RULES
FOR THE CLASSIFICATION AND CONSTRUCTION OF HIGH SPEED CRAFT

PART III
HULL EQUIPMENT

October
2014

GDAŃSK

RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF HIGH SPEED CRAFT developed and issued by Polski Rejestr Statków S.A., hereinafter referred to as PRS, consist of the following parts:

Part I – Classification Regulations
Part II – Hull
Part III – Hull Equipment
Part IV – Buoyancy, Stability and Subdivision
Part V – Fire Protection
Part VI – Machinery Equipment and Installations
Part VII – Electrical Installations and Control Systems.

As regards materials and welding, the requirements specified in *Part IX – Materials and Welding* of the *Rules for Classification and Construction of Sea-going Ships* apply.

Part III – Hull Equipment – October 2014 was approved by PRS Executive Board on 15 October 2014 and enters into force on 20 October 2014.

The requirements of Part III – Hull Equipment are extended by the below-listed Publication:

Publication No. 21/P – Testing of the Hull Structures.

* *Polish Register of Shipping means Polski Rejestr Statków S.A., seated in Gdańsk, al. gen. Józefa Hallera 126, 80-416 Gdańsk, Poland,* registered in the Register of Entrepreneurs of the National Court Register, under entry number 0000019880. Polish Register of Shipping, its affiliates and subsidiaries, their respective officers, employees or agents are, individually and collectively, referred to as Polish Register of Shipping or as PRS for short.

PRS/RP, 01/2024

CONTENTS

1 GENERAL

1.1 Application

1.1.1 The requirements specified in this *Part III – Hull Equipment* (hereinafter referred to as the *Rules*) apply to mono-hull high speed craft defined in *Part I – Classification Regulations*.

1.1.2 The requirements specified the *Rules* apply to craft with steel or aluminium alloy hulls of typical shape and dimensional proportions. Craft having atypical shape or dimensional proportions are subject to PRS consideration in each particular case.

1.1.3 Where the *Rules* require that a particular fitting, material, appliance or apparatus, or type thereof, shall be fitted or carried in a craft, the Administration may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in the craft, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or type thereof, is at least as effective as that required by the *Rules*.

1.1.4 Where compliance with any of the requirements of the *Rules* would be impractical for the particular designs of the craft, the Administration may substitute those with alternative requirements provided that equivalent safety is achieved.

1.1.5 Materials used for the manufacture of the below described equipment and its welds shall generally fulfil the requirements specified in the *Rules for Classification and Construction of Sea-going Ships, Part IX – Materials and Welding*, unless otherwise stated in the *Rules*.

1.2 Definitions and Symbols

1.2.1 General definitions and symbols are specified in *Part I – Classification Regulations* and *Part II – Hull.* Definitions and symbols specific to a particular type of equipment are provided in specific chapters of the *Rules*.

1.3 Survey and Classification

1.3.1 Survey and classification are performed in accordance with the regulations specified in *Part I – Classification Regulations*.

1.3.2 The following are subject to PRS survey during manufacture:

.1 anchors;
.2 anchor chains and cables;
.3 steel mooring lines;
.4 hatch covers and cargo doors;
.5 sidescuttles, flush scuttles and windows;
.6 anchor and mooring stoppers;
.7 mooring and towing bollards, hawsepipes, chocks, etc.;
.8 watertight doors in bulkheads providing for the craft subdivision;
.9 active rudders intended to ensure adequate steering abilities of the craft at low rotational speed of the propeller in association with the primary steering gear;
.10 fixed devices for the securing of containers, ro-ro cargo and timber deck cargo;
.11 seats and seat belts for the crew and passengers.

1.3.3 All the hull equipment covered by the requirements of the *Rules* is subject to PRS survey during the craft construction.

1.4 Technical Documentation

1.4.1 The respective scope of technical documentation required for a particular type of high speed craft is specified in sub-chapter 1.4 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships*.

1.4.2 PRS may extend the scope of classification documentation specified below, if it is considered necessary upon examination of the ship technical specification and general arrangement plan.

2 STEERING GEAR

2.1 General

2.1.1 Each ship shall be provided with an appropriate arrangement ensuring her manoeuvrability and course-keeping ability. Such arrangement may be: arrangement with a rudder blade, arrangement with a steering nozzle or other arrangement agreed with PRS.

2.1.2 The requirements of this Chapter apply only to arrangements with ordinary rudders or streamlined steering nozzles with fixed stabilizers. Special arrangements such as steering nozzles with movable stabilizers, Voith-Schneider propellers, etc., are subject to PRS consideration in each particular case.

2.1.3 In special cases PRS may – taking account of the craft intended service, characteristics and expected operating conditions – agree that the required steering qualities of the craft at low propeller rotations be ensured by means of arrangements mentioned in 2.1.1 in association with the active rudder system. Active rudder systems are complementary to the arrangements dealt with in Chapter 2.

2.1.4 Materials used for the manufacture steering gear components shall fulfil the requirements of Chapter 2 in *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships*.

2.1.5 Each craft shall be provided with two – main and auxiliary – steering gears in accordance with the requirements specified in the above mentioned Chapter.

2.2 Steering Gear Loads

2.2.1 Scope of Application

2.2.1.1 Parameters calculated in this sub-chapter are applicable only to scantling of ordinary rudders structural components and cannot be used for determining the steering gear power system characteristics.

2.2.2 Force Acting on Rudder Blade

2.2.2.1 Rudder blade force, upon which the rudder scantlings are to be based, shall not be taken less than the value determined from the formula below:

$$F = 132 K_1 K_2 K_3 A V^2 \qquad (2.2.2.1)$$

A – rudder blade area, [m^2];
V – $\min[v, 2/3\ (v + 2L^{1/2})]$, [knots];
v – 90% of maximum service speed, [knots];
K_1 – factor depending on the rudder blade dimensions;

$$K_1 = \frac{a_1 + 2}{3}$$

$a_1 = \frac{b^2}{A_1}$, however not to be taken more than 2;

b – mean height of the rudder blade, see Fig. 2.2.2.1, [m];

A_1 – sum of rudder blade area A and the area of rudder post or rudder horn, if any, within the height b, [m²];

b – mean height of the rudder blade: $b = \frac{z_3 + z_4 - z_2}{2}$;

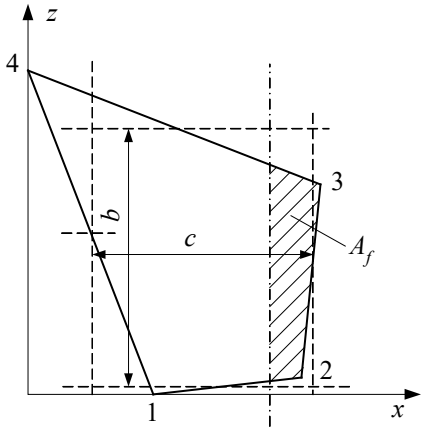


Fig. 2.2.2.1

K_2 – factor depending on the type of rudder blade profile in accordance with Table 2.2.2.1;

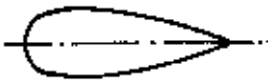
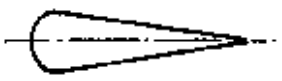
K_3 – factor taking the following values:

K_3 = 0.8 for rudders behind a fixed propeller nozzle,

= 1.15 for rudders behind a fixed propeller nozzle,

= 1.0 otherwise.

Table 2.2.2.1

	Ahead condition	Astern condition
NACA – 00, Göttingen profiles 	1.1	0.8
Hollow profiles 	1.35	0.9
Flat side profiles 	1.1	0.9

2.2.3 Other calculations for the steering gear shall be conducted in accordance with the requirements specified in Chapter 2 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships.*

3 ANCHORING EQUIPMENT

3.1 General

3.1.1 In these *Rules*, it is assumed that a high speed craft lies at anchor in emergencies only.

3.1.2 The requirements of this Chapter regard the high speed craft specificity. Other issues which are beyond the scope of these requirements, the ones specified in Chapter 3 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships.*

3.1.3 The arrangement of the equipment for anchoring, local craft construction in way of such equipment as well as the construction of anchoring equipment shall be such that risks to persons performing anchoring are kept to the minimum.

3.1.4 Under any operational load up to the chain cable breaking load, the load acting on the chain cable shall not cause such damage to the hull which might impair its water integrity. At least 20% strength reserve shall be provided above the resultant load based on the respective chain cable or anchor line minimum breaking load specified by the manufacturer.

3.1.5 Anchoring equipment (as well as mooring and towing arrangements) shall be chosen based on the equipment number N_C to be determined in accordance with paragraph 1.7.2 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships*.

3.2 Anchoring Equipment

3.2.1 High speed craft shall be provided with at least one anchor with its associated cable or cable and warp and means of recovery. Every craft shall be provided with adequate and safe means for releasing the anchor and its cable and warp.

3.2.2 Minimum values of anchor mass and anchor cable are specified in Table 3.2.2.

Table 3.2.2
Anchoring Equipment

Equipment number $a < N_C \le b^*$		Bower anchor HHP		Stud-link anchor chain for bower anchors	
a	b	Mass of single anchor** [kg]	Number of anchors	Total length of chains*** [m]	Diameter (steel Grade 2) [mm]
–	15	20	1	55	(1)
15	20	30	1	55	(1)
20	25	40	1	82.5	(1)
25	30	50	1	82.5	(1)
30	40	60	1	82.5	(2)
40	50	70	1	192.5	(2)
50	60	80	1	192.5	(2)
60	70	90	1	192.5	(2)
70	80	105	1	220	12.5
80	90	120	1	220	14
90	100	135	1	220	14
100	110	150	1	220	14
110	120	165	1	247.5	16
120	130	180	1	247.5	16

Equipment number $a < N_C \leq b^*$		Bower anchor HHP		Stud-link anchor chain for bower anchors	
130	140	195	1	275	16
140	150	210	1	275	17.5
150	175	240	1	275	19
175	205	290	1	302.5	19
205	240	330	1	302.5	20.5
240	280	390	1	330	22
280	320	450	1	357.5	24
320	360	510	1	357.5	26
360	400	570	1	385	26
400	450	650	1	385	28
450	500	770	1	412.5	30
500	550	800	1	412.5	32
550	600	870	1	440	32
600	660	960	1	440	34
660	720	1050	2	440	36
720	780	1140	2	467.5	36
780	840	1230	2	467.5	38
840	910	1320	2	467.5	40
910	980	1425	2	495	42
980	1060	1530	2	495	42
1060	1140	1650	2	495	44
1140	1220	1770	2	522.5	44
1220	1300	1890	2	522.5	46

* For N_C values beyond the specified range, anchoring equipment is subject to PRS consideration in each particular case.
** Mass of shankless anchor shall not be less than 60% of the value indicated in the table.
*** Where warp is applied instead of chain cable, its breaking load shall be equal to that of cable and the warp shall be connected to the anchor by means of chain span of breaking load as the warp and of the length equal 12.5 m or the length equal to the distance between the anchor secured in its voyage position and anchor winch.

(1) Anchor cables or warps of a breaking load not less than 47 kN are permitted.
(2) Anchor cables of Grade 2 steel (or studless ones) of a breaking load not less than 85 kN are permitted.

3.2.3 Basically, high holding power anchors (HHP) shall be applied. Application of ordinary stockless anchors or anchors of other types is subject to PRS consideration in each particular case.

3.2.4 Good engineering practice shall be followed in the design of any enclosed space containing the anchor-recovery equipment to ensure that persons using the equipment are not put at risk. Particular care shall be taken with the means of access to such spaces, the walkways, the illumination and protection from the cable and the recovery machinery.

3.2.5 Adequate arrangements shall be provided for two-way voice communication between the operating compartment and persons engaged in dropping, weighing or releasing the anchor.

3.2.6 Anchoring arrangements shall be such that any surfaces against which the cable may chafe (for example, hawse pipes and hull obstructions) are designed to prevent the cable from being damaged and fouled. Adequate arrangements shall be provided to secure the anchor under all operational conditions.

3.2.7 Craft shall be protected so as to minimize the possibility of the anchor and cable damaging the structure during normal operation.

4 MOORING EQUIPMENT

4.1 General

4.1.1 The requirements of this Chapter regard the high speed craft specificity. Other issues which are beyond the scope of these requirements, the ones specified in Chapter 4 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships.*

4.1.2 The arrangement of the equipment for mooring, local craft construction in way of such equipment as well as the construction of mooring equipment shall be such that risks to persons performing mooring are kept to the minimum.

4.1.3 Under any operational load up to the mooring line breaking load, the load acting on the chain cable shall not cause such damage to the hull which might impair its water integrity. At least 20% strength reserve shall be provided above the resultant load based on the respective mooring line minimum breaking load specified by the manufacturer.

4.2 Mooring Equipment

4.2.1 Where necessary, suitable fairleads, bitts and mooring ropes shall be provided.

4.2.2 Adequate storage space for mooring lines shall be provided such that they are readily available and secured against the high relative wind speeds and accelerations which may be experienced. Mooring lines shall normally be stored in enclosed cabinets or boxes. Open-top boxes may only be permitted where their contents are secured against the outward movement or otherwise posing risk during the craft operation is highly unlikely up to the most adverse expected conditions.

4.2.3 The number and type of mooring lines depending on the equipment number is specified in Table 4.2.3.

Table 4.2.3
Mooring Equipment

Equipment number $a < N_C \leq b^*$		Number of mooring lines (steel or fibre ones)	Length of single mooring line [m]	Minimum breaking load [kN]
a	b			
–	15	2	30	29
15	20	2	30	29
20	25	2	40	29
25	30	2	40	29
30	40	2	40	32
40	50	2	40	32
50	60	3	40	34
60	70	3	40	34
70	80	3	50	37
80	90	3	50	39
90	100	3	55	39
100	110	3	55	44
110	120	3	55	44
120	130	3	55	44
130	140	3	60	49
140	150	3	60	49

Equipment number $a < N_C \leq b^*$		Number of mooring lines (steel or fibre ones)	Length of single mooring line [m]	Minimum breaking load [kN]
a	b			
150	175	3	60	54
175	205	3	60	59
205	240	4	60	64
240	280	4	60	69
280	320	4	70	74
320	360	4	70	78
360	400	4	70	88
400	450	4	70	98
450	500	4	70	108
500	550	4	80	123
550	600	4	80	132
600	660	4	80	147
660	720	4	80	157
720	780	4	85	172
780	840	4	85	186
840	910	4	85	201
910	980	4	85	216
980	1060	4	90	230
1060	1140	4	90	250
1140	1220	4	90	270
1220	1300	4	90	284
* For N_C values beyond the specified range, mooring lines are subject to PRS consideration in each particular case.				

4.2.4 For the mooring purposes, steel wire lines, as well as natural or synthetic fibre lines may be used. Irrespective of the breaking load value indicated in Table 5.2.3, fibre lines shall have a diameter at least 20 mm. Their structure shall be in accordance with the requirements of Chapter 4 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships*.

5 TOWING ARRANGEMENTS

5.1 General

5.1.1 The requirements of this Chapter regard the high speed craft specificity. Other issues which are beyond the scope of these requirements, the ones specified in Chapter 5 of *Part III – Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships*.

5.1.2 The arrangement of the equipment for towing, local craft construction in way of such equipment as well as the construction of anchoring equipment shall be such that risks to persons performing towing are kept to the minimum.

5.1.3 Under any operational load up to the towing rope breaking load, the load acting on the towing equipment shall not cause such damage to the hull which might impair its water integrity. At least 20% strength reserve shall be provided above the resultant load based on the respective towing rope minimum breaking load specified by the manufacturer.

5.2 Towing Equipment

5.2.1 Adequate arrangements shall be provided to enable the craft to be towed in the worst intended conditions. Where towage is to be from more than one point, a suitable bridle shall be provided.

5.2.2 Towing arrangements shall be such that any surface against which the towing cable may chafe (for example, fairleads) is of sufficient radius to prevent the cable being damaged when under load.

5.2.3 The maximum permissible speed at which the craft may be towed shall be included in the operating manual.

6 CONTROLLABILITY AND MANOEUVRABILITY

6.1 Manoeuvrability

6.1.1 Craft manoeuvrability shall be checked in accordance with the International Code of Safety for High-speed Craft, 2000 (2000 HSC Code), Annex 9 – Definitions, requirements and compliance criteria related to operational and safety performance.

6.2 Controllability

6.2.1 Craft shall be controllable and be capable of performing those manoeuvres essential to its safe operation up to the critical design conditions.

6.3 Safe Operational Parameters

6.3.1 There shall be no unsafe change in the stability, controllability or attitude of the craft during transition from one type of operating surface or mode to another. Information on change in the behaviour characteristics of the craft during transition shall be available to the master.

Factors which limit the ability of the craft to operate over sloping ground and steps or discontinuities shall be determined, as applicable, and made available to the master.

6.3.2 It shall be demonstrated that the worst likely acceleration or deceleration of the craft, due to any likely failure, emergency stopping procedures or other likely causes, would not hazard the persons on the craft.

6.3.3 Safe maximum speeds shall be determined, taking account of the limitations from 9.2.1, modes of operation, wind force and direction and the effects of possible failures of any one lift or propulsion system over calm water, rough water.

6.3.4 Minimum depth of water and other appropriate information required for operations in all modes shall be determined.

6.3.5 When determining the operating limitations of a craft, particular attention shall be paid to the following aspects during normal operation and during failures and subsequent to failures:

.1 yawing;
.2 turning;
.3 automatic pilot and steering performance;
.4 stopping in normal and emergency conditions;
.5 trim;
.6 roll;
.7 slamming;
.8 bow diving.

7 STABILIZATION SYSTEMS

7.1 General Requirements and Definitions

7.1.1 *Stabilization control system* is a system intended to stabilize the main parameters of the craft's attitude: heel, trim, course and height and control the craft's motions: roll, pitch, yaw and heave. This term excludes devices not associated with the safe operation of the craft, e.g. motion reduction or ride-control systems.

7.1.2 The main elements of a stabilization control system may include the following:

.1 devices such as rudders, foils, flaps, skirts, fans, water jets, tilting and steerable propellers, pumps for moving fluids;

.2 power drives actuating stabilization devices; and

.3 stabilization equipment for accumulating and processing data for making decisions and giving commands such as sensors, logic processors and automatic safety control.

7.1.3 *Self-stabilization* of the craft is stabilization ensured solely by the craft's inherent characteristics.

7.1.4 *Forced stabilization* of the craft is stabilization achieved by:

.1 an automatic control system; or

.2 manually assisted control system; or

.3 combined system incorporating elements of both automatic and manually assisted control system.

7.1.5 Stabilization systems shall be so designed that, in case of failure or malfunctioning of any one of the stabilization devices or equipment, it would be possible either to ensure maintaining the main parameters of the craft's motion within safe limits with the aid of working stabilization devices or to put the craft into the displacement or other safe mode.

7.1.6 In case of failure of any automatic equipment or stabilization device, or of its power drive, the parameters of craft motion shall remain within safe limits.

7.1.7 The parameters and the degree of stabilization of the craft provided by the automatic stabilization system shall be satisfactory, having regard to the purpose and service conditions of the craft.

7.2 Control Systems

7.2.1 Craft fitted with an automatic control system shall be provided with an automatic safety control. Probable malfunctions shall have only minor effects on automatic control system operation and shall be capable of being readily counteracted by the operating crew.

7.3 Demonstrations

7.3.1 The limits of safe use of any of the stabilization control system devices shall be based on demonstrations and a verification process in accordance with the *International Code of Safety for High-speed Craft*, *2000* (*2000 HSC Code*), *Annex 9 – Definitions, requirements and compliance criteria related to operational and safety performance.*

7.3.2 Any limitation on the operation of the craft as may be necessary to ensure that the redundancy or safeguards in the systems provide equivalent safety shall be included in the craft operating manual.

8 OPERATING COMPARTMENTS

8.1 General Requirements and Definitions

8.1.1 *Operating area*[1] is the operating compartment and those parts of the craft on both sides of, and close to, the operating compartment which extend to the craft's side.

8.1.2 *Primary controls* are all control equipment necessary for the safe operation of the craft when it is under way, including those required in an emergency situation.

8.1.3 Integrated operating station shall contain equipment which provides relevant information to enable the officer in charge and any assisting officer to perform navigational and safety functions safely and efficiently.

8.1.4 Adequate arrangements shall be made to prevent passengers from distracting the attention of the operating crew.

8.2 Compartment Layout

8.2.1 The design and layout of the compartment from which the crew operate the craft shall be such as to permit operating crew members to perform their duties in a correct manner without unreasonable difficulty, fatigue or concentration, and to minimize the likelihood of injury to operating crew members in both normal and emergency conditions.

8.2.2 The design and arrangement of the operating compartment, including location and layout of the individual workstations, shall ensure the required field of vision for each function.

8.2.3 Craft's operating compartment shall not be used for purposes other than navigation, communications and other functions essential to the safe operation of the craft, its engines, passengers and cargo.

8.2.4 The arrangement of equipment and means for navigation, manoeuvring, control, communication and other essential instruments shall be located sufficiently close together to enable both the officer in charge and any assisting officer to receive all necessary information and to use the equipment and controls, as required, while they are seated. If necessary, the equipment and means serving these functions shall be duplicated.

8.2.5 If a separate workstation for supervision of engine performance is placed in the operating compartment, the location and use of this workstation shall not interfere with the primary functions to be performed in the operating station.

8.2.6 Radio equipment location shall not interfere with the primary navigational functions in the operating station.

8.2.7 The design and layout of the compartment from which the crew operate the craft and the relative positions of the primary controls shall be assessed against the essential operational manning level. Where minimum manning levels are proposed, the design and layout of the primary and communication controls shall form an integrated operational and emergency control centre from which the craft can be controlled under all operational and emergency events by the operating crew without the necessity for any crew member to vacate the compartment.

---

[1] Patrz *Ship's Bridge Layout and Associated Equipment – Requirements and Guidelines* (ISO 8468) oraz *Guidelines on ergonomic criteria for bridge equipment and layout* (MSC/Circ.982).

8.3 Seats and Safety Belts

8.3.1 Relative positions of the primary controls and the seats shall be such that each operating crew member, with the seat suitably adjusted and without prejudice to the requirement of 8.2.1, can:

.1 without interference, produce full and unrestricted movement of each control both separately and with all practical combinations of movement of other controls; and

.2 at all workstations, exert adequate control forces for the operation to be performed.

8.3.2 When a seat at a station from which the craft may be operated has been adjusted so as to suit the occupant, subsequent change of seat position to operate any control shall not be acceptable.

8.3.3 In craft where PRS considers the provision of a safety belt necessary for use by the operating crew, it shall be possible for those operating crew members, with their safety belts correctly worn, to comply with 8.2.4 except in respect of controls which it can be shown will only be required on very rare occasions and which are not associated with the need for safety restraint.

8.4 Instruments and chart table

8.4.1 Instruments, instrument panels and controls shall be permanently mounted in consoles or other appropriate places, taking into account operation, maintenance and environmental conditions. This shall not prevent the use of new control or display techniques, provided the facilities offered are not inferior to recognized standards.

8.4.2 All instruments shall be logically grouped according to their functions. In order to reduce to a minimum the risk of confusion, instruments shall not be rationalized by sharing functions or by inter-switching.

8.4.3 Instruments required for use by any member of the operating crew shall be plainly visible and easily read.

8.4.4 Instruments essential for the safe operation of the craft shall be clearly marked with any limitation if this information is not otherwise clearly presented to the operating crew.

Instrument panels forming the emergency control for the launching of liferafts and the monitoring of the fire-fighting systems shall be in separate and clearly defined positions within the operating area.

8.4.5 Instruments and controls shall be provided with means for screening and dimming in order to minimize glare and reflections and prevent them being obscured by strong light.

8.4.6 The surfaces of console tops and instruments shall have dark glare-free colours.

8.4.7 Instruments and displays providing visual information to more than one person shall be located for easy viewing by all users concurrently. If this is not possible, the instrument or display shall be duplicated.

8.4.8 If considered necessary by PRS, the operating compartment shall be provided with a suitable table for chart work. There shall be facilities for lighting the chart. Chart-table lighting shall be screened.

8.5 Lighting and Colours

8.5.1 Satisfactory level of lighting shall be available to enable the operating personnel to adequately perform all their tasks both at sea and in port, by day and night. There shall be only a limited reduction in the illumination of essential instruments and controls under likely system fault conditions.

8.5.2 Care shall be taken to avoid glare and stray image reflection in the operating area environment. High contrast in brightness between work area and surroundings shall be avoided. Non-reflective or matt surfaces shall be used to reduce indirect glare to a minimum.

8.5.3 Satisfactory degree of flexibility within the lighting system shall be available to enable the operating personnel to adjust the lighting intensity and direction as required in the different areas of the operating compartment and at individual instruments and controls.

8.5.4 Red light shall be used to maintain dark adaptation whenever possible in areas or on items of equipment requiring illumination in the operational mode, other than the chart table.

8.5.5 During hours of darkness, it shall be possible to discern displayed information and control devices.

8.5.6 Surface materials inside the operating compartment shall have a suitable colour and finish to avoid reflections.

8.6 Field of Vision from Operating Compartment

8.6.1 Operating station shall be placed above all other superstructures so that the operating crew are able to gain a view all round the horizon from the navigating workstation.

8.6.2 Where it is impractical to meet the requirements for a single navigating workstation, the operating station shall be designed so that an all-round view of the horizon is obtained by using two navigating workstations combined or by any other means to PRS satisfaction.

8.6.3 Blind sectors shall be as few and as small as possible, and not adversely affect the keeping of a safe look-out from the operating station. If stiffeners between windows are to be covered, this shall not cause further obstruction inside the wheelhouse.

8.6.4 The total arc of blind sectors from right ahead to 22.5° abaft the beam on either side shall not exceed 20°. No individual blind sector shall exceed 5°. The clear sector between two blind sectors shall not be less than 10°.

8.6.5 Where it is considered necessary by PRS, the field of vision from the navigating workstation shall permit the navigators from this position to utilize leading marks astern of the craft for track monitoring.

8.6.6 The view of the sea surface from the operating station, when the navigators are seated, shall not be obscured by more than one craft length forward of the bow to 90° on either side irrespective of the craft's draught, trim and deck cargo.

8.6.7 The field of vision from the docking workstation, if remote from the operating station, shall permit one navigator to safely manoeuvre the craft to a berth.

8.7 Windows

8.7.1 Divisions between windows, located in the front, on the sides and in the doors, shall be kept to a minimum. No division shall be installed immediately forward of the operating stations.

8.7.2 It shall be demonstrated that clear view through the operating compartment windows is provided at all times regardless of weather conditions. The means provided for maintaining the windows in a clear condition shall be so arranged that no reasonably probable single failure can result in a reduction of the cleared field of vision such as to interfere seriously with the ability of the operating crew to continue the operation and bring the craft to rest.

8.7.3 Arrangements shall be provided so that the forward view from operating stations is not adversely affected by solar glare. Neither polarized nor tinted window glass shall be fitted.

8.7.4 Operating compartment windows shall be angled to reduce unwanted reflection.

8.7.5 The windows shall be made of material which will not break into dangerous fragments if fractured. Windows in the superstructure forward bulkhead shall be made of hardened glass and provided with deadlights in accordance with the requirements specified in 9.1.5.

8.8 Safety Measures

8.8.1 Operating area shall be free of physical hazard to the operating personnel and have non-skid flooring in dry and wet conditions and adequate handrails. Doors shall be fitted with devices to prevent them moving, whether they are open or closed.

8.9 Communication Facilities

8.9.1 Such means as are necessary shall be provided to enable the crew to communicate between, and have access to, each other and with other occupants of the craft in both normal and emergency conditions.

8.9.2 Means to communicate between the operating compartment and spaces containing essential machinery, including any emergency steering position, irrespective of whether the machinery is remotely or locally controlled, shall be provided.

8.9.3 Means for making public address and safety announcements from control stations to all areas to which passengers and crew have access shall be provided.

8.9.4 Provisions shall be made for means to monitor, receive and transmit radio safety messages at the operating compartment.

9 ACCOMMODATION

9.1 General

9.1.1 Public spaces, crew accommodation spaces and furnishings in those spaces shall be so designed and arranged as to minimize the risk of injury to occupants making proper use of such spaces during normal and emergency conditions including regular or emergency start, stoppage or manoeuvring of the craft.

These spaces shall be so designed and arranged as to protect the occupants from unfavourable environmental conditions.

9.1.2 Spaces accessible to passengers shall not contain controls, electrical equipment, high-temperature parts and pipelines, rotating assemblies or other items, from which injury to passengers could result, unless such items are adequately shielded, isolated, or otherwise protected.

9.1.3 Public spaces shall not contain operating controls unless the operating controls are so protected and located that their operation by a crew member shall not be impeded by passengers during normal and emergency conditions.

9.1.4 Windows[2] in passenger and crew accommodation shall be of adequate strength and suitable for the worst intended conditions specified in the *Permit to operate* and be made of material which will not break into dangerous fragments if fractured.

[2] For more requirements for windows – see Chapter 11.

9.1.5 Windows shall be provided with deadlights whose quantity shall be related to the total number of windows as follows:

.1 100% for windows below the main deck,

.2 50% for windows in the forward bulkhead on the superstructure first tier

and additionally a deadlight shall be provided for each window in side wall on the superstructure first tier.

Administration may consider reduction in those quantities for restricted service craft.

9.2 Design Acceleration Levels

9.2.1 For passenger craft, superimposed vertical accelerations above 1.0 g at longitudinal centre of gravity shall be avoided unless special precautions are taken with respect to passenger safety.

9.2.2 Passenger craft shall be designed for the collision design acceleration g_c , defined in sub-chapter 5.5 of *Part II – Hull*, with respect to the safety in, and escape from, the public spaces, crew accommodation and escape routes, including in way of life-saving appliances and emergency source of power. The size and type of craft together with speed, displacement and building material shall be taken into consideration when the collision load is determined. The collision design condition shall be based on head-on impact at a defined collision speed.

9.2.3 Mounting of large masses such as main engines, auxiliary engines, transmissions and electrical equipment shall be proved by calculation to withstand, without fracturing, the design acceleration specified in sub-chapter 5.5 of *Part II – Hull*.

9.3 Accommodation Design

9.3.1 Public spaces, control stations and crew accommodation of high-speed craft shall be located and designed to protect passengers and crew in the design collision condition. In this respect, these spaces shall not be located forward of a transverse plane (see figure 9.3.1) such that:

$$A_{bow} = 0.0035\, A \cdot m \cdot f \cdot V, \text{ not less, however, than } 0.04\, A \qquad (9.3.1)$$

where:

A_{bow} – plan projected area of craft energy absorbing structure forward of the transverse plane, [m^2]

A – total plan projected area of craft, [m^2]

m – material factor = 0.95/M

M – hull material factor:

M = 1.3 for higher strength steel;
= 1.0 for aluminium alloys;
= 0.95 for normal strength steel;
= 0.8 for glass-reinforced plastic.

Where materials are mixed, the material factor shall be taken as a weighted mean, weighted according to the mass of material in the area defined by A_{bow} .

f – framing factor as follows:

0.8 for longitudinal deck and shell stiffening;
0.9 for mixed longitudinal and transverse;
1.0 for transverse deck and shell stiffening.

V = 90% of maximum speed, [m/s]

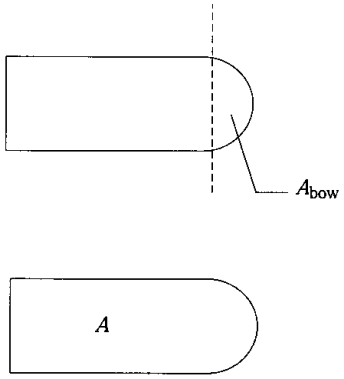


Fig. 9.3.1 Plan view of two different craft styles

9.3.2 Public spaces and crew accommodation shall be designed based on the guidelines provided in Table 9.3.2 or by other methods which have been proven to give equal protective qualities.

Table 9.3.2
Overview general design guidelines[3]

Design level 1: $g_c < 3$	
1	Seat/seat belts
1.1	Low or high seatback
1.2	No restrictions on seating direction
1.3	Sofas allowed
1.4	Not seat belts requirement
2	Tables in general allowed
3	Padding of projected objects
4	Kiosks, bars, etc., no special restrictions
5	Baggage, no special requirements
6	Large masses, restrainment and positioning
Design level 2: g_c = 3 to 12	
1	Seat/seat belts
1.1	High seatback with protective deformation and padding
1.2	Forward and backward seating direction
1.3	No sofas allowed as seat
1.4	Lap belt in seats when no protective structure forward unless the seats were successfully tested without belts in this direction and layout
2	Tables with protective features allowed; dynamic testing
3	Padding on projecting objects
4	Kiosks, bars, etc, on aft side of bulkheads, or other specially approved arrangements
5	Baggage placed with protection forward
6	Large masses, restrainment and positioning

9.3.3 Equipment and baggage in public spaces and in the operator's compartment shall be positioned and secured so that they remain in the stowed position when exposed to the collision design acceleration.

9.3.4 Seats, life-saving appliances and items of substantial mass and their supporting structure shall not deform or dislodge under any loads up to those specified in sub-chapter 5.5 of *Part II – Hull* in any manner that would impede subsequent rapid evacuation of passengers.

[3] Other arrangements may be employed if an equivalent level of safety is achieved.

9.3.5 There shall be adequate handholds on both sides of any passage to enable passengers to steady themselves while moving about. Armrests and seatbacks in public spaces may be considered as handholds.

9.4 Seating Construction

9.4.1 Seats shall be provided in enclosed spaces for each passenger and crew member for which the craft is certified to carry.

9.4.2 Seats fitted in addition to those required under paragraph 9.4.1 and which are not permitted to be used in hazardous navigational situations or potentially dangerous weather or sea conditions need not fulfil the requirements of sub-chapter 9.4. Such seats shall be secured in accordance with 9.3.4 and clearly identified as not being able to be used in hazardous situations.

9.4.3 Seats shall be so installed as to allow adequate access to any part of the accommodation space. In particular, they shall not obstruct access to, or use of, any essential emergency equipment or means of escape.

9.4.4 Seats and their attachments, and the structure in the proximity of the seats, shall be of a form and design, and so arranged, such as to minimize the possibility of injury and to avoid trapping of the passengers after the assumed damage in the collision design condition in accordance with 9.3.1. Dangerous projections and hard edges shall be eliminated or padded.

9.4.5 Seats, seat belts, seat arrangements and adjacent parts such as tables shall be designed for the actual collision design acceleration.

9.4.6 All seats, their supports and their deck attachments shall have good energy-absorbing characteristics and shall meet the requirements of *Annex 10* to *2000 HSC Code*.

9.4.7 One-hand-release safety belts of three-point type or with shoulder harness shall be provided for all seats from which the craft may be operated for all craft with the g_c acceleration from the collision design acceleration exceeding 3*g*.

9.4.8 Safety belts shall be provided on passenger seats and crew seats, if necessary, to obtain the protective performance measures described in *Annex 10* to *2000 HSC Code*.

9.5 Doors and Corridors

9.5.1 In order to ensure immediate assistance from the crew in an emergency situation, the crew accommodation, including any cabins, shall be located with due regard to easy, safe and quick access to the public spaces from inside the craft. For the same reason, easy, safe and quick access from the operating compartment to the public spaces shall be provided.

9.5.2 Craft shall be so designed that all occupants may safely evacuate the craft into survival craft under all emergency conditions[4], by day or by night. The positions of all exits which may be used in an emergency, and of all life-saving appliances, the practicability of the evacuation procedure, and the evacuation time to evacuate all passengers and crew shall be demonstrated.

9.5.3 Exit doors[5] shall be capable of being readily operated from inside and outside the craft in daylight and in darkness. The means of operation shall be obvious, rapid and of adequate strength.

4 Detailed requirements for the means of escape are specified in *Part V – Fire Protection.*
5 For more requirements for external doors – see Chapter 11.

Doors along escape routes shall, wherever appropriate, open in the direction of escape flow from the space served.

9.5.4 closing, latching and locking arrangements for exits shall be such that it is readily apparent to the appropriate crew member when the doors are closed and in a safe operational condition, either in direct view or by an indicator. The design of external doors shall be such as to minimize the possibility of jamming by ice or debris.

9.5.5 Craft shall have a sufficient number of exits which are suitable to facilitate the quick and unimpeded escape of persons wearing approved lifejackets in emergency conditions, such as collision damage or fire.

9.5.6 Sufficient space for a crew member shall be provided adjacent to exits to ensure rapid evacuation of passengers.

9.5.7 All exits, together with their means of opening, shall be adequately marked for the guidance of passengers. Adequate marking shall also be provided for the guidance of rescue personnel outside the craft.

9.5.8 Footholds, ladders, etc., provided to give access from the inside to exits shall be of rigid construction and permanently fixed in position. Permanent handholds shall be provided whenever necessary to assist persons using exits, and shall be suitable for conditions when the craft has developed any possible angles of list or trim.

9.5.9 The width of corridors, doorways and stairways which form part of the evacuation paths shall be not less than 900 mm for passenger craft and 700 mm for cargo craft. This width may be reduced to 600 mm[6] for corridors, doorways and stairways serving spaces where persons are not normally employed. There shall be no protrusions in evacuation paths which could cause injury, ensnare clothing, damage lifejackets or restrict evacuation of disabled persons.

9.5.10 There shall be adequate handholds on both sides of any passage to enable passengers to steady themselves while moving about.

9.6 Noise Levels

9.6.1 Noise level in public spaces and crew accommodation shall be kept as low as possible to enable the public address system to be heard, and shall not in general exceed 75 dB(A).

9.6.2 The maximum noise level in the operating compartment shall not in general exceed 65 dB(A) to facilitate communication within the compartment and external radiocommunications.

9.7 Protection of Crew and Passengers

9.7.1 Effective guard rails or bulwarks shall be fitted on all exposed parts of decks to which crew or passengers have access. Alternative arrangements such as safety harnesses and jack-stays may be accepted if they provide an equivalent level of safety. The height of the bulwarks or guard rails shall be at least 1 m from the deck, provided that where this height would interfere with the normal operation of the craft, PRS may consider the approval of a lesser height.

9.7.2 The opening below the lowest course of the guard rails shall not exceed 230 mm. The other courses shall be not more than 380 mm apart. In the case of craft with rounded gunwales the guard rail supports shall be placed on the flat of the deck.

6 The dimensions specified here do not apply to aisles between seats in the particular comarptment.

9.7.3 Satisfactory means (in the form of guard rails, life lines, gangways or underdeck passages, etc.) shall be provided for the protection of the crew in getting to and from their quarters, the machinery space and all other parts used in the necessary work of the craft.

9.7.4 Deck cargo carried on any craft shall be so stowed that any opening which is in way of the cargo and which gives access to and from the crew's quarters, the machinery space and all other parts used in the necessary work of the craft, can be properly closed and secured against the admission of water. Effective protection for the crew in the form of guard rails or life lines shall be provided above the deck cargo if there is no convenient passage on or below the deck of the craft.

9.7.5 Provision shall be made on board for embarkation stations to be properly equipped for evacuation of passengers into life-saving appliances. Such provision shall include handholds, anti-skid treatment of the embarkation deck, and adequate space which is clear of cleats, bollards and similar fittings.

10 BAGGAGE, STORES, SHOPS AND CARGO COMPARTMENTS

10.1 General

10.1.1 Provision shall be made to prevent shifting of baggage, stores and cargo compartment contents, having due regard to occupied compartments and accelerations likely to arise. If safeguarding by positioning is not practicable, adequate means of restraint for baggage, stores and cargo shall be provided. Shelves and overhead shelves for storage of carry-on baggage in public spaces shall be provided with adequate means to prevent the luggage from falling out in any conditions that may occur.

10.1.2 Controls, electric equipment, high-temperature parts, pipelines or other items, the damage or failure of which could affect the safe operation of the craft or which may require access by crew members during a voyage, shall not be located in baggage, store and cargo compartments unless such items are adequately protected so that they cannot be damaged or, where applicable, operated inadvertently by loading, by unloading or by movement of the contents of the compartment.

Loading limits, if necessary, shall be durably marked in those compartments.

10.1.3 Having regard to the purpose of the craft, the closures of the exterior openings of the luggage and cargo compartments as well as special-category spaces shall be appropriately weathertight.

11 CLOSURES OF OPENINGS IN HULL AND DECK ERECTION WALLS

11.1 Doors, Windows and other Openings in Weathertight Compartment Walls

11.1.1 Weathertight superstructures and deckhouses located above the datum shall in the outside boundaries have means of closing openings with sufficient strength such as to maintain weathertight integrity in all damage conditions where the space in question is not damaged. Furthermore, the means of closing shall be such as to maintain weathertight integrity in all operational conditions.

11.1.2 Doors, windows, and other openings as well as any associated frames and mullions in weathertight superstructures and deckhouses shall be weathertight and shall not leak or fail at a uniformly applied pressure less than that at which adjacent structure would experience permanent set or fail.

11.1.3 For doors in weathertight superstructures, hose tests shall be performed with a water pressure from the outside in accordance with the requirements specified in PRS *Publication No. 21/P*.

11.1.4 The height above the deck of sills to doorways leading to exposed decks shall be as high above the deck as is reasonable and practicable, particularly those located in exposed positions. Such sill heights shall in general not be less than 100 mm for doors to weathertight spaces on decks above the datum, and 250 mm elsewhere. For craft of 30 m in length and under, sill heights may be reduced to the maximum which is consistent with the safe working of the craft.

11.1.5 Windows are not be permitted in the boundaries of special category spaces or ro-ro spaces or below the datum. If required by restrictions in the *Stability and Subdivision Booklet*, forward facing windows, or windows which may be submerged at any stage of flooding shall be fitted with hinged or sliding storm shutters ready for immediate use.

11.1.6 Sidescuttles to spaces below the datum shall be fitted with efficient hinged deadlights arranged inside so that they can be effectively closed and secured watertight.

11.1.7 No sidescuttle shall be fitted in such a position that its sill is below a line drawn parallel to and one metre above the design waterline.

11.2 Hatchways and other Openings

11.2.1 The construction and the means for securing the weathertightness of cargo and other hatchways shall comply with the following:

.1 coaming heights shall in general not be less than 100 mm for hatches to weathertight spaces on decks above the datum, and 250 mm elsewhere. For craft of 30 m in length and under, coaming heights may be reduced to the maximum which is consistent with the safe working of the craft;

.2 the height of these coamings may be reduced, or the coamings omitted entirely, on condition that the Administration is satisfied that the safety of the craft is not thereby impaired in any sea conditions up to the worst intended conditions; and

.3 the arrangements for securing and maintaining weathertightness shall ensure that the tightness can be maintained in any sea conditions up to the worst intended conditions.

11.2.2 Machinery space openings shall be properly framed and efficiently enclosed by casings of ample strength and, where the casings are not protected by other structures, their strength shall be specially considered. Access openings in such casings shall be fitted with weathertight doors.

11.2.3 Heights of sills and coaming mentioned in 11.2.2 shall, in general, not be less than 100 mm for openings to weathertight spaces on decks above the datum, and 380 mm elsewhere. For craft of 30 m in length and under, these heights may be reduced to the maximum which is consistent with the safe working of the craft.

11.2.4 Manholes and flush scuttles on the datum or within superstructures other than enclosed superstructures shall be closed by substantial covers capable of being made watertight. Unless secured by closely spaced bolts, the covers shall be permanently attached.

11.2.5 Service hatches to machinery, etc. may be arranged as flush hatches provided that the covers are secured by closely spaced bolts, are kept closed at sea, and are equipped with arrangements for portable guardrails.

11.2.6 Openings in exposed decks leading to spaces below the datum or enclosed superstructures other than hatchways, machinery space openings, manholes and flush scuttles shall be protected by an enclosed superstructure, or by a deckhouse or companionway of equivalent strength and weathertightness.

11.2.7 The height above the deck of sills to the doorways in companionways on an exposed deck shall, in general, not be less than 100 mm for doors to weathertight spaces on decks above the datum, and 250 mm elsewhere. For craft of 30 m in length and under sill heights may be reduced to the maximum which is consistent with the safe working of the craft.

11.3 Inner Bow Doors

11.3.1 Where ro-ro craft are fitted with bow loading openings, an inner bow door shall be fitted abaft such openings, to restrict the extent of flooding in the event of failure of the outer closure. This inner bow door, where fitted, shall be:

.1 weathertight to the deck above, which deck shall itself be weathertight forward to the bow loading opening;

.2 so arranged as to preclude the possibility of a bow loading door causing damage to it in the case of damage to, or detachment of, the bow loading door;

.3 forward of all positions on the vehicle deck in which vehicles are intended to be carried; and

.4 part of a boundary designed to prevent flooding into the remainder of the craft.

11.3.2 Craft may be exempt from the requirement for such an inner bow door where one of the following applies:

.1 the vehicle loading deck at the inner bow door position is above the design waterline by a height more than the significant wave height corresponding to the worst intended conditions;

.2 it can be demonstrated using model tests[7] or mathematical simulations that when the craft is proceeding at a range of speeds up to the maximum attainable speed in the loaded condition at all headings in long crested seas of the greatest significant wave height corresponding to the worst intended conditions, either:

.2.1 the bow loading door is not reached by waves; or

.2.2 having been tested with the bow loading door open to determine the maximum steady state volume of water which accumulates, it can be shown by static analysis that, with the same volume of water on the vehicle deck(s) the residual stability requirements specified in 2.7.6 and 2.8.15 or 2.9.1 of *Part IV – Stability and Subdivision* are satisfied. If the model tests or mathematical simulations are unable to show that the volume of water accumulated reaches a steady state, the craft shall be considered not to have satisfied the conditions of the exemption mentioned in 11.3.2. Where mathematical simulations are employed they shall already have been verified against full-scale or model testing;

.3 bow loading openings lead to open ro-ro spaces provided with guard-rails or having freeing ports complying with 11.3.2.4;

.4 the deck of the lowest ro-ro space above the design waterline is fitted on each side of the deck with freeing ports evenly distributed along the sides of the compartment. These shall either be proven to be acceptable using tests according to 11.3.2.2 above or comply with the following:

.4.1 $A \geq 0.3\ l$; where :

A – total area of freeing ports on each side of the deck, [m^2]

[7] See *Guidelines for the Conduct of High Speed Craft Model Tests* (MSC/Circ.1195).

l – length of compartment, [m];

.4.2 the craft shall maintain a residual freeboard to the deck of the ro-ro space of at least 1 m in the worst condition;

.4.3 such freeing ports shall be located within the height of 0.6 m above the deck of the ro-ro space, and the lower edge of the ports shall be within 0.02 m above the deck of the ro-ro space; and

.4.4 such freeing ports shall be fitted with closing devices or flaps to prevent water entering the deck of the ro-ro space whilst allowing water which may accumulate on the deck of the ro-ro space to drain.

11.4 Other Requirements for Ro-ro Craft

11.4.1 All accesses in the ro-ro space that lead to spaces below the deck shall have the lowest point which is not less than the height required from the tests conducted according to 11.3.2.2.2 or 3 m above the design waterline.

11.4.2 Where vehicle ramps are installed to give access to spaces below the deck of the ro-ro space, their openings shall be capable of being closed weathertight to prevent ingress of water below.

11.4.3 Accesses in the ro-ro space that lead to spaces below the ro-ro deck and having a lowest point which is less than the height required from the tests conducted according to 11.3.2.2.2 or 3 m above the design waterline may be permitted provided they are watertight and are closed before the craft leaves the berth on any voyage and remain closed until the craft is at its next berth.

11.4.4 The accesses mentioned in 11.4.2 and 11.4.3 above shall be fitted with alarm indicators in the operating compartment.

11.4.5 Special category spaces and ro-ro spaces shall be patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions and unauthorised access by passengers thereto can be detected whilst the craft is underway.

11.4.6 The requirements for other types of the means of closure, e.g. stern doors and side doors are specified in Chapter 7 of Part III – *Hull Equipment* of the *Rules for Classification and Construction of Sea-going Ships*.

11.5 Doors in Watertight Bulkheads

11.5.1 Doors in watertight bulkheads may be hinged or sliding. They shall be shown by suitable testing to be capable of maintaining the watertight integrity of the bulkhead. Such testing shall be performed for both sides of the door and shall apply a pressure head 10% greater than that determined from the minimum permissible height of a downflooding opening. The tests may be performed either before or after the door is fitted into the craft but, where shore testing is adopted, satisfactory installation in the craft shall be verified by inspection and hose testing.

11.5.2 Type approval may be accepted in lieu of testing individual doors, provided the approval process includes pressure testing to a head equal to, or greater, than the head required in 11.5.1.

11.5.3 All watertight doors shall be capable of being operated when the craft is inclined up to 15°, and shall be fitted with means of indication in the operating compartment showing whether they are open or closed. All such doors shall be capable of being opened and closed locally from each side of the bulkhead.

11.5.4 Watertight doors shall remain closed when the craft is at sea, except that they may be opened for access. A notice shall be attached to each door to the effect that it is not to be left open.

11.5.5 Watertight doors shall be capable of being closed by remote control from the operating compartment in not less than 20 s and not more than 40 s, and shall be provided with an audible alarm, distinct from other alarms in the area, which will sound for at least 5 s but no more than 10 s before the doors begin to move whenever the door is closed remotely by power, and continue sounding until the door is completely closed. The power, control and indicators shall be operable in the event of main power failure, as required by regulation II-1/15.7.3 of the *Convention*. In passenger areas and areas where the ambient noise exceeds 85 dB(A) the audible alarm shall be supplemented by an intermittent visual signal at the door. If the Administration is satisfied that such doors are essential for the safe work of the craft, hinged watertight doors having only local control may be permitted for areas to which crew only have access, provided they are fitted with remote indicators as required in 11.5.3.

11.6 Indicators And Surveillance

11.6.1 Indicators shall be provided in the operating compartment for all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could lead to major flooding in the intact and damage conditions. The indicator system shall be designed on the fail-safe principle and shall indicate by visual alarms if the door is not fully closed or if any of the securing arrangements are not in place and fully locked, and by audible alarms if such door or closing appliance becomes open or the securing arrangements become unsecured.

11.6.2 The indicator panel in the operating compartment shall be equipped with a mode selection function 'harbour/sea voyage' so arranged that an audible alarm is given in the operating compartment if the craft leaves harbour with the bow doors, inner doors, stern ramp or any other side shell doors not closed or any closing device not in the correct position. The power supply for the indicator systems shall be independent of the power supply for operating and securing the doors.

11.6.3 Television surveillance and a water leakage detection system shall be arranged to provide an indication to the operating compartment and to the engine control station of any leakage through inner and outer bow doors, stern doors or any other shell doors which could lead to major flooding.

12 FREEING PORTS

12.1 Freeing Ports

12.1.1 Where bulwarks on weather decks form wells, ample provision shall be made for rapidly freeing the decks of water and for draining them. The minimum freeing port area A on each side of the craft for each well on the weather deck of the main hull(s) shall be:

.1 where the length of bulwark l in the well is 20 m or less:

$$A = 0.7 + 0.035\, l, \, [m^2] \qquad (12.1.1\text{-}1)$$

.2 where l exceeds 20 m:

$$A = 0.07\, l, \, [m^2] \qquad (12.1.1\text{-}2)$$

In no case l need be taken as greater than $0.7L$.

12.1.2 If the bulwark is more than 1.2 m in average height, the required area shall be increased by 0.004 square metres per metre of length of well for each 0.1 metre difference in height. If the bulwark is less than 0.9 m in average height, the required area shall be decreased by 0.004 square metres per metre of length of well for each 0.1 metre difference in height.

Such freeing ports shall be located within the height of 0.6 m above the deck and the lower edge shall be within 0.02 m above the deck.

12.1.3 All such openings in the bulwarks shall be protected by rails or bars spaced approximately 230 mm apart. If shutters are fitted to freeing ports, ample clearance shall be provided to prevent jamming. Hinges shall have pins or bearings of non-corrodible material. If shutters are fitted with securing appliances, these appliances shall be of approved construction.

12.1.4 Craft, having superstructures which are open in front or both ends, shall fulfil the requirements of 12.1.1.

12.1.5 In craft, having superstructures which are open at the aft end, the minimum freeing port area shall be:

$$A = 0.3\ b,\ [m^2] \qquad (12.1.5)$$

where:

b = breadth of craft at the exposed deck, [m].

12.1.6 Ro-ro craft fitted with bow loading openings leading to open vehicle spaces shall fulfil the requirements of 11.3.1 and 11.3.2.

13 ALARM SYSTEM AND COMMUNICATIONS

13.1 General

13.1.1 General emergency alarm system shall be provided. The alarm shall be audible throughout all the public spaces, corridors and stairways, crew accommodation and normal crew working spaces and open decks, and the sound pressure level shall be at least 10 dB(A) above ambient noise levels under way in normal cruise operation. The alarm shall continue to function after it has been triggered until it is normally turned off or is temporarily interrupted by a message on the public address system.

13.1.2 There shall be a public address system covering all areas where passengers and crew have access, escape routes, and places of embarkation into survival craft. The system shall be such that flooding or fire in any compartment does not render other parts of the system inoperable. The public address system and its performance standards shall be approved by the Administration having regard to the recommendations developed by IMO.

13.1.3 All passenger craft shall be equipped with illuminated or luminous notices or video information system(s) visible to all sitting passengers, in order to notify them of safety measures.