area. In addition, the cursor may be used to select modes, functions, vary parameters and control menus outside the operational display area.

Means shall be provided to easily locate the cursor position on the display.

The accuracy of the range and bearing measurements provided by the cursor shall meet the relevant requirements for VRM and EBL.

5.7.25 The own ship's heading information shall be provided by a gyrocompass.

The accuracy of azimuth alignment of the radar presentation shall be within 0,5 with a rate of turn likely to be experienced with the class of ship.

The own ship's heading information shall be referenced to the consistent common reference point and displayed with a numerical resolution to permit accurate alignment with the gyro system.

5.7.26 A True Motion display mode shall be provided having regard to the motion parameters of the own ship. The automatic reset of own ship may be initiated by its position on the display, or time related, or both.

The reset shall be selected to occur at least on every scan.

North Up and Course Up orientation modes shall be provided.

A clear and continuous indication of the motion and orientation mode shall be provided.

5.7.27 Manual off-centring shall be provided to locate the selected aerial position at any point within at least 0,5 of the radius from the centre of the operational display area.

On selection of off-centred display, the selected aerial position shall be capable of being located to any point on the display within 0,75 of the radius from the centre of the operational display area.

In True Motion, the selected aerial position shall automatically reset to a location giving the maximum view along own ship's course.

Provision for an early reset of selected aerial position shall be provided.

5.7.28 Two modes of display and graphics stabilization: ground and sea stabilization modes shall be provided.

The stabilization mode in use and information on information sensor enabling implementation of the selected mode shall be clearly indicated.

5.7.29 Variable length (time) target trails (afterglow) shall be provided with an indication of trail time and mode.

It shall be possible to select true or relative trails.

The trails shall be distinguishable from targets.

Either scaled trails or past positions or both, shall be maintained and available for presentation within 2 scans, following:

the reduction of increase of one range scale;

the offset and reset of the radar picture position; and

a change between true and relative trails.

5.7.30 Targets shall be presented in accordance with relevant symbols according to the requirements of 5.7.58.

The target information may be provided by the radar tracking function and by the reported target information from the AIS.

The number of targets present shall be as defined in Table 5.7.2.

A warning alarm shall be automatically actuated when the target number (radar tracked or AIS reported targets) is about to be maximum.

As far as practical, the data formats for operating and displaying the radar and AIS targets shall be consistent.

5.7**.31** Radar targets shall be provided by the radar transceiver. The signals shall be filtered with the aid of the associated clutter controls. Radar targets may be automatically or manually acquired and tracked using an automatic target tracking facility.

The automatic target tracking calculations shall be based on the measurement of radar target relative position and own ship motion.

Any other sources of information, when available, may be used to support the optimum tracking performance.

Target tracking facilities shall be available on at least the 3, 6 and 12 miles range scales. Tracking range shall extend to a minimum 12 miles.

The radar system shall be capable of tracking targets having the relative speed equivalent to those at which sea-going ships including high-speed craft can operate.

5.7.32 In addition to the requirements for processing of targets reported by AIS, it shall be possible to provide presentation for a number

of radar targets according to Table 5.7.2. When the established target tracking capacity is about to be exceeded, target overflow shall not degrade the radar system performance.

5.7.**33** Manual and automatic acquisition of radar targets shall be provided with provision for acquiring the number of targets specified in Table 5.7.2. There shall be means for the user to define the boundaries of the auto-acquisition area.

5.7.**34** When a target is acquired, the system shall present the trend of the target's motion within one minute and the prediction of the target's motion within 3 min.

The target tracking system shall be capable of updating the information of all acquired targets automatically and shall continue to track targets that are clearly distinguishable on the display for 5 out of 10 consecutive scans.

The target tracking system design shall be such that smoothed target vector is calculated, while target manoeuvres shall be detected as early as possible.

The possibility of tracking errors, including target swap, shall be minimized.

Separate facilities for cancelling the tracking of any one and of all targets shall be provided.

The greatest possible automatic tracking accuracy shall be achieved when the tracked target has achieved a steady state and with the required accuracy performance of the information sensor.

For ships capable of up to and including 30 kn true speed, the tracking facility shall present, within 1 min steady state tracking, the relative motion trend and after 3 min, the predicted motion of a target, within the accuracy values specified in Table 5.7.34.

Accuracy may be significantly reduced under the following conditions:

shortly after acquisition; own ship manoeuvre; a manoeuvre of the target; any tracking disturbance; sensor accuracy.

Measured target range and bearing shall be within:

50 m (by range) (or 1 per cent of target range);

2° (by bearing).

For ships capable of speeds in excess of 30 kn and with speeds of up to 70 kn, the motion accuracy values specified in Table 5.7.34 shall be maintained with target relative speeds of up to and including 140 kn.

A ground referencing function, based of a stationary tracked target,

shall be provided. Targets used for this function shall be marked with the relevant symbol.

Table 5.7.34 **Tracked Target Accuracy(95 per cent probability figures)**

Time of steady state (min)	Relative course (deg)	Relative speed (kn)	D_{ap} (NM)	T_{ap} (min)	True course (deg)	True speed (kn)
1min: Trend	11	1,5 або 10% (whichever is greater)	1	–	–	–
3 min: Motion	3	0,8 або 1% (whichever is greater)	0,3	0,5	5	0,5 or 1% (whichever is greater)

5.7.35 Reported targets provided by the AIS shall be displayed according to pre-defined parameters. Targets may be sleeping, or may be activated.

Activated targets shall be treated in a similar way to radar tracked targets.

There shall be an automatic indication when the capacity of display of AIS targets (sleeping and/or activated) is about to be exceeded.

5.7.36 To reduce display clutter, a means to filter the presentation of sleeping AIS targets shall be provided, together with an indication of the filter status (e. g. by target range, distance and time to the closest point of approach — D_{ap} and T_{ap} AIS target class: A, B, etc.). It shall not be possible to remove individual AIS targets from the display.

5.7.37 A means shall be provided to activate a sleeping AIS target and to deactivate the activated AIS targets.

If zones for the automatic activation of AIS targets are provided, they shall be the same as for automatic radar target acquisition.

In addition to the beginning of activation the AIS targets when entered

in the established zone, sleeping AIS targets may be automatically activated when meeting user defined parameters: target range, distance and time to the closest point of approach D_{ap} and T_{ap} AIS target class (A, B).

5.7.38 The AIS target presentation status shall be in accordance with Table 5.7.38.

5.7.39 Symbols for presentation of AIS target on the radar display shall be in accordance with the requirements of 5.7.58.

AIS targets that are displayed shall be presented as sleeping targets by default.

The course and speed of a tracked radar target or reported AIS target shall be indicated by a predicted vector of adjustable length.

Permanent and clear indication of vector time and stabilization shall be provided.

The consistent common reference point of own ship shall be used for presentation of radar targets and AIS targets on the radar display.

To present activated targets on close range from the own ship, a means to present the true scale outline of an activated AIS target shall be provided.

It shall be possible to display the past track of activated AIS targets.

Table 5.7.38 **The AIS presentation status**

Function	Cases to be presented		Presentation
AIS On/Off	AIS processing switched on/ graphical presentation switched off	AIS presentation switched on/ graphical presentation switched on	Alphanumeric or graphical
Filtering of sleeping AIS targets	Filter status	Filter status	Alphanumeric or graphical
Activation of targets		Activation criteria	Graphical
D_{ap} and T_{ap} alarm	Function On/Off Sleeping targets included	Function On/Off Sleeping targets included	Alphanumeric or graphical

Lost target alarm	Function On/Off Lost target filter criteria	Function On/Off Lost target filter criteria	Alphanumeric or graphical
Target association	Function On/Off Association criteria Default target priority	Function On/Off Association criteria Default target priority	Alphanumeric

5.7.40 It shall be possible to select any tracked radar or AIS target for alphanumeric display of its data. A target selected for display shall be identified by the relevant symbol. If more than one target is selected for data display, the relevant symbols and the corresponding data shall be clearly indicated. There shall be a clear indication to show that the target data is derived from radar or from AIS.

For each selected target, the following data shall be presented in alphanumeric form:

source of data (radar or AIS);

range of target;

bearing of target;

COG (course over ground);

speed over ground;

D_{ap} and T_{ap}.

Additionally, for each selected tracked AIS target the following data shall be presented:

ship's identification;

navigational status (underway, at anchor, etc.);

position.

Target heading and reported rate of turn of the AIS target may be also made available.

Additional target information may be provided on request.

If the received AIS information is incomplete, the absent information shall be clearly indicated as "MISSING" within the target data field.

The data on selected target shall be displayed and continually updated, until another target is selected for data display or until the window is

closed.

Means shall be provided to present own ship AIS data on request.

5.7.41 A clear indication of the cause for all alarm criteria shall be given.

If the calculated D_{ap} and T_{ap} values of a tracked target or activated AIS target are less than the set limits;

a D_{ap} and T_{ap} alarm shall be given;

the alarmed target shall be clearly indicated.

The preset D_{ap} and T_{ap} limits applied to targets from radar and AIS shall be identical. The D_{ap} and T_{ap} alarm functionality shall be applied for all activated AIS targets.

On request the D_{ap} and T_{ap} alarm functionality may also be applied to sleeping AIS targets.

When new targets are detected within the defined acquisition zone for automatic tracking and when new AIS targets are activated, these targets shall be clearly identified and an alarm shall be given.

The system shall alert the user if a tracked radar target is lost, rather than excluded by a predetermined range or pre-set parameter. The last position of the target removed from tracking shall be clearly indicated on the display.

It shall be possible to enable or disable the lost target alarm function for AIS targets. A clear indication shall be given if the target is lost and if the lost target alarm is disabled.

The last position of the lost AIS target shall be clearly indicated on the display.

5.7.42 The indication of the lost target shall disappear if the AIS signal is received again , or after the lost target alarm has been acknowledged. A means of recovering limited historical data from previous AIS reports on lost targets shall be provided.

It shall not be possible to display one physical target as two independent targets (radar and AIS targets).

If the association criteria are fulfilled such that the radar and AIS reported information are considered as one physical target, than as a default condition, such target shall be displayed by the activated AIS target symbol and alphanumeric AIS target data.

The user shall have the option to change the default condition to display data and shall be permitted to select target data source (radar or AIS).

If the AIS and radar information become sufficiently different, the AIS

and radar information shall be considered as two distinct physical targets and one activated AIS target and one tracked radar target shall be displayed. No alarm shall be raised.

5.7.43 On ships of 10000 gross tonnage and upwards the radar system shall be capable of simulating the manoeuvre, namely, shall provide a possibility of simulating the approach situations during the manoeuvre with due regard for own ship's dynamic characteristics.

A trial manoeuvre simulation shall be clearly identified.

The requirements are:

the simulation of own ship course and speed shall be variable;

a simulated time to manoeuvre with a countdown shall be provided;

during simulation, target tracking shall continue and the actual target data shall be indicated;

trial manoeuvre shall be applied to all tracked radar target and all activated AIS targets.

5.7.44 It shall be possible for the user to manually display sketch maps of the navigation area, various navigation lines, routes referenced to own ship and its geographical position. It shall be possible to remove the display of this data by a simple operator action.

The sketch maps may consist of lines, symbols and reference points, which shall comply with the requirements of 5.7.58.

The displayed additional marks and symbols shall not degrade the radar information. The displayed information shall be retained when the equipment is switched off and restored when a relevant equipment module is replaced.

5.7.45 The radar system may provide the means to display electronic navigation charts (ENC) to provide real-time sailing conditions monitoring.

The displayed ENC shall comply with International Hydrographic Organization (IHO)'s relevant standards.

It shall be possible to display information derived from ENC updates.

It shall be possible to display ENC by levels or categories of information, but not by individual objects or chart symbols.

The display of ENC shall use the same reference criteria as the AIS, including consistent common reference point of own ship and datum. Scale and orientation of ENC and radar indication shall be identical.

It shall be possible to remove the display of chart data by a single operator action.

The display of radar information shall have priority over all other data which may be displayed. Chart information shall be displayed such that radar information is not obscured or degraded. Chart information shall be clearly perceptible as such.

A malfunction of the source of chart data shall not affect the operation of the radar/AIS system.

5.7.46 Alarm shall be provided to alert the user of "picture freeze". Failure of any sensor interfaced to the radar, including: gyro, log, aerial position sensor shall be alarmed.

In case of the radar failure, provision shall be made for transfer to the use of accessible standby means or arrangements shall be made to continue the radar operation with some system functionalities being limited in use.

5.7.47 When multiple radars operate jointly, the system shall safeguard against single point system failure.

When an integrated multiple radar system includes components of the same purpose, provision shall be made for interswitching thereof.

The mode used to receive and process the radar information as well as the operational data on system status shall be indicated at each display position.

5.7.48 The radar operational controls shall ensure that radar system is simple and convenient to operate.

The radar system shall be capable of being switched "on" or "off at the main system radar display or at an additional control position.

The radar control functions may be realized as an individual control panel or with the use of a programmed access to control (e. g. on-screen menu) or a combination of these.

The primary control functions shall be dedicated hardware controls or control keyboard, with an associated status indication. The following are defined as primary radar control functions:

radar standby/run;
range scale selection;
gain;
manual tuning function (if applicable);
anti-clutter rain;
anti-clutter sea;
AIS function on/off;
alarm acknowledge;
cursor;

a means to set EBL;
a means to set VRM;
display brightness;
acquisition of radar targets.

The primary functions shall be operated directly at the main system radar display in addition to the remote control positions.

5.7.49 The radar system shall include a means to record the total operating hours for any components with a limited life.

Provision shall be made to identify the radar failures.

5.7.50 Provision shall be made to switch off automatically high-frequency radiation within the preset sectors. Indication of these sectors shall be provided.

5.7.51 The radar aerial shall be designed to operate reliably in wind speeds likely to be encountered on the class of ship on which it is installed.

The rotation rate shall be such as to provide and appropriate information update rate.

There shall be a means to prevent aerial rotation and electromagnetic radiation during servicing, or while personnel are in the vicinity of the aerial or up-mast units.

5.7.52 The radar design shall ensure that the radar system can be operated by trained users.

A target simulation facility shall be provided for training purposes and for acquiring skills in operation.

5.7.53 The radar system shall be capable of receiving the required input information (in standard format) from:

a gyrocompass or transmitting heading device; a log;
radionavigation system receiver; AIS equipment;
other sources of equivalent information.

5.7.54 Means shall be provided in the radar system to preclude the use of invalid data. If quality and validity of input data are identified as inconsistent with the requirements this shall be clearly indicated.

As far as is practical, the integrity of data coming from external sensors shall be checked. Such check shall be carried out by comparison with other connected sensors or by other accessible checks such as testing to ascertain that the current data do not exceed the allowable data limits.

The latency of processing input data shall be minimized.

5.7.55 It shall be possible to provide information (in standard format)

by any radar output interface to other ship's systems.

The radar system shall provide an output of the display data for the voyage data recorder.

At least one normally closed contact (isolated) shall be provided for indicating failure of the radar.

The radar shall have a bi-directional interface to other systems to facilitate communication so that alarms indicating failure of the radar can be transferred to external systems and so that audible alarms from the radar can be remotely muted from external systems.

5.7.56 In the event of failure in receiving input data from external information sources maintaining operation of the radar there shall be an appropriate permanent indication. Depending on the nature of failure, the following basic functions shall be performed:

.1 in the event of failure of information from gyrocompass (transmitting heading device) the radar equipment shall operate satisfactorily in an "unstabi-lized head-up" mode. The stabilization mode shall be changed automatically within 1 min after a failure in receiving appropriate information from external source.

If automatic anticlutter sea processing could prevent the detection of targets in the absence of azimuth stabilization, the processing shall switch off automatically within 1 min.

An indication shall be given that only relative bearing measurements can be used;

.2 in the event of failure of speed through water information a means of manual speed input shall be provided;

.3 in the event of failure of speed or course and speed over ground information the equipment shall be operated with speed through water information;

.4 in the event of failure of position input information the electronic navigation chart shall be displayed if only at least a single reference point with known position is used or the position is manually entered;

.5 in the vent of failure of radar video input information from the radar components ensuring radiation and reception of radar signals, the equipment shall continue to display target information based on AIS data. The last radar picture shall not be displayed;

.6 in the event of failure of AIS input information, the equipment shall display the radar video and target database;

.7 in the event of failure of information from other ship's systems interfaced to the radar, the equipment shall be capable of operating

equivalent to stand alone system.

5.7.57 The radar operating instructions shall contain a detailed information on all possible functions, including:

recommended settings of controls for different weather conditions of radar operation;

performance of the radar system;

operator's actions in case of failures;

limitations of the display and tracking process and accuracy, including any delays in processing and presentation of information;

using own ship heading and speed over ground/ course over ground information for collision avoidance;

limitations and conditions of target association, separate target presentation;

criteria of selection for automatic acquisition of AIS targets and cancellation of activation;

methods applied to display AIS targets and any limitations;

principles underlying the trial manoeuvre technology, including simulation of own ship's manoeuvring characteristics, if provided;

alarms and indications;

equipment installation and arrangement requirements;

radar range and bearing accuracies;

additional functional capabilities and operator's actions (e. g. for detection of SARTs);

the value of the consistent common reference point of own ship in the information processing and presentation process;

factors affecting the change of radar performance.

The manufacturer's instructions for the radar system installation shall be an integral part of the technical documentation.

5.7.58 Abbreviations of terms used in displaying the operation modes and other information shall be in accordance with those given in Table 5.7.58-1.

Abbreviations of displayed units shall be in accordance with those given in Table 5.7.58-2.

Symbols used to indicate the radar targets, AIS targets and other marks on the radar display of own ship shall be in accordance with those given in Table 5.7.58-3.

Table 5.7.58-1 **Terms and their abbreviations**

Abbreviation	Term used	
	English	Ukrainian
1	**2**	**3**
ACK	Acknowledge	Підтвердження
ACQ	Acquire, Acquisition	Захоплення
AZ	Acquisition zone	Зона захоплення
AFT	Aft	Корма
ALARM	Alarm	Тривога
ALT	Altitude	Висота
AM	Amplitude modulation	Амплітудна модуляція
ANCH	Anchor watch	Якірна вахта
ANT	Antenna	Антена
RAIN	Anti clutter rain	Придушення перешкод від дощу
SEA	Anti clutter sea	Придушення перешкод від хвилювання моря
AUD	Audible	Звуковий
AUTO	Automatic	Автоматичне
AFC	Automatic frequency control	Автоматичне керування частотою
AGC	Automatic gain control	Автоматичне посилення
AIS	Automatic identification System	Автоматична ідентифікаційна система
AUX	Auxiliary system/function	Додаткова система/функція
AVAIL	Available	Доступність
BKGND	Background	Огляд
BRG	Bearing	Пеленг
BWW	Bearing waypoint to waypoint	Пеленг із шляхової точки на іншу шляхову точку
BRILL	Brilliance	Яскравість
CAL	Calibrate	Калібрування
CNCL	Cancel	Скасування
CENT	Centre	Центр
CHG	Change	Зміна
CP	Circular polarized	Кругова поляризація
CLR	Clear	Очищення
CPA	Closest point of approach	Точка найкоротшого

		зближення
CCRP	Consistent common reference point	Загальна опорна точка
CONT	Contrast	Контраст
CORR	Correction	Коректура
CRS	Course	Шляховий кут (курс)
COG	Course over the ground	Шляховий кут (курс) відносно ґрунту
CTW	Course through the water	Шляховий кут (курс) від-носно води (з урахуванням дрейфу)
CTS	Course to steer	Заданий шляховий кут
CUP	Course up	Орієнтація по шляховому куту
CTD	Cross track distance	Траверзна відстань
CURS	Cursor	Курсор
DG	Dangerous goods	Небезпечні вантажі
DATE	Date	Дата
DR	Dead reckoning	Зчислення шляху
DECR	Decrease	Зменшення
DEL	Delete	Видалити
DEP	Departure	Відхід
DPTH	Depth	Глибина
DEST	Destinations	Пункт призначення
DEV	Deviations	Девіація
DGNSS	Differential GNSS	Диференціальний режим ГНСС
DSC	Digital selective calling	Цифровий вибірковий виклик (ЦВВ)
DISP	Display	Дисплей
DIST	Distance	Відстань
DRMS	Distance root mean square	Середнє квадратичне відхилення по відстані
DTG	Distance to go	Задана відстань
DRIFT	Drift	Дрейф
E	East	Схід

EBL	Electronic bearing lane	Електронна лінія пеленгу
EPFS	Electronic position fixing system	Електронна система визна-чення місцезнаходження
ENH	Enhance	Збільшення помітності
ERR	Error	Похибка
EP	Estimated position	Зчислене місце з урахуванням дрейфу
ETA	Estimated time of arrival	Розрахунковий час приходу
EVENT	Event	Подія
EXT	External	Зовнішній
FIX	Fix	Визначення місця
FM	Frequency modulation	Частотна модуляція
FULL	Full	Повний
GAIN	Gain	Посилення
GDOP	Geometric dilution of precision	Геометричний фактор погіршення точності
GNSS	Global navigation satellite system	Глобальна супутникова навігаційна система
GC	Great circle	Велике коло
GND	Ground	Поверхня Землі
GRI	Grou p repetition interval	Груповий інтервал повторення
GZ	Guard zone	Охоронна зона
GYRO	Gyro	Гірокомпас
HS	Harmful substance	Повідомлення про небезпечні вантажі
HUP	Head up	Орієнтація по курсу
HDG	Heading	Курс
HCS	Heading control system	Система керування курсом судна
HL	Heading line	Лінія курсу
HF	High frequency	Висока частота
HSC	High speed craft (HSC)	Високошвидкісне судно
HDOP	Horizontal dilution of	Горизонтальний

	precision	геометричний фактор погіршення точності
ID	Identification	Ідентифікація
INCR	Increase	Збільшення
IND	Indication	Індикація
INFO	Information	Інформація
INF READ	Infrared	Інфрачервоний
INIT	Initialization	Початок
INP	Input	Уведення
I/O	Input/ Output	Уведення/ Виведення
IRCS	Integrated Radio Communication System	Інтегрована система радіозв'язку
IR	Interference rejection	Придушення перешкод
ISW	Interswitch	Перемикання
INT	Interval	Інтервал
LAT	Latitude	Широта
LIM	Limit	Межа (граничне значення)
LOP	Line of position	Лінія положення/ місцезнаходження
LOG	Log	Лаг
LR	Long range	Велика дальність
LON	Longitude	Довгота
LOST TGT	Lost target	Загублена ціль
LF	Low frequency	Низька частота
MAG	Magnetic	Магнітний
MVR	Maneuver	Маневр
MAN	Manual	Ручне
MAP	Map	Карта
MAX	Maximum	Максимум
MMSI	Maritime mobile services identity number	Ідентифікаційний номер морської рухомої служби
MENU	Menu	Меню
MP	Maritime pollutant	Забруднювач морського середовища
MIN	Minimum	Мінімум

MSI	Maritime safety information	Інформація з безпеки мореплавання
MKR	Marker	Маркер
MSTR	Master	Капітан
MF	Medium frequency	Середні частоти
MISSING	Missing	Помилка
MUTE	Mute	Тиша (без звуку)
NAV	Navigation	Навігація
N	North	Північ
NORM	Normal	Нормальний (не)
N UP	North up	Орієнтація по меридіану
OFF	Off	Вимкнути
OOW	Officer on watch	Вахтовий офіцер
OFFSET	Offset	Зсув/зміщення
ON	On	Увімкнути
OUT	Out/Output	Уведення/ Виведення
OS	Own ship	Власне судно
PANEL	Panel illumination	Освітлення панелі
PI	Parallel index line	Лінія паралельного індексу
PASSV	Passenger vessel	Пасажирське судно
PERM	Permanent	Постійно
POB	Person overboard	Людина за бортом
PIN	Personal identification number	Особистий номер члена екіпажу
PILOT	Pilot vessel	Лоцманське судно
PORT	Port/Portside	Лівий борт
POSN	Position	Координати
PDOP	Position dilution of precision	Фактор погіршення точності місця
PWR	Power	Живлення
PRED	Predicated	Прогнозоване
PPC	Predicated point of collision	Розрахункова точка зіткнення
PRF	Pulse repetition frequency	Частота повторення імпульсів
PPR	Pulse per revolution	Кількість імпульсів на

		оберт
RACON	Racon	Радіолокаційний маяк-відповідач
RADAR	Radar	РЛС
RAIN	Rain	Дощ
RGN	Range	Відстань (дальність)
RR	Range ring	Кільця дальності
RCDS	Raster chart display system	Система відображення растрових карт
RNC	Raster navigation chart	Растрова навігаційна карта
ROT	Rate of turn	Кутова швидкість повертання
RX	Receiver	Приймач (приймальний пристрій)
RM	Relative motion	Відносний рух
RPM	Revolution per minute	Кількість обертів за хвилину
RMS	Root mean square	Середнє квадратичне відхилення
ROUTE	Route	Шлях
S	South	Південь
SF CNT	Safety contour	Контур безпеки
SAIL	Sailing vessel	Вітрильне судно
SAT	Satellite	Супутник
S-BAND	S-band	Смуга частот S- діапазону
SARV	Search and rescue vessel	Рятувальне судно
SEL	Select	Вибір
SEQ	Sequence	Послідовність
SET	Set	Знос
TIME	Ship's time	Судновий час
SP	Short pulse	Короткий імпульс
SNR	Signal to noise ratio	Відношення сигнал/перешкода
SI	Simulation	Програвання
SPD	Speed	Швидкість

SDME	Speed and distance measuring equipment	Пристрій вимірювання швидкості і пройденої відстані
SOG	Speed over the ground	Швидкість відносно ґрунту
STW	Speed through the water	Швидкість відносно води
STBY	Stand –by	Готовність
STBD	Starboard side	Правий борт
STN	Station	Станція
SYNC	Synchronization	Синхронізація
TGT	Target	Ціль
TT	Target tracking	Супроводження цілі
TEST	Test	Перевірка (випробування)
TIME	Time	Час
TD	Time difference	Різниця в часі
TOA	Time of arrival	Час прибуття
TOD	Time of departure	Час відходу
TCPA	Time to CPA	Час зближення на найкоротшу відстань
TTG	Time to go	Час переходу
TWOL	Time to wheel over line	Час підходу до лінії повороту
TRK	Track	Шлях судна
TCS	Track control system	Система керування траєкторією судна
TMG	Track made good	Заданий шлях
TRAIL	Trail	Слід
TPL	Transferred line of position	Зміщення лінії положення
THD	Transmitting heading device	Пристрій для передачі курсу
TRIAL	Trial	Програвання
TRIG	Trigger pulse	Триггерний імпульс
TM	True motion	Істинний рух
TUNE	Tune	Настроювання
UHF	Ultrahigh frequency	Надвисока частота

UTC	Universal time coordinate	Універсальний координований час
VRM	Variable range marker	Рухомий маркер
VAR	Variation	Схилення
VECT	Vector	Вектор
VHF	Very high frequency	Висока частота
VLF	Very low frequency	Наднизька частота
GRND	Vessel aground	Судно, що сидить на грунті
ANCH	Vessel at anchor	Судно на якорі
VCD	Vessel constrained by draught	Судно обмежене своєю осадкою
DIVE	Vessel engaged in diving operation	Судно, зайняте водолазними роботами
DRG	Vessel engaged in dredging or underwater operation	Судно, зайняте днопогли-блювальними роботами
TOW	Vessel engaged in towing operation	Судно, зайняте буксируванням
NUC	Vessel not under command	Некероване судно
RIM	Vessel restricted in maneuverability	Судно обмежене можливістю маневрування
VTS	Vessel traffic service	Система керування рухом судна
VID	Video	Відео
VDR	Voyage data recorder	Записувач даних рейсу
WARNING	Warning	Попередження
WAT	Water	Вода
WPT	Waypoint	Шляхова точка
W	West	Захід
WOL	Wheel over line	Лінія подачі команди на перекладку руля
WOT	Wheel over time	Час подачі команди на перекладку руля

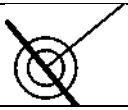
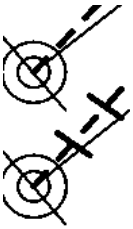
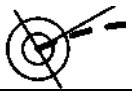
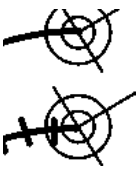
X-BAND	X-band	Смуга частот X- діапазону

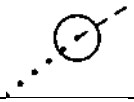
Table 5.7.58-2 **Units and their abbreviations**

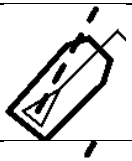
Abbreviation	Term used	
	English	Ukrainian
1	**2**	**3**
cbl	cable length	кабельтов (відстань)
cps	cycles per second	частота (кількість періодів за секунду)
deg	degree (s)	градус (и)
fm	fathom (s)	сажні
ft	feet/ foot	фути
GHz	Gigahertz	гігагерци (ГГц)
hPa	HectoPascal	гектопаскалі (гПа)
Hz	Hertz	герци (Гц)
hr	hour (s)	година (и)
kHz	Kilohertz	кілогерци (кГц)
km	Kilometer	кілометри (км)
kPa	Kilopascal	кілопаскалі (кПа)
kn	Knot (s)	вузли
MHz	Megahertz	мегагерци (МГц)
min	Minute (s)	хвилини
NM	Nautical mile (s)	морські милі

Table 5.7.58-3 **Symbols**

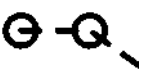
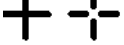
Topic	Symbol	Description
1	**2**	**3**
Own ship symbols		
Own ship		Double circle, located at common reference position. Use of the symbol is optional, if own ship position is shown by the combination of heading line and beam line.

Own ship true scale outline		The symbol size corresponds to the image scale. The true scale outline is oriented along own ship's heading. The position of the symbol is the common reference point.
Own ship radar aerial position		Cross located at the physical location of the radar aerial that is the current source of displayed radar video.
Own ship heading line		Solid line whose length is limited by bearing scale. If the bearing scale is not displayed the heading line shall have a limited length. Origin is at the common reference point.
Own ship beam line		Solid line of fixed or variable length. Midpoint is at common reference point.
Own ship speed vector		Dashed line — short dashes with spaces approximately twice the line width of heading line. Time increments may optionally be marked along the dashed line using short intersecting lines. To indicate water/ ground stabilization one or two arrowheads , respectively, may be added at the speed vector endpoint
Own ship path prediction		A curved vector may be provided as a path predictor.
Own ship past track		Thick line for primary source of navigational information. Thin line for secondary source. Optional time marks are allowed.

Tracked target including dangerous target		Solid filled or unfilled circle . The speed vector shall be displayed as dashed line with short dashes with spaces approximately twice the line width. Optionally, time increments may be marked along the vector. For a dangerous target bold red (on colour display) solid circle with speed vector flashing until acknowledged.
Tracked Radar Target Symbols		
Target in acquisition state		Circle segments. For automatic acquisition, bold circle segments, flashing and red (on colour display) until acknowledged.
Lost target		Bold lines across the circle, flashing until acknowledge.
Selected target		A square indicated by its corners centred around the target symbol.
Target past positions		Dots, equally spaced by time.
Супроводжувана обрана ціль	**R**	Large R adjacent to designated tracked target. Multiple reference targets shall be marked as Rl, R2, R3, etc.
AIS Target Symbols		
AIS target (sleeping)		An isosceles, acute-angled triangle shall be used. The triangle shall be oriented by heading or course over ground. The reported position shall be located at half the height of the triangle. The symbol of the sleeping target shall

		be smaller than that of the activated target.
AIS target — true scale outline		A true scale outline may be added to the target symbol if the selected range scale makes this action possible.
Selected target		A square indicated by its corners.
Activated AIS target including dangerous target		An isosceles, acute-angled triangle shall be used. The triangle shall be oriented by heading or course over ground. The speed over ground vector shall be displayed as a dashed line with short dashes with spaces approximately twice the line width. The heading shall be displayed as a solid line with length twice of the length of the triangle symbol. Origin of the heading line is the apex of the triangle The turn shall be indicated by a short intersecting line. A path predictor may be provided as curved vector. For a Dangerous AIS Target bold, red (on colour display) solid triangle with speed vector flashing until acknowledged.
Lost target		Triangle with bold solid cross. The cross shall have a fixed orientation. The triangle shall be oriented per last heading value. The symbol shall flash until acknowledged.
Target past positions		Dots, equally spaced by time.

Other Symbols

Real position of charted object		Diamond with crosshair centred at reported position.
Virtual position		Diamond with crosshair centred at reported position.
Monitored route		Dashed bold line, waypoints as circles.
Planned or alternate route		Dotted lines, waypoints as circles.
Trial maneuvre		Large T on screen.
Simulation mode		Large S on screen.
Cursor		Crosshair (two alternatives).
Range rings		Solid circles.
Variable range markers		Circle
Electronic bearing lines		Dashed line.
Acquisition /Activation area		Solid line boundary for an area.
Event mark		Rectangle with diagonal line, clarified by added text (e.g. "MOB" for man overboard case.

5.7.59 The radars for ships of river-sea navigation (marks for restricted areas of navigation in the character of classification of a ship are **R2-RSN**, **R3-RSN, A-R2-RSN**, **B-R3-RSN**, **C-R3-RSN**), engaged on inland waterways voyages shall, in addition to requirements in 5.1, 5.7.1, 5.7.7–5.7.9, 5.7.14, comply with the following requirements:

.1 The display unit of the radar installed on board ship with the aerial

height above sea level being equal to 10 m shall be capable of giving clear presentation of various objects within the ranges (in kilometers) given below:

Shore of height, m:
60 37
6 13
Ship of gross tonnage:
5000 13
20 4
Buoy with reflecting surface of 10 m^2 4

The display of all objects shall remain visible when the ship is rolling or pitching up to ±10°;

.2 Basic performance parameters of the shipboard radar with the aerial height of 7 m above sea level shall not be worse than those specified in Table 5.7.59.2.

The equipment performance shall not deteriorate when the ship is rolling and pitching up to ±10°;

.3 The display shall have an effective diameter of at least:

180 mm for ships from 300 to 1600 gross tonnage;

250 mm for ships from 1600 gross tonnage and over.

The display unit of the radar shall be provided with six range scales from 400 m to 5000 m. In this regard there shall be indicated not less than four fixed electronic range rings and a variable electronic marker range with a numeric read-out of range in meters (kilometers) on each range scale.

The variable electronic marker range shall enable the range of an object to be measured with an error not more than 10 m on range scales of 0,4 to 2,0 km and 0,8 per cent of the range of the following scale established.;

Table 5.7.59.2

Basic performance parameters	Value
Minimum radar detection range, m	15
Range resolution on dials 0,4 to 1,2 km, m	15
Range resolution on the rest dials in relation to the maximum value of the range dial established, %	1

Accuracy in range measuring, m	10
Bearing resolution, deg	1,0
Accuracy in measuring bearings, deg	1,0
Accuracy in course indication, deg	0,5

.4 It shall be possible that brightness of the fixed electronic range rings and a variable electronic marker be varied until they are fully removed from the display;

.5 The display unit of the radar shall be fitted with the electronic or mechanical device for taking bearings of the detected objects;

.6 In radar provision be made for clockwise, continuous and automatic scan through 360° of azimuth. The scan rate shall be not less than 18 r.p.m. The aerial shall operate satisfactorily in relative wind speeds up to 50 m/s;

.7 It shall be possible to off-set the radar origin to any display point for a distance of at least 0,5 of the display radius;

.8 The radar display provided with two sets of range scales, in meters (kilometers) and miles, shall have the means of switching-over and the relevant indication of a measurement unit chosen for range measuring.

5.8 RADAR REFLECTOR

5.8.1 The radar reflector (either active or passive) shall have effective echoing area to enable detection by ships navigating by radar at both 9 GHz and 3 GHz bands whose wavelengths are 3 cm and 10 cm respectively.

5.8.2 The radar reflector shall have the following nominal level of the effective echoing area when mounted at a minimum height of 4 m above water level:

at least 7,5 m^2 in 9 GHz band; 0,5 m^2 in 3 GHz band.

5.8.3 The nominal minimum level for reflector effective echoing area, as per 5.8.2, shall be maintained over a total of at least 280° azimuth.

5.8.4 The radar reflector polar diagram shall be such that any single angle with a response below nominal minimum level would not be greater than 10° (zero range), and the distances between the neighboring zero ranges shall be less than 20°.

5.8.5 For self-propelled ships and sailing vessels designed to operate with little heel and/or trim (catamaran/trimaran), the requirements of 5.8.2 shall be met through angles of heel 10° either side of vertical. For other sailing vessels, these requirements shall be met through angles of

heel 20° or more either side of vertical.

5.8.6 The radar reflector shall be clearly and respectively marked where it meets the requirements specified in 5.8.2 at ±20° inclination (heel).

5.8.7 The manufacturer recommended mounting height (not less than 4 m) and any preferred orientation shall be clearly marked directly on the radar reflector.

5.8.8 Active radar reflectors shall conform to relevant requirements of International Telecommunication Union (ITU).

5.8.9 The radar reflector shall be capable of maintaining its reflection performance under the conditions of sea states and action of any climatic and mechanical factors specified in 5.1.2.

5.9 RADIOBEACON STATION

5.9.1 The basic performance parameters of the radiobeacon station are specified in Table 5.9.1.

The tolerance of frequency of radiobeacon station shall not exceed 100 Hz.

5.9.2 The transmitter shall be capable of transmitting audio modulated fluctuations of frequencies 400 Hz with continuity of carrier frequency and automatically producing two-letter signal of Morse signals with interval of half a minute and speed of 5 bauds.

Duration of signals:

"dot", ms — 240 ± 10 per cent;

"dash", ms — 720± 10 per cent.

Table 5.9.1

Nos	Parameter	Value
1	Frequency range, kHz (four frequencies tuning by clamping method)	315 – 526,5
2	Class of emissions	A2A
3	Modulating frequency under all destabilizing factors, Hz	400 ± 25

5.10 REMOTE TRANSMITTING HEADING DEVICE

5.10.1 The remote transmitting heading device operating together with the sensing part (heading sensor) in latitudes of up to 70° shall ensure an

output signal meeting at least the following accuracy (subject to the sensing part remaining operative under the conditions likely to be encountered during the ship's service (including high-speed):

.1 the transmission and resolution error shall be less than ±0,2°;

.2 the static error measured at permanent speed and direction of the ship shall be less than ±1,0°;

.3 the dynamic error measured under the conditions of roll, pitch, vibrations or change of speed shall be less than ±1,5°. If the amplitude of the dynamic error exceeds ±0,5°, the dynamic error frequency shall be less than 0,033 Hz equivalent to a period not shorter than 30s;

.4 the follow-up error for different rates of turn shall be less than:

±0,5° at rates up to 10°/s;

± 1,5° between a rate of 10°/s to 20°/s.

5.10.2 Any corrective devices to introduce modifications in the true heading information transmitted by the device shall be protected against inadvertent operation.

5.10.3 Manually settable values used for electronic correction shall be indicated by adequate means.

5.10.4 An alarm shall be provided to indicate malfunctions of the device or a failure of the power supply.

5.10.5 At least one output channel shall be provided to transmit the true course information to other navigational equipment in compliance with 5.1.31.

5.10.5 If a device for remote transmission of the magnetic compass course is provided on board, it shall meet the above requirements of the present Chapter, applicable requirements of 5.2 under the prevailing environmental conditions and ensure the following:

.1 be capable of indication of deviation and variation values indispensable for calculation of the total compass correction. The said values shall be displayed directly or accounted for in the output.

All the heading data displayed and output, which is generated by the device for remote transmission of magnetic compass course shall be automatically converted into the true ship's heading.

The magnetic system of the standard magnetic compass or special magnetic sensing parts may be used as a sensing part of the compass with remote electrical transmission of card readings.

Where the magnetic system of the standard magnetic compass is used as a sensing part for remote transmission of card readings, the device for electrical transmission of readings to repeaters and remote transmitting

heading device shall be so designed that their arrangement and operation will in no way affect taking bearings, indication of course and bearing of the compass card, as well as the work for compensation of deviation;

.2 divergence between the readings of repeaters of repeaters and those of the sensitive element of the magnetic compass fitted with remote transmission of dial readings shall not exceed 1°;

.3 the accuracy of readings of the standard compass and the operating repeaters shall not be affected by failure or switching-off of separate repeaters;

.4 audible alarm indicating failure in the follow-up system of the magnetic compass with remote electric transmission of card readings. The audible alarm shall be supplied from independent source of electrical power;

.5 the set of magnetic compass with remote electric transmission of card readings shall be provided with a special lighted panel "Repeaters are switched to magnetic compass" shall be included into a complete set of the magnetic compass fitted with remote electric transmission of readings (refer to 3.7.2.10).

5.11 RADIONAVIGATION SYSTEM RECEIVERS

5.11.1 Radionavigational system receivers shall comply with general requirements of 5.1, Part IV "Radio Equipment", as well as provide for the following:

.1 required accuracy of the ship's positioning in accordance with the type of the employed radio-navigational system or systems;

.2 possibility of its interfacing with navigational equipment and integrated navigation system. The data output shall be in compliance with the International Standard on Digital interfaces for Maritime navigation and radiocommunication equipment and systems;

.3 check of the system working ability by built-in control system;

.4 receiver input protection in accordance with 4.6.10 and 4.6.11 of Part IV "Radio Equipment";

.5 a 5 minute protection interval, for preventing damage to the receiver, its any input and output connections, as well as any receiving equipment input and output;

.6 continuous work in actual operation conditions;

.7 use of different number of combined signal receiving channels which receive signals both from the global satellite navigational systems

and from radionavigational system earth stations with the use of such wide area differential subsystems as WAAS (Wide Area Augmentation System), EGNOS (European Geostationary Navigation Overlay Service) and MSAS (Multifunctional Satellite Augmentation System), space differential subsystem (Space Base Augmentation System — SBAS), and regional differential subsystems such as Starfix, SkyFix and Eurofix/Scorpio.

5.11.2 The GNSS GPS (Global Positioning System) receiver intended for navigation purposes on ships of speeds not exceeding 70 knots shall include the following minimum facilities:

.1 antenna capable of receiving GPS signals;

.2 GPS receiver and processor;

.3 means of computing latitude/ longitude position;

.4 data control and interface;

.5 geographical position display and have, if it is required, other forms of output.

5.11.2.1 The GPS receiver shall comply with the following minimum performance standards and provide for:

.1 receiving and processing SPS (Standard Positioning Service) signals in SA (Selective Availability) mode of operation, providing position information in latitude and longitude basing on WGS-84 (World Geodetic System 1984) datum in degrees, minutes and thousandths of minutes and time referenced to UTC (Universal Time Coordinated). Means shall be provided for converting the coordinates determined in WGS-84 System into the Reference System of the navigational chart in use. If such a possibility is provided, then the ship's position conversion mode shall be shown on the receiver information display with the indication of the employed system in which the ship's position is determined;

.2 operation on the LI (1575,42 MHz) frequency and in C/A (Coarse/Acquisition) code. It is also recommended to provide operation on the L2 (1227,6 Hz) frequency with the use of (Precise) code;

.3 static accuracy such that the position of the antenna is determined to within: 100 m (95 per cent) with HDOP (Horizontal Dilution of Precision) factor equalling 4 or PDOP (Positional Dilution of Precision) factor equalling 6;

.4 dynamic accuracy such that the position of the ship under the sea states and motion experienced in ships is determined to within: 100 m (95 per cent) with HDOP factor equalling 4 or PDOP factor equalling 6;

.5 selecting automatically the appropriate satellite-transmitted signals

to determine the ship's position with the required accuracy and update rate;

.6 acquiring and processing satellite signals with input carrier levels in the range of —130 dBm to — 120 dBm. Once the satellite signals have been acquired, the equipment shall continue to operate satisfactorily with satellite signals having carrier levels down to —133 dBm;

.7 acquiring the first position reading to the required accuracy within 30 min when there is no valid almanac data in the receiver memory;

.8 acquiring the first position reading to the required accuracy within 5 min when there is valid almanac data in the receiver memory;

.9 re-acquiring position to the required accuracy within 5 min when there has been a service interruption of 24 h or less, but the energy supply has not been interrupted;

.10 re-acquiring position to the required accuracy within 2 min when there has been an energy supply interruption of up to 60 s;

.11 generating and outputting to a display and digital interface a new position solution at least once every 1 s;

.12 position resolution equal to or better than 0,001 minutes of latitude and longitude;

.13 COG (Course Over the Ground), SOG (Speed Over the Ground) and UTC outputs, showing these values on the information display and other radio and navigational equipment connected to the receiver. The outputs shall have a validity mark aligned with that on the position output.

The accuracy requirements for COG and SOG shall not be inferior to the relevant performance standards for heading and speed and distance measuring equipment;

.14 possibility of acquiring and processing correction signals from dGPS (Differential GPS) subsystem in accordance with the ITU (International Telecommunications Union) Recommendations and relevant RTCM (Radio Technical Commission for Maritime Services) Standard. If the GPS receiver is fitted with a facility for acquiring and processing the correction signals from the differential subsystem, its performance standards for static and dynamic accuracy (refer to 5.11.2.1.3 and 5.11.2.1.4) shall be at least 10 m (95 per cent).

5.11.2.2 The receiver shall provide indication if the calculated position does not correspond to these operational requirements.

5.11.2.3 The receiver shall provide a warning within 5 s if:

.1 HDOP factor exceeds the established limit;

.2 a new position has not been calculated for more than 1 s.

Under such conditions the last known position and the time of the last valid fix, with the explicit indication of the state so that no ambiguity can exist, shall be output until normal operation is resumed.

5.11.2.4 If it is impossible to determine the ship's position, an alarm signal shall be given by the receiver.

5.11.2.5 The receiver shall provide indication of the differential mode of operation in case of:

.1 receiving differential correction signals;

.2 considering differential corrections in the displayed ship's position.

5.11.2.6 The receiver shall provide timely indication if the differential mode of operation cannot be used.

5.11.2.7 The receiver shall provide the display of the differential mode text message.

5.11.3 The GNSS GLONASS receiver intended for navigation purposes on ships of speeds not exceeding 70 knots shall include the following minimum facilities:

antenna capable of receiving GLONASS signals;

GLONASS receiver and processor;

means of computing latitude/longitude position;

data control and interface;

geographical position display and have, if it is required, other forms of output.

5.11.3.1 The GLONASS receiver shall comply with the following minimum performance standards and provide for:

.1 receiving and processing GLONASS SPS (Standard Positioning Service) signals, providing position information in latitude and longitude basing on PE-90 Reference System in degrees, minutes and thousandths of minutes and time referenced to UTC. Means shall be provided for converting the coordinates determined in PE-90 System into WGS-84 System or into the Reference System of the navigational chart in use. If such a possibility is provided, then the ship's position conversion mode shall be shown on the receiver information display with the indication of the employed system in which the ship's position is determined;

.2 operation in the Standard Positioning Service mode on the LI (1602,5625 - 1615,5 MHz) frequencies and in C Code;

.3 static accuracy such that the position of the antenna is determined to within: 45 m (95 per cent) with HDOP factor equalling 4 or PDOP factor equalling 6;

.4 dynamic accuracy such that the position of the ship under the sea states and motion experienced in ships is determined to within: 45 m (95 per cent) with HDOP factor equalling 4 or PDOP factor equalling 6 under the sea states and motion experienced in ships;

.5 selecting automatically the appropriate satellite-transmitted signals to determine the ship's position with the required accuracy and update rate;

.6 acquiring and processing satellite signals with input carrier levels in the range of —130 dBm to — 120 dBm. Once the satellite signals have been acquired, the equipment shall continue to operate satisfactorily with satellite signals having carrier levels down to —133 dBm;

.7 acquiring the first position reading to the required accuracy within 30 min when there is no valid almanac data in the receiver memory;

.8 acquiring the first position reading to the required accuracy within 5 min when there is valid almanac data in the receiver memory;

.9 re-acquiring position to the required accuracy within 5 min when there has been a service interruption of 24 h or less, but the energy supply has not been interrupted;

.10 re-acquiring position to the required accuracy within 2 min when there has been an energy supply interruption of up to 60 s;

.11 generating and outputting to a display and digital interface a new position solution at least once every 1 s;

.12 position resolution equal to or better than 0,001 minutes of latitude and longitude;

.13 COG (Course Over the Ground), SOG (Speed Over the Ground) and UTC outputs, showing these values on the information display and other radio and navigational equipment connected to the receiver. The outputs shall have a validity mark aligned with that on the position output. The accuracy requirements for COG and SOG shall not be inferior to the relevant performance standards for heading and speed and distance measuring equipment;

.14 possibility of acquiring and processing correction signals from dGPS (Differential GPS) subsystem in accordance with the ITU Recommendations and relevant RTCM Standard. If the GLONASS receiver is fitted with a facility for acquiring and processing the correction signals from the differential subsystem, its performance standards for static and dynamic accuracy (refer to 5.11.3.1.3 and 5.11.3.1.4) shall be at least 10 m (95 per cent).

5.11.3.2 The receiver shall provide indication if the calculated position does not correspond to these operational requirements.

5.11.3.3 The receiver shall provide a warning within 5 s if:

.1 HDOP factor exceeds the established limit;

.2 a new position has not been calculated for more than 1 s.

Under such conditions the last known position and the time of the last valid fix, with the explicit indication of the state so that no ambiguity can exist, shall be output until normal operation is resumed.

5.113.4 If it is impossible to determine the ship's position, an alarm signal shall be given by the receiver.

5.11.3.5 The receiver shall provide indication of the differential mode of operation in case of:

.1 receiving differential correction signals;

.2 considering differential corrections in the displayed ship's position.

5.113.6 The receiver shall provide timely indication if the differential mode of operation cannot be used.

5.11.3.7 The receiver shall provide the display of the differential mode text message.

5.11.4 The combined GPS GLONASS receiver intended for navigation purposes on ships of speeds not exceeding 70 knots shall include the following minimum facilities:

.1 antenna capable of receiving GPS/GLONASS signals;

.2 GPS/GLONASS combined receiver and processor;

.3 means of computing latitude/ longitude position;

.4 data control and interface;

.5 geographical position display:

5.11.4.1 The GPS/GLONASS receiver shall comply with the following minimum performance standards and provide for:

.1 receiving and processing SPS (Standard Positioning Service) signals when the SA (Selective Availability) mode of operation and GLONASS system range determining code are switched on, providing position information in latitude and longitude which is referred to WGS-84 datum in degrees, minutes and thousandths of minutes and time referenced to UTC. Means shall be provided for converting the coordinates determined in WGS-84 Reference System into PE-90 System or into the Reference System of the navigational chart in use.

If such a possibility is provided, then the ship's position conversion mode shall be shown on the receiver information display with the indication of the employed system in which the ship's position is determined;

.2 operation on the LI (1575,42 MHz) frequency and in C/A (Coarse/Acquisition) Code of GPS system and on the LI (1602,5625 — 1615,5 MHz) frequencies and in C Code of GLONASS system;

.3 static accuracy such that the position of the antenna is determined to within: 35 m (95 per cent) without considering the differential subsystem signals and — 10 m (95 per cent) with considering the differential subsystem signals with HDOP factor ≤ 4 or PDOP factor ≤6;

.4 dynamic accuracy such that the position of the ship under the sea states and motion experienced in ships is determined to within: 35 m (95 per cent) without considering the differential subsystem signals and — 10 m (95 per cent) with considering the differential subsystem signals with HDOP factor ≤ 4 or PDOP factor ≤6;

.5 selecting automatically the appropriate satellite-transmitted signals to determine the ship's position with the required accuracy and update rate;

.6 acquiring and processing satellite signals with input carrier levels in the range of —130 dBm to — 120 dBm. Once the satellite signals have been acquired, the equipment shall continue to operate satisfactorily with satellite signals having carrier levels down to —133 dBm;

.7 acquiring the first position reading to the required accuracy within 30 min when there is no valid almanac data in the receiver memory;

.8 acquiring the first position reading to the required accuracy within 5 min when there is valid almanac data in the receiver memory;

.9 re-acquiring position to the required accuracy within 5 min when there has been a GPS/GLONASS service interruption of 24 h or less, but the energy supply has not been interrupted;

.10 re-acquiring position to the required accuracy within 2 min when there has been an energy supply interruption of up to 60 s;

.11 re-acquiring of a separate satellite signal and using such signal for positioning within 10 s after blocking the signal for a period up to 30 s;

.12 generating and outputting to a display and digital interface a new position solution at least once every 1 s;

.13 position resolution equal to or better than 0,001 minutes of latitude and longitude;

.14 COG, SOG and UTC outputs, showing these values on the information display and other radio and navigational equipment connected to the receiver. The outputs shall have a validity mark aligned with that on the position output.

The accuracy requirements for COG and SOG shall not be inferior to the relevant performance standards for heading and speed and distance measuring equipment;

.15 possibility of acquiring and processing correction signals from dGPS (Differential GPS) subsystem and dGLONASS (Differential GLONASS) in accordance with the ITU Recommendations and relevant RTCM Standard.

5.11.4.2 The receiver shall provide indication if the calculated position does not correspond to these operational requirements.

5.11.4.3 The receiver shall provide a warning within 5 s if:

.1 HDOP factor exceeds the established limit;

.2 a new position has not been calculated for more than 1 s.

Under such conditions the last known position and the time of the last valid fix, with the explicit indication of the state so that no ambiguity can exist, shall be output until normal operation is resumed.

5.11.4.4 If it is impossible to determine the ship's position, an alarm signal shall be given by the receiver.

5.11.4.5 The receiver shall provide indication of the differential mode of operation in case of:

.1 receiving differential correction signals; **.2** considering differential corrections in the displayed ship's position.

5.11.4.6 The receiver shall provide timely indication if the differential mode of operation cannot be used.

5.11.4.7 The receiver shall provide the display of the differential mode text message.

5.11.5 The equipment for receiving signals from the radiobeacons thransmitting corrections from the dGPS and dGLONASS differential subsystems intended for navigation purposes on ships of speeds not exceeding 70 knots shall include the following minimum facilities:

.1 antenna capable of receiving dGPS or dGLONASS correction signals from marine radiobeacons;

.2 dGPS and dGLONASS correction signals receiver and processor;

.3 data control and interface.

5.11.5.1 The equipment for receiving signals from radiobeacons shall comply with the following minimum performance standards and provide for:

.1 reception and processing of dGPS and dGLONASS differential subsystems radiobeacon signals within a frequency range from 283,5 to 325 kHz in compliance with the ITU Recommendations and relevant RTCM

Standard;

.2 facilities for automatic and manual station selection;

.3 possibility of using data with a delay not exceeding 100 ms after the signal reception;

.4 acquiring and processing of the signal within 45 s in atmospheric clutter conditions;

.5 availability of an antenna which is nondirec-tional in the horizontal plane.

5.11.6 The Galileo satellite system receiver intended for navigation purposes on ships of speeds not exceeding 70 knots shall include the following minimum facilities:

antenna capable of receiving Galileo signals;

Galileo receiver and processor;

means of accessing the computed latitude/ longitude position;

data control and interface;

position display and, if required, other displays/ outputs.

If the Galileo satellite system receiver forms part of Integrated Navigation System approved by the Register, requirements of 5.11.6.3, 5.11.6. 4 and 5.11.6.5 shall be provided by this system and the composition of the equipment may be reduced.

5.11.6.1 The Galileo system receiver shall:

.1 be capable of receiving and processing the Galileo positioning and velocity, and timing signals on: for a single frequency receiver, the **L1** frequency alone in the frequency range of 1559 - 1591 MHz (the receiver shall use the ionospheric model broadcast to the receiver by the constellation to generate ionospheric corrections); and for a dual frequency receiver, either on the **L1** and E5b frequencies in the ranges of 1164-1215 MHz and 1559-1591 MHz frequencies or on the **L1** and E5a frequencies in the ranges of 1164 - 1215 MHz and 1559 - 1591 MHz frequencies (the receiver shall use dual frequency processing to generate ionospheric corrections).

It is recommended to provide the reception and processing of the Galileo system signal on three frequencies: the **L1,** E5a and E5b;

.2 provide position information in latitude and longitude which is referred to WGS-84 datum in degrees, minutes and thousandths of minutes and provide time referenced to universal time coordinated UTC;

3 have static accuracy such that the position of the antenna is determined to within: 15 m horizontal (95 per cent) and 35 m vertical (95 per

cent) for single frequency operations on the **L1** frequency; and 10 m horizontal (95 per cent) and 10 m vertical (95 per cent) for dual frequency operations on the **L1** and E5a or **LI** and E5b frequencies with PDOP factor < 3,5;

.4 have dynamic accuracy equivalent to the static accuracy under the sea states and motion experienced in ships;

.5 have position resolution equal or better than 0,001 min of latitude and longitude;

.6 have timing accuracy such that time is determined within 50 ns of UTC;

.7 be capable of selecting automatically the appropriate satellite-transmitted signals to determine the ship's position and velocity, and time with the required accuracy and update rate;

.8 be capable of acquiring satellite signals with input signals having carrier levels in the range of — 128 to —118 dBm. Once the satellite signals have been acquired, the equipment shall continue to operate satisfactorily with satellite signals having carrier levels down to —131 dBm;

.9 be capable of acquiring position, velocity and time to the required accuracy within 5 min when there is no valid almanac data;

.10 be capable of acquiring position, velocity and time to the required accuracy within 1 min when there is valid almanac data;

.11 be capable of re-acquiring position, velocity and time to the required accuracy within 1 min when there has been a service interruption of 60 s or less;

.12 generate and output to a display and digital interface a new position solution at least once every 1 s for conventional craft and at least once every 0,5 s for high-speed craft;

.13 provide the COG, SOG and UTC outputs, with a validity mark aligned with that on the position output.

The accuracy requirements for COG and SOG shall not be inferior to the relevant performance standards for the heading and speed and distance measuring equipment and the accuracy shall be obtained under the various dynamic conditions that could be experienced onboard ships;

.14 provide at least one normally closed contact, which shall indicate failure of the Galileo receiver equipment;

.15 have a bidirectional interface to facilitate communications so that alarms can be transferred to external systems and so that audible alarms from the Galileo receiver can be acknowledged from external systems.

The interface shall comply with the relevant international standards;

.16 have facilities to process differential Galileo (dGalileo) data fed to it in accordance with the standards of ITU Recommendations and the appropriate RTCM standard and provde indication of the reception of dGalileo signals and whether they are being applied to the ship's position.

5.11.6.2 The dGalileo receiver equipment shall also indicate whether the performance of Galileo is outside the bounds of requirements for general navigation in the ocean, coastal, port approach and restricted waters, and in inland waterway phases of the voyage.

5.11.6.3 The Galileo receiver equipment shall as a minimum:

.1 provide a warning within 5 s of loss of position or if a new position based on the information provided by the Galileo constellation has been calculated for more than 1 s for conventional craft and 0,5 s for high-speed craft.

Under such conditions the last known position and the time of last valid fix, with explicit indication of the state so that no ambiguity can exist, shall be output until normal operation is resumed;

.2 use RAIM (Receiver Autonomous Integrity Monitoring) to provide integrity performance appropriate to the operation being undertaken.

5.11.6.4 For receivers having the capability to process the Galileo Safety of Life Service, integrity monitoring and alerting algorithms shall be based on a suitable combination of the Galileo integrity message and receiver autonomous integrity monitoring (RAIM).

The receiver shall provide an alarm within 10 s Time to Alarm (TTA) of the start of an event if an alert limit of 25 m Horizontal Alert Limit (HAL) is exceeded for a period of at least 3 s. The probability of detection of the event shall be better than 99,999 per cent over a 3-h period (integrity risk 10^{-5}/3 h).

5.12 COMBINED SIHP CONTROL DESKS

5.12.1 Controls and indicating instruments of navigational equipment and of other gears for ship handling required by the present or other parts of the Rules and intended for installation in the wheelhouse or in a place from which the ship is operated may be arranged in the combined ship control desks.

5.12.2 Referred to the controls and indicating instruments mentioned in 5.12.1 are the controls and instruments intended for:

.1 changing the ship's movement (remote control of main engines, blades of controllable pitch propellers, propeller shaft tachometers, pitch

indicators of the CPP, etc.);

.2 communicating orders and recording commands on changes on ship's movement by electromechanical means (engine telegraphs, reverse recorders, etc.);

.3 observing navigational features in the area concerned (radar displays, depth indicators, hydro-locators, anchor cable indicators, etc.);

.4 indicating the values relating to the ship's movement (course, speed, distance, helm, rate of turn, draught indicators, etc.);

.5 controlling very high frequency radio communication means (remote controls and voice communicating devices);

.6 external audible and visual signalling (manual controls for whistles, timing units for automatic generation of sound and light signals, remote controls of electric megaphones, masthead flashing light and day signalling lamps keying devices, navigation lights commutators, etc.);

.7 internal communication and audible signalling (telephones of two-way communication, commutators of service telephone communication, telephones of ship's automatic exchange, commutators of public address system, alarm signalling switches, etc.);

.8 ensuring survivability of the ship and other essential operations (watertight and fire doors closing, starting of fire fighting systems, control of anchor arrangement, ventilation of accommodation and service spaces and holds, thruster and active rudder, etc.);

.9 audible and visual signalling to indicate any failure and executive signalling to indicate given command fulfilment (general and individual signalling on failures of essential machinery, systems and gears, signalling on limit values of various parameters, for example, temperature, pressure, revolutions, depths, etc.);

.10 automated and automatic control of the ship and for making decisions on passing and preventing collisions of ships at sea;

.11 distribution, switchgear and protection devices provided in Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.12.3 Provision shall be made in the design of the combined ship control desk for the appropriate panels for free and convenient arrangement of necessary controls and indicating instruments and its inner spaces shall be sufficient for arrangement of inner wiring and devices in accordance with 5.12.2.11, if any.

5.12.4 The combined ship control desk may be designed both as one common unit and as separate sections, mechanically and electrically

connected with one another, the controls and indicating instruments may also be fitted in separately standing desks.

5.12.5 The dimensions of the combined ship control desk shall be such as to provide the fulfilment of the requirements of 5.12.3 with respect to the devices and instruments built into the desk, as well as the possibility of using controls and observing the instruments, controls and signalling means installed therein when the operator stands facing the ship's bow and to prevent interference for look-outs.

5.12.6 The requirements of 5.12.5 shall be considered fulfilled, if the following conditions are met:

.1 the height of the desk vertical panels or boards with controls or indicating and other instruments arranged at the bulkheads with no scuttles therein is such that the above controls and instruments are not lower than 650 mm and not higher than 2000 mm;

.2 the depth of separate sections of the whole desks fitted at the fore bulkhead of the wheelhouse ensures the access to the scuttles.

5.12.7 The panels of the combined ship control desk may be inclined at any angle ensuring the most exact taking of readings from the indicating instruments and convenient use of controls.

5.12.8 All controls shall be so installed as to be easily accessible for the personnel and close to the indicators and instruments related thereto or made integral with the latter within the boundaries clearly indicated on the panel. They shall have distinct markings showing the purpose and the direction of the control operation.

5.12.9 Indicating devices installed on the combined ship control desk shall provide for continuous and automatic information.

The use of indicating devices giving the information only on call of the operator is permitted.

5.12.10 Where the audible and visual signalling systems capable of indicating any fault in the operation of instruments and machinery are provided, the audible signal shall be clearly heard at any point of the navigation bridge. Signals of various tones shall be used, where necessary.

Controls of emergency systems installed in the desk shall be of red colour. The corresponding portions of scales of instruments intended for indicating emergency and pre-emergency conditions in the systems shall be painted red. In this case:

.1 confirmative signals of starting machinery, systems and arrangements shall function not from the movement or position of controls, but

from pulses directly characterizing the working condition of the item of machinery, system or arrangement concerned;

.2 depending on the meaning of light signals, the colour of symbols and letters of indicating inscriptions shall be green for normal operating conditions and red for emergency conditions;

.3 the above colours of light signals shall be used in accordance with the requirements of 5.1.29.

5.12.11 Controls arranged in compliance with 5.12.8 shall be so designed that the direction of movement of steering wheel, handle, lever, switch, etc. corresponds to the change of the parameter to be controlled as it is provided by 3.1.3 and 3.1.4, Part VII "Machinery Installations" and Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.12.12 Controls and devices built in the combined ship control desk shall be fed in compliance with the requirements of 2.3.4 of the present Part or from the distribution gear put in the combined ship control desk and meeting the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships.

5.12.13 The combined ship control desk shall be so designed or its separate sections shall be so assembled that controls and indicating instruments vital for the safety of ship's navigation and intended for immediate use under extraordinary circumstances when the ship is under way shall be arranged in the desk to the right from the centre line. This condition will be fulfilled if the controls and indicating instruments listed in 5.12.2.1 to 5.12.2.6 are placed from the starboard to the centre line, in ascending order.

Controls and indicating instruments listed in 5.12.2.7 to 5.12.2.9 as well as in 5.12.2.10 may be arranged to the left from the centre line.

5.13 INTEGRATED NAVIGATION SYSTEM

5.13.1 An integrated navigation system (INS) shall provide proper and safe combining of the ship navigational equipment for joint processing and displaying the obtained information, automatic monitoring of the navigational information integrity for continuous monitoring of the navigation environment and providing of appropriate alarms.

Integrated navigation systems, depending on the volume of functions performed, shall be divided into three categories:

category A - systems that providing processing and display of information about the course, speed and coordinates of the ship, as well as

the current time;

category B - systems that provide automatic processing and display of course information, speed, current coordinates of the ship, as well as depth with alarm signal about the known on the planned route and detected hazards;

category C - systems that provide, in addition to the category B functions, automatic ship's course, track or speed control, and monitoring of control parameters.

5.13.2 The INS shall not impair operational characteristics of the navigational equipment incorporated into the system.

5.13.3 The working ability of the navigational equipment shall be ensured in case of malfunction of separate information processing and data exchange units.

5.13.4 Malfunction or failure of any navigational equipment or appliance, which is a part of INS, shall not affect other components of the system, with the exception of those whose efficiency depends directly on the device that is out of order.

Recovery of the integrated navigation system after its failure shall be possible only after prior notification of the operator and confirming the possibility of starting the system.

5.13.5 The input of data from navigation information sensors shall be carried out automatically. Manual input of some data in case of sensor failure can be provided.

5.13.6 The integrated navigation system shall provide the operator with the necessary navigational information, as well as create alert signals in case of unreliable information received from the sensor.

5.13.7 Duplication of navigation equipment, which is part of the integrated navigation system ensuring safe ship control, shall be provided.

5.13.8 The integrated navigation system shall provide continuous automatic comparison of navigational information received from two independent sensors.

Displayed navigation information and information intended for use in the system of automatic control shall be pre-processed in the comparison block..

The use of an incorrect formation in the automatic control system shall be excluded.

5.13.9 The information required for safe control of the ship shall be

displayed continuously by the integrated navigation system.

Additional information shall be displayed by the system upon the call of the operator.

5.13.10 Management of the integrated navigation system shall be carried out with a single control panel, which includes the system controls, means of information displaying and alarms.

5.13.11 The integrated navigation system shall provide protection against operator errors during data input.

5.13.12 The integrated navigation system shall record each alarm and provide its aknowledgement by the watch officer.

5.14 UNIFIED TIMING SYSTEM

5.14.1 The unified timing system station shall ensure:

.1 formation and storage of the time scale and its checking against the International accurate hour's service signals transmitted through the radio channels;

.2 possibility of centralized shifting of displayed readings of the current time within 0 to 23 h with a step of 1 h;

.3 indication of current time readings transmitted to the controllable clock in hours, minutes, seconds.

5.14.2 The error of the main clock run shall not exceed 0,5 s during twenty-four-hour operation.

5.15 ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM[3]

5.15.1 These performance standards shall apply to ECDIS, ECDIS equipment operating in the Raster Chart Display System (RCDS) mode, as well as ECDIS backup arrangements.

5.15.2 These performance standards shall apply to all ECDIS equipment carried on all ships which are covered by these Rules, as follows:

dedicated standalone workstation;

mulifunction workstation as part of integrated navigation system.

5.15.3 Requirements for structure and format of the chart data, encryption of the chart data as well as the presentation of chart data are within the scope of relevant International Hydrographic Organisation (IHO) standards.

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[3] Refer to IMO MSC.232(82) "ADOPTION OF THE REVISED PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)".

5.15.4 In addition to the requirements of this Chapter, ECDIS equipment shall meet the applicable requirements of 5.1, Part IV "Radio Equipment" and 5.1 of this Part, as well as of requirements of the Rules for Bridge Design, Equipment, Arrangement and Procedures (refer to Annex to this Part).

5.15.5 The Electronic Chart Display and Information System shall be capable of displaying all chart information of the System Electronic Navigational Chart (SENK) originated by the authorized hydro-graphic offices.

5.15.6 ECDIS shall facilitate simple and reliable updating of the electronic navigational chart.

5.15.7 ECDIS shall enable the mariner to execute in a convenient and timely manner all route planning and route monitoring, and it shall be capable of continuously plotting the ship's position.

5.15.8 The ECDIS display may also be used for the display of radar, radar tracked target information, AIS and other appropriate data layers to assist in route monitoring.

5.15.9 ECDIS shall have at least the same reliability and availability of presentation as the paper chart published by government authorized hydrographic offices.

5.15.10 ECDIS shall provide appropriate alarms or indications with respect to the information displayed or malfunction of the equipment.

5.15.11 ECDIS equipment may operate in the Raster Chart Display System mode.

RCDS mode of operation shall conform to performance standards stipulated in 5.15.108.

5.15.12 The chart information to be used in ECDIS shall be of the latest edition, as corrected by official updates, of that issued by or on the authority of a Government, government-authorized Hydro-graphic Office or other relevant government institution, and conform to IHO standards.

5.15.13 The contents of the SENC shall be adequate and up-to-date for the intended voyage.

5.15.14 It shall not be possible to alter the contents of the ENC or SENC information transformed from the ENC.

5.15.15 Updates shall be stored separately from the ENC.

5.15.16 ECDIS shall be capable of accepting official updates to the ENC data provided in conformity with IHO standards. These updates shall be automatically applied to the SENC.

By whatever means updates are received, the implementation procedure shall not interfere with the display in use.

5.15.17 ECDIS shall also be capable of accepting updates to the ENC data entered manually with simple means for verification prior to the final acceptance of the data.

They shall be distinguishable on the display from ENC information and its official updates and not affect display legibility.

5.15.18 ECDIS shall keep and display on demand a record of updates including time of application to the SENC. This record shall include updates for each ENC until it is superceded by a new edition.

5.15.19 ECDIS shall allow the mariner to display updates in order to review their contents and to ascertain that they have been included in the SENC.

5.15.20 ECDIS shall be capable of accepting both non-encrypted ENCs and ENCs encrypted in accordance with the IHO Data Protection Scheme.

5.15.21 ECDIS shall be capable of displaying all SENC information. An ECDIS shall be capable of accepting and converting an ENC and its updates into a SENC.

The ECDIS may also be capable of accepting a SENC resulting from conversion of ENC to SENC ashore in accordance with IHO requirements.

5.15.22 SENC information available for display during route planning and route monitoring shall be subdivided into the following three categories:

display base;

standard display;

all other information.

5.15.22.1 The display base which shall be permanently shown on the ECDIS display consists of:

.1 coastline (high water);

.2 own ship's safety contour;

.3 isolated underwater dangers of depths less than the safety contour which lie within the safe waters defined by the safety contour;

.4 isolated dangers which lie within the safe water defined by the safety contour, such as fixed structures, overhead wires, etc;

.5 scale, range and north arrow;

.6 units of depth and height; and

.7 display mode.

5.15.22.2 The initial standard ECDIS display shall consist of:

.1 display base;

.2 drying line;

.3 buoys, beacons, other aids to navigation and fixed structures;

.4 boundaries of fairways, channels, etc;

.5 visual and radar conspicuous features;

.6 prohibited and restricted areas;

.7 chart scale boundaries;

.8 indication of cautionary notes;

.9 ship's routeing systems and ferry routes;

.10 archipelagic sea lanes.

5.15.22.3 All other information that can be displayed individually on demand includes:

.1 spot soundings;

.2 submarine cables and pipelines;

.3 details of all isolated dangers;

.4 details of all aids to navigation;

.5 contents of cautionary notes;

.6 ENC edition date;

.7 most recent chart update number;

.8 magnetic variation;

.9 graticule;

.10 place names.

5.15.23 ECDIS shall present the standard display at any time by a single operator action.

5.15.24 When an ECDIS is switched on following a switch off or power failure, it shall return to the most recent manually selected settings for display.

5.15.25 It shall be easy to add or remove information from the ECDIS display. It shall not be possible to remove information contained in the display base.

5.15.26 For any operator identified geographical position (e.g. by cursor picking) ECDIS shall display on demand the information about the chart objects associated with such a position.

5.15.27 It shall be possible to change the display scale by appropriate steps e.g. by means of either

chart scale values or

ranges in nautical miles.

5.15.28 It shall be possible for the mariner to select a safety contour from the depth contours provided by the SENC. ECDIS shall emphasize the safety contour over other contours on the display, however:

.1 if the mariner does not specify a safety contour, this shall default to 30 m.

If the safety contour specified by the mariner or the default 30 m contour is not in the displayed SENC, the safety contour shown shall default to the next deeper contour;

.2 if the safety contour in use becomes unavailable due to a change in source data, the safety contour shall default to the next deeper contour;

.3 in each of the above cases, an indication shall be provided.

5.15.29 It shall be possible for the mariner to select a safety depth. ECDIS shall emphasize soundings equal to or less than the safety depth whenever spot soundings are selected for display.

5.15.30 The ENC and all updates to it shall be displayed without any degradation of their information content.

5.15.31 ECDIS shall provide a means to ensure that the ENC and all updates to it have been correctly loaded into the SENC.

5.15.32 The ENC data and updates to it shall be clearly distinguishable from other displayed information, including those listed below:

.1 own ship:

past track with time marks for primary track;

past track with time marks for secondary track;

.2 vector for course and speed made good;

.3 variable range marker and/ or electronic bearing line; **.4** cursor; **.5** event:

dead reckoning position and time (DR);

estimated position and time (EP);

.6 fix and time;

.7 position line and time;

.8 transferred position line and time:

predicted tidal stream or current vector with effective time and strength;

measured tidal stream or current vector with effective time and strength;

.9 danger highlight;

.10 clearing line;

.11 planned course and speed to make good;

.12 waypoint;

.13 distance to run;

.14 planned position with date and time;

.15 visual limits of lights arc to show rising/ dipping range;

.16 position and time of "wheel over".

5.15.33 ECDIS shall provide an indication if:

.1 the information is displayed at a larger scale than contained in the ENC;

.2 own ship position is covered by an ENC at a larger scale than provided by the display.

5.15.34 Radar information and/ or AIS information may be transferred from systems compliant with the relevant standards of this Part. Other navigational information may be added to the ECDIS display. However, it shall not degrade the displayed SENC information and it shall be clearly distinguishable from the SENC information.

5.15.35 It shall be possible to remove the radar information, AIS information and other navigational information by single operator action.

5.15.36 ECDIS and added navigational information shall use a common reference system. If this is not the case, an indication shall be provided.

5.15.37 Transferred radar information may contain a radar image and/ or tracked target information.

5.15.38 If the radar image is added to the ECDIS display, the chart and the radar image shall match in scale, projection and in orientation.

5.15.39 The radar image and the position from the position sensor shall both be adjusted automatically for antenna offset from the conning position.

5.15.40 It shall always be possible to display the SENC information in a "north-up" orientation. Other orientations are permitted (e.g. a "course-up" orientation).

When such orientations are displayed, the orientation shall be altered in steps large enough to avoid unstable display of the chart information.

5.15.41 ECDIS shall provide for true motion mode (the ship's symbol moves against non-moving chart background). Other modes are permitted.

5.15.42 When true motion mode is in use, reset and generation of the chart display of the neighbouring area shall take place automatically at own ship's distance from the edge of the display as determined by the mariner.

5.15.43 It shall be possible to manually change the displayed chart area and the position of own ship relative to the edge of the display.

5.15.44 If the area covered by the ECDIS display includes waters for which no ENC at a scale appropriate for navigation is available, the areas representing those waters shall carry an indication to the mariner to refer to the paper chart or to the RCDS mode of operation.

5.15.45 IHO recommended colours and symbols shall be used to represent SENC information.

5.15.46 The colours and symbols other than those mentioned in 5.15.45, shall comply with the applicable requirements contained in 5.2.

5.15.47 SENC information displayed at a scale specified in the ENC shall use the specified size of symbols, figures and letters recommended by IHO.

5.15.48 ECDIS shall allow the mariner to select whether own ship is displayed in true scale or as a symbol.

5.15.49 ECDIS shall be capable of displaying information for:

.1 route planning and supplementary navigation tasks; and

.2 route monitoring.

5.15.50 The effective size of the chart presentation for route monitoring shall be at least 270 x 270 mm.

5.15.51 The display shall be capable of meeting colour and resolution recommendations of IHO.

5.15.52 The method of presentation shall ensure that the displayed information is clearly visible to more than one observer in the conditions of light normally experienced on the bridge of the ship by day and by night.

5.15.53 If information categories included in the standard display are removed to customize the display, this shall be permanently indicated. It shall be possible to restore the information removed from the standard display. Identification of categories which are removed from the standard display shall be shown on demand.

5.15.54 It shall be possible to carry out route planning and route monitoring in a simple and reliable manner.

5.15.55 The largest scale data available in the SENC for the area given shall always be used by the ECDIS for all alarms or indications of crossing the ship's safety contour and of entering a prohibited area, and for alarms and indications according to Table 5.15.84.

5.15.56 It shall be possible to carry out route planning including both straight and curved segments.

5.15.57 It shall be possible to adjust a planned route alphanumerically

and graphically including:

.1 adding waypoints to a route;

.2 deleting waypoints from a route;

.3 changing the position of a waypoint.

5.15.58 It shall be possible to plan one or more alternative routes in addition to the selected route. The selected route shall be clearly distinguishable from the other routes.

5.15.59 An indication is required if the mariner plans a route across an own ship's safety contour.

5.15.60 An indication shall be given if the mariner plans a route closer than a user-specified distance from the boundary of a prohibited area or a geographic area for which special conditions exist. An indication shall also be given if the mariner plans a route closer than a user-specified distance from a point object, such as a fixed or floating aid to navigation or isolated danger.

The following are the areas for which special conditions exist:

traffic separation zone;

inshore traffic zone;

restricted area;

caution area;

offshore production area;

areas to be avoided;

user defined areas to be avoided;

military practise area;

seaplane landing area;

submarine transit lane;

anchorage area;

marine farm/aquaculture;

PSSA (particularly sensitive sea area).

5.15.61 It shall be possible for the mariner to specify a cross track limit of deviation from the planned route at which an automatic off-track alarm shall be activated.

5.15.62 For route monitoring the selected route and own ship's position shall appear whenever the display covers that area.

5.15.63 It shall be possible to display a sea area that does not have the ship on the display (e.g. for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions (e.g. updating ship's position, and

providing alarms and indications) shall be continuous. It shall be possible to return to the route monitoring display covering own ship's position immediately by single operator action.

5.15.64 ECDIS shall give an alarm if, within a specified time set by the mariner, own ship will cross the safety contour.

5.15.65 ECDIS shall give an alarm or indication, as selected by the mariner, if, within a specified time set by the mariner, own ship will cross the boundary of a prohibited area or of a geographical area for which special conditions exist.

5.15.66 An alarm shall be given when the specified cross track limit for deviation from the planned route is exceeded.

5.15.67 An indication shall be given to the mariner if, continuing on its present course and speed, over a specified time or distance set by the mariner, own ship will pass closer than a user-specified distance from a danger (e.g. obstruction, wreck, rock) that is shallower than the mariner's safety contour or an aid to navigation.

5.15.68 The ship's position shall be derived from a continuous positioning system of an accuracy consistent with the requirements of safe navigation. Whenever possible, a second independent positioning source, preferably of a different type, shall be provided. In such cases ECDIS shall be capable of identifying discrepancies between the two sources.

5.15.69 ECDIS shall provide an alarm when the input from position, heading or speed sources is lost. ECDIS shall also repeat, but only as indication, any alarm or indication passed to it from position, heading or speed sources.

5.15.70 An alarm shall be given by ECDIS when the ship reaches a specified time or distance, set by the mariner, in advance of a critical point on the planned route.

5.15.71 The positioning system and the SENC shall be on the same geodetic datum. ECDIS shall give an alarm if this is not the case.

5.15.72 It shall be possible to display alternative routes in addition to the selected route. The selected route shall be clearly distinguishable from the other routes. During the voyage, it shall be possible for the mariner to modify the selected route or change to an alternative route.

5.15.73 It shall be possible to display:

.1 time-labels along a ship's track manually on demand and automatically at intervals selected between 1 and 120 min;

.2 an adequate number of: points, free movable electronic bearing lines, variable and fixed range markers and other symbols required for navigation

purposes and specified in 5.15.32.

5.15.74 It shall be possible to enter the geographical co-ordinates of any position and then display that position on demand. Also, it shall be possible to select any point (features, symbol or position) on the display and read its geographical coordinates on demand.

5.15.75 It shall be possible to adjust the displayed geographical position of the ship manually. This manual adjustment shall be noted alphanumerically on the screen, maintained until altered by the mariner and automatically recorded.

5.15.76 ECDIS shall provide the capability to enter and plot manually obtained bearing and distance lines of position (LOP), and calculate the resulting position of own ship. It shall be possible to use the resulting position as an origin for dead-reckoning.

5.15.77 ECDIS shall indicate discrepancies between the position obtained by continuous positioning systems and positions obtained by manual observations.

5.15.78 ECDIS shall store and be able to reproduce certain elements required to reconstruct the navigation and verify the official database used during the previous 12 h.

The following data shall be recorded at one minute intervals:

.1 to ensure a record of own ship's past track: time, position, heading, and speed; and;

.2 to ensure a record of official data used: ENC source, edition, date, cell and update history.

In addition, ECDIS shall record the complete track for the entire voyage, with time marks at intervals not exceeding 4 h.

It shall not be possible to manipulate or change the recorded information.

5.15.79 ECDIS shall have a capability to preserve the record of the previous 12 h and of the voyage track.

5.15.80 The accuracy of all calculations performed by ECDIS shall be independent of the characteristics of the output device and shall be consistent with the SENC accuracy.

5.15.81 Bearings and distances drawn on the display or those measured between features already drawn on the display shall have accuracy no less than that afforded by the resolution of the display.

5.15.82 The ECDIS system shall be capable of performing and presenting the results of at least the following calculations:

.1 true distance and azimuth between two geographical positions;

.2 geographical position from known position and distance/azimuth;

.3 geodetic calculations such as spheroidal distance, rhumb line, and great circle.

5.15.83 ECDIS shall be provided with means for either automatically or manually carrying out onboard tests of major functions. In case of a failure, the test shall display information to indicate which module is at fault.

5.15.84 ECDIS shall provide a suitable alarm or indication of system malfunction, the minimum scope of requirements to which is given in Table 5.15.84.

5.15.85 ECDIS shall not degrade the performance of any equipment providing sensor inputs. Nor shall the connection of optional equipment degrade the performance of ECDIS below this standard.

5.15.86 ECDIS shall be connected to the ship's position fixing system, to the gyro compass and to the speed and distance measuring device. For ships not fitted with a gyro compass, ECDIS shall be connected to a marine transmitting heading device.

5.15.87 ECDIS may provide a means to supply SENC information to external equipment.

5.15.88 It shall be possible to operate ECDIS and all equipment necessary for its normal functioning when supplied by a main and an emergency source of electrical power.

5.15.89 Changing from one source of power supply to another or any interruption of the supply for a period of up to 45 s shall not require the equipment to be manually re-initialized.

5.15.90 Adequate back-up arrangements shall be provided to ensure safe navigation in case of an ECDIS failure.

.1 Facilities enabling a safe take-over of the ECDIS functions shall be provided in order to ensure that an ECDIS failure does not develop into a critical situation.

.2 A back-up arrangement shall provide means of safe navigation for the remaining part of a voyage in case of an ECDIS fail.

5.15.91 The back-up system shall display in graphical (chart) form the relevant information of the hydrographic and geographic environment which are necessary for safe navigation.

TAble 5.15.84

Section	Require-ments	Information
5.15.64	Alarm[1]	Crossing safety contour
5.15.64	Alarm	The ship is crossing safety contour
5.15.65	Alarm or in-dication	Area with special conditions
5.15.66	Alarm	Deviation from route
5.15.69	Alarm	Positioning system failure (loss of signal from the system)
5.15.70	Alarm	Approach to critical point
5.15.71	Alarm	Different geodetic datum
5.15.84	Alarm or indication	Malfunction of ECDIS
5.15.28.3	Indication [2]	Default safety contour
5.15.33.1	Indication	Information overscale
5.15.33.2	Індикація	Larger scale ENC available
5.15.35	Indication	Different reference systems
5.15.44	Indication	No ENC available
5.15.53	Indication	Customized display
5.15.59	Indication	Route planning across safety contour
5.15.60	Indication	Route planning across specified area
5.15.67	Indication	Crossing a danger in route monitoring mode
5.15.83	Indication	System test failure

[1] Alarm — an alarm or alarm system which announces by audible means, or audible and visual means, a condition requiring.

[2] Indication — visual indication giving information about the condition of a system or equipment.

5.15.92 The back-up system shall be capable of performing the route planning functions, including:

.1 taking over the route plan originally performed on the ECDIS;

.2 adjusting a planned route manually or by transfer from a route planning device.

5.15.93 The back-up system shall enable a takeover of the route monitoring originally performed by the ECDIS, and provide at least the following functions:

.1 plotting own ship's position automatically, or manually on a chart;

.2 taking courses, distances and bearings from the chart;

.3 displaying the planned route;

.4 displaying time labels along ship's track;

.5 plotting an adequate number of points, bearing lines, range markers, etc., on the chart.

5.15.94 If the back-up is an electronic device, it shall be capable of displaying at least the information equivalent to the standard display as defined in this performance standard.

5.15.95 The chart information to be used in the backup arrangements shall be the latest edition, as corrected by official updates, of that issued by or on the authority of a Government, authorized Hydro-graphic Office or other relevant government institution, and conform to IHO standards.

It shall not be possible to alter the contents of the electronic chart information.

The chart or chart data edition and issuing date shall be indicated.

5.15.96 The information displayed by the ECDIS back-up arrangements shall be up-to-date for the entire voyage.

5.15.97 If an electronic device is used, it shall provide an indication if:

.1 the information is displayed at a larger scale than that contained in the database;

.2 own ship's position is covered by a chart at a larger scale than that provided by the system.

5.15.98 If radar and other navigational information are added to an electronic back-up display, all the corresponding requirements for radar information and other navigation information of this performance standard shall be met.

If an electronic device is used, the display mode and generation of the neighbouring area shall be in accordance with 5.15.40 — 5.15.44.

5.15.99 The back-up arrangement shall be able to keep a record of the ship's actual track, including positions and corresponding times.

5.15.100 The back-up arrangement shall provide reliable operation under prevailing environmental and normal operating conditions.

5.15.101 Accuracy shall be in accordance with requirements from sections 5.15.80 — 5.15.82.

5.15.102 If an elecronic device is used, it shall provide a suitable alarm or indication of system malfunction.

5.15.103 If an elecronic device is used, it shall be designed in

accordance with the ergonomic principles of ECDIS.

5.15.104 If an elecronic device is used, colours and symbols shall be in accordance with the colours and symbols requirements of ECDIS, and the effective size of the chart presentation shall be not less than 250 x 250 mm or 250 mm diameter.

5.15.105 The back-up power supply of an electronic device shall be separate from the ECDIS.

5.15.106 If an elecronic device is used, it shall be connected to systems providing continuous position-fixing capability and not degrade the performance of any equipment providing sensor input.

5.15.107 If radar with selected parts of the ENC chart information overlay is used as an element of the back-up, the radar shall comply with requirements of section 5.7.

5.15.108 If ECDIS is used for displaying raster navigation charts (Raster Chart Display System — RCDS) the performance standards specified in this Chapter shall be followed with the exception of 5.15.20, 5.15.22, 5.15.26 — 5.15.29, 5.15.47, 5.15.51, 5.15.53, 5.15.55, 5.15.59, 5.15.60, 5.15.64, 5.15.65 and 5.15.67.

5.15.108.1 When operating in RCDS-mode, an appropriate portfolio of up-to-date paper charts (APC) shall be carried on board and be readily available to the mariner.

The APC is a suite of paper charts of a scale to show sufficient detail of topography, depths, navigational hazards, aids to navigation, charted routes, and routeing measures to provide the mariner with information on the overall navigational environ-ment.

The APC shall provide adequate look-ahead capability.

5.15.108.2 The RNC used in RCDS shall be of the latest edition of that originated by, or distributed on the authority of, a government authorized hydrographic office and conform to IHO standards. RNCs not on WGS-84 or PE-90 shall carry metadata (i.e., additional data) to allow geo-referenced positional data to be displayed in the correct relationship to SRNC data.

5.15.108.3 The contents of the SRNC shall be adequate and up-to-date for that part of the intended voyage not covered by ENC.

5.15.108.4 It shall not be possible to alter the contents of the RNC.

5.15.108.5 RCDS shall be capable of displaying all SRNC information.

5.15.108.6 SRNC information available for display during route

planning and route monitoring shall be subdivided into two categories:

.1 the RCDS standard display consisting of RNC and its updates, including its scale, the scale at which it is displayed, its horizontal datum, and its units if depth and heights;

.2 any other information such as mariner's notes.

5.15.108.7 It shall be easy to add to, or remove from the RCDS display any information additional to the RNC data, such as mariner's notes. It shall not be possible to remove any information from the RNC.

5.15.108.8 There shall always be an indication if the ECDIS equipment is operating in RCDS mode.

5.15.108.9 It shall always be possible to display the SRNC in "chart-up" orientation. Other orientations are permitted.

5.15.108.10 IHO recommended colours and symbols shall be used to represent SRNC information.

5.15.108.11 RCDS shall be capable of displaying, simply and quickly, chart notes which are not located on the portion of the chart currently being displayed.

5.15.108.12 It shall be possible for the mariner to enter points, lines and areas which activate an automatic alarm. The display of these features shall not degrade the SRNC information and it shall be clearly distinguishable from the SRNC information.

5.15.108.13 It shall be possible to display a sea area that does not have the ship on the display (e.g. for look ahead, route planning), while route monitoring. If this is done on the display used for route monitoring, the automatic route monitoring functions in 5.15.63 shall be continuous. It shall be possible to return to the route monitoring display covering own ship's position immediately by single operator action.

5.15.108.14 The RCDS shall only accept positional data referenced to the WGS-84 or PE-90 geodetic datum. RCDS shall give an alarm if the positional data is not referenced to one of these datum. If the displayed RNC cannot be referenced to the WGS-84 or PE-90 datum then a continuous indication shall be provided.

5.15.108.15 RCDS shall allow the user to manually align the SRNC with positional data. This can be necessary, for example, to compensate for local charting errors.

5.15.108.16 It shall be possible to activate an automatic alarm when the ship crosses a point, line, or is within the boundary of a mariner entered feature within a specified time or distance.

5.15.108.17 RCDS shall be capable of performing transformations

between a local datum and WGS 84 datum.

5.15.108.18 RCDS shall provide a suitable alarm or indication of system malfunction, the minimum scope of requirements to which is given in Table 5.15.108.18.

Table 5.15.108.18

Section	Requirements	Information
1	2	3
5.15.66	Alarm[1]	Deviation from route
5.15.108.16	Alarm	Approach to mariner entered feature e.g. area, line
5.15.69	Alarm	Positioning system failure (loss of signal from the system)
5.15.70	Alarm	Approach to critical point
5.15.71	Alarm or indication	Different geodetic datum
5.15.84	Alarm or indication	Malfunction of RCDS mode
5.15.108.8	Indication [1]	ECDIS operating in a raster mode
5.15.33.1	Indication	Larger scale information available or overscale
5.15.33.2	Indication	Larger scale RNC available for the area of the vessel

[1] Definitions of terms "alarm" and "indication" are given in the note to Table 5.15.84.

5.16 СИСТЕМА КЕРУВАННЯ КУРСОМ СУДНА

5.16.1 The heading control system shall enable the ship to keep a preset heading with minimum operation of the ship's steering gear.

5.16.2 The heading control system shall automatically keep the ship on a preset heading with an accuracy at which an average heading value may differ from the preset value not more than by ± 1° at a speed providing ship's normal manoeuvrability. The maximum amplitude of yaw shall

not exceed that allowed under manual control.

5.16.3 The heading control system may be able to perform turns based either on a preset turning radius or a preset rate of turn.

The heading control system may work together with a track control system adjusting its heading for total drift.

5.16.4 The heading control system shall change to a preset heading without significant overshoot (yaw).

5.16.5 Provision shall be made in the heading control system for manual change of the heading in the automatic mode without change-over to manual steering.

Two remote stations for manual steering are recommended for the heading control system to make possible an emergency change of the ship's heading from these stations when the system operates in the automatic mode. A single change in the ship's heading in either direction shall not be limited, up to a complete turning. The design of the remote stations for manual steering shall be such that after putting the manual control at the station in the neutral position the ship shall keep the preset heading and further operation of the system in the automatic mode shall be maintained.

The steering wheel, handle or push-button may be used as a manual control.

5.16.6 A repeater of the gyrocompass or magnetic compass, indicators of the rudder preset and true positions, controls for switching on power supply to the entire heading control system and steering gear motors, sensitivity switches and steering mode change-over controls, controls for presetting ship's turning radius or rate of turn, signal lamps and other controls required for operation of the system shall be installed on the control desk of the system.

It shall be possible to vary illumination of the controls and indicators installed on the control desk of the system.

5.16.7 The heading control system shall be capable of adapting manually or automatically to different steering characteristics of the ship under various speed and loading conditions depending on weather, and to provide reliable operation under normal operating conditions.

5.16.8 The heading control system shall prevent unnecessary activation of the rudder due to normal yaw motion in a seaway and enable to preset the maximum rudder angle with indication when the angle of limitation has been reached.

5.16.9 Any inadvertent alteration of the preset heading shall be

prevented.

5.16.10 The system shall enable change-over from automatic to manual steering and vice versa by a single control located in an easily accessible position.

The following requirements shall be met:

.1 change-over shall be possible at any position of the rudder, including any failure in the automatic control system;

.2 change-over shall be effected by one manual control within 3 s;

.3 adequate indication shall be provided to show which method of steering is in operation.

5.16.11 When changing over from manual to automatic control the heading control system shall take over the actual heading as the preset heading.

5.16.12 If the heading control system works as part of a track control system, then switching from track control to automatic heading control shall be provided in the event of any failure in the track control system. The actual heading at the moment of switching shall be taken as the preset heading.

Any inadvertent switching back to track control shall be prevented.

5.16.13 The heading control system shall be totally self-synchronizing and shall not require any adjustments when a steering mode is changed-over.

The manual steering system built in the control desk of the heading control system shall be simple, reliable, capable of ensuring follow-up mode of the system operation, and shall not use elements of the automatic steering system.

5.16.14 An alarm both audible with mute function and visual shall be provided in order to indicate failure or reduction in the power supply to the heading control system or heading monitor, as well as when the actual heading deviates from the preset heading beyond a preset limit.

5.16.15 In case two independent compasses are available, the following shall be provided:

.1 an alarm both audible with mute function and visual when the preset value of permissible discordance between readings of operating and back-up heading monitors is reached;

.2 a clear indication on the actual heading source.

The heading monitor may be a separate device and is not required to be an integral part of the heading control system.

5.16.16 The heading control system shall provide an alarm on a failure of any information sensor used in the steering process. All emergency alarms likely to be activated in connection with sensor operation shall be duplicated on the control desk of the heading control system.

5.16.17 Where the system is not capable for adapting automatically to different environmental conditions and steering characteristics, adequate means for manual adjustments shall be provided on the front panel of the system control desk.

5.16.18 Normal alterations of heading shall be possible by adjustment of one control only (steering wheel, handle, push-button):

.1 alteration of the preset heading to starboard shall be effected by turning the heading setting control clockwise or titling it to the right-hand side.

.2 alteration of the present heading to port side shall be effected by turning the heading setting control counter-clockwise or titling it to the left-hand side. Actuation of any other control shall affect the preset heading of the ship.

5.16.19 Where remote control stations are provided, facilities for the delegation of control to remote station shall be incorporated in the master station.

Controls at remote positions shall be similar to those on the master station and have illumination which may be varied as required by 5.16.6.

5.16.20 Provision shall be made for connection of the heading control system with suitable source of speed information.

Connection of the heading control system with information sources shall comply with 5.1.31.

5.17 SHIP'S TRACK CONTROL SYSTEM

5.17.1 The ship's track control system in conjunction with their sensors of position, heading and speed information shall, regarding manoeuvring characteristics, provide automatic keeping a ship on a pre-planned track over ground under various operational conditions and at ship's speed from minimum manoeuvring speed up to 30 knots, and at ship's rate of turn not greater than 10°/s.

5.17.2 A track control system shall be automatically able to steer the ship from her position to a preset waypoint or along a preset sequence of waypoints.

5.17.3 The system shall allow the watch navigator to start automatic track control only if the safe approach manoeuvre to the pre-set track is

provided by the following:

the ship's position;

the difference between track course and actual heading;

ship's manoeuvrability.

5.17.4 The radio and navigation systems receiver used by the ship's track control system shall meet requirements in 5.11.

5.17.5 Means shall be provided for continuous monitoring the ship's position by another independent positioning system.

5.17.6 When following along the pre-set sequence of waypoints, an alarm shall be given not later than 1 min before the course change and at the moment of manoeuvre starting.

5.17.7 The ship's track control system shall provide means for the watch navigator to confirm the course change at wheel-over. Without the confirmation, the ship shall follow automatically the preset track.

An alarm actuation shall be provided if a wheel over alarm was not confirmed within 30 s.

5.17.8 A sequence of waypoints of a pre-set track shall not be modified until:

.1 the pre-planning of the new track is completed;

and

.2 the requirements of 5.17.3 are fulfilled.

5.17.9 The track control system shall ensure the automatic manoeuvre of the ship when sailing from one leg of a pre-set track to another basing:

.1 on a pre-set turn radius;

.2 on a pre-set rate of turn and manoeuvrability of the ship.

5.17.10 The ship's track control system shall provide its adaptation (manual or automatic) to different steering characteristics of the ship under various weather, speed and loading conditions, and also ensure reliable functioning in service.

5.17.11 The ship's track control system may be operated in heading control mode. In this case, the requirements in 5.16 shall be fulfilled.

When changing over from track control to heading control, the actual heading shall be taken over by the system as the pre-set heading.

Changing over of system functioning modes shall be performed by a single operator action from the convenient and readily accessible position.

A possibility of changing the system functioning modes by chance shall be excluded.

Clear indication on the system control panel shall be provided to show which method of ship's steering is in operation.

5.17.12 The system shall provide the change over from track control to manual steering and back by a single operator action from the convenient and readily accessible position. In this case the following requirements shall be fulfilled:

.1 possibility of change over at any rudder angle and under any conditions including failure in the automatic steering system;

.2 carrying out the change over by a single action within time not exceeding 3 s;

.3 provision of clear indication on the system control panel of functioning mode in use.

A possibility of return to ship's track control mode by chance shall be excluded.

5.17.13 When changing over from manual steering to automatic steering, the system shall ensure bringing the ship to the preset track.

5.17.14 The separate or built-in repeater shall be provided to indicate the actual value of ship's heading.

5.17.15 An audible alarm, that can be cancelled, and a visual one shall be provided to warn about failure or reduction in power supply of the ship's track control system and of the course indication system, and also about an excess of a pre-set values of the ship's permissible deviation from a pre-set track or course depending on the system functioning mode in use.

5.17.16 The ship's track control system shall provide: **.1** an alarm with an acknowledgement function in

case of failure or fault of the position fixing and course indication system;

.2 a preparation of guidance for changing over to a safe steering mode.

An actuation of an alarm shall be provided if warning signal about fault or failure of the position fixing and course indication systems was not acknowledged within 30 s.

It shall not be possible for the system to use information from faulty sensors.

5.17.17 The system shall provide an alarm in case when:

.1 the actual position of the ship deviates from the preset track beyond a preset cross track limit;

.2 the ship's speed through the water is lower than a predefined limit necessary for steering the ship.

5.17.18 The track control system shall provide a possibility to calculate heading between subsequent pre-set waypoints, and also a turn radius or rate of turn. In this case the system shall regard all pre-set track control related limits, conditions of alarm actuation and other ship's steering parameters.

5.17.19 The following information shall be continuously displayed on the system control panel:

.1 mode of ship's steering (heading or track control);

.2 sensors of actual position of the ship, its heading and speed;

.3 status and failure of sensors;

.4 track course and actual heading;

.5 actual ship's position, cross track distance and speed;

.6 TO-waypoint (waypoint which the ship is approaching) and NEXT-waypoint (waypoint following the TO-waypoint);

.7 time and distance to TO-waypoint;

.8 calculated track course following turn performance;

.9 selected track identification. Items 5.17.19.4, 5.17.19.5, 5.17.19.7 and 5.17.19.8 shall be displayed numerically.

5.17.20 The following information shall be provided on demand:

.1 a list of pre-planned waypoints including waypoints numbers, coordinates, courses and distances between waypoints, calculated turn radii or rates of turn;

.2 all track control related pre-set limits and other steering parameters. In this case, functionally related values (such as pre-set and actual, etc.) shall be displayed as a pair of data.

5.17.21 In case of failure of the track control mode or the position fixing system in use, the track control system shall:

.1 automatically switch over to the heading control mode if it is available. In doing so the actual heading at the instant of switching over shall be taken as the pre-set heading;

.2 maintain the rudder angle if the heading control is not available.

5.17.22 In case of the course indication system failure, the track control system shall ensure actuating alarms required in 5.17.15 to 5.17.17 and maintaining the rudder angle.

5.18 UNIVERSAL SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEM (AIS)

5.18.1 The universal shipborne automatic identification system (AIS)

shall be capable of operating in the following modes:

.1 an autonomous mode for operation in all areas of the ship's service ensuring continuous automatic self organizing mutual exchange of static and dynamic (navigational) information between ships and between ships and shore-based stations. This mode shall be capable of being switched to/from one of the following alternate modes;

.2 an assigned mode for operation in an area subject to a competent authority responsible for traffic monitoring such that the static and dynamic information transmission interval and time slots may be set by that authority and/or scheduled;

.3 a polling mode for automatic transfer of static and dynamic information, as well as voyage related information in response to interrogation from a ship or competent authority.

5.18.2 For the purpose of identification, the Maritime Mobile Service Identity (MMSI) number assigned to the ship shall be used in the AIS.

5.18.3 The AIS shall comprise:

.1 a communication processor, capable of operating over a range of maritime frequencies, with an appropriate channel selecting and switching method, in sup-port of both short (VHF) and long range applications;

.2 at least one transmitter, two time-division multiple access (TDMA) receivers using a universal time scale, and one digital selective call (DSC) receiver tuned to Maritime Mobile Service's VHF channel 70;

.3 a means of processing data from an electronic position-fixing system which provides a resolution of one ten thousandth of a minute of arc and uses the WGS-84 datum;

.4 a means to automatically input data from the dynamic information sensors;

.5 a minimum keyboard and display (MKD) to enable manual input, updating and retrieving of data;

.6 a means of error checking the transmitted and received data;

.7 built-in test equipment;

.8 internal Global Navigational Satellite System (GNSS) receiver to determine the Universal Coordinated Time (UTC) for synchronization purposes.

5.18.4 The AIS shall be capable of:

.1 providing the ship's manoeuvring and positional information (dynamic information) at intervals specified in Table 5.18.17;

.2 providing static information periodically and automatically to a competent authority and other ships fitted with AIS;

.3 receiving and processing information from a competent authority and other ships;

.4 responding to high priority or safety related calls with a minimum of delay.

Additionally, in the event of failure of the main source of ship's positional information, it is recommended to provide for automatic switching to the internal Global Navigational Satellite System receiver for positional information. In this case, an appropriate built-in integrity tests (BUT) indication shall be output and the position data shall be continuously available on the minimum display.

5.18.5 The AIS shall be capable of operating in the VHF frequency band of Maritime Mobile Service (156,025 to 162,025 MHz) with the frequency spacing between 25 kHz and 12,5 kHz channels.

After switching on, the AIS shall by default be capable of operating on two international simplex channels: AIS 1 — 161,975 MHz (channel 2087), AIS 2 — 162,025 MHz (channel 2088).

The AIS shall be capable of switching over to other channels by one of the following three methods:

.1 manual switching;

.2 automatic switching as required by shore-based station in the TDMA format;

.3 automatic switching as required by shore-based station in the DSC format.

5.18.6 The AIS shall be capable of transmitting and receiving the following information:

.1 static:

IMO number assigned to the ship;

call sign and name;

length and beam;

type of ship;

location of position-fixing antenna on the ship (aft of bow and port or starboard of centerline);

.2 dynamic:

ship's position with accuracy indication and integrity status;

time in UTC;

course over ground (COG);

speed over ground (SOG);

heading (according to gyrocompass);

rate of turn (where rate of turn indicator is available);

navigational status (underway, at anchor, not under command (NUQ, limited freedom to manoeuvre, at berth, grounded, trawling, etc. — manual input);

.3 voyage related:

ship's draught;

hazardous cargo and its type (as required by a competent authority);

destination and estimated time of arrival (ETA) (at master's discretion). The name of the port of destination shall comply with the International Code — UN/LOCODE;

.4 safety-related messages (short messages relevant to maritime safety and containing important navigational and meteorological notices).

5.18.7 In the autonomous mode, the AIS shall be capable of transmitting information at the following intervals, depending on the information type and the ship's navigational status:

.1 static information:

every 6 min;

on request;

.2 dynamic information:

dependant on the navigational status of own ship according to Table 5.18.7.2;

.3 voyage-related information: every 6 min;

when data have been amended; on request;

.4 safety-related messages: as required.

The AIS shall be able to handle up to 4500 reports per min when operating on two channels.

Table 5. 18.7

Ship's navigational status	Dynamic information reporting interval
Ship at anchor or moored and not moving faster than 3 knots.	3 min
Ship at anchor or moored and moving faster than 3 knots.	10 s
Ship with a speed of between 0 to 14 knots.	10 s
Ship with a speed of between 0 to 14 knots and changing course.	3,3 s
Ship with a speed of between 14 to 23 knots.	6 s

Ship with a speed of between 14 to 23 knots and changing course.	2 s
Ship with a speed of greater than 23 knots.	2 s
Ship with a speed of greater than 23 knots and changing course.	2 s

5.18.8 The input and transmitted data shall be protected against unauthorized alteration.

5.18.9 The AIS installation shall be operational within 2 min of switching on.

5.18.10 Means shall be provided to automatically record all periods when the AIS installation is nonfunctioning in a non-volatile memory.

5.18.11 The minimum keyboard and display (MKD) of the AIS shall comply with the following requirements:

.1 display of at least 3 lines of data. Each line shall clearly display at least the ships' name, bearing and range;

.2 horizontal scrolling of bearing and range is not allowed;

.3 the displayed information shall be clearly visible under all possible conditions of illumination at the place where it is located. Where needed, display lighting shall be provided;

.4 provision shall be made for manual input of voyage-related information and safety-related messages;

.5 provision shall be made for displaying the alarms information, indications as a result of built-in integrity test, received safety related messages and received long range interrogations.

5.19 SOUND RECEPTION SYSTEM

5.19.1 The sound reception system shall be capable of receiving outside sound signals from all directions in the audio band 70 Hz to 820 Hz, of reproducing those signals acoustically inside the wheelhouse indicating therewith the direction of the sound signals source.

5.19.2 The volume of outside sound signals reproduced in the wheelhouse shall be adjusted. In this case, the minimum sound pressure level shall be 10 dB(A) above the bridge noise level.

5.19.3 The visual indicator of a sound signals reception system shall indicate a direction not later than in 3 s after reception of the incoming sound signal by the system.

5.20 VOYAGE DATA RECORDER (VDR)

5.20.1 VDR shall continuously and automatically maintain sequential records of preselected data items obtained from the ship devices and systems relating to the status and operational modes of the ship's equipment, command and control of the ship, and environment.

5.20.2 The method of recording shall ensure that the various data items can be co-related in date and time during playback on suitable equipment.

5.20.3 The fixed recording medium shall be installed in a fixed protective capsule which shall meet the following requirements:

continue recording of information during an accident;

be secured against a physical or electronically manipulated change or deletion of recorded data;

maintain the recorded data and be fitted with means to facilitate grappling and recovery;

be of a highly visible colour and marked with retro-reflective materials.

The device ensuring location of the float-free type protective capsule, after being automatically switched on, shall be capable of transmitting signal for at least:

48 h — an initial locating signal;

168 h — a locating homing signal.

5.20.3.1 The fixed recording medium shall be installed in a fixed protective capsule fixed to the open deck of the ship.

5.20.3.2 The protective capsule case shall provide protection of recorded information with following influences:

.1 shock (a half sine-wave pulse of 50 g, with a duration of 11 ms);

.2 penetration (a mass of 250 kg with a pin of 100 mm diameter, dropped from a height of 3 m);

.3 low temperature fire of 260 °C nominal for 10 h);

.4 high temperature fire of 1100 °C for 1 h);

.5 3 m sea water immersion for 30 days;

.6 6000 m deep-sea water immersion for 24 h.

5.20.3.3 The protective capsule case shall be fitted with an appropriate device to aid location under water, e.g. an acoustic underwater beacon attached to the case of the fixed protective capsule and indicating location thereof for 30 days since activation and operating in the frequency band of 37,5 kHz (frequency band of 25 to 50 kHz), and have a clearly seen inscription in English: "VOYAGE DATA RECORDER — DO NOT

OPEN — REPORT TO AUTHORITIES".

5.20.3.4 The float-free recording medium shall be fitted with a light indicator and a radio transmitter that provides the transmission of signals indicating its location. The duration of the simultaneous operation of the light indicator and the transmitter shall be at least 7 days from the time of the release and float of the container.

5.20.4 It shall be possible to record, as a minimum, the following data items:

.1 date and time in steps ensuring a reconstruction of events sequence. Date and time, referenced to Universal Time Coordinate (UTC), shall be obtained from a source external to the ship and an internal clock (synchronized with valid date and time data) with indication, which source is in use. During times of a loss of the external source, the internal clock shall be used;

.2 latitude and longitude of ship's position derived from a receiver of radio navigation systems with indication of its type and operational mode, as well as the datum used;

.3 ship's heading as indicated by the ship's gyrocompass or magnetic compass;

.4 ship's speed as indicated by the ship's log(s) including an indication if it is through the water or over the ground;

.5 conversations, commands and sound signals on the bridge, and also announcements over public address system;

.6 communications with other ships, objects and shore-based services using VHF radio equipment;

.7 radar and auxiliary navigational data displayed on both radar display units. The recording method shall be such that, on playback, it is possible to present a faithful replica of the entire radar display that was on view at the time of recording, albeit within the limitations of any bandwidth compression techniques that are essential to the working of the VDR;;

.8 depth under keel, the depth scale currently being displayed and other status information;

.9 all mandatory alarms on the bridge;

.10 rudder and steering gear order and response. This shall include status and settings of heading or track control system;

.11 engine and thruster order and response. This shall also include any thrusters, if fitted;

.12 status of sea openings of ship's hull. This shall include all mandatory status information required to be displayed on the bridge;

.13 watertight and fire door status;

.14 accelerations and hull stresses (where a ship is fitted with suitable sensors);

.15 wind speed and direction (where a ship is fitted with suitable sensors).

5.20.5 Optionally, additional items may be recorded provided that the requirements for the recording and storage of the specified selections are not compromised.

5.20.6 The voyage data recorder shall provide storage of information not less than for the previous 12 hours of the voyage.

5.20.7 The equipment shall be so designed that, as far as is practical, it is not possible to manipulate the amount of data being recorded by the VDR, the data itself nor the data which has already been recorded.

5.20.8 The recording method shall be such that each item of the recorded data is checked for integrity and an alarm given if a non-correctable error is detected.

5.20.9 If the ship's source of electrical power supply fails, the VDR shall continue to record bridge audio from the dedicated reserve power source (e.g. using its own accumulator batteries) for a period of 2 h.

5.20.10 Malfunctions or failure of VDR shall not affect the operation of the data sensors interfaced thereto.

5.20.11 The VDR shall provide an interface for downloading the stored data and playback the information to an external computer. The interface shall be compatible with an internationally recognized format, such as Ethernet, USB, Fire Wire or equivalent. It shall be possible to perform a download of the recorded data for a user-defined period of time.

5.20.12 A copy of the software programme providing the capability to download the stored data and playback the information onto a connected external laptop computer and for the playback of the data shall be provided for each VDR installation.

The software shall be compatible with a standard operating system available with commercial-off-the shelf laptop computers and provided on a portable storage device such as CD-ROM, DVD, USB-memory stick, etc.

5.20.13 In the technical documentation delivered together with VDR the instructions for connecting the external laptop computer to the S-VDR and for executing the software shall be provided.

5.20.15 The portable storage device containing the software, the instructions and any special (not commercial-off-the-shelf) parts necessary for the physical connection of the external laptop computer, shall be stored within the main input of the VDR.

5.20.16 Where non-standard or proprietary formats are used for storing the data in the VDR, the software for converting the stored data into open industry standard formats shall be provided on the portable storage device or resident in the VDR.

5.21 SIMPLIFIED VOYAGE DATA RECORDER (S-VDR)

5.21.1 The simplified voyage data recorder (S-VDR) shall continuously and automatically maintain sequential record of preselected data items obtained from the ship devices and systems, relating to the status and operational modes of the ship's equipment, command and control of the ship and environment.

The recorded data shall be maintained for a period of at least 2 years following termination of recording.

5.21.2 The method of recording shall ensure that the various data items can be co-related in date and time during playback on suitable equipment.

5.21.3 The final recording medium shall be installed in a protective capsule, which may be fixed to the open deck of the ship or be of float-free type and shall meet the following requirements:

be capable to continue data recording during accident and of being accessed and of maintaining the recorded data;

be secure against tampering with data recorded;

be of a highly visible colour and marked with retro-reflective material;

be fitted with an appropriate device to aid location;

be marked with clearly seen inscription in English: "VOYAGE DATA RECORDER — DO NOT OPEN — REPORT TO AUTHORITIES".

5.21.4 The special protective capsule designed to be fixed to open deck shall comply with all the requirements of 5.20.3 with the exception of the requirements for withstanding penetration (pin dropping). An acoustic underwater beacon ensuring location of the protective capsule shall operate in the frequency band of 25 to 30 Hz with battery life at least 30 days.

5.21.5 The float-free type special protective capsule shall be fitted with means to facilitate grappling and recovery, after free ascent thereof, and meet the applicable requirements (as they relate to the mechanical

and climatic effects) for the emergency position-indicating radio beacons defined in 9.1, Part IV "Radio Equipment". The device ensuring location of the float-free type protective capsule, after being automatically switched on, shall be capable of transmitting signal for at least:

48 h — an initial locating signal;

168 h — a locating homing signal.

5.21.6 It shall be possible to record, as a minimum, the following data items:

.1 date and time in steps ensuring a reconstruction of events sequence. Date and time referenced to UTC, may be obtained from a source external to the ship or from an internal clock with indication, which source is in use;

.2 latitude and longitude of ship's position obtained from a receiver of radio navigation systems with indication of its type and operational mode, as well as the datum used;

.3 ship's heading as indicated by the ship's gyrocompass or magnetic compass;

.4 ship's speed as indicated by the ship's log including an indication if it is through the water or over the ground;

.5 conversations, commands and sound signals on the bridge and also, if possible, announcements over intercom and public address system;

.6 communications with other ships, objects and shore-based services using VHF radio equipment;

.7 radar and auxiliary navigational data displayed on the radar display unit. The recording method shall ensure the possibility to playback an image as it was during recording regarding possible distortions connected with data compression during recording. If radar data is recorded, AIS information may be recorded additionally as a secondary source of information on both other and own ship;

.8 if it is technically impossible to connect the radar installed on board ship to the simplified voyage data recorder, then the AIS target data shall be recorded as a source of information regarding both own and other ships.

5.21.7 It may be possible to record other additional information derived from the items of ship's equipment listed in 5.20.4 and having appropriate outputs to provide the possibility of interfacing these items to S-VDR. In this case, recording of additional data shall not distort main data or affect their preservation.

5.21.8 It shall not be possible to tamper with the selection of data being

recorded nor the data, which has already been recorded.

Any attempt of an unauthorised access to S-VDR operation shall be recorded.

5.21.9 The recording method shall provide an actuation of alarm when a non-correctable error is detected during recording.

5.21.10 S-VDR shall provide recording and storage of information of at least previous 12 h of a voyage.

5.21.11 If the ship's source of electric power supply fails, the simplified voyage data recorder shall continue to record bridge audio for a period of 2 h using its own accumulator batteries. At the end of this 2 period, all recording shall cease automatically.

5.21.12 Any interfacing to any data sensor shall be such that the operation of that sensor suffers no deterioration, even if the S-VDR system develops faults.

5.21.13 The S-VDR shall provide an interface for downloading the stored data and playback the information to an external computer. The interface shall be compatible with an internationally recognized format, such as Ethernet, USB, Fire Wire or equivalent.

5.21.14 A copy of the software programme providing the capability to download the stored data and playback the information onto a connected external laptop computer and for the playback of the data shall be provided for each S-VDR installation.

The software shall be compatible with an operating system available with commercial-off-the shelf laptop computers and provided on a portable storage device such as CD-ROM, DVD, USB-memory stick, etc.

5.21.15 Instructions for executing the software and for connecting the external laptop computer to the S-VDR shall be provided.

5.21.16 The portable storage device containing the software, the instructions and any special (not commercial-off-the-shelf) parts necessary for the physical connection of the external laptop computer, shall be stored within the main input of the S-VDR.

5.21.17 Where non-standard or proprietary formats are used for storing the data in the VDR, the software for converting the stored data into open industry standard formats shall be provided on the portable storage device or resident in the S-VDR.

5.22 BRIDGE NAVIGATIONAL WATCH ALARM SYSTEM (BNWAS)

5.22.1 The BNWAS shall monitor the functioning of the main conning position and identify the watch officer unfitness, which may result in accident.

The system shall give visual and audible alarms to warn the watch officer and, if ignore, shall alert the ship's master or back-up officer.

5.22.2 Provisions shall be made for three functioning modes of the watch officer fitness verification system:

.1 automatic mode to ensure the automatic activation of the system when the heading or track control system is activated and the automatic deactivation of the system when the heading or track control system terminates.

In ships fitted with the BNWAS required in this Part, this system shall be in operation whenever the ship is underway at sea. Use of automatic mode in such ships is not allowed, and connection of the BNWAS to the heading or track control system is not required;

.2 continuous mode of functioning;

.3 total deactivation mode when, under any conditions, the system does not function.

5.22.3 When activated, the BNWAS shall give visual and audible alarms in the following sequence:

.1 immediately after the activation, the system shall remain dormant for a period 3 to 12 min set by the ship's master, where upon the visual alarm shall be actuated;

.2 if the receipt of the visual alarm is not acknowledged by the watch officer within 15 s, the system shall initiate the first stage audible alarm on the bridge;

.3 if the receipt of the first stage audible alarm is not acknowledged by the watch officer within 15 s since its actuating on the bridge, the second stage audible alarm shall additionally be activated in the back-up officer and/or ship's master accommodation;

.4 if the second stage audible alarm is not acknowledged by the watch officer, back-up officer or ship's master within 90 s since its actuating, the third stage audible alarm shall be activated in all the spaces of officers' location;

.5 in ships others than passenger ones, the second stage audible alarm may simultaneously be sounded in all the spaces where officers are located. In this case, the third stage audible alarm may be redundant;

.6 in large ships the time interval between the second and third stage audible alarms ma be increased up to 3 min necessary for the back-up

officer and ship's master to get to the navigation bridge.

5.22.4 The reset of the BNWAS to the initial state (acknowledgement of visual alarm receipt and deactivation of the audible alarm) shall be possible on the navigation bridge only, be carried out by one action of an operator, whereupon the countdown of the next dormant period shall start.

When the system is reset to the initial state before the termination of the dormant period, the system shall start the countdown of the next dormant period since that moment.

Reusable actions to reset the system to the initial state shall not prolong the duration of the dormant period or alter the sequence and time intervals between visual and audible alarms.

5.22.5 The device for alarm (visual and audible) acknowledgement and system reset to the initial state shall be illuminated at night and may be integral with the BNWAS or designed as a separate block.

This device and its arrangement at the work station on the navigation bridge shall ensure its use by the watch officer only and prevent an unauthorized intervention of other people.

5.22.6 The navigation bridge shall be provided with the means for prompt actuating the second and third stage audible alarm to urgently call the back-up officer and/or ship's master.

The function of such means shall be effected with a special button marked "Emergency Call".

5.22.7 Under all operational conditions the BNWAS shall assure the time countdown with an accuracy of 5 per cent or 5 s, whichever is less.

5.22.8 The BNWAS shall be provided with the following controls:

.1 means for selection of a operational mode and duration of the dormant period protected against an unauthorized access;

.2 means for prompt actuating the second and third stage audible alarm, if fitted;

.3 devices for alarm acknowledgement and system reset to the initial state, which shall be readily accessible and located on bridge wings, and all the workstations of the navigation bridge.

5.22.9 The indication of the operational mode of the BNWAS for the watch officer shall be provided.

5.22.10 The visual alarm activated on termination of the dormant period shall be flashing and visible from any workstation on the navigation bridge. The visual alarm colour shall not impair the conditions of environmental observations at night, and its brilliance shall be regulated. In

this case, an opportunity to completely switch off the visual alarm shall be excluded.

5.22.11 The first stage audible alarm activated on the navigation bridge in 15 s after visual alarm activation shall be of a distinctive tonality or modulation and be heard by the watch officer at all the work stations on the navigation bridge. The function of the first stage audible alarm may be engineered using one or more sounding devices.

Fitting the BNWAS, provision shall be made for selection of the tonality or modulation, as well as of the audible alarm volume. The follow-up alterations of these characteristics by the watch officer are not allowed.

5.22.12 The second and third stage audible alarms activating sequentially if the first stage audible alarm was not acknowledged, shall be of distinctive sounding and loud enough to wake up a sleeper in spaces where the ship's master, back-up officer and officers are accommodated.

5.22.13 All the blocks being part of the BNWAS shall be protected against unauthorized modifications in its operation introduced by the crew.

5.22.14 Standard connectors for connecting visual and audible alarm activating devices, as well as additional devices for alarm acknowledgement and system reset to the initial state shall be used in the BNWAS.

5.22.15 The BNWAS shall be powered from the ship's main power supply in compliance with the requirements of Part XI "Electrical Equipment" of the Rules for the Classification and Construction of Sea-Going Ships. The malfunction indication, and all elements of the Emergency Call facility, if incorporated, shall be powered from a battery maintained supply for a period of 1 h.

5.23 LONG-RANGE IDENTIFICATION AND TRACKING (LRIT) SYSTEM EQUIPMENT

5.23.1 The equipment of a Long-Range Identification and Tracking System (LRIT system) shall provide automatic transmission of the following LRIT information:

.1 the identity of the ship;

.2 the position of the ship (latitude and longitude);

.3 the date and time of the position provided.

5.23.2 The LRIT system equipment shall conform to the performance standards and functional requirements of this Chapter and applicable standards 5.1 and 5.2 of Part IV "Radio Equipment".

5.23.3 The LRIT system equipment shall comply with the following

minimum requirements:

.1 be capable of automatically and without human intervention on board the ship transmitting the ship's LRIT information at 6-hour intervals to an LRIT Data Centre;

.2 be capable of being configured remotely to transmit LRIT information at variable intervals;

.3 be capable of transmitting LRIT information following receipt of polling commands;

.4 interface directly to the shipborne global navigation satellite system equipment, or have internal positioning capability;

.5 be supplied with energy from the main and emergency source of elecrical power.

This provision shall not apply to ships using for the transmission of LRIT information any of the radio communication equipment provided for compliance with the provisions of Part IV "Radio Euipment". In such cases, the shipborne equipment shall be provided with sources of energy as specified in 2.3, of the mentioned Part;

.6 be tested for resistance to mechanic and climatic effects as well as for electromagnetic compatibility with other electronic and electric shipborne equipment.

5.23.4 The LRIT equipment shall provide the functionality specified in Table 5.23.4.

5.23.5 The shipborne equipment shall transmit the LRIT information using a communication system which provides coverage in all areas where the ship operates.

5.23.6 The shipborne equipment shall be set to automatically transmit the ship's LRIT information at 6-hour intervals to the LRIT Data Centre identified by the Flag State Administration, unless the LRIT Data User requesting the provision of LRIT information specifies a more frequent transmission interval.

5.23.7 The LRIT equipment design shall provide for the possibility of working ability periodic check without the LRIT information tansmission.

5.23.8 It shall be possible to switch off the LRIT equipment or to stop the transmission of the LRIT information (with the corresponding record in the ship's Log Book) in the following cases:

.1 if, according to the international agreements, rules and standards, the navigational information is to be protected; or

.2 in exceptional circumstances, and, as far as possible, for a short period of time, if the captain of the ship thinks that the LRIT equipment operation threatens the ship's safety or security level.

Table 5. 23.4

Parameter	Comments
Shipborne equipment identifier	The identifier used by the shipborne equipment (MMSI)
Positional data	The GNSS position (latitude and longitude) of the ship (based on the WGS-84 datum). Position: the equipment shall be capable of transmitting the GNSS position (latitude and longitude) of the ship (based on WGS-84 datum) without human interaction on board the ship. On-demand position reports[1]: the equipment shall be capable of responding to a request to transmit LRIT information on demand without human interaction on board the ship, irrespective of where the ship is located. Pre-scheduled position reports[2]: the equipment shall be capable of being remotely configured to transmit LRIT information at intervals ranging from a minimum of 15 min to periods of 6 h to the LRIT Data Centre, irrespective of where the ship is located and without human interaction on board the ship.
Time stamp [3]	The date and time[3] associated with the GNSS position The equipment shall be capable of transmitting the time[3] associated with the GNSS position with each transmission of LRIT information.

[1]On-demand position reports — means transmission of LRIT information as a result of either receipt of polling command or of remote configuration of the equipment so as to transmit at interval other than the preset ones.

[2]Pre-scheduled position reports — means transmission of LRIT information at the preset transmit intervals.

[3]All times shall be indicated as Universal Co-ordinated Time (UTC).

5.23.9 Where a ship is undergoing repairs, modifications or conversions in dry-dock or in port or is laid up for a long period, the master or the Flag State Administration may reduce the frequency of the transmission of LRIT information to one transmission every 24-hour period, or may temporarily stop the transmission of such information with the relevant note in the log book. The LRIT equipment shall be capable of ensuring such reduction of the LRIT information transmission frequency and temporary stop of its transmission.

5.24 DECISION SUPPORT SYSTEM FOR MASTERS OF PASSENGER SHIP[4]

5.24.1 In all passenger ships, a decision-support system for emergency management shall be provided on the navigation bridge.

Existing ships shall comply with the requirements of this regulation not later than the date of the first periodical survey after 1 July 1999.

5.24.2 The system shall, as a minimum, consist of a printed emergency plan or plans. All foreseeable emergency situations shall be identified in the emergency plan or plans, including, but not limited to, the following main groups of emergencies:

.1 fire;

.2 damage to ship;

.3 pollution;

.4 unlawful acts threatening the safety of the ship and the security of its passengers and crew;

.5 personnel accidents;

.6 cargo-related accidents; and

.7 emergency assistance to other ships.

5.24.3 The emergency procedures established in the emergency plan or plans shall provide decision support to masters for handling any combination of emergency situations.

5.24.4 The emergency plan or plans shall have a uniform structure and be easy to use.

Where applicable, the actual loading condition as calculated for the

[4] Refer to SOLAS-74, Regulation III / 29 “Decision support system for masters of passenger ships”.

passenger ship's voyage stability shall be used for damage control purposes.

5.24.5 In addition to the printed emergency plan or plans, the Register may also accept the use of a computer-based decision-support system on the navigation bridge which provides all the information contained in the emergency plan or plans, procedures, checklists, etc., which is able to present a list of recommended actions to be carried out in foreseeable emergencies.

6. PERFORMANCE STANDARDS FOR THE PRESENTATION OF NAVIGATION-RELATED INFORMATION ON SHIPBORNE NAVIGATION DISPLAYS

6.1 These Performance Standards specify the presentation of navigational information on the bridge of a ship, including the consistent use of navigational terms, abbreviations, colours and symbols, as well as other presentation characteristics.

These performance standards shall be applied in addition to the requirements for presentation of navigational information by other navigational equipment and systems, the performance standards of which are covered by this Part of the Rules.

Any additional means of information display, not specified by this Part of the Rules, shall present the navigational information in accordance with these performance standards.

6.2 The presentation of information shall be consistent with respect to screen layout and arrangement of information.

Data and control functions shall be logically grouped.

Priority of information shall be identified for each application, permanently displayed and presented to the user in a prominent manner by, for example, use of position, size and colour.

6.3 The presentation of information shall be consistent with respect to values, units, meaning, sources, validity, and if available, integrity.

6.4 The presentation of information shall be clearly separated into an operational display area (e. g. radar, chart) and one or more user dialogue areas (e. g. menus, data, control functions).

6.5 The presentation of alphanumeric data, text, symbols and other graphical information (e.g. radar image) shall support readability from typical user positions under all ambient light conditions likely to be experienced on the bridge of a ship, and with due consideration to the night vision of the officer of the watch.

Alphanumeric data and text shall be presented using a clearly legible non-italic, sans-serif font. The font size shall be appropriate for the viewing distance from user positions likely to be experienced on the bridge of a ship. Text shall be presented using simple unambiguous language that is easy to understand.

Navigation terms and abbreviations shall be presented using the nomenclature defined in Table 5.7.58-1.

6.6 When icons are used, their purpose shall be intuitively recognized by appearance, placement and grouping.

6.7 The colours used for the presentation of alphanumeric data, text, symbols and other graphical information shall provide sufficient contrast against the background under all lighting conditions likely to be experienced on the bridge of a ship.

The colours and brightness shall take into account the light conditions of daylight, dusk and night.

The presentation shall support night viewing by showing light foreground information on a dark non-reflecting background at night.

The background colour and contrast shall be chosen to allow presented information to be easily discriminated without degrading the colour coding aspects of the presentation.

6.8 Symbols used for the presentation of operational information are defined in Table 5.7.58-3.

Symbols used for the display of charted information shall comply with relevant IHO standards.

6.9 When colour coding is used for discrimination of conspicuousness of alphanumeric text, symbols and other information, all colours in the set shall clearly differ from one another.

6.10 When colour coding is used, the red colour shall be used for coding of alarm related information.

6.11 When colour coding is used, it shall be used in combination with other symbol attributes, such as size, shape, and orientation.

6.12 Flashing of information shall be reserved for unacknowledged alarms.

6.13 The source, validity, and, where possible, the integrity of information shall be indicated.

Invalid information or information with low integrity shall be clearly marked, qualitatively and/ or quantitatively. Invalid information or information with low integrity may be quantitatively indicated by displaying

absolute or persentage values.

6.14 When colour coding is used, information with low integrity shall be qualitatively marked by using yellow, and invalid information shall be qualitatively marked by using red.

6.15 In order to show that the screen is being refreshed, means shall be provided to immediately make the user aware of a presentation failure on an operational display (e.g. "picture freeze").

6.16 The operational status of information shall be indicated as shown in Table 6.16.

Table 6.16.

Status	Visual indication	Audible signal
Alarm, not acknowledged.	Red flashing	Accompanied by an audible signal
Alarm, acknowledged Invalid information.	Red	Supression of audible signal
Important indications/warnings (e. g. low integrity)	Yellow	Silence unless otherwise specified by the Organization
Normal state	None required, optionally green	Silence

6.17 A list of alarms shall be provided based on the sequence of occurrence. Additional indication of priority, as set by the user, shall be provided on displays showing alarms from multiple sources.

Alarms that have been acknowledged and are no longer relevant shall be deleted from the list of alarms, but may be retained in an alarm history list.

6.18 When a single display is used to present information from multiple navigation systems and equipment, the presentation of alarms and indications shall be consistent for the display of the time of alarm occurrence, the cause of the alarm, the source of the alarm and the status of the alarm (e.g.

acknowledged, not acknowledged).

6.19 If displays are capable of presenting information in different mode(s), there shall be a clear indication of the mode in use, for example, orientation, stabilization, motion, and chart projection.

6.20 When a graphical representation of own ship is provided, it shall be possible for the user to select either a scaled ship's outline or a simplified symbol as specified in Table 5.7.58-3.

The size of the ship's outline or the simplified symbol in the graphical presentation shall be the true scale size of the ship or 6 mm, whichever is greater.

6.21 A heading line and, where appropriate, a velocity vector shall be associated with own ship symbol and shall originate at the position of the consistent common reference point (CCRP).

6.22 The presentation of charted information shall comply with the relevant IHO standards.

6.23 The presentation of proprietary charted information shall comply with relevant IHO standards, as far as practical. There shall be a clear indication when the presentation is not in accordance with IHO standards.

6.24 The presentation of user-added information shall comply with the relevant IHO standards, as far as practical.

6.25 If chart data derived from different scales appear on the display, the scale boundary shall be clearly indicated.

6.26 Radar images shall be displayed by using a basic colour that provides optimum contrast. Radar echoes shall be clearly visible when presented on top of a chart background.

The relative strength of echoes may be differentiated by tones of the same basic colour.

The basic colour may be different for operation under different ambient light conditions.

6.27 Target trials shall be distinguishable from targets and clearly visible under all ambient light conditions.

6.28 Target information may be provided by radar tracking and/ or by reported target information from the Automatic Identification System (AIS).

6.29 The operation of the radar target tracking and the processing of reported AIS information, including the number of targets presented, related to screen size, shall be in compliance with standards as defined in 5.7.

The presentation of radar target tracking and AIS information is defined within these performance standards.

6.30 As far as practicable, the user interface and data format for operating, displaying and indicating radar tracking and AIS information shall be consistent.

6.31 There shall be an indication when the target tracking and/or reported target processing/display capacity is about to be exceeded.

6.32 There shall be an indication when the target tracking and/or reported target processing/display capacity has been exceeded.

6.33 To ensure that the clarity of the total presentation is not substantially impaired, it shall be possible to filter the presentation of sleeping AIS targets (e.g. by target range, CPA/TCPA or AIS target class A/B, etc.).

Sleeping AIS targets shall be automatically activated when meeting user defined parameters (e.g. target range, CPA/TCPA or AIS target class A/B).

6.34 If a filter is applied, there shall be a clear and permanent indication.

The filter criteria in use shall be readily available.

6.35 It shall not be possible to remove individual AIS targets from the display.

6.36 If zones for the automatic activation of AIS targets are provided, they shall be the same as for automatic radar target acquisition, if available.

Any user defined zones (e.g. acquisition/activation zones) in use shall be presented in graphical form.

6.37 Targets shall be presented with symbols according to Table 5.7.58-3.

6.38 AIS information shall be graphically presented either as sleeping or activated targets.

6.39 The course and speed of a tracked radar target or reported AIS target shall be indicated by a vector that clearly shows the predicted motion. The vector time (length) shall be consistent for presentation of any target regardless of its source.

6.40 The presentation of vector symbols shall be consistent irrespective of the source of information.

The presentation mode shall be clearly and permanently indicated, including for example: True/ Relative vector, vector time and vector stabilisation.

6.41 The orientation of the AIS target symbol shall indicate its heading.

If the heading information is not received, the orientation of the AIS symbol shall be aligned to the COG.

When available, the turn or rate of turn (ROT) indicator and/ or the path prediction shall indicate the manoeuvre of an activated AIS target.

6.42 A consistent common reference point shall be used for the alignment of tracked target symbols and AIS target symbols with other information on the same display.

6.43 On large scale/low range displays, a means to present a true scale outline of an activated AIS target shall be provided.

6.44 It shall be possible to display the past positions of activated targets.

6.45 A target selected for the display of its alphanumeric information shall be identified by the relevant symbol.

If more than one target is selected for data display, the symbols and the corresponding data shall be clearly identified.

6.46 There shall be a clear indication to show that the target data is derived from radar or AIS or from a combination of these.

6.47 For each selected tracked radar target the following data shall be presented in alphanumeric form: source(s) of data, measured range of target, measured bearing of target, predicted target range at the closest point of approach (CPA), predicted time to CPA (TCPA), true course of target, true speed of target. Additional target information shall be provided on request.

6.48 For each selected AIS target the following data shall be presented in alphanumeric form: source of data, ship's identification, position and its quality, calculated range of target, calculated bearing of target, CPA, TCPA, COG, SOG, navigational status. Additional target information shall be provided on request.

6.49 If the received AIS information is incomplete, the absent information shall be clearly indicated in the target data field as missing.

6.50 The data shall be displayed and continually updated, until another target is selected for data display or until the window is closed.

6.51 Means shall be provided to present own ship AIS data on request.

6.52 The alphanumeric displayed data shall not obscure graphically presented operational information.

6.53 A clear indication of the status of the alarms and of the alarm criteria shall be given.

6.54 A CPA/TCPA alarm of a tracked radar or activated AIS target shall be clearly indicated and the target shall be clearly indicated and the target shall be clearly marked by a dangerous target symbol.

6.55 If a user defined acquisition/ activation zone facility is provided, a target entering the zone shall be clearly identified with the relevant symbol and for tracked radar targets an alarm shall be given. The zone shall be identified with the relevant symbology, and shall be applicable to tracked radar and AIS targets.

6.56 The last position of a lost target shall be clearly marked by a lost target symbol on the display, and the lost target alarm shall be given.

The lost target symbol shall disappear if the signal is received again, or after the alarm has been acknowledged.

There shall be a clear indication whether the lost target alarm function for AIS targets is enabled or disabled.

6.57 An automatic target association function serves to avoid the presentation of two target symbols for the same physical target.

If target data from AIS and radar tracking are both available and if the AIS and radar information are considered as one target, then as a default condition, the activated AIS target symbol and the alphanumeric AIS target data shall be automatically selected and displayed.

The user shall have the option to change the default condition to the display of tracked radar targets and shall be permitted to select either radar tracking or AIS alphanumeric data.

6.58 If the AIS and radar information are considered as two distinct targets, one activated AIS target and one tracked radar target shall be displayed. No alarm shall be raised.

6.59 The AIS presentation status shall be indicated according to Table 6.59.

Table 6. 59

Function	Cases to be presented		Presentation
AIS ON/OFF	AIS processing switched ON/ graphical presentation switched OFF	AIS processing switched ON/ graphical presentation switched ON	Alphanumeric or graphical
Filtering of: sleeping AIS targets (6.33 — 6.35)	Filter status	Filter status	Alphanumeric or graphical
Activation of		Activation	Graphical

targets (6.33, 6.36)		criteria	
CPA/TCPA (6.53 — 6.56)	Function ON/OFF CPA/ TCPA Criteria Sleeping targets included	Function ON/OFF CPA/TCPA Criteria Sleeping targets included	Alphanumeric or graphical
Lost target alarm (6.56)	Function ON/OFF Lost target filter criteria	Function ON/OFF Lost target filter criteria	Alphanumeric or graphical
Target association (6.57 — 6.58)	Function ON/OFF Association criteria Default target priority	Function ON/OFF Association criteria Default target priority	Alphanumeric

6.60 A trial manoeuvre simulation shall be clearly identified by the relevant symbol positioned astern of own ship within the operational display area of the screen.

6.61 If the display equipment is capable of supporting the presentation of multiple functions then there shall be a clear indication of the primary function supported by the presentation (e.g. Radar, ECDIS).

It shall be possible to select the Radar presentation or the ECDIS presentation by a simple operator action.

6.62 If a radar image and an electronic chart are displayed together, the chart and the radar image shall use a consistent common reference point and match in scale, projection and orientation. Any offset shall be indicated.

6.63 Range scales of 0,25; 0,5; 0,75; 1,5; 3; 6; 12 and 24 miles shall be provided. Additional range scales are permitted. These range scales do not apply when presenting raster chart data.

The range scale shall be permanently indicated.

6.64 When range rings are displayed, the range ring scale shall be indicated.

6.65 No part of the operational display area shall be permanently used for presentation of information that is not part of the navigation presentation (e.g. pop up displays, drop down menus and information windows).

Temporary, limited and relevant alphanumeric data may be displayed adjacent to a selected symbol, graphic or target within the operational display area.

6.66 RADAR display.

6.66.1 Radar video, tracked radar targets and AIS targets shall not be substantially degraded, masked or obscured by other presented information.

6.66.2 It shall be possible to temporarily supress all graphical information from the display, retaining only radar video and trails.

6.66.3 The brightness of radar echoes and associated graphic symbols for tracked radar targets shall be variable. It shall be possible to control the brightness of all displayed information. There shall be independent means to adjust the brightness of groups of displayed graphics and alphanumeric data.

The brilliance of the heading line shall not be variable to extinction.

6.66.4 Vector chart information may be displayed on a radar presentation. This shall be accomplished using layers selected from the chart database. As a minimum, the elements of the ECDIS standard display shall be available for individual selection by category or layer, but not as individual objects. As far as practical, chart information shall be presented in accordance with the ECDIS performance standards and with these presentation standards.

6.66.5 If chart information is displayed within the operational display area, the display of radar information shall have priority. The chart information shall be clearly perceptible as such. The chart information shall not substantially degrade, mask or obscure the radar video, tracked radar targets and AIS targets.

6.66.6 When chart information is displayed, there shall be permanent indication of its status. Source and update information shall also be made available.

6.66.7 Map graphics may be displayed, but not substantially degrade, mask or obscure the radar video, tracked radar targets and AIS targets.

6.67 ECDIS display.

6.67.1 The ENC and all updates to it shall be displayed without any degradation of their infoma-tion content.

6.67.2 Chart information shall not be substantially degraded, masked or obscured by other presented information.

6.67.3 It shall be possible to temporarily suppress all supplemental information from the display, retaining only chart related information

contained in the display base.

6.67.4 It shall be possible to add or remove information from the ECDIS display. It shall not be to remove information contained in the Display Base from the ECDIS display.

6.67.5 It shall be possible to select a safety contour from the depth contours provided by the ENC. The safety contour shall be emphasized over other contours on the display.

6.67.6 It shall be possible to select a safety depth. Soundings equal to or less than the safety depth shall be emphasized whenever spot soundings are selected for display.

6.67.7 An indication shall be provided if the information is displayed at a larger scale than that contained in the ENC, or if own ship's position is covered by an ENC at a larger scale than that provided by the display.

6.67.8 Overscaled areas shown on the ECDIS display shall be identified.

6.67.9 Radar and target information may be displayed on ECDIS but shall not substantially degrade, mask or obscure the chart information. As far as practical, radar and target information shall be presented in accordance with the radar performance standard and with these presentation standards.

6.67.10 Radar and target information shall be clearly distinguishable from the chart information. It shall be possible to remove this information by a simple operator action.

6.67.11 Information from additional sources may be displayed on ECDIS but shall not substantially degrade, mask or obscure the chart information.

6.67.12 Additional information shall be clearly distinguishable from the chart information. It shall be possible to remove this information by a simple operator action.

6.68 The user may configure a presentation for a specific task at hand. The presentation may include radar and/ or chart information, in combination with other navigation or ship related data. When not fully compliant with the Radar or ECDIS performance standards, such a presentation shall be identified as an auxiliary presentation.

6.69 As far as practical, the presentation of any radar and/or ECDIS related functions shall be compliant with the requirements of the relevant performance standards and of these presentation standards, with the exception of size requirements for the operational area. Chartlets or

windows or radar information may be presented along with other information associated with the task at hand.

6.70 It shall be possible to adjust the contrast and brightness of the display provided, as applicable to the

display technology. It shall not be possible to dim the display. The range of control shall permit the display to be legible under all ambient light conditions.

6.71 It shall be possible for the navigator to reset the values of contrast and/ or brightness to a preset or default condition.

6.72 Where magnetic fields degrade the presentation of navigation information, a means to neutralise the effect of magnetic fields shall be provided.

6.73 Display equipment shall be of suffucient size to support the requirements of the relevant performance standards specified in this Part.

6.74 The operational display area of the chart presentation for route monitoring shall be at least 270 x 270 mm.

6.75 The operational display area of the radar presentation shall be at least a circle of diameter of:

180 mm — for ships smaller than 500 gross tonnage;

250 mm — for ships larger than 500 gross tonnage and High-Speed Craft (HSC) less than 10000 gross tonnage;

320 mm — for ships larger than 10000 gross tonnage.

6.76 Multicoloured display equipment shall be used except where monochrome displays are permitted within individual performance standards specified in this Part of the Rules.

6.77 Multicoloured operational displays including multifunction displays (e. g. conning displays) shall provide a minimum of 64 colurs except where permitted or not required, or when used for a single specific purpose (e. g. speed log, echo sounder).

6.78 Operational display equipment including multifunction displays (e. g. conning displays) shall provide a minimum screen resolution of 1280 x 1024 or equivalent for a different aspect ratio, except where permitted or not required, or when used for a single specific purpose (e. g. speed log, echo sounder).

6.79 The display shall support the reading of information under all ambient conditions, simultaneously, by at least two users, from standing and sitting operator positions likely to be found on the bridge of a ship.

6.80 Technical specifications, operational and maintenance

instructions of the means of presentation of navigational information shall be constantly available on each ship in English (Russian) language. This information shall contain the list of all relevant terms, abbreviations, symbols and definitions.

APPENDIX

RULE STANDARD FOR BRIDGE DESIGN, EQUIPMENT ARRANGEMENT AND PROCEDURES (BDEAP)

The present Appendix is applied to ships contracted for construction on or after 1 January, 2011.

INTRODUCTION

1. The present Rule Standard for Bridge Design, Equipment Arrangement and Procedures (BDEAP) set forth a set of requirements for compliance with the principles and aims of the International Convention for the Safety of Life at Sea (SOLAS-74) and other international documents relating to the bridge design.

The requirements include guidance notes that are recommendations on how the requirements may be met by acceptable technical solutions, which shall be considered examples only and do not in any way exclude alternative solutions that may fulfill the purpose of the requirements.

2. The requirements, which affect bridge design, design and arrangement of navigational equipment and systems on the bridge and bridge procedures shall be taken with the aim of:

2.1 facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;

2.2 promoting effective and safe bridge resource management;

2.3 enabling the bridge team and the pilot to have convenient and continuous access to essential information, which is presented in a clear and unambiguous manner, using standardized symbols and coding systems for controls and displays;

2.4 indicating the operational status of automated functions and integrated components, systems and/or sub-systems;

2.5 allowing for expeditious, continuous and effective information processing and decision-making by the bridge team and the pilot;

2.6 preventing or minimizing excessive or unnecessary work and any

condition or distraction on the bridge, which may cause fatigue or interfere with the vigilance of the bridge team and the pilot;

2.7 minimizing the risk of human error and detecting such error, if it occurs, through monitoring and alarm systems, in time for the bridge team and the pilot to take appropriate action.

1. GENERAL

1.1 APPLICATION

1.1.1 The present Rule Standard contains a set of requirements for compliance with the principles and aims of SOLAS regulation V/15[5], when applying the requirements of the following regulations of SOLAS Chapter V:

19 "Carriage requirements for shipborne navigational systems and equipment";

22 "Navigation bridge visibility";

24 "Use of heading and/or track control systems";

26 "Steering gear: testing and drills";

27 "Nautical charts and nautical publications";

28 "Records of navigational activities" taking regulations 18 and 20 into consideration.

1.2 STRUCTURE AND APPLICATION

1.2.1 The present Rule Standard is structured to reflect the areas and aims addressed by regulation 15.

1.2.1.1 Requirements.

The requirements cover the provisions of Chapter V of SOLAS-74 and applicable parts of MSC/Circ.982, enabling the present Rule Standard to be used as a stand-alone document for the purpose of development and subsequent approval of the appropriate technical documentation relating to the following areas of:

bridge design;

design and arrangement of navigational systems and equipment;

bridge procedures.

1.2.1.2 Guidance note.

Guidance notes as how the requirements may be met by the acceptable technical solutions or other remedies are given when applicable. A guidance note given does not in any way exclude the alternative solutions that

may fulfill the purpose and intention of the said requirements, providing other requirements and the overall bridge functionality are not adversely affected.

1.2.1.3 Analysis of the Regulation V / 15 with the disclosure of each sub-item in relation to the purpose of this Regulation.

1.3 НОРМАТИВНІ ПОСИЛАННЯ

1.3.1 Applicable parts of MSC/Circ.982 — Guidelines on ergonomic criteria for bridge equipment and layout;

MSC/Circ.603 — Guidelines on display sizes and techniques for navigational purposes;

IMO resolution A.694(17) — General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids;

IMO resolution A.708(17) - Navigation Bridge Visibility and Functions - Annex: Guidelines on Navigation Bridge Visibility and Functions.

IMO resolution A.1021 (26) Code on alarms and indicators, 2009.

1.4 INFORMATIVE REFERENCES

1.4.1 ISO and IEC standards referred to in MSC/Circ.982 for relevant additional information:

ISO 8468, Ship's bridge layout and associated equipment - Requirements and guidelines;

ISO 14612, Additional requirements and guidelines for centralized and integrated functions;

IEC 60945, Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results;

IEC 61174, Electronic Chart Display and Information System (ECDIS) - Operational and performance requirements, methods of testing and required test results;

1.4.2 International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code).

1.4.3 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended (STCW Convention-78/95).

1.5 DEFINITIONS

1.5.1 Definitions and explanations related to general and technical terminology are given in 1.2 of this Part of the Rules.

For the purpose of this document.

Emergency situations when incidents seriously affect internal operating conditions of the ship and the ability to maintain safe course and speed (fire, ship system technical failure, structural damage).

Alarm means an alarm or alarm system, which announces by audible and visual means a condition requiring attention.

Additional bridge functions mean functions related to ship operations, which shall be carried out on the bridge in addition to primary functions, but not necessarily by the watch officer. Examples of such functions are:

extended communication functions;

monitoring and control of ballasting and cargo operations;

monitoring and control of machinery;

monitoring and control of domestic systems;

Acknowledge means action for silencing of audible alarm and bringing visual alarm to steady state.

Bridge wings mean those parts of the bridge on both sides of the ship's wheelhouse, which, in general, extend to the ship's side.

Monitoring means act of constantly checking information from instrument displays and environment in order to detect any irregularities.

Maneuvering means operation of steering systems and propulsion machinery as required to move the ship into predetermined directions, positions or tracks.

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

Commanding view means view without obstructions, which could interfere with the navigator's ability to perform his main tasks, covering at least the field of vision required for safe performance of collision avoidance functions (225°).

Primary bridge functions mean functions related to determination, execution and maintenance of safe course, speed and position of the ship in relation to the waters, traffic and weather conditions.

Such functions are:

route planning functions;

navigation functions;

collision avoidance functions;

maneuvering functions;

docking functions;

monitoring of safety systems;

external and internal communication related to safety in bridge operations including distress situations;

pilotage functions.

Close to means within functional reach (inside the wheelhouse).

Totally enclosed bridge means a bridge without open bridge wings, meaning that bridge wings form an integral part of an enclosed wheelhouse.

Route planning means pre-determi-nation of course lines, radius turns and speed in relation to the waters to be navigated.

Conning station or position means place in the wheelhouse with a commanding view, providing the necessary information for conning and which is used by navigators, including pilots, when monitoring and directing the ship's movements.

Accept means manual silencing of an audible alarm.

Navigation areas:

Ocean areas mean 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 ship speed.

Coastal waters mean waters that encompass navigation along a coast at a distance less than the equivalence of 30 minutes of sailing with the relevant ship 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.

Narrow waters mean 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 ship speed.

Workstation means a workplace, at which one or several tasks constituting a particular activity are carried out, and which provides the information and equipment required for safe performance of the tasks.

Workstation for monitoring means a workstation facilitating equipment and a commanding view for observation of the ship's heading and speed, the waters and traffic, incorporating means as required for positioning of the ship, and if located close to the front windows may serve as conning station for the master and a pilot carrying out control and advisory functions.

Workstation for navigating and maneuvering means a workstation with commanding view used by navigators when carrying out navigation, route monitoring, traffic surveillance and maneuvering functions, and which enables monitoring of the safety state of the ship.

Workstation for radio communication means a workplace for operation and control of equipment for Global Maritime Distress and Safety System (GMDSS), and shipboard communication for ship operations.

Workstation for safety operations means a workplace-dedicated organization and control of internal emergency and distress operations, and which provides easy access to information related to the safety state of the ship.

Wheelhouse means enclosed area of the bridge.

Cancel means manual stopping of a visual alarm after the cause has been eliminated.

Navigation means planning of the ship's route and determination of position and course of the ship, execution of course alterations and speed changes..

Operating conditions:

Normal operating conditions when all shipboard systems and equipment related to primary bridge functions operate within design limits, and weather conditions or traffic do not cause excessive operator workloads.

Irregular operating conditions when external conditions cause excessive operator workloads.

Abnormal operating conditions when malfunction of technical system requires operation of backup systems on the bridge, or when it occurs 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.

Bridge functions mean functions comprising tasks related to operation of the ship and carried out on the bridge.

Collision avoidance functions mean detection and plotting of other ships and moving objects; determination and execution of course and speed deviations to avoid collision.

Navigation bridge means area of a wheelhouse or enclosed bridge allocated navigating functions and control of the ship, and which includes any additional bridge workstation to be used by the officer of the watch.

Docking means maneuvering the ship alongside a berth while controlling mooring operations.

2 BRIDGE DESIGN

2.1 GENERAL

2.1.1 The bridge shall be designed and arranged with the aim of:

- facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;
- promoting effective and safe bridge resource management;
- allowing for expeditious, continuous and effective information processing and decision-making by the bridge team and the pilot;
- preventing or minimizing excessive or unnecessary work and any condition or distraction on the bridge, which may cause fatigue or interfere with the vigilance of the bridge team and the pilot;

2.1.2 The design of bridge is governed by:

- the functions and related tasks to be carried out on the bridge, systems used and methods of task performance;
- the range, layout and location of workstations required for performance of bridge functions;
- the fields of vision required for visual observations from each of the workstations;
- composition of the bridge team and the procedures required for safe operations under all identified conditions;
- the type and range of equipment to be provided for performance of the tasks at the individual workstations and elsewhere on the bridge.

2.1.3 FUNCTIONS, TASKS AND MEANS.

2.1.3.1 Table 2.1.3 shows the main bridge functions and tasks to be carried out on the bridge. The types of approved equipment that are related to the performance of different tasks are indicated. The list may serve as basis for outfitting of workstations.

Table 2.1.3

Tasks and means			
Tasks to be performed	Equipment to be operated	Information to be viewed	Remarks
1	2	3	4
Navigation - Grounding avoidance. Planning.			
Plan route prior to departure	Paper chart/table Nautical		

	publications GNSS		
Alter route while under way	ECDIS* ECDIS backup**		*Optional installation **If replacing paper
In Transit			
Monitor route-keeping: - Determine position by bearings - Read position on display - Plot position	Pelorus/gyro repeater* Radar GNSS Paper chart/table		*Analogue Bearings 360° around the horizon, (one on each bridge wing)
- Determine and plot position automatic	ECDIS		Optional installation
Maintain route/alter course by - manual steering - using autopilot - automatic route-keeping	Manual steering control Heading control system Track control system* (ECDIS)		*Alternative to heading control Interfaced to ECDIS, gyro, speed, radar when part of INS
Give sound signals	Whistle control		Fog - traffic
Receive sound signals	Sound reception system	Loudspeakers	Повністю закритий місток
Monitor/Take action: - operational warnings - system failure alarms	Alarm panel		
Monitor heading, turn, rudder angle, speed, propulsion		Gyro repeater Indicators:	

		- rudder angle - rate-of-turn - RPM Pitch - speed log	
Adjust lighting	Dimmer buttons		
Monitor performance automatic route-keeping system		Conning info display	Organizing indicator info providing situation awareness when in automatic route-keeping mode
Monitor shallow water areas	Echo Sounder system	Water depth	(Anchoring)
Effect internal communication	Intercom (auto telephone)		Related to navigation
Effect external communication	VHE		
Receive/send distress message	GMDSS equipment or remote control		
Traffic surveillance - Collision avoidance			
Detect floating targets Analyse traffic situations Observe visually Decide on collision avoidance measures	Radar with ETP* (may incl. AIS) Binoculars Window wiper - cleaning - heating control AIS (automatic identification system)	Targets' relative position, course, speed. Expected passing distance Time Target true position, course, speed	* Electronic target plotting ("historical" data) Regarded additional info (means)
Manoeuvring			(For route-keeping)

Change steering mode	Steering mode switch		
Alter heading	Heading control	Heading (Gyro)	
Observe rudder angle		Rudder angle	
Override steering	Override control		
Manual steering control			
Change speed	Propulsion control	RPM/Pitch	
Give sound signals	Whistle control		
Receive sound signals	Sound reception system	Loudspeaker	Totally enclosed bridges
Navigate back to route	Paper chart/table GNSS		
Maintain track of traffic	Radar with route and navigable waters ECDIS*		* May replace paper
Harbour manoeuvring	Thruster		Optional
Anchoring: Maneuvre; Positioning (Identify anchor position)	 Manual steering control Propulsion control (Thruster control.) Radar Chart GNSS	Heading Rudder angle RPM/Pitch Water depth	Performed at front workstations or in combination with docking station Information to be provided for pilots

Observe ship's safety state			
Monitor alarm conditions: - Navigation alarms Equip. & system failures Operational warnings	Main alarm panel W/indicators and acceptance button	Alarm list	Refer to 3.2
Machinery alarms	Alarm panel		
Cargo alarms	Alarm panel		
Fire alarm	Fire alarm panel		
Manual steering Maintain, adjust, alter heading according to order	Steering control Intercom (Public address system)	Gyro repeater Magnetic comp. Rudder angle Rate-of-tum	Appropriate crew member
Conning functions. Determine & direct course and speed in relation to waters and traffic			
Monitor:			
heading		Gyro repeater	May be digital
rudder angle		Rudder angle	
rate-of-turn		RoT indicator	
propulsion		RPM/Pitch	
speed		Speedlog	
water depth		Echo sounder display	Anchoring
Give sound signals	Whistle control button		
Effect communication	VHF		Available

Safety operations

Take action on alarm condition:			
analyse situation consult plans and drawings:	Manuals - Drawings - (PC)		May be computer based info
observe ship's external operational situation			Cooperation with navigating officer
organize and execute measures by communication	Intercom (UHF)		
check status of ventilation system;	Emergency stop		
Cargo alarms	Alarm panel		
Fire detection & alarms	Fire detection and alarm panel		
Gas & smoke detection			
External communication			
Distress - weather - safety	GMDSS equipment		As required (Area)
Determine weather conditions Consider navigation warnings	Navtex receiver EGC receiver		
Public correspondence	Additional equipment		Specified by owners
Docking operations (bridge wings)			
Directing steering	Intercom (PubHc address system)	Heading Rudder angle	
Giving sound signals	Керування свистком/тифоном		

Receiving sound signals	Sound reception system	Loudspeaker	Totally enclosed bridge
Perform manoeuvring	Steering Propulsion control Thruster control		Additional installation by owners
Additional functions			Refer to 2.2

INS-integrated navigation system

GNSS is a global navigation satellite system

ARP automatic radar plotting
EGC enhenced group call

2.2 TYPE AND RANGE OF WORKSTATIONS

2.2.1 The ship's navigation bridge shall not be used for purposes other than navigation, communications and other functions essential to the safe operation of the ship, its engines and cargo, and workplaces shall be arranged with the aim of:

facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;

promoting effective and safe bridge resource management.

2.2.2 Individual workstations for performance of primary bridge functions including conning position for pilotage shall be provided for:

navigating and maneuvering (and traffic surveillance);
monitoring;
manual steering;
docking on bridge wings;
planning (of voyage, routes, ship operations);
safety (monitoring and emergency operations);
communication (GMDSS);
conning (pilot) (refer also to Guidance note of 2.5.12).

Guidance note.

The workstation for monitoring may be combined with:

a workplace for navigation (route monitoring/ position-fixing) when the workstation for navigation and maneuvering provides individual workplaces for traffic surveillance and navigation (chart work);

a backup workstation for navigation and a conning position when electronic chart display and information system (ECDIS) is installed, enabling navigation, traffic surveillance and maneuvering at one workplace.

2.2.3 Additional workstations may be arranged for performance of other functions than those related to primary bridge functions when relevant.

Guidance note.

The main types of additional bridge workstations may be divided into two distinct categories (A and B), based on purpose and functions and whether they shall be operated by the watch officer or not.

A. Workstations for functions regarded related to operation of the ship, its engines and cargo:

a) to be monitored and controlled by the watch officer;

b) to be used by other personnel than the watch officer.

B. Workstations for functions not regarded essential to safe operation of the ship and to be used by other personnel than the watch officer, but located on the bridge for practical reasons.

The type of tasks to be performed at the individual workstation and the operating procedures employed may conclude whether a workstation of category A shall be of type *a)* or *b)*. Workstations of category A, type *a)* shall not include tasks that may prevent the officer in charge of primary bridge functions to leave a workstation for additional functions instantly at any time during operations.

Refer to 2.5.14 — 2.5.16.

2.3 WORKING ENVIRONMENT

2.3.1 The bridge shall be designed and arranged with the aim of: preventing or minimizing excessive or unnecessary work and any condition or distraction on the bridge, which may cause fatigue or interfere with the vigilance of the bridge team and the pilot.

Internal environmental conditions on the bridge that may affect human performance are:

temperature;

humidity;

ventilation;

noise;

vibration;
illumination and type of lighting;
glare and reflection; interior colors;
occupational safety.

2.3.2 The enclosed bridge or wheelhouse shall be equipped with an air conditioning or ventilation system for regulation of temperature and humidity.

Guidance note.

It shall be possible to maintain a temperature, which is not less than 18 °C in cold climates and does not exceed 27 °C in tropical climates, and to maintain the relative air humidity in the range of 20 to 60 per cent, preferably maintaining 45 per cent humidity at 21 °C and not less than 20 per cent at any temperature.

2.3.3 Ventilation system with suitable air flow velocity and rate of air circulation shall be provided. Direction of air flow from air conditioning and heating systems towards workplaces shall be avoided.

Guidance note.

The preferred air velocity is 0,3 m/s and shall not exceed 0,5 m/s.

The recommended rate of air circulation for enclosed spaces is 6 complete changes per hour.

2.3.4 Excessive levels of noise interfering with voice communication, causing fatigue and degrading overall system reliability, shall be avoided.

Guidance note.

The sound level measured 1 m from the outlets of air distribution systems shall not exceed 55 dB(A). Noise levels produced by individual bridge equipment shall not exceed 60 dB(A) at 1 m.

2.3.5 Vibrations when the ship is at normal transit speeds shall not affect the reading of indicators or the comfort of personnel.

2.3.6 Lighting arranged for adjustment of illumination and direction of light shall be provided at all workplaces. The illumination brightness shall be sufficient for safe performance of the tasks and possible to dim down to zero.

2.3.7 Lighting that may be required for continuous operations during darkness and in entrances to the bridge shall be red with adjustable brightness to suit the operations and ease visual adaptation to darkness.

2.3.8 It shall be possible to dim equipment displays and indicators providing information to individual workstations and red lighting covering the workstation area, at the workstation in use.

2.3.9 Light sources shall be arranged and located in a way that prevents glare, stray image and mirror effects in bridge windows and deckhead areas above workstations.

Guidance note.

Deckhead areas above workstations shall have a dark colour of matt, anti-gloss type minimizing light reflection. The colour of bridge bulkheads shall have a calm and matt appearance.

2.3.10 To reduce the risk of personnel injury during bridge operations:

the wheelhouse floor, bridge wings and upper bridge decks shall have non-slip surfaces;

hand- or grab-rails shall be installed as required at workstations, passageways and entrances, enabling personnel to move and stand safely when the ship is rolling and pitching in heavy weather;

chair deck rails installed at workstations shall be provided with anti-trip skirting board or be flush mounted;

stairway openings shall be protected if not sufficiently lit or otherwise indicated during darkness.

2.3.11 Personnel safety equipment to be stored on the bridge shall be clearly marked and easily accessible.

2.4 BRIDGE PASSAGEWAYS

2.4.1 Bridge passageways shall facilitate the expected movement of the bridge team between individual workstations, bridge entrances, exits and windows in carrying out the bridge tasks safely and effectively including the maintenance of equipment.

2.4.2 A clear route across the wheelhouse, from bridge wing to bridge wing for two persons to pass each other, shall be provided.

Guidance note.

The width of the passageway shall be 1200 mm and not less than 700 mm at any single point of obstruction.

2.4.3 The distance between separate workstation areas shall be sufficient to allow unobstructed passage for persons not working at the stations.

Guidance note.

The width of such passageways shall not be less than 700 mm, including persons sitting or standing at their workstations.

2.4.4 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, shall be sufficient for one person to pass a stationary person.

Guidance note.

Where there is a passageway between the front bulkhead and front workstation consoles, its width shall preferably be 1000 mm and not be less than 800 mm. When the front workstation is placed against the front bulkhead, the guidelines of 2.4.2 may be applicable, or 2.4.3 if there is a passageway providing a clear route from bridge wing to bridge wing aft of the workstation.

2.4.5 The distance between bridge wing consoles and bulkheads shall be as little as possible for easy operation of controls from both a position behind and beside the console giving optimum view of the ship's side and the mooring operations, but wide enough for one person to pass the console.

Guidance note.

The width of the passageway shall be 600 mm.

Note. The Panama Canal Commission (PCC) requires that a minimum of 1 meter clearance from consoles or obstructions shall be provided from the forward to aft portions of the bridge wing ends. Special requests for relaxation of this requirement may be considered on a case-by-case basis.

2.4.6 The clear deckhead height in the wheel-house shall take into account the installation of deckhead panels and instruments as well as the height of door openings required for easy entrance to the wheelhouse. The following clear heights for unobstructed passage shall be provided:

.1 the clear height between the bridge deck surface covering and the underside of the deck head covering shall be at least 2250 mm;

.2 the lower edge of deck head-mounted equipment in open areas and passageways, as well as the upper edge of door openings to bridge wings and other open deck areas shall be at least 2100 mm above the deck;

.3 the height of entrances and doors to the wheelhouse from adjacent passageways shall not be less than 2000 mm.

2.5 WORKSTATION ARRANGEMENTS AND REQUIRED FIELDS OF VISION

2.5.1 The workstations for primary bridge functions shall be arranged to serve their functions under all operating conditions and different manning of the bridge and provide the fields of vision required for visual observations and easy cooperation between bridge personnel, promoting

effective and safe bridge resource management.

2.5.2 Workstations for navigating and maneuvering, including traffic surveillance and monitoring shall be arranged within an area spacious enough for two persons to carry out the tasks in close cooperation, but sufficiently close together to enable the watch officer to control and safely carry out all the tasks from one working area under normal operating conditions.

Guidance note.

The workstation for navigating and maneuvering shall be arranged to allow an assisting officer to carry out route monitoring, which may include position-fixing and chart work, and course adjustments when ordered, while the officer in charge concentrates on traffic situations and adjustment of course and speed as required to follow the route and avoid danger of collision.

The workplaces shall be adjacent to enable easy communication and cooperation when two navigators operate the workstation, and to provide the watch officer with a workstation for safe and efficient performance of all the tasks when he is the only navigator on the bridge and is to use both the workplace for route monitoring/position-fixing and the workplace for traffic surveillance/maneuvering.

N o t e . The workplace for position-fixing and chart work is regarded a workstation for monitoring also when in use by an assisting officer and may serve as a workplace for the use of backup chart systems and for conning when ECDIS is installed at the workplace for traffic surveillance.

Workstation with work places location for navigation and maneuvring – monitoring, is given in Table 2.5.2-1.

Table 2.5.2- 1

Position fixing	Alarms	Traffic surveilamce
Chart work	Communicatior	
Monitoring	Maneuvre	

The Table 2.5.2-1 shows the relative location of workplaces based on manual position-fixing in paper charts allowing efficient performance by the single watch officer under normal operating conditions and two persons in close cooperation when the workload exceeds the capacity of the watch officer.

When an electronic chart system is installed, enabling route monitoring, traffic surveillance and maneuvering from one working position, the

workplace for monitoring may be used by pilots for conning if located close to centre windows. Work places when arranged for the use of electronic chart system incorporating automatic position-fixing (ECDIS with backup).

Workstation arrangement for navigation and maneuvering — monitoring — conning is given in Table 2.5.2-2.

Workstation with work places location for use of ECDIS system with automatic position identification is givent in Table 2.5.2-2 (ECDIS with back up).

Table 2.5.2- 2

Back up navigation system	Alarms	Traffic surveilamce
Chart work	Communication	Automatic position
Monitoring	Maneuvre	identification
Conning		

2.5.3 Workplaces for performance of navigation, traffic surveillance and monitoring shall be arranged for working in standing as well as seated position with optimum field of vision.

2.5.4 The field of vision from the bridge shall be provided, facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operating conditions by enabling visual observations for performance of bridge functions at the workstations specified in 2.2.

2.5.5 It shall be possible to observe all objects of interest for the navigation such as ships and lighthouses, in any direction from inside the wheelhouse by providing a horizontal field of vision to the horizon of 360° within the confines of the wheelhouse.

Guidance note.

On a bridge with enclosed bridge wings it shall be possible to obtain the view of 360° from inside the bridge area by using two positions, one on each side of the workstation for navigation and maneuvering, not being more than 15 m apart. This guideline may also be applicable for providing the required field of vision within the confines of wheelhouses with a total breadth of more than 18 m.

2.5.6 From the conning position and the workstation for navigating and maneuvering, the view of the sea surface forward of the bow to 10° on either side under any ballast or cargo condition shall not be obscured by more than 2 ship's lengths or 500 m, whichever is the less. Each individual bliend sector

shall not exceed 5°.

2.5.7 The workstation for navigating and maneuvering and the conning position shall provide a field of vision enabling maintenance of visual traffic surveillance, extending over a forward arc of not less than 225° that is from right ahead to not less than 22,5°, abaft the beam on either side of the ship. From a workstation for monitoring, a blind sector covering the view abaft the beam on port side is accepted.

Guidance note.

All workstations to be used by the officer of the watch shall provide a forward field of vision of 225°. A blind sector covering the view abaft the beam on port side may be accepted for workstations to be used infrequently by the watch officer for short periods at a time and for workstations to be used by assisting officers.

2.5.8 Workstations for monitoring, navigating and maneuvering shall provide the required fields of vision from a seated working position and shall not be located directly behind large masts, cranes etc., which obstruct the view right ahead from the workstation.

2.5.9 A separate blind sector formed by the ship's cargo, cargo lifting equipment or another obstacle forward of (in 180° sector) the ship's wheelhouse and restricting the sea surface scanning from the workstation shall not exceed 10°. The resulting blind sector shall not exceed 20°. The sectors of unrestricted observation area between blind sectors shall be at least 5°. However, for the scanning decribed in 2.5.6 of this Appendix, each separate blind sector shall not exceed 5°.

Guidance note.

To help reducing the size of internal blind sector caused by bridge wing bulwarks and divisions between windows in bridge wing bulkheads, such bulwarks and bulkheads shall be located in a line of sight seen from the working position at the front workstations.

2.5.10 The workstation for manual steering shall preferably be located on the ship's centre line and shall not interfere with the functions to be performed by the officer of the watch. The steering position shall provide a forward field of vision not less than 60° to each side. If large masts, cranes, etc. obstruct the view in front of the workstation, it shall be located some distance to starboard of the centre line, sufficiently to obtain a clear view ahead.

2.5.11 When the workstation for manual steering is located off centre, or the bow of the ship cannot be seen from the steering position, special

steering references (sighting marks) shall be installed forward of the steering position. The steering references shall be installed in line parallel to the ship's centre line for use by day and by night.

2.5.12 The ship's side shall be visible from the bridge wing. Equipment for docking operations from the bridge wings, or a workstation console if installed, shall be located to enable visual observations required for safe maneuvering of the ship, monitoring of tug and mooring operations and shall provide a field of vision from not less than 45° on opposite bow to right astern from the working positio.

N o t e . The Panama Canal Commission (PCC) requires that the conning position located at the extreme end of the bridge wings provides a clear and unobstructed view fore and aft of the vessel's side. The side hull plating at the vessel's waterline, fore and aft, shall be visible from bridge wing conning positions.

2.5.13 The conning position shall be located close to the front centre window to provide the pilot with a commanding external view, including a view of the sea surface sufficiently close to both sides of the ship's bow for safe directing of the steering in narrow canals and buoy lanes.

G u i d a n c e n o t e .

The position for the conning station may be met by the workstation for monitoring/backup navigation when located sufficiently close to the forward centre window, provided the workstation is installed in addition to a complete workstation for navigation, traffic surveillance and maneuvering and therefore not required by the ship's personnel during pilotage (refer to Guidance notes of 2.2.2).

N o t e . 1 . The Panama Canal Commission (PCC) requires that the conning position be located "directly behind and next to" the centre front window and the nearest window thereto on each side that provides a clear and unobstructed view ahead for conning during canal transit. A minimum of 1 meter clearance from consoles or obstructions shall be provided. Special requests for relaxation of this requirement may be considered on a case-by-case basis.

2. PCC requires that the conning position shall provide a view of the sea surface forward of the bow from 1,5 ship's length when at ballast load Kne and 1 ship's length at full load line.

2.5.14 There shall be a close approach access to at least one front window providing the view of the area in front of the bridge superstructure.

2.5.15 Workstations for additional functions, which shall be used by the watch officer (refer to 2.2.2), shall provide the field of vision required to maintain efficient look-out in accordance with 2.5.6 and enable monitoring of the ship's heading and rudder angle.

2.5.16 The location of a workstation for additional functions regarded essential for safe operation of the ship and to be used by other personnel than the watch officer shall not in any way influence the performance of primary bridge functions.

2.5.17 Workstations for additional functions not essential to the safe operation of the ship, its engines and cargo, or furniture arranged for meetings or relaxation inside the wheelhouse shall not be installed within the area of the navigation bridge or within fields of vision outside this area, which are required for traffic surveillance from workstations. If such workstation or furniture arrangement is installed close to these areas, the use of it shall in no way influence the performance of primary bridge functions, either by use of light, noise disturbance or visual distraction.

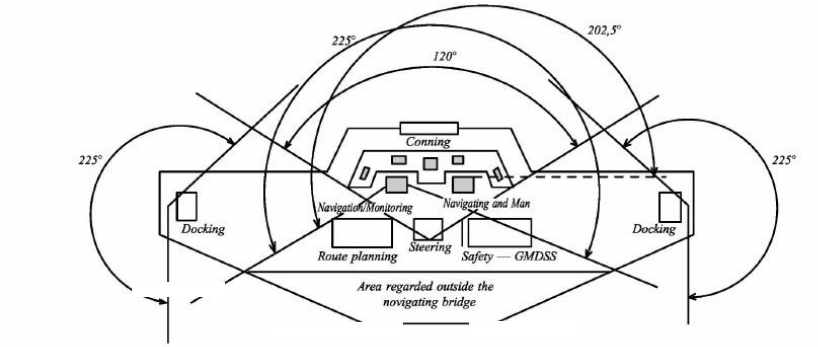

Fig. 2.5.17-1 Location of workstations and required fields of vision. Position- fixing in paper charts — Passageway and conning position infront.

Guidance note.

Fig. 2.5.17-1 shows the principles for bridge layout with front workstations arranged for operations in seated and standing position and with bridge wing bulkheads in line of sight from the working positions. A bridge area, which may be regarded outside the navigation bridge, and the sectors of required field of vision from workstations are indicated.

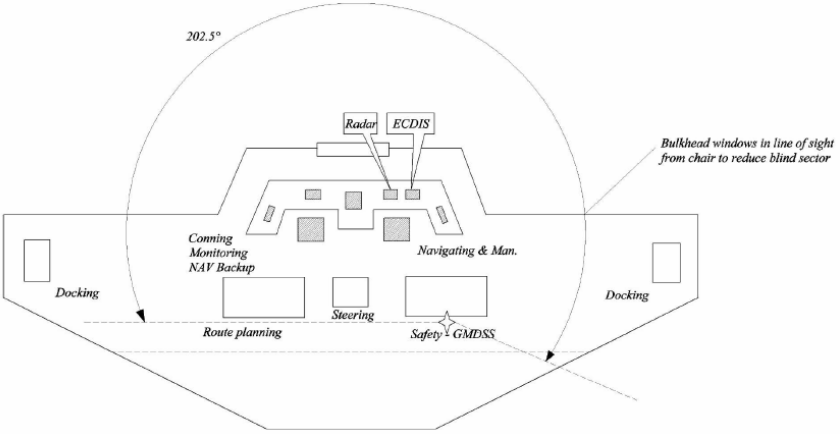

Fig. 2.5.17-2 Required field of vision from the radio station when to be controlled and infrequently used for short periods of time by the watch officer. Navigation based on electronic chart system (ECDIS) - Conning position at console.

Note to Fig. 2.5.17-2 (also valid for Fig. 2.5.17-3). Location of ECDIS at the workstation for navigating and maneuvering (including traffic surveillance) enables position-fixing at this position and makes the area a complete workstation (WS) for the navigation function and maneuvering. This leaves the workstation for navigation backup/monitoring available for conning when installed at the front bulkhead. Close approach access to front windows is maintained.

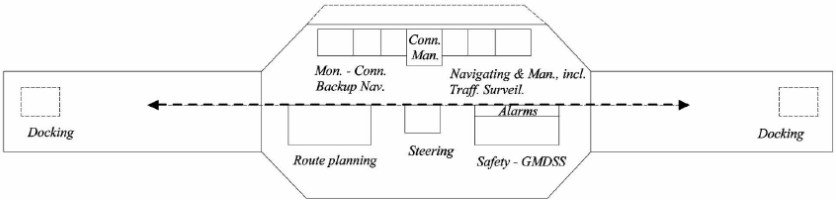

Рис. 2.5.17-3 Design principles — Flat front — Open bridge wings with passageway from door to door Consoles up front — Access to front window.

2.6 FIELDS OF VISION AND BRIDGE WINDOW ARRANGEMENT

2.6.1 The bridge front windows shall be inclined from the vertical plane, top out, at an angle not less than 10° and not more than 25° to help avoid reflections. Polarized and tinted windows shall not be fitted.

Guidance note.

The rear and side windows shall be inclined from the vertical plane top out, at an angle of 4° — 5° to help avoid reflections. If the arrangement of light sources meet the quirement of paragraph 2.3.9 without inclination of the side and rear windows, inclination may not be necessary.

Note. Bridges designed with enclosed bridge wings:
inclined side windows, which extend the maximum breadth of the ship, may not be in accordance with requirements of the Panama Canal Commission for some ship sizes.

2.6.2 The lower and upper edge of windows shall not present an obstruction to the view forward of the bow seen from a seated as well as a standing position at the workstations for monitoring, navigating and maneuvering.

Guidance note.

The height of the lower edge of windows above the floor surface shall not exceed 1000 mm within the required field of vision and the height of the upper
edge shall be at least 2000 mm.

2.6.3

The upper edge of the front windows shall allow a forward view of the horizon for a person with a height of eye of 1800 mm at the navigating and maneuvering workstation when the ship is pitching in heavy seas. If 1800 mm height of eye is considered unreasonable and impractical, a reduction of the height may be accepted, but not to less than 1600 mm.

Guidance note.

A vertical angle of view of not less than 5° above a horizontal line from a standing eye height of 1750 mm shall be provided (refer to Fig. 2.6.3).

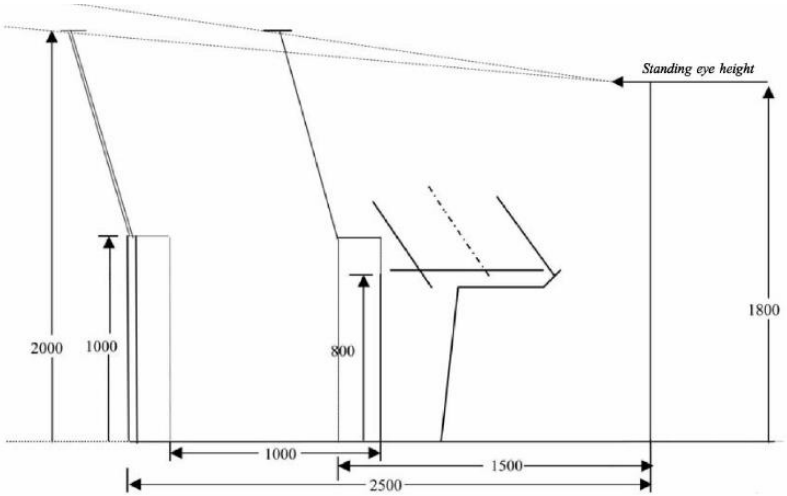

Fig. 2.6.3 With front windows at an angle of 15°, a vertical angle of view of 5° from an eye height of 1750 mm may be provided at a distance of 2600 mm from the front bulkhead, all owing for a passageway of 1000 mm in front of workstation consoles.

2.6.4 Framing between windows shall be kept to a minimum and not be installed immediately forward of any workstation. If stiffeners between windows shall be covered, this shall not cause further obstruction of the view.

Guidance note.

The division between windowpanes within the required field of vision shall not exceed 150 mm. If stiffeners are used, divisions shall not exceed 100 mm in width and 120 mm in depth. The width of windowpanes within the field of vision required for traffic surveillance shall not be less than 1200 mm in order to limit the number of stiffeners.

2.6.5 To enable visual observations through windows to be maintained under all weather conditions, all windows within the required fields of vision from the working position at workstations to be used by bridge personnel, including pilots, shall provide a clear view regardless of weather conditions.

Guidance note.

The following means shall be installed to provide a clear view through

windows:
sunscreens of roller blind type;
heavy duty blade type wipers and fresh water window washing;
efficient de-icing and de-misting systems.
Technical systems installed shall comply with appropriate ISO standards (refer to ISO standard 17899).
A catwalk or other means to help maintenance of window wipers and manual cleaning of bridge front windows shall be provided.

2.7 WORKSTATION LAYOUT, CONSOLES AND CHAIR ARRANGEMENT

2.7.1 The configuration of workstations and consoles shall provide a workplace for rational and user-friendly placing of equipment, with the aim of:

facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;

promoting effective and safe bridge resource management;

enabling the bridge team and the pilot to have convenient and continuous access to essential information;

allowing for expeditious, continuous and effective information processing and decision-making by the bridge team and the pilot;

preventing, or minimizing, excessive or unnecessary work and any condition or distractions on the bridge, which may cause fatigue or interfere with the vigilance of the bridge team and the pilot.

2.7.2 A functional workstation designed in accordance with the established overall operational and ergonomic requirements shall provide:

a sufficient area for performance of the tasks to be carried out by the number of people that may be required to attend consoles designed for operations at specific workplaces in standing and seated position;

enabling installation of equipment to be within reach from the working position;

avoiding obstruction of the view through bridge windows from seated position;

chairs suiting ergonomic requirements for efficient use of installed equipment and maintenance of fields of vision, if chairs shall be installed.

2.7.3 The workstation for navigation and maneuvering shall have working positions for position-fixing, maneuvering and traffic surveillance as close as possible for efficient use by the officer of the watch, but

also enabling the tasks to be performed by two navigators in close cooperation.

Guidance note.

The working position for operating the radar with collision avoidance functions shall be regarded the main working position at this workstation. Controls for course and speed adjustments shall be located within reach from this position to enable collision avoidance maneuvers without losing view of the traffic, and means for position-monitoring/-fixing shall be readily available.

Figs. 2.7.3-1 and 2.7.3-2 show examples of workstation layouts designed in compliance with 2.5.2.

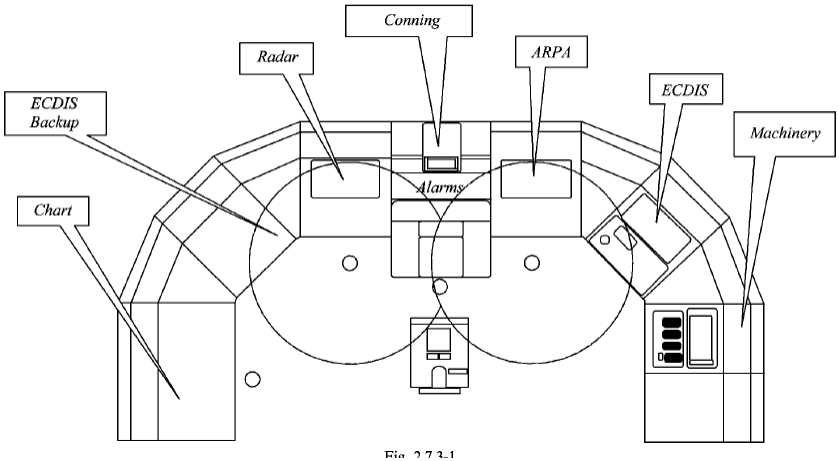

Fig. 2.7.3-1 Workstation layout which may include ECDIS with combined electronic and paper chart back up arrangement as well as conning information display monitoring of INS functions.

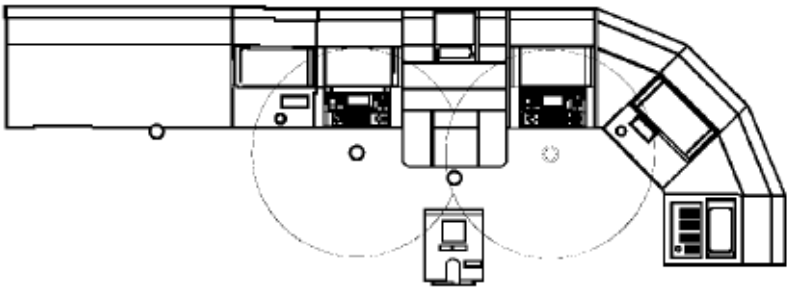

Fig. 2.7.3-2 A modified workstation configuration, based on same principles as shown in Fig. 2.7.3-1.

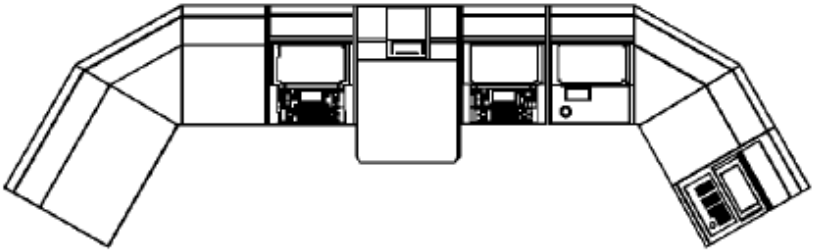

Fig. 2.7.3-3 A modified version of Fig. 2.7.3-2.

If ECDIS with backup (which is optional) is not installed, the chart table shall preferably be installed closer to the radar (refer to Fig. 2.7.3-3). Alternatively, spaces may be allocated for future ECDIS installation.

May suit wheelhouses with limited depth (longitudinal distance between front and rear bulkheads).

Includes space for conning information display and machinery monitoring system.

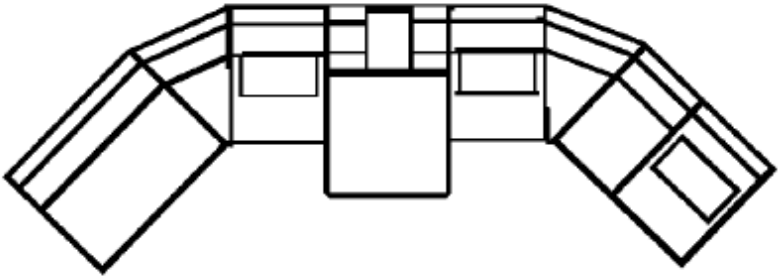

Fig. 2.7.3-4 Design principles similar to Fig. 2.7.3-3, but without electronic chart installatins.

Applicable for limited dimensions wheelhouses.A place for an information display and a monitoring system for a machinery (propulsion) installation is provided.

2.7.4 Consoles shall principally be divided into two areas:

a vertical (slanting) part for location of information displays to be easily readable;

a horizontal part (desktop) for controls, switches and buttons to be within easy reach from the working position.

2.7.5 The height of console desktops at the workplaces for navigation, maneuvering, traffic surveillance and monitoring shall enable easy use of equipment required for safe performance of the tasks to be performed from both standing and sitting position.

Guidance note.

To provide a functional reach from standing position, the height of console desktops above bridge eck surface shall be 800 mm and not less than 750 mm. The sitting height is governed by the elbow height in relation to console desktop.

To provide a functional reach of equipment and easy operation of controls from sitting position the elbow height of the operator shall be preferably 50 mm higher than the console desktop and not less than the height of the desktop.

To provide the elbow height for persons of different size and build in relation to the console desktop, it shall be possible to adjust the height of the seat to allow the elbow height of 240 mm ±55 mm above seat. It shall be possible to adjust chair armrests accordingly, if installed, and to fold the armrests away.

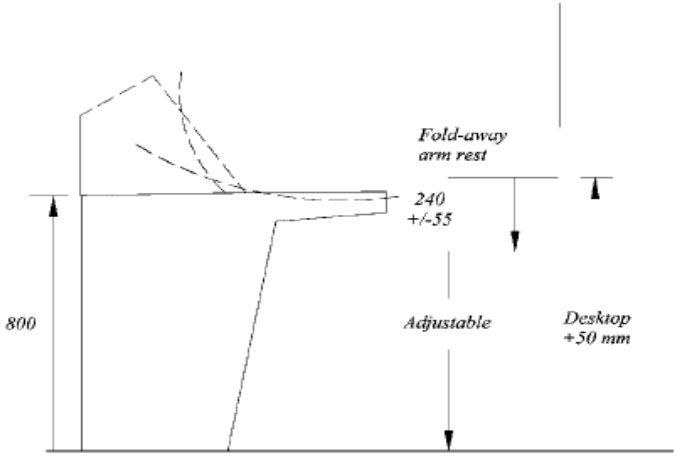

Fig. 2.7.5

2.7.6 The console in front of a seated working position shall provide sufficient leg room.

Guidance note.

The leg room shall have a depth of 450 mm and not less than required for a person sitting at a working position 350 mm from the console (chair backrest 440 mm from the edge of the console, requiring a leg room depth of at least 230 mm).

2.7.7 The consoles forming the front workstations shall not be higher than required for efficient use in standing position and shall not obstruct the fields of vision over the lower edge windows in front of the workstation from sitting position.

Guidance note.

The console height shall not exceed 1200 mm. This console height may be accepted for installation at a distance of 350 mm or more from the window, also if it interferes with the line of sight from an eye height of 1400 mm, providing the height of the chair can be adjusted to compensate for the interference.

N o t e . Refer to 2.6.3 for eye heights at standing position.

2.7.8 Consoles within the required fields of vision aft of the front workstation consoles shall not obstruct the horizontal line of sight from

the sitting eye height.

Guidance note.

The height of the consoles shall be 100 mm lower than the horizontal line of sight and shall not exceed 1300 mm.

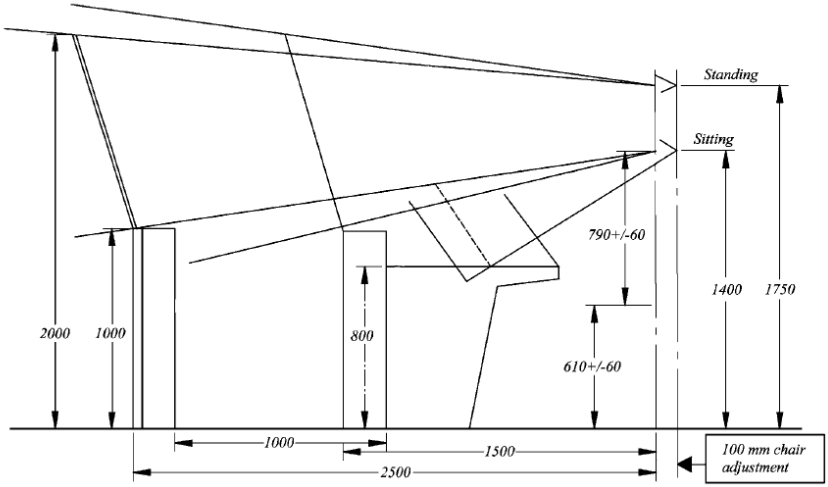

Fig. 2.7.8

2.7.9 When a chair is installed at a workplace for operations in both standing and seated position, it shall be fastened to rails allowing fore and aft movement of the seat to enable easy reach of equipment when seated and sufficient room to stand in front of the console when the chair is pushed back.

It shall be possible to adjust the height of the seat to suit users of different heights for optimum view and reaching distance and armrests, if provided, shall be of fold away type and preferably adjustable in height.

Guidance note.

The seat height of the chair shall be adjustable from 550 to 670 mm above the deck surface. The movement in fore-aft direction shall allow the front edge of the seat to be positioned at the edge of the front console and to allow a free space of at least 700 mm between the chair and console when moved in aft direction. Armrests shall preferably be adjustable from 185 and 295 mm above the seat, if installed.

3 DESIGN AND ARRANGEMENT OF NAVIGATIONAL SYSTEMS AND EQUIPMENT

3.1 DESIGN AND QUALITY OF NAVIGATIONAL SYSTEMS AND EQUIPMENT

3.1.1 Navigational systems and equipment shall be designed with the aim of:

presenting the information in a clear and unambiguous manner, using standardized symbols and coding systems for controls and displays;

indicating the operational status of automated functions and integrated components, systems and/or sub-systems;

minimizing the risk of human error and detecting such error if it occurs, through monitoring and alarm systems, in time for the bridge team and the pilot to take appropriate action;

and be arranged with the aim of:

facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;

enabling the bridge team and the pilot to have convenient and continuous access to essential information;

allowing for expeditious, continuous and effective information processing and decision-making by the bridge team and the pilot.

3.1.2 Navigational systems and equipment shall be of approved type and comply with the applicable international requirements and requirements of the Register Rules.

N o t e . The basic design of navigation al systems and equipment required to be carried is governed by functional and technical requirements as well as ergonomic and human-machine interface criteria expressed in individual IMO performance standards.

The quality of the human engineering part of the design of equipment and alarm functions shall be determined in performance tests and trials carried out during the approval process.

Alteration of hardware and software of type approved equipment requires review of the documentation by the type approving authority and may include re-testing to a certain extent, depending on the type of changes.

3.1.3 Navigational equipment and systems offering alternative modes of operation shall indicate the actual mode in use.

3.1.4 The system architecture of an integrated system shall include

means providing situation awareness by indication of operational status of automated functions and the individual equipment.

3.1.5 In case of failure in one part of an integrated navigation system, it shall be possible to operate every other individual item of equipment or part of the system separately.

3.2 BRIDGE ALARM MANAGEMENT

3.2.1 An alarm system shall be provided, indicating any fault requiring attention and shall:

activate an audible and visual alarm on the navigation bridge for any situation, which requires action by, or attention of the officer of the watch;

as far as practicable be designed on the self-monitoring principle.

The bridge alarm system shall be designed with the overall aim of:

minimizing the risk of human error and detecting such error, if it occurs, through monitoring and alarm systems, in time for the bridge team and the pilot to take appropriate action.

The overall aim includes the aim of:

enabling the officer on watch to devote full attention to the safe navigation of the ship enabling immediate identification of any abnormal situation requiring action to maintain safe navigation of the ship;

avoiding distraction by alarms, which require attention but have no direct influence on the safe navigation of the ship and which do not require immediate action to restore or maintain the safe navigation of the ship.

Alarms and indicators on the navigation bridge shall be rmnimized and only alarms and indicators required by appropriate documents shall be placed on the navigation bridge, unless permitted by the flag administration (refer to IMO resolution A.830(19))[5].

3.2.2 A method of accepting all alarms on the bridge (both the source of alarm and alarms of other equipment caused by the loss of sensor input) shall be provided at the navigating and maneuvering workstation to avoid distraction. The system shall enable immediate identification of the alarm sources without requiring any operator action and enable immediate silencing of the alarms by single operator action.

Guidance note.

A bridge management system shall include grouping of alarms and

[5] Refer to IMO Resolution A.1021 (26) "Code for Alarm and Indication, 2009"

indicators, separating alarms that affect safety of navigation and alarms that do not influence safety of navigation.

The group of alarms related to safety of navigation shall incorporate all system alarms, equipment alarms and operational warnings that are critical to safety of navigation, including the detection of:

operator disability;

danger of collision heading;

heading deviations;

deviations from the route;

danger of grounding; propulsion failure; steering gear failure.

Essential equipment and systems to be incorporated in such an alarm system shall include:

bridge watch monitoring system;

heading information system;

heading/track control system;

position-fixing systems;

electronic chart system, if installed;

radar with electronic target plotting functions;

relevant machinery alarms for early warning.

All groups of bridge alarms and warnings shall be centralized in a common panel or screen at the workstation for navigation and maneuvering.

3.2.3 Acknowledgement of an alarm at either the instrument or an alarm panel shall cancel the audible warning at both sources and change the visual alarm from flashing to constant light.

3.2.4 Permanently inhibiting individual alarms shall not be possible, but manual suppression of local audible alarms may be accepted when this is clearly and constantly indicated at the equipment and the unit is part of the alarm management system.

Guidance note.

Local audible alarms may be manually suppressed by means of an on/off switch located on or close to the equipment or by other means, e.g. electronically. The off-position shall enable suppression of the audible alarm when the equipment is part of a central alarm system and the on-position shall engage the local alarm when the equipment serves as a stand-alone unit.

3.2.5 If an alarm channel in a computer-based system is inhibited manually, then this shall be clearly indicated by a visual signal.

3.2.6 Audible alarms shall be maintained until they are accepted and

the visual identification of individual alarms shall remain until the fault has been corrected.

3.2.7 Alarm indications shall be red, or if on displays, red or otherwise highlighted. If alarm messages are displayed on color VDUs, the alarm status shall remain visible in the event of the failure of one color of the display system.

Guidance note.

The following method of indication shall be applied:

.1 active alarm status: red, blinking and audible;

.2 active alarm status acknowledged: red, static (canceling the audible alarm);

.3 active warning message — not critical: yellow, static (may be accompanied by a short audible attention signal);

.4 normal condition: no light (indication of a safe situation).

3.2.8 The alarm system shall be able to indicate more than one fault at the same time, and the acknowledgement of any alarm shall not inhibit another alarm, meaning that if an alarm has been acknowledged and a second fault occurs before the first is rectified, the audible and visual alarms shall operate again.

3.2.9 A new alarm condition shall be clearly distinguishable from those existing and already acknowledged by indicating new alarms by a flashing light, and existing and accepted alarms by a constant light.

Guidance note.

In colour graphic systems, it shall not be possible to distinguish between the status of alarms and warnings by means of colour only.

3.2.10 Provisions shall be made for functional testing of required alarms and indicators.

3.2.11 The alarm system shall be continuously powered and shall have an automatic changeover to stand-by power supply in case of loss of normal power supply.

3.2.12 Failure of the normal or backup power supply of the alarm system shall be indicated by an alarm.

3.2.13 Loss of system communication shall be indicated by an alarm.

3.3 ARRANGEMENT OF NAVIGATIONAL SYSTEMS AND EQUIPMENT

3.3.1 The type and number of navigational systems and equipment to be carried shall at least incorporate the items specified in the present Part

of the Rule Standard, and shall be installed at the various workstations with the aim of:

facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;

enabling the bridge team and the pilot to have convenient and continuous access to essential information that is presented in a clear and unambiguous manner, using standardized symbols and coding systems for controls and displays;

indicating the operational status of automated functions and integrated components, systems and/or sub-systems;

minimizing the risk of human error and detecting such error if it occurs through monitoring and alarm systems, in time for the bridge team and the pilot to take appropriate action.

The relative location of individual equipment and their placement in relation to the distance from the working position of the user are governed by:

type and range of equipment to be installed (refer to Guidance note of 3.3.2);

equipment relationship with tasks to be performed at the various workstations (refer to Guidance note of 2.1 and 3.3.1);

importance of equipment functions and frequency of use;

workstation and console configurations;

size of equipment and space available for installation (case by case).

3.3.2 All information, controls, facilities and fields of vision required to carry out each of the tasks safely and efficiently shall be provided at the corresponding workstations.

Guidance note.

The Table 3.3.2 specifies minimum carriage requirements for ships of different tonnage, the tasks or the purpose the equipment shall serve and the type of workstation (WS), at which the equipment shall be used and shall be installed. Refer also to table 2.1.3 specifying equipment in relation to functions and tasks.

Workstation for navigating and maneuvering.

To assist in casualty investigations, ships, when engaged on international voyages shall be fitted with a voyage data recorder (VDR)

3.3.3 Other means than those specified in 3.3.1 may be permitted, provided they serve the same functions and are approved.

3.3.4 The location of equipment at the workplaces for navigation,

maneuvering, traffic surveillance and monitoring shall enable:

easy use of all controls, switches and buttons from standing position;

easy use of primary means for route monitoring;

traffic surveillance;

heading and speed adjustments;

internal and external communication, including ship's whistle;

change of steering mode, from seated position.

Work in paper charts and maneuvering requiring the use of lateral thrusters may be performed in standing position only, but controls for thruster systems shall be grouped with controls for propulsion and manual steering.

Guidance note.

The position for operation of radars and the position at the centre console for harbor maneuvers are regarded the main working positions at the workstation for navigation and maneuvering.

Figure 3.3.4 indicates location of main categories of equipment that shall be within reach from the front workstation comprising three workplaces.

Table 3.3.2

Workstation for navigating and manoeuvring

Main functions: Position surveillance, traffic surveillance, course alterations and speed change

Task/Purpose	Equipment and means			Remarks
	Equipment	Indicators	Related equipment	
1	2	3	4	5
Applicable for all ships				
Check heading	Magnetic compass [1]			[1]Readable from WS for manual steerin
Take optical bearings	Pelorus Means of correcting heading and bearing to true		Magnetic compass	Arc of 360°
Positioning - manual - electronic [1]	GNSS Paper charts Chart table			[1]Optional chart system

	ECDISw/back-uparr.[1]			

Continue of Table 3.3.2

1	2	3	4	5
Surveillance by hearing	Sound reception system	Sound direction		All ships with totally enclosed bridge
Communicate heading[1] -manual - automatic[2]	Telephone		[2] Main gyro (optional)	[1] Stored in bridge area; [2] Optional Gyro repeater (located in steering gear comp.)
	Applicable for ships ≥ 150 gr.t			
Spare compass	Interchangeable magnetic compass (or other means)			Stored in bridge area
Communicate ship/shore	Signalling lamp			Readily available
	Applicable for ships ≥ 300 gr.t			
Traffic surveillance Navigation	Radar with electronic plotting aid (EPA)			9GHz
Check keel clearance	Echo sounding device			
Check speed & distance	Speed & distance			Speed through

	measuring device			the water
Transmitting heading [1]	Transmitting heading device[2]			[1] Trans, to Radar/EPA and AIS; [2] Gyro required for ships > 500 gr.t.
Ship identification, tracking	AIS			Required equipment
External communication	VHF telephone			Required equipment (refer to Part IV)
	Applicable for ships ≥ 500 gr.t			
Determine heading[1] Transmitting heading[2]	Gyro compass	Gyro heading repeater		[1]Also available to WS for monitoring [2]Trans, to Radar/ATA and AIS
Take bearings - arc 360°		2 gyro bearing repeaters [1]	Main gyro	[1] Location bridge wings
Supply heading info to emergency steering position		Gyro heading repeater [1]	Main gyro	[1]Located at emerg. steering position
Manoeuvring - rudder angle		Rudder angle		[1] Readable also from WSs

				for monitoring / manual steering
-RPM - thruster force / direction - operational mode		RPM/(Ritch)		Readable also from WS for monitoring
		Thruster settings		
		Actual mode of use		When equipment offers different modes
Traffic surveillance	Radar with ATA[1]		Radar	[1] Replaces EPA
	Applicable for ships ≥ 3000 gr. t			
Traffic surveillance Navigation	Radar with ATA		Radar	3GHz or 9GHz (Add a second radar with ATA)
	Applicable for ships ≥ 10000 gr. t			
Traffic surveillance	Automatic radar plotting aid (ARPA)[1]		Radar	[1] Replaces one ATA
Automatic steering	Heading or track control system			
	Applicable for ships ≥ 50000 gr. t			
Monitor ship's turn	Rate-of'-turn indicator	Rate-of'-turn		To be read from WS for monitoring / manual steering

Measure speed & dist. forward / athwartship	2-axis speed log			Over ground
Internal com.	Auto telephone.			
External com.	VHF telephone			
Monitor alarms and warnings	Alarm panel			Enabling accept of alarms and warnings
Accept watch alarms	Alarm accept button			Watch monitoring

Workstation for monitoring

Main functions: Observation of bridge operations and surrounding environment - Assisting OOW

Monitor Steering		Gyro repeater Rudder angle Rate-of-tum	Main gyro	See WS for navigation and manoeuvring
Monitor Speed		Speed RPM main engine	Speed log	See WS for-nav./man. Pitch if relevant
Monitor time		Clock		
Give sound signals	Whistle control			
Accept watch alarms	Alarm accept button			Watch monitoring
Internal com.	Auto telephone.			
External com.	VHF telephone			
Monitoring environment	Ctrls. for window wipers, washing & heating Binoculars			

Workstation for planning and documentation Main functions: Route planning - documenting ship operations				
Route planning	GNSS			
	Paper chart Chart table			
	Electronic chart			Optional

Workstation for Safety operations Main functions: Monitor safety state - Execute relevant measures - Organise operations				
Display alarm conditions		Remaining alarm indicators not available atWS for navigation/man.		Include acknowledgement of fire and emergency alarms
Provide information / other means for safety management	Remaining safety controls not available at WS for nav./man. Internal telephone			Info about ship's safety systems and contingency plan to be available at the WS

Workstation for Radio communication Main functions: GMDSS -Public correspondence				
GMDSS	To be specified in relation to trading area (GMDSS sea areas: A1, A2, A3, A4)			
Public correspondence				

Conning station (pilot) Main functions: External and internal observations for determination of safe course and speed				
Observe waters, navigational aids and traffic	Binoculars			Access to radar
Observe own		Gyro		

ship's heading and steering, speed and propulsion		repeater Rudder angle Speed RPM/Pitch if relevant		
Effect sound signals	Whistle button			
Communicate other ships	VHF telephone			Easy access from working position

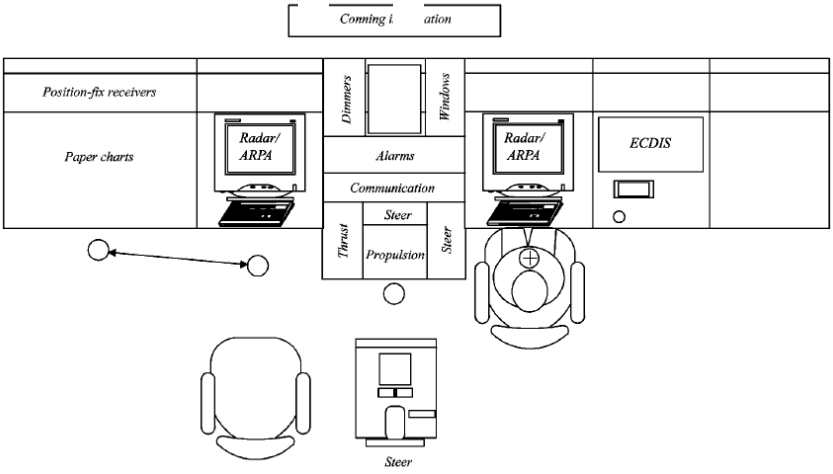

Fig. 3.3.4 Example of principle location of main equipment in a center console, which includes manoeuvering functions.

4 ANALYSIS AND DETAILS OF THE AIMS OF BRIDGE DESIGN AND EQUIPMENT ARRANGEMENT

4.1 GENERAL

4.1.1 The present Annex contains the details and analysis of aims of the bridge design and equipment arrangement with respect to SOLAS

regulation V/15 and its interface with other documents and applicable SOLAS regulations V/19, V/22, V/24, V/25, V/27, V/28), which ensures the achievement of a common understanding of the requirements and approach to their realization.

4.1.2 In subsection 4.2, each subparagraph of regulation V / 15 of the SOLAS-74 Convention has been analyzed with the disclosure of the objectives of this regulation.

4.2 ANALYSIS AND DETAILS OF BRIDGE DESIGN AND EQUIPMENT ARRANGEMENT

4.2.1 AIM 15.1

Facilitating the tasks (.1) to be performed by the bridge team and the pilot (.2) in making full appraisal of the situation and in navigating the ship safely under all operational conditions (.3).

.1 Overall tasks to be performed:

route planning;

navigation;

traffic surveillance;

maneuvering;

docking;

manual steering;

conning;

safety operations;

internal and external communication related to the tasks to be performed; pilotage.

.2 Basic tasks performed by the bridge team (based on minimum equipment carriage requirements and regular manning):

watch officer:

navigation — position-fixing by:

optical system;

radar system;

reading from display;

plotting ship's position;

visual observations;

adjust ship's heading to follow route;

traffic surveillance;

visual look-out;

monitor radar/ARPA;

maneuvering;

adjust ship's heading and speed in relation to traffic;

external and internal communication related to safety in bridge operation;

rating, assisting the watch officer: visual look-out;

navigator, assisting the watch officer (or watch officer assisting the captain):

navigation — route monitoring; position-fixing; plotting ship's position; adjust course; monitor the waters;

rating, relieving the automatic heading control:

manual steering;

pilot assisting in safe navigation:

conning and determination of heading and speed.

.3 Operational conditions and situations:

normal condition:

when all shipboard systems and equipment related to primary bridge functions operate within design limits, and weather conditions or traffic do not cause excessive operator workloads;

irregular condition:

when external conditions cause excessive operator workloads requiring professional assistance on the bridge;

abnormal condition:

when internal technical system failures require operation of basic back-up systems 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;

emergency situation:

when failure of internal ship systems not affecting the ability of navigation or maneuvering, or fire incidents occur, which need to be controlled and managed from the bridge;

distress situations:

when the ship has lost its navigating or maneuvering capability.

.3.1 Example of bridge team composition under different operational conditions.

Reference, which may be used for design purposes*:

normal: watch officer — night: + rating;

irregular: watch officer + assisting navigator (+ rating);

abnormal: captain + watch officer + look-out (+ helmsman);

emergency: captain + watch officer + assisting navigator + look-out

(+ helmsman) (+ chief engineer/chief officer).

4.2.2 AIM 15.2

Promoting effective and safe bridge resource management (.1).

.1 Factors promoting safe resource management:

organized distribution of tasks and responsibilities;

functional workplace arrangement suiting different operating conditions, task;

distribution and task performance;

procedures for safe operations.

4.2.3 AIM 15.3

Enabling the bridge team and the pilot to have convenient and continuous access to essential information (.1), which is presented in a clear and unambiguous manner, using standardized symbols and coding systems for controls and displays (.2).

.1 Essential information (and controls) required by the bridge team.

The information and controls required as well as what is to be regarded essential are linked to the type and importance of tasks to be carried out by the individual members of the bridge team and the pilot.

The table showing task and means, which is included in 2.1, identifies the essential information required. Easy access to information may be provided by outfitting and placing the workstations for efficient task performance by members of the bridge team, in accordance with the content of 3.3.

.2 Presentation of information and standardization.

Requirements addressing presentation of information and coding of systems for controls and displays for equipment required to be carried are regulated by IMO performance standards and IEC test standards.

4.2.4 AIM 15.4

Indicating the operational status (.4) of automated functions (.1) and integrated components (.2), systems and/or sub-systems (.3).

.1 Relevant automated functions:

steering a set course;

plotting ship's position in an electronic chart system;

steering along a planned route governed by ship's position;

adjusting the speed according to ship's position and preset values;

maneuvering operations (semi-automatic/joystick).

.2 Relevant integrated components: heading control unit;

satellite positioning-fixing unit (GNSS and GPS);

electronic chart display unit (ECDIS); radar display unit;

track control unit; speed control unit.

.3 Relevant systems: track control system;

integrated navigation systems (INS), including grounding avoidance system for automatic route-keeping.

.4 Indicating the operational status (of automated functions and integrated components, systems and/or sub-systems).

Indication of operational status is provided by:

supplying continuous information of relevant system activities related to the ship's course, speed, propulsion, steering and operating mode on one individual display;

enabling continuous visual observation of key values;

enabling the checking of the functioning of system elements and operational performance;

enabling early detection of deviations from planned operations and system specifications.

Categories of indications that may be included:

normal operations:

available components in the total system configuration;

configuration in use;

activity status of individual components in use;

second mode of operation at system failure, preferably based on system failure;

mode, effect and criticality analysis (FMEAC);

early warning:

reduced accuracy;

reduced reliability of integrated system performance;

reduced reliability of propulsion and steering system;

alarm conditions:

equipment malfunction;

system failure; display freeze;

operational warnings: danger of collision;

danger of grounding; weather conditions.

4.2.5 AIM 15.5

Allowing for expeditious, continuous and effective information processing and decision-making (.1) by the bridge team and the pilot.

.1 Conditions allowing effective information processing and decision-making:

when all information required for evaluation and decision-making is

clearly presented and available at the location where action shall be taken on the decision made, including appropriate feedback on actions and updated information for continuous consideration;

when information and equipment for performance of functions to be carried out by different members of the bridge team are arranged at specific workstations located for close co-operation.

4.2.6 AIM 15.6

Preventing or minimizing excessive or unnecessary work and any conditions or distractions on the bridge, which may cause fatigue or interfere with the vigilance of the bridge team and the pilot (.1).

.1 Conditions that may interfere with the vigilance of the bridge team.

Such conditions include:

poor working environment;

location of workstations for additional functions too close to navigation area;

location of information needed for decisionmaking, which is wide spread;

lack of harmonization of workplace functionality;

unauthorized persons on the navigation bridge;

high workloads.

4.2.7 AIM 15.7

Minimizing the risk of human error and detecting such error if it occurs (.1), through monitoring and alarm systems (.2) , in time for the bridge team and the pilot to take appropriate action (.3).

.1 Factors imperative for minimizing human error.

Workplace related:

workplace functionality;

information availability;

system reliability;

human-machine interface;

Minimizing the risk of human error and detecting such error if it occurs (.1), through monitoring and alarm systems (.2) , in time for the bridge team and the pilot to take appropriate action (.3).

.1 Factors imperative for minimizing human error.

Workplace related:

workplace functionality;

information availability;

system reliability;

human-machine interface;

size of navigating area.

4.3 EXAMPLES OF ARRANGEMENT OF BRIDGE MAIN EQUIPMENT

4.3.1 Functions / tasks to be solved and corresponding equipment, systems and means necessary for the safe operation of the vessel are given in Table. 4.3.1.

Table 4.3.1.

Tasks and Means - Location			
Function/Tasks to be performed	Equipment to be operated	Information to be viewed	Remarks
1	2	3	4
Navigation - Grounding avoid-ance			
Planning			
Plan route prior to departure	Paper chart/table Nautical publica-tions – "**N1**"		
Alter route while un-der way	DGPS – "**N2**"	GPS Position	
	ECDIS* – "**N3**" ECDIS backup** – "**N4**"		* Optional installation ** If replac-ing paper
In Transit			
Determine and plot position automatic.	ECDIS * – "**N3**"		* Optional installation
Monitor route-keep-ing: - Determine position by bearings;	Pelorus/gyro re-peater* – "**N5**"		* Analog. Bearings 360° around the horizon, (one on each bridge wing)
- Read position on display;	Radar – "**N6**" DGPS Paper chart/table – "**N2**"		
- Plot position;	Paper chart/table		

	– "**N1**"		
Maintain route/alter course by - manual steering - using autopilot	Manual steering ctrl – "**M1**" Heading ctrl. system – "**M2**"; Track ctrl. system * – "**M2A***"		*Altemative to head ctrl. Interfaced to ECDIS, gyro, speed, radar when part of LNS
- automatic route-keeping;	ECDIS – "**NA2**"		
Give sound signals	Whistle ctrl.– "**C1**"		Fog - traffic
Receive sound signals	Sound reception syst– "**C2**"	Loudspeakers	Enclosed bridge
Monitor/Take action: - operational warnings - system failure alarms	Alarm panel– "**S1**"		
- ship's safety state	Alarm systems – "**S2**"		
Adjust lighting	Dimmer buttons – "**L1**"		
Monitor heading, turn, rudder angle, speed, propulsion		Gyro repeater– "I**M1**" Indicators: - rate-of-turn– "I**M3**" - rudder angle– "I**M2**" - speed log– "**M5**" - RPM, Pitch– "I**M4**"	
Monitor shallow water areas	Echo Sounder system – "**N10**"	Water depth- "**IN1**"	(Anchoring)

Monitor performance automatic route-keeping system		Conning info display– "I**A3**"	Organizing indicator info providing situation awareness when in automatic route-keeping mode
Effect internal communication	Intercom (auto tlph.)– "**C3**"		
Effect external comm.	VHF – "**C4**"		Related to navigation
Receive/send distress message	GMDSS remote ctrl.– "**C5**"		
Traffic surveillance			
Collision avoidance	"**T**"		
Detect floating targets Analyse traffic situations Observe visually	Radar with ETP* (may incl. AIS) Binoculars Window wiper -cleaning - heating ctrl. "**T1**"	Targets relative position, course, speed Expected passing distance Time	*Electronic target plotting ("historical" data)
Decide on collision avoidance measures	AIS (automatic identification system) – "**T2**"	Target true position, course, speed	Regarded additional info (means)
Manouevring	"**M**"		
Change steering mode	Steering mode switch – "**M0**"	Heading (Gyro) - "I**M1**"	
Alter heading	Heading ctrl. – "**M2**"		
Observe rudder angle		Rudder angle – I**M2**"	
Override steering	Override*: ctrl. – "**M4**"		
Manual steering ctrl.	"**M1**"		

Change speed	Propulsion ctrl.– "**M3**"	RPM/Pitch– "I**M4**"	
Give sound signals	Whistle ctrl.– "**C1**"		
Receive sound signals	Sound jrsception syst.– "**C5**"	Loudspeaker – "I**C5**"	Enclosed bridges
Navigate back to route Maintain track of traffic	Paper chart/table – "**N1**" DGPS – "**N2**" adar v'viih route and navigable waters – "**T1**" ECDIS* – "**N3**"		* May replace paper
Harbour manoeuvring	Thrusters– "**M5**"		Owners specification
Anchoring			
Manoeuvre	Manual steering ctr. – "**M1**" Propulsion ctr. – "**M3**" (Thruster ctil.) – "**M5**"	Heading – "I**M1**" Rudder angle – "I**M2**" RPM/Pitch – "I**M4**"	Performed at front workstations or in combination with docking station.
Positioning (Identify anchor position)	Radar – "**T1**" Chart – "**N1**" DGPS – «**N2**»	Water depth – "**IM6**"	Information to be provided for Pilots.
Observe ship's safety state			
Monitor alarm conditions: - Navigation alarms: Equip. & system failures. Operational warnings.	Main alarm panel W/indicators and acceptance button	Alarm list	

- Machinery alarms	Alarm panel		
- Cargo alarms	Alarm panel		
- Fire alarm	Fire alarm panel		
Conning station			
Determine & direct course and speed in relation to waters and traffic			
Monitor: - heading;		Gyro repeater * – "I**M1**"	* Digital, readable 2 m
- rudder angle;		Rudder angle – "I**M2**"	
- rate-of-turn;		RoT indicator – "I**M3**"	
- propulsion;		RPM/Pitch – "I**M4**"	
- speed;		Speed log – "**M5**"	
- water depth;		Echo sounder display ** – "**M6**"	** Anchoring
Give sound signals	VHF		Available
Give sound signals	Whistle ctrl. button		
Effect communication			(Rating)
Manual steering			
Maintain, adjust, alter heading according to order	Steering ctrl.– "**M6**"	Gyro repeater Magn. comp. Rudder angle Rate-of-turn	
	Intercom, (Public address system)– "**C6**"		
Safety operations			
Take action on alarm condition: - analyse situation	Manuals - Drawings	Computer based info	

- consult plans and drawings			
- observe ship's external operational situation			Cooperation with navigating officer
- organize and execute measures by communication - check status of ventilation system	Intercom (VHF) Emergency stop		
Monitor development of alarm conditions	Alarm panel/display		
- Cargo alarms	Alarm panel		
- Fire detection & alarms	Fire detection and alarm panel		
- Gas & smoke detection			
External communication			
Distress - weather - safety	GMDSS station− "**C7**"		As required (Area)
Public correspondence	Additional equipment		
Determine weather conditions Consider nav. warnings	Navtex reciever, EGC − "**C8**"		Specified by owners
Docking operations (bridge wings)			
Directing steering	Intercom (Public address system)− "**C6**"	Heading − "**IM1**" Rudder angle− "**IM3**"	
Directing speed	Intercom (Public address system)−	RPM/Pitch− "**IM5**"	

	"**C6**"		
Giving sound signals	Whistle control button− "**C1**"		
Receiving sound signals	Sound reception syst,− "**C2**"	Loudspeaker − "**IC2**"	Enclosed bridge
Perform manoeuvring	Steering− "**M1**"		Additional install, by owners
	Propulsion ctrls− "**M3**"		
	Thruster ctrl.− "**M4**"		
Additionalfunctions			Refer to 2.2

Symbols used in columns 2 and 3 of the Table:

N − equipment for navigation;
A − indicating extended automation of function;
I − information — indicators/displays for navigation;
T − equipment for traffic surveillance;
C − communication means;
M − means required for manoeuvenng functions.

4.3.2 Organization of workplaces on the navigation bridge.

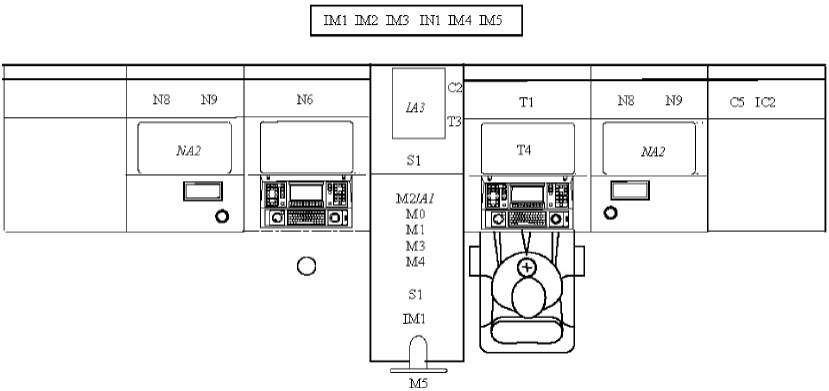

Fig. 4.3.2-1 Individual workplaces.

Example of location of main equipment in a centre console. Easy access to maneuvering functions in standing position (refer to 3.3.3)

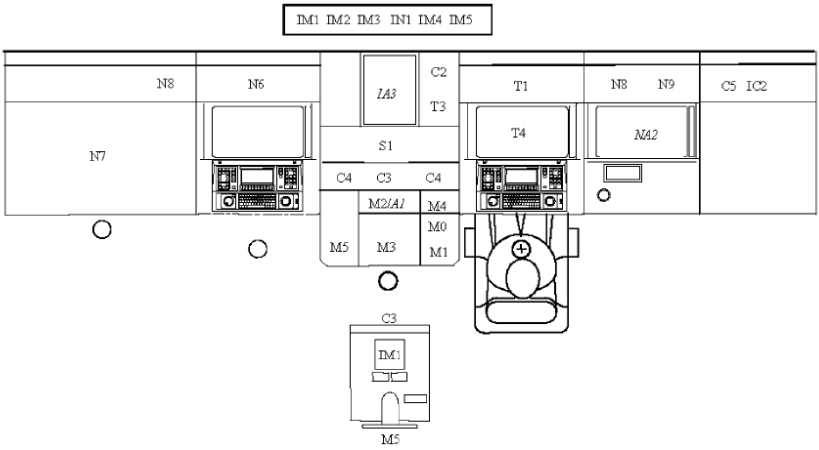

Fig. 4.3.2-2 Redundant workstations

When all the means required for performance of navigation, traffic surveillance and maneuvering are available at each of the two work-places, a long centre console dividing the workstation may be used.

5 BRIDGE PROCEDURES

5.1 BRIDGE TEAM MANAGEMENT

5.1.1 Navigation bridges complying with this standard have been designed and arranged with the aim of:

facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;

promoting effective and safe bridge resource management.

.1.2 Procedures shall be established enabling safe operations under all operational conditions by the manning required to master situations that may appear. Such procedures shall be defined in the company and ship specific bridge procedures manual.

Guidance note.

The bridge workstations are arranged to suit the distribution of functions and tasks at different operating conditions by manning the relevant workstations when required, as indicated in the table 5.1.2.

Table 5.1.2

Examples of workstations in use during different operational conditions

Operational conditions	Waters				
	Ocean areas Coastal water	Narrow waters	Pilot waters		Harbours
			General	Confined	
Normal	W1	W1+P2	W1+P2*	W1+(W3)+ W8	W1+W3+ W4
Irregular	W1+W2	W1+W2+ W3	W1+W2*+ W3	W1+W2+ W3+W8	W1+W2+ W3
Abnormal	W1+W2+ P3	W1+W2+ W3+W8	W1+W2+ W+W8	W1+W2+ W3+W8	W1+W2+ W3+W4
Emergency	W1+(W3) +W6+W7	W1+(W3) +W6+W7	W1+(W3)+ W8+ W6+W7	W1+(W3)+ W8+W6+ W7	W1+(W3)+ W4+W6+ W7

* − When used by the pilot

S y m b o l s : WS − workstation;

W1: WS for navigating, manoeuvering (+ traffic surveillance);
W2: WS for monitoring/conning;
W3: WS for manual steering;
W4: WS for docking;
W5: WS for planning;
W6: WS for safety operations;
W7: WS for communication;
W8: conning station.

The workplace for traffic surveillance and maneuvering together with the workstation for safety operations and communication form an operational and emergency control centre wherefrom two persons can control the ship and handle emergency events in close cooperation.

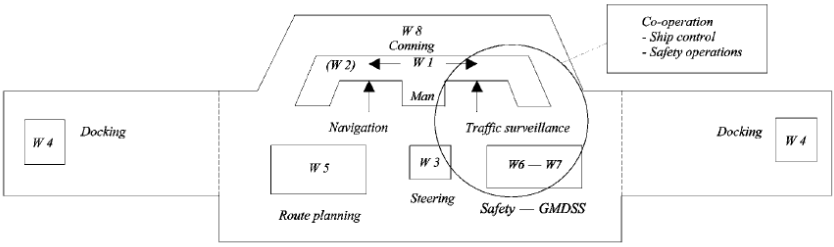

Fig.5.1.2. Design principles — Location of workstations Enabling efficient bridge team management during different operating conditions.

5.2 OTHER BRIDGE PROCEDURES

5.2.1 The following routines shall be included and emphasized in the regular bridge procedures:

use of heading and/or track control systems;

testing of manual steering system after prolonged use of automatic steering system;

operation of steering gear;

updating of nautical charts and nautical publications;

recording of navigational activities.