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**ECONOMIC COMMISSION FOR EUROPE**

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Working Party on Inland Water Transport

Working Party on the Standardization of Technical  
and Safety Requirements in Inland Navigation

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Item 7 (e) of the provisional agenda

**RESOLUTION NO. 61, "RECOMMENDATIONS ON HARMONIZED EUROPE-WIDE  
TECHNICAL REQUIREMENTS FOR INLAND NAVIGATION VESSELS"**

Special provisions applicable to river-sea navigation vessels

Proposal submitted by the group of volunteers on Resolution No. 61

Addendum

Note by the secretariat

The present document contains a proposal on the first draft of Chapter 20B, "Special provisions applicable to river-sea navigation vessels", prepared by the group of volunteers on Resolution No. 61 in accordance with the decision of the fiftieth session of the Working Party on Inland Water Transport (ECE/TRANS/SC.3/174, para. 33).

## **DRAFT CHAPTER 20B, “SPECIAL PROVISIONS APPLICABLE TO RIVER-SEA NAVIGATION VESSELS”**

### **20B-1 GENERAL PROVISIONS**

#### **20B-1.1 PURPOSE AND SCOPE**

20B-1.1.1 On the whole, present Recommendations, with due regard to definitions in 1-2 of Resolution No. 61 and in 20B-1.2, apply to:

- (i) cargo vessels (dry cargo vessels and tankers), passenger ships, tugs, towed barges (dry cargo and tankers);
- (ii) vessels with length from 20 m to 140 m.

20B-1.1.2 For the purpose of these Recommendations, sea navigation areas shall be classified as follows:

- (i) vessels of RS 6,0 class are conventionally allowed to navigate sea waves with 3 % probability of over-topping and height below 6,0 m – closed seas away from shelter at distance up to 100 miles (distance between shelters up to 200 miles); open seas with distance to shelter up to 50 miles (distance between shelters up to 100 miles);
- (ii) vessels of RS 4,5 class are conventionally allowed to navigate sea waves with 3 % probability of over-topping and height below 4,5 m – closed seas away from shelter at distance up to 100 miles (distance between shelters up to 200 miles); open seas with distance to shelter up to 50 miles (distance between shelters up to 100 miles);
- (iii) vessels of RS 3,5 class are conventionally allowed to navigate sea waves with 3 % probability of over-topping and height below 3,5 m within specified geographical borders of sea areas with season limitations;
- (iv) vessels of RS 3,0 class are conventionally allowed to navigate sea waves with 3 % probability of over-topping and height below 3,0 m within specified geographical borders of sea areas with season limitations;
- (v) vessels of RS 2,0 class are conventionally allowed to navigate sea waves with 3 % probability of over-topping and height below 2,0 m within specified geographical borders of sea areas with season limitations;
- (vi) when classifying passenger river-sea navigation vessels depending on sea areas where they operate the recommendations of Article 4 of Directive 98/18 EC in force are considered;
- (vii) inland navigation vessels are conventionally allowed to navigate in strictly limited area between ports of one country if complying with additional season and wave operational limitations and special technical requirements to seaworthiness characteristics, stability, hull structure, machinery and electrical equipment, navigational equipment and communication means.

20B-1.1.3 Administrations can concede derogations from requirements of International Conventions for vessels engaged on international voyages between ports of two countries bound by mutual agreements on legitimacy of digression from requirements of International Conventions.

20B-1.1.4 Special technical requirements for inland navigation vessels as regards season and wave operational limitations, seaworthiness characteristics, stability, hull structure, machinery and electrical equipment, navigational equipment and communication means are

applied in accordance with the requirements of the Administration and/or a recognized classification society.

20B-1.1.5 Unless specified otherwise, provisions of the present Recommendations apply to new vessels.

## **20B-1.2 DEFINITIONS**

### **Types of vessels**

1. “River-sea navigation vessel”: a vessel by its technical condition acceptable and conventionally approved for operations to navigate sea and inland waterways.
2. “Oil tanker”: a vessel designed or fitted to transport mainly crude oil or petroleum products in bulk in its holds.
3. “Chemical tanker”: a vessel designed or fitted to transport mainly liquid hazardous materials in bulk.
4. “Gas tanker”: a vessel designed or fitted to transport mainly liquefied gas in bulk.

### **Particular areas on board**

5. “Vertical fire fighting zones”: spaces into which the vessel hull, superstructures and deckhouses are divided by transverse fire-proof or fire-retardant structures.
6. “Machinery space of grade A”: rooms and connecting shafts which accommodate:
  - internal combustion engines used as main propulsion plant or
  - internal combustion engines used as auxiliary plants provided the total power of such engines is at least 375 kW or
  - any liquid fuel operated boiler or liquid fuel plant.

### **Other definitions**

7. “International voyage”: a voyage undertaken from a port of the country covered by international conventions to a port outside such country or vice versa.
8. “Coastal voyage”: any voyage other than international voyage.
9. “Closed seas”: inland and mediterranean isolated seas communicating with ocean high-seas through straits and different from high seas in salinity and temperature of water, nature of currents, tides, wind- and wave conditions.
10. “Main seas (open seas)”: off-lying seas with ample communication to ocean high-seas and water closely resembling that of high-seas in its salinity and temperature of water, nature of currents, tides, wind- and wave conditions.

## **20B-2 PROCEDURE AND RULES FOR THE INSPECTION OF RIVER-SEA NAVIGATION VESSELS**

20B-2.1 Procedures and rules for inspection of river-sea navigation vessels shall be implemented with due regard to Chapter 2, Resolution No. 61.

20B-2.2 Inspections intended to renew ship’s design safety certificate shall be run in time intervals determined by Administrations yet not later than in 5 years.

20B-2.3 In the interim between periodical inspections, an intermediate inspection shall be run with checking of the underwater part within 3 months prior or after the second annual date of ship's design safety certificate issuance (within 3 months prior or after the third annual date of ship's design safety certificate issuance ) to be implemented instead of an annual inspection.

20B-2.4 River-sea navigation vessels engaged on international voyages shall be inspected in compliance with requirements of international conventions and agreements.

## **20B-3 STRUCTURAL REQUIREMENTS**

### **20B-3.1 STRENGTH**

20B-3.1.1 Hull structural strength is deemed sufficient if a vessel is classified as per 20B-1.1.2 assigned by a recognized Classification Society.

20B-3.1.2 To reduce external loads acting against vessel that sails the rough sea, the bow draft of cargo vessels for any operational loading shall not be less than:

- (i) for RS 6,0 class vessels — agreed with a recognized classification society;
- (ii) RS 4,5 class vessels —  $T_0 \geq 2,2$  m;
- (iii) for RS 3,5 class vessels —  $T_0 \geq 1,7$  m at  $L_{wL} \geq 60$  m,  
 $T_0 \geq 0,9$  m at  $L_{wL} \leq 25$  m;
- (iv) for RS 3,0 class vessels —  $T_0 \geq 1,4$  m at  $L_{wL} \geq 60$  m,  
 $T_0 \geq 0,75$  at  $L_{wL} \leq 25$  m;
- (v) for RS 2,0 class vessels —  $T_0 \geq 0,9$  m at  $L_{wL} \geq 60$  m,  
 $T_0 \geq 0,5$  m at  $L_{wL} \leq 25$  m.

Minimal acceptable bow draft for vessels of transitional lengths shall be determined from linear interpolations.

### **20B-3.2 DESIGN REQUIREMENTS**

20B-3.2.1 A cargo vessel shall be designed and constructed as a double-hull vessel with the double hull provided at least for cargo holds (tanks) and double bottom.

The double bottom shall extend from the forepeak bulkhead to after-peak bulkhead as far as it is practicable and compatible with the ship design and normal operation.

The double-hull requirement does not apply to tankers with removable cargo tanks.

Distance between the outer shell plating and inner shell longitudinal bulkhead as well as the double bottom space shall be sufficient to arrange for manholes and passageways to safely access the abovementioned areas.

20B-3.2.2 Oil tankers, chemical tankers and gas tankers shall be equipped with facilities which enable crew members to safely access the bow area in bad weather conditions.

20B-3.2.3 Vessels designed for navigation in ice conditions shall have a corresponding reinforced hull to comply with Administration requirements. These requirements shall be deemed by Administrations as satisfactory for any vessel built and maintained in compliance with rules of a recognized Classification Society.

## **20B-3.3 STABILITY**

### **20B-3.3.1 GENERAL REQUIREMENTS**

20B-3.3.1.1 Stability of each intact vessel shall be sufficient. Sufficient stability shall be corroborated by calculations. Administrations are entitled to introduce own requirements to stability of coast sailing ships and regard the vessel stability sufficient if stability data are approved by a recognized Classification Society. Stability of ships which engaged on international voyages is regarded sufficient if stability requirements comply with present provisions developed on the basis of IMO recommendations.

20B-3.3.1.2 The vessel shall be provided with Stability Booklet issued: for coast sailing vessels in the flag state language, for vessels engaged on international voyages – also in the English language.

20B-3.3.1.3 Vessel stability shall be checked under most adverse loading conditions, at least, for following typical cases:

- (i) with full cargo and full stores,
- (ii) with full cargo and 10 % stores,
- (iii) with no cargo yet with ballast and full stores,
- (iv) with no cargo yet with ballast and 10 % stores.

Free-surface effects of liquid cargo shall be accounted for in stability calculations. The metacentric height shall be corrected for free-surface effects of liquid cargo in such tanks where the mass of liquid is subject to changes throughout operation, the correction being calculated for tanks filled to 50 % of their capacity with the vessel upright, whatever filling assumptions taken in estimates of mass load.

20B-3.3.1.4 Construction complete, the vessel shall undergo heeling tests to determine its displacement and gravity center coordinates while lightweight. Following vessels shall be subjected to heeling tests:

- (i) lead vessel and each fifth vessels in the series-built line,
- (ii) each custom-built vessel,
- (iii) each vessel after restoring repair,
- (iv) vessels after major repair, conversion or modernization,
- (v) passenger vessels to be in service between periods below 5 years, if light displacement calculations differs from the design value for more than 2 % or gravity center deviation lengthwise exceeds 1 % of vessel length.

## **20B-3.4 SUBDIVISION**

### **20B-3.4.1 GENERAL REUIREMENTS**

20B-3.4.1.1 In addition to requirements of Section 3-4, Resolution No. 61, requirements contained herein are compulsory for vessels engaged on coastal navigation and international voyages. Besides, vessels engaged on international voyages also have to comply with requirements of the International Convention for Safety of Life at Sea (1974) as amended (SOLAS-74).

20B-3.4.1.2 Forepeak, after-peak and engine room of all vessels shall be isolated with watertight bulkheads.

20B-3.4.1.3 Resistance to flooding for vessels of RS 3,5, RS 3,0, RS 2,0 classes engaged on coastal navigation or international voyages only between ports of two countries which have concluded agreements on acceptability of derogations from Conventions shall be ensured at flooding of:

- (i) forepeak and after-peak taken apart for vessels of all types;
- (ii) any single compartment – for passenger vessels of RS 3,0 and RS 2,0 classes, self-propelled flush-deck vessels, flush-deck barges and tankers of RS 3,5, RS 3,0 and RS 2,0 classes;
- (iii) forepeak, after-peak, double-bottom and/or double-hull spaces – for dry cargo vessels of RS 3,5 class.

20B-3.4.1.4 Passenger vessels of RS 6,0, RS 4,5, RS 3,5 classes and vessels of other types of RS 6,0, RS 4,5 classes, whatever their destination, coastal or international, shall comply with requirements of SOLAS-1974.

20B-3.4.1.5 A forepeak bulkhead shall be fitted aft of the fore perpendicular, at a distance equal at least one-half of the hull width. On approval of the Administration or a recognized Classification Society, the forepeak length for vessels less than 14 m wide may be reduced.

20B-3.4.1.6 Vessels subject to present recommendations shall be provided with the stability booklet and damage control plan approved by the Administration or a recognized Classification Society.

20B-3.4.1.7 While calculating the vessel emergency trim, list and stability, values of damage to the hull and bottom and values of flooding permeability for a compartment shall be taken according to the Rules of the Administration and/or a recognized Classification Society.

For transportation of dangerous goods or chemicals, estimates of damage extent shall be made with due regard of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) and the International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC code).

## **20B-3.4.2 REQUIREMENTS TO DAMAGE STABILITY**

20B-3.4.2.1 Trim and stability of an intact vessel at all loading options in accordance with the vessel designation (icing disregarded) shall be sufficient to provide for compliance with damaged stability requirements.

20B-3.4.2.2 Damage stability requirements are deemed as complied with, if the calculations reveal that in case of damage as per 20B-3.4.1.7 with flooding of compartment numbers specified in 20B-3.4.1.3 and 20B-3.4.1.4, under flooding permeability factor as per 20B-3.4.1.7, the requirements to the metacentric height at the final stage of flooding, heeling angle at asymmetric flooding, margin line position, range of emergency stability diagram with positive levers, area below the static stability curve, prescribed by the Administration and/or a recognized Classification Society, are complied with.

## **20B-3.5 CRITERIA FOR STABILITY INSPECTION**

### **20B-3.5.1 GENERAL PRINCIPLES**

20B-3.5.1.1 Criteria of stability disregard the cargo shift.

20B-3.5.1.2 A vessel is deemed to be sufficiently stable, if, in a loaded state specified in 20B-3.3.1.3, 20B-3.5.3.1, 20B-3.5.3.3, 20B-3.5.3.4, 20B-3.5.3.5, it complies with requirements set by the Administration and/or a recognized Classification Society with regard to:

- (i) metacentric height, which is adopted with corrections for free-surface effects of liquid cargo, shall have the value specified by requirements of 20B-3.5.2.4;
- (ii) weather criteria;
- (iii) requirements to the shape and parameters of static stability diagram;
- (iv) requirements to stability determined as per 20B-3.5.3 depending on type and designation of vessel.

### **20B-3.5.2 WEATHER CRITERIA**

20B-3.5.2.1 The vessel stability is regarded as sufficient as regards weather criteria if, on joint action of wind and waves, there is a compliance with requirements of “Stability code for damaged vessels of all types” with due account for the correction to follow.

20B-3.5.2.2 It is assumed in determining the weather criteria that:

the vessel is subjected to the steady speed wind blowing at the right angle to the center plane. The corresponding wind heeling arm  $l_{w1}$ , is determined by the formula, m:

$$l_{w1} = \frac{P_v A_w z_v}{1000g\Delta},$$

where  $P_v$  – wind static pressure, in Pa, assumed to be 252 Pa for vessels of RS 2,0, RS 3,0, RS 3,5, RS 4,5, RS 6,0 classes,

$z_v$  – lever arm taken as the distance between the centre of gravity of the lateral area and the center of water pressure against the underwater section (approximately to half the draft), m,

$\Delta$  – vessel displacement, t,

$A_w$  – lateral plane, m<sup>2</sup>,

$g$  – gravity acceleration,  $g=9,81$  m/s<sup>2</sup>.

20B-3.5.2.3 Roll amplitude  $\theta_r$ , grad, determined by the formula:

$$\theta_r = 109kX_1X_2\sqrt{rS},$$

where  $k$ ,  $X_1$ ,  $X_2$  – factors determined in compliance with “Code of intact stability for all types of ships”;

$r$  – determined in compliance with “Code of intact stability for all types of ships”;

$S$  – factor depending on roll period  $\tau$  and type of vessel determined from Table 20B-3.5.2.3.

Table 20B-3.5.2.3

Vessel class	Factor	Roll period $\tau$ , c						
		5 and less	6	7	8	10	12	14 and above
RS 6,0; RS 4,5; RS 3,5	<i>S</i>	0,100	0,093	0,083	0,073	0,053	0,040	0,035

Note. For vessels of R S3,0, R S2,0 class *S*-values can be reduced on approval of the Administration or a recognized Classification Society.

20B-3.5.2.4 The original metacentric height corrected for free-surface effect of liquid cargo shall be at least 0,15 m for all types of vessels at any options of loading (except “unladen vessel”).

Minimal corrected metacentric height may have another value as in cases specified in 20B-3.5.3.

### 20B-3.5.3 ADDITIONAL REQUIREMENTS TO STABILITY OF SPECIFIC VESSEL TYPES

#### 20B-3.5.3.1 Dry cargo vessels

- (i) Stability of dry cargo vessels shall be checked at loading options given in 20B-3.3.1.3.
- (ii) Stability of vessels which carry cargo on deck shall be checked with additional loading options:
  - vessels with holds filled by homogeneous cargo which have draft as per summer load line, with cargo on deck, full stores and liquid ballast, if necessary,
  - same as previous loading option yet with 10 % stores.
- (iii) Stability of container ships shall be checked at loading options as per 20B-3.3.1.3 and in addition:
  - vessel with the maximum number of containers each having the weight equal 0,6 of maximal gross for each type of fully stored container and liquid ballast, if necessary,
  - a vessel loaded as in the previous case yet with 10 % stores,
  - a vessel with the maximum number of empty containers, ballast and full stores,
  - a vessel loaded as in the previous case yet with 10 % stores;
- (iv) Stability of vessels which ship cargo in bulk shall be checked by criterion of acceleration  $k^*$ .

Assessed by criterion of acceleration, stability is deemed acceptable, if, under considered state of loading, the estimated acceleration (in g-fractions) does not exceed an allowed value, i.e.

$$k^* = \frac{0,3}{a_{est}} \geq 1,$$

where  $a_{est}$  – estimated acceleration,  $m/s^2$ ,

$$a_{est} = 1,1 \cdot 10^{-3} B X_1^2 \theta_r,$$

$X_1$  – determined as per 20B-3.5.2.3,

$\theta_r$  – roll amplitude determined as per 20B-3.5.2.3.



In cases, when  $k^* < 1,0$ , the Administration can, on grounded application of a shipowner, permit vessel to operate with wave height restrictions. The height of wave with 3 % probability of over-topping is determined depending on  $k^*$  -criterion from Table 20B-3.5.3.1. Transient values of wave height can be determined from linear interpolations.

Table 20B – 3.5.3.1

$k^*$	2,0 and above	2,0÷1,5	1,50 and above	1,50÷1,0	1,0÷0,50	0,50 and below
$h_{3\%}$ , m	6,0	4,5	4,5	3,5	3,0	2,0

- (v) Metacentric height of vessels which carry cargo in bulk or on deck shall be at least 0,2 m.
- (vi) As long as there no data on stowage rate  $\mu$ , stability of vessels which carry timber in holds or on deck shall be determined at minimal value  $\mu=2,32 \text{ m}^3/\text{t}$ .

#### 20B-3.5.3.2 Tankers

- (i) Stability of tankers shall be checked at loading options specified in B 20B-3.3.1.3.
- (ii) Stability calculations are made with due regard to free-surface effects of liquid cargo in reserve tanks. For cargo tanks, free-surface effects are accounted for depending on actual filling of these.

#### 20B-3.5.3.3 Displacement passenger vessels

- (i) Stability of passenger vessels is checked at following loading options:
  - vessel with full cargo load, fully booked with passengers and luggage and full stores,
  - vessel with full cargo load, fully booked with passengers and luggage and 10 % stores,
  - vessel with no cargo, fully booked with passengers and luggage and full stores,
  - vessel with no cargo, fully booked with passengers and luggage and 10 % stores,
  - vessel with neither cargo nor passengers yet with full stores,
  - vessel with neither cargo nor passengers yet with 10 % stores.
- (ii) Stability of passenger vessels is additionally checked at heeling due crowding of passenger to one side.
- (iii) In addition, passenger vessel stability is checked during the vessel's turning.
- (iv) The heeling angle jointly induced by the heeling moment due to one-side crowding of passengers on promenade decks and the heeling moment due to steady turning shall not exceed the angle at which the deck is immersed or bilge leaves the water, whichever is less. In any case, the heeling angle shall not exceed  $12^\circ$ .
- (v) All estimation of heeling angle due to one-side crowding of passengers and turning shall be made not regarding icing yet with correction for free-surface effects of liquid cargo.

#### 20B-3.5.3.4 Tugs

- (i) Stability of tugs with no cargo holds shall be checked at following loading options:
  - vessel with full stores,
  - vessel with 10 % stores.

- (ii) Stability for tugs shall be checked for stability under motional effect of towline (bollard pull force) with rolling taken into account, i.e. to fulfill the following condition:

$$Dg(d_{perm} - d_k) \geq M_p,$$

where  $M_p$  – heeling moment, kNm, from motional impact on vessel from stretched towline  $M_p$  determined as per 20B-3.5.3.5,

$D$  – vessel displacement, t ,

$d_{perm}$  – lever of permissible moment taken from the dynamic stability curve, at the admissible heeling angle determined as advised in the same way as in checks of stability by the main criterion, m,

$d_k$  – lever of permissible moment taken from the dynamic stability curve under estimated roll amplitude.

- (iii) Tugs shall be checked for stability against towline jerks with no account taken of free-surface effects from liquid cargo.

20B-3.5.3.5 Heeling moment  $M_p$ , kNm, is determined as per requirements set by the Administration or a recognized Classification Society.

#### 20B-3.5.3.6 Towed barges (dry cargo barges and tankers)

- (i) Stability of barges is determined at following options of loading:
- vessel with full load,
  - iced vessel with full load,
  - unladen vessel.

Barges to carry on-deck cargo are checked for stability under additional loading option:

- vessel with on-deck cargo and icing.

In timber transportations, estimation is made with account given to eventual increase of timber weight due to its soaking. If not specified otherwise, it is recommended to increase weight of on-deck cargo by 10 %. This weight increase is set off to overload and excluded from vessel deadweight.

- (ii) In calculating stability levers for a timber carrying barge, it is allowed to account for cargo volume in full height and width multiplied by permeability factor 0,25.
- (iii) Tank barge stability is checked with account taken of liquid cargo free-surface effects in dependence of actual filling of tanks.
- (iv) Transport barge stability is deemed sufficient if:
- the static stability curve area up to the angle of maximum stability lever is at least 0,08 m-rad,
  - the angle of static heeling due to constant wind does not exceed half the angle of deck immersion,
- positive heeling angles of static stability curve extend at least to:
- 20° in case of vessels 100 m long and less,
  - 15° in case of vessels 150 m and above.

Transient values of heeling angle extent are determined by linear interpolation.

#### 20B-3.5.3.7 Icing

Stability of vessels to be operated in subzero weather conditions shall be checked with account for ice-accretion loads.

## **20B-3A FIRE PROTECTION**

### **20B-3A.1 STRUCTURAL REQUIREMENTS**

#### **Stairways and trunks**

20B-3A.1.1 Requirements of international Conventions to partition the vessel in major vertical fire-protection zones and provide for fire-proof structures to isolate spaces with different fire risks, to protect stairways, trunks, elevators, arrangement of doors and closures are compulsory for vessels engaged both on coastal and international voyages.

Administration may have directives for derogations from international Conventions for coast cruisers depending on the vessel class and its operation area or in accordance to the Rules of a recognized Classification Society.

### **20B-3A.2 DRAWINGS AND DIAGRAMS**

20B-3A.2.1 Whatever is operation area of a vessel, visible fire-protection diagrams shall be provided in the central control station, wheel house and on prominent places in the corridors. A second copy of fire-protection diagram or a booklet with such diagrams shall be kept outside the deckhouse in an assigned place secured against sea impact.

### **20B-3A.3 STORAGE OF FLAMMABLE MATERIALS AND SUBSTANCES**

20B-3A.3.1 Requirements of international Conventions for storage of flammable materials and substances are binding for vessels sailing on coastal and international voyages.

Administration may have directives for derogations from international Conventions for coast cruisers depending on the vessel class and its operation area or in accordance to the Rules of a recognized Classification Society.

## **20B-4 FREEBOARD AND LOAD LINES**

### **20B-4.1 GENERAL**

20B-4.1.1 Requirements of present section apply to vessels engaged on coastal or international voyages between ports of two countries bound by mutual Conventions on legitimate derogations from Conventions.

Corresponding requirements of International Convention on Load Lines 66/88 shall apply to international cruise vessels.

Apart from the draught mark painted as per requirements of the International Convention on Load Lines, cargo vessels on international lanes may have the draught mark made as per requirements of present section.

### **20B-4.2 FREEBOARD CALCULATION**

20B-4.2.1 Minimal summer freeboard for vessels of RS 3,5 class (except passenger vessels) and RS 3,0, RS 2,0 classes with the standard sheer can be specified by requirements of the Administration and/or recognized Classification Society.

Minimal summer freeboard for vessels of RS 6,0, RS 4,5 and RS 3,5 classes (passenger vessels), whatever their destination (coastal or international), shall be specified in accordance with requirements of the International Convention on Load Lines 66/88.

20B-4.2.2 Freeboard depth on the fore perpendicular shall be no less than the total value of standard bow sheer ordinate and minimal freeboard amidships.

20B-4.2.3 The vessel board shall bear the draught mark the size of which may be specified by requirements of Administration and/or recognized Classification Society.

In direction bow off the draught mark a fresh-water load line shall be painted at a distance equal to 1/48 of draft directed upward from the circle center.

Sternwards off the draught mark, it is necessary to paint marks of inland navigation for waterway zones 1, 2 and 3 and navigation across salt water sea areas cleared for vessel classes inferior to those under consideration. For example, for a vessel of RS 3,5 class - navigation in areas intended for RS 3,0 and RS 2,0 class vessels.

Diagram of draught mark is given in Fig. 20B-4.2.3.

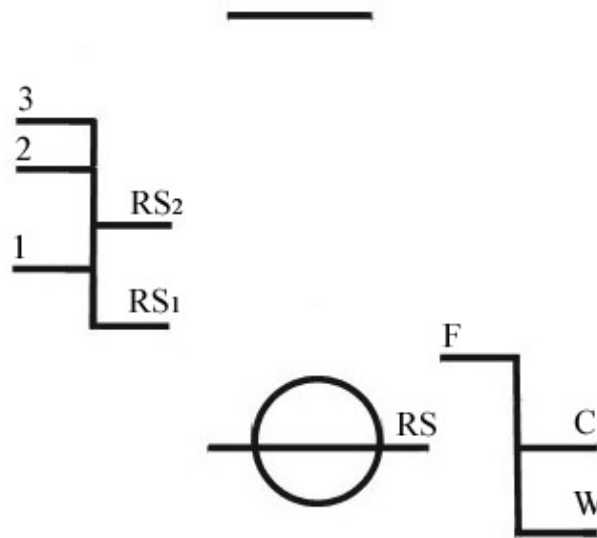


Fig. 20B-4.2.3

C — mark corresponding to draught at summer freeboard;

F — mark corresponding to draught for this particular class on fresh water;

W — mark corresponding to draught at winter freeboard (if specified for this vessel);

RS<sub>1</sub>, RS<sub>2</sub> — marks corresponding to permissible draught of a vessel when it operates in zones inferior to its assigned class;

1, 2, 3 — marks which correspond to permissible draughts of a vessel if it operates on inland waterways of zones 1, 2, 3 respectively.

20B-4.2.4 The winter draught mark shall be placed below the summer at a distance equal to 1/48 of summer draught.

### 20B-4.3 HATCHWAYS AND COVERS OF VESSEL OPENINGS

20B-4.3.1 Height of cargo and companion hatchway coamings shall meet requirements of the Administration and/or recognized Classification Society.

20B-4.3.2 All hatchways designed to be watertight shall be equipped with covers provided with clamps and sealings. Fasteners and aids to provide seal integrity in maritime environment shall comply with requirements of the Administration.

20B-4.3.3 Hatchway covers shall be designed to withstand wave loads depending on the vessel class, its length and load of cargo to transport in these enclosures.

Minimal estimated loads for hatchway covers shall comply with requirements of the Administration and/or recognized Classification Society.

20B-4.3.4 Design of closures for other openings (doors to upper deck and their coamings, ventilation cowls and their coamings, side scuttles and superstructure ports, windows etc.) shall be approved by the Administration and/or recognized Classification Society.

## **20B-5 SHIP MACHINERY AND ARRANGEMENTS**

### **20B-5.1 GENERAL**

20B-5.1. Design and implementation of deck machinery included into ship mechanisms shall provide for vessel operation under standard operating conditions presented in 6.1.3, Resolution No. 61 and in 20B-6.1.2.

Mechanisms to be mounted on the open deck shall be designed based on operation conditions at ambient temperature in the range from  $-25\text{ }^{\circ}\text{C}$  to  $+45\text{ }^{\circ}\text{C}$ .

20B-5.1.2 Layout and installation of deck machinery, design of parts, their strength and machinery support systems shall comply with requirements of the Administration and/or recognized Classification Society.

### **20B-5.2 STEERING GEAR AND THRUSTER**

20B-5.2.1 With reference to issues considered in this Chapter it is necessary to meet requirements of Chapter 6, Resolution No. 61.

20B-5.2.2 Self-propelled passenger and cargo vessels with area of lateral projection over centerplane in excess of  $800\text{ m}^2$ , shall be provided with a thruster apart from the steering gear.

Note. Lateral projection area includes vessel wet and dry parts as well as area of on-deck cargo.

### **20B-5.3 ANCHOR EQUIPMENT**

20B-5.3.1 Vessels shall be provided with anchors and chains as per equipment number N or  $N_A$ . Equipment number N for monohull vessels of classes RS 2,0, RS 3,0, RS 3,5, RS 4,5 shall be determined in compliance with 10-1.2.2.

For vessels of class RS 6,0 anchor equipment is assigned on the basis of equipment number  $N_A$  calculated by the following formulae:

for self-propelled vessels

$$N_A = 0,85\Delta^{2/3} + 1,7Bh + 0,085A_w ;$$

for non-self-propelled vessels

$$N_A = 1,0625\Delta^{2/3} + 2,125Bh + 0,10625A_w ;$$

for tugboats

$$N_A = 0,85\Delta^{2/3} + 1,7(Ba + \Sigma h_i b_i) + 0,085A_w,$$

where  $\Delta$  is displacement of the vessel corresponding to summer load line,  $m^3$ ;

B — breadth of the vessel, m;

$A_w$  — lateral plane within the vessel's length L as per summer load waterline,  $m^2$ . When calculating A only the lateral plane of the hull, superstructures and deckhouses with breadth over 0.25 B should be considered;

h — distance from the summer load waterline to the upper edge of the deck plating of the highest deckhouse calculated by the formula, m:

$$h = a + \Sigma h_i,$$

a — distance from the summer load waterline to the upper edge of the deck plating of the upper deck near the side amidships, m;

$h_i$  — height of each layer of superstructure or deckhouse with breadth over 0.25 B at the centre line of the vessel. In case of two or more superstructures or deckhouses in the given layer only the superstructure or deckhouse of the biggest breadth should be considered. In the lowest layer  $h_i$  is measured in the centre line from the upper deck or, if the upper deck is stepped, from conventional line being the prolongation of the upper deck.

Sheer and trim may not be considered in calculations of h. Containers and similar cargoes transported on the deck and on covers of cargo hatches, masts, cargo derricks, rigging, guard rails and similar structures may be omitted in calculations of h and A; bulwark and hatch coamings less than 1.5 high may be omitted also. If the height of bulwark and hatch coamings is over 1.5 m, they shall be considered as a deckhouse or superstructure.

20B-5.3.2 Total mass P of bow anchors for vessels of RS 2,0 class shall be at least (kg):

for self-propelled cargo and passenger vessels with equipment number from 50 to 5200  $m^2$

$$P = -11,1760 + 1,90971 \cdot N^{0,912368} \geq N;$$

for non-self-propelled craft with equipment number from 150 to 5200  $m^2$

$$P = -0,5589 + 1,8253 \cdot N^{0,9174657} \geq N;$$

for tugboats with equipment number from 50 to 1600  $m^2$

$$P = \exp(0,78894 + 0,9164 \cdot \ln N) \geq N.$$

20B-5.3. Total mass P of bow anchors (kg) for vessels of RS 3,0 class shall not be less than:

for self-propelled cargo and passenger vessels with equipment number below 1000  $m^2$

$$P = 1 / (0,000248 + 0,5997 / N) \geq N;$$

for self-propelled cargo and passenger vessels with equipment number 1000  $m^2$  and over

$$P = 234,5 + 1,097 N;$$

for non-self-propelled craft with equipment number from 200 to 1000 m<sup>2</sup>

$$P = 18,72 + 2,9996 \cdot N^{0,868} \geq N ;$$

for non-self-propelled craft with with equipment number 1000 m<sup>2</sup> and over

$$P = 63,803 + 1,828 \cdot N^{0,943} ;$$

for tugboats with equipment number from 50 to 2000 m<sup>2</sup>

$$P = 1 / (-7,42 \cdot 10^{-5} + 0,1061 \cdot \ln(N) / N) \geq N .$$

20B-5.3.4 Total mass P of bow anchors (kg) for vessels of RS 3,5, RS 4,5 classes shall be more than values determined from formulae B-5.3.3 for vessels of RS 3,0 class at least by 20 %.

20B-5.3.5 Mass P of two bow anchors (kg) for vessels of RS 6,0 shall not be less than the value calculated by the formula

$$P = 1 / (1,997 \cdot 10^{-6} + 0,1625 / N_A)$$

20B-5.3.6 Total length of bow anchor chains is determined by following procedure. First, with an aid of formulae below, total length  $l_A$  of anchor chains is calculated in first approximation (m). Next, the value  $l_A$  obtained is corrected by reduction of obtained value  $l_A$  to closest value of length  $L_A$  multiple to shackle length (25 m) with due regard of the number of anchors except the chains of diameter less than 15 mm. For vessels of RS 3,0 class with equipment number 1000 m<sup>2</sup> and above, the total rated length  $l_A$  of anchor chains shall be increased by one shackle length before being reduced to length  $L_A$ . Besides, provisions of 10-1.4.1 shall be complied as well.

For self-propelled vessels of class RS 2,0 with equipment number from 50 to 5200 m<sup>2</sup> (m)

$$l_A = 1 / (0,0036455 + 0,22895 \cdot \ln(N) / N) ;$$

For self-propelled vessels of class RS 2,0 with equipment number from 150 to 5200 m<sup>2</sup> (m)

$$l_A = \sqrt{-16660,441 + 928,5287 \cdot (\ln N)^2} ;$$

For tugboats of class RS 2,0 c with equipment number from 50 to 1600 m<sup>2</sup> (m)

$$l_A = 1 / (0,0035 + 1,13 / N) .$$

For self-propelled vessels of class RS 3,0 with equipment number less than 1000 m<sup>2</sup> (m)

$$l_A = 1 / (0,002565 + 0,1826 \cdot \ln(N) / N) .$$

For self-propelled vessels of class RS 3,0 with equipment number 1000 m<sup>2</sup> and over (m)

$$l_A = 1 / (0,00277 + 1,3056 / N) .$$

For non-self-propelled vessels of class RS 3,0 with equipment number from 200 to 1000 m<sup>2</sup> (m)

$$l_A = (15,972 - 959,209 / N)^2 .$$

For non-self-propelled vessels of class RS 3,0 with equipment number  $1000 \text{ m}^2$  and over (m)

$$l_A = 1 / (0,00297 + 1,563 / N).$$

For tugboats of class RS 3,0 c with equipment number from 50 to  $2000 \text{ m}^2$  (m)

$$l_A = 1 / (0,0024 + 0,18 \cdot \ln(N) / N).$$

Total length of bow anchor chains for vessels of RS 6,0 class with equipment number  $N_A$  from 10 to 2500 is determined by the formula

$$l_A = 57,19 + 9,12(\ln N_A)^2.$$

20B-5.3.7 Total length of bow anchor chains for vessels of RS 3,5, RS 4,5 classes shall be more than values determined according to B-5.3.6 for vessels of RS 3,0 class at least by 25 %.

20B-5.3.8 Two bow anchors shall be provided to all vessels except those with equipment numbers 50 and  $75 \text{ m}^2$  which are permitted to have one bow anchor only.

20B-5.3.9 Vessels are provided with bow anchors as per 10-1.3 Resolution No. 61 whereby value P is determined as per 20B-5.3.2 – 20B-5.3.4.

20B-5.3.9 Stern anchors for vessels of RS 2,0, RS 3,0, RS 3,5, RS 4,5 classes re provided according to 10-1.3 where P is calculated according to 20B-5.3.2 – 20B-5.3.4.

Mass of stern anchor for vessels of RS 6,0 class with equipment number from 35 to 205 is calculated according to relationship  $P=N_A$ . At  $N_A > 205$  Mass of stern anchor for vessels of RS 6,0 class shall be at least 75 % of the mass of one of bow anchors.

Stern anchor length for vessels of RS 6,0 class is determined according to first paragraph of 20B5.3.6; here for vessels with equipment number from 35 to 205

$$l_A = 92 - 11504 \ln(N_A) / N_A^2,$$

and for vessels with equipment number over 205 the chain length of stern anchor permitted as a spare anchor is equal to half total length of bow anchors.

#### **20B-5.4 MOORING EQUIPMENT**

20B-5.4.1 Quantity, type of mooring equipment and parts as well as their arrangement on board shall be determined by the design body in accordance with vessel structural particulars and ship designation.

20B-5.4.2 Number and length of mooring lines for vessels of RS 2,0 class shall be selected in compliance with provisions of 10-1.4.5. Vessels of RS 3,0, RS 3,5 and RS 4,5 classes with length up to 85 m shall be equipped with at least 3 mooring lines each 100 m long. Vessels of RS 3,0, RS 3,5 and RS 4,5 classes with length over 85 m shall be provided with at least 4 mooring lines each 120 m long.

20B-5.4.3 Quantity and length of mooring lines for vessels of RS 6,0 class shall be determined on the basis of equipment number determined in 20B-5.3.1 as follows:

$10 < N_A \leq 25$  — at least two mooring lines at least 30 m long;

$25 < N_A \leq 50$  — at least two mooring lines at least 50 m long;



$50 < N_A \leq 205$  — at least three mooring lines with the length at least:

- 80 m at  $N_A \leq 70$ ;
- 100 m at  $N_A \leq 90$ ;
- 110 m at  $N_A \leq 130$ ;
- 120 m at  $N_A \leq 205$ ;

$205 < N_A \leq 1480$  — at least four mooring lines with the length at least:

- 120 m at  $N_A \leq 280$ ;
- 140 m at  $N_A \leq 500$ ;
- 160 m at  $N_A \leq 720$ ;
- 170 m at  $N_A \leq 980$ ;
- 180 m at  $N_A \leq 1480$ ;

$1480 < N_A \leq 2500$  — at least five mooring lines with the length at least:

- 190 m at  $N_A \leq 2080$ ;
- 200 m at  $N_A \leq 2500$ .

20B-5.4.4 For vessels with  $A_w/N_A$  over 0,9 the number of mooring lines stated in 20B-5.4.3 shall be exceeded by:

- 1 — for vessels with  $0,9 < A_w/N_A \leq 1,1$ ;
- 2 — for vessels with  $1,1 < A_w/N_A \leq 1,2$ ;
- 3 — for vessels with  $A_w/N_A > 1,2$ .

## **20B-5.5 TOWING EQUIPMENT**

20B-5.5.1 Towing equipment of tugs shall include:

- (i) at least two holding devices to fix a towline cable: main and standby. The towline cable can be fastened by means of:
  - (a) towing winch and towing hook;
  - (b) towing hook and towing posts or bitts;
  - (c) towing winch and towing posts or bitts;
- (ii) towline cable;
- (iii) towing beams and other cable guiding structures;
- (iv) towline cable catchers.

20B-5.5.2 Towing hooks, posts, bitts, cable catchers, towing equipment mechanisms, towline cable catchers and tow winches shall meet requirements of Administration and/or recognized Classification Society.

## **20B-5.6 LIFE-SAVING APPLIANCES**

### **20B-5.6.1 GENERAL**

20B-5.6.1.1 Requirements of 20B-5.6 are binding for vessels in coastal sailing or on international voyages between ports of two countries bound by agreements on legitimate exemptions from Conventions. Compliance with requirements of International Convention for

the Safety of Life at Sea (1974) and International Code on Life-Saving Appliances (1977) are compulsory for international cruise and passenger vessels beginning with RS 3,5 class and other vessel types as per 20B-1.1.2 beginning with RS 4,5 class whatever its destination.

20B-5.6.1.2 Life-saving appliances shall be certified by a Classification Society.

### **20B-5.6.2 SUPPLY OF RS 3,5 CLASS VESSELS WITH COLLECTIVE LIFE-SAVING APPLIANCES**

20B-5.6.2.1 Vessels other than passenger vessels shall be provided with life-saving appliances as per Table. 20B-5.6.2.1.

Table 20B-5.6.2.1

Vessel type	Number of people provided with life-saving appliances, %	
	Lifeboats	Liferafts
Dry cargo vessels with a length of 85 m and above and tankers	100 on each side <sup>1</sup>	—
Dry cargo vessels with a length up to 85 m	—	100 on each side <sup>2</sup>
Push tugs	100 on each side <sup>3</sup>	—

<sup>1</sup> Dry cargo vessels shall be provided with semi-enclosed or fully enclosed lifeboats.  
Tankers which oil cargo with vapor flashpoint temperature below 60° C shall be provided with fire-proof lifeboats.

<sup>2</sup>All rafts shall be of the same seating capacity. In case transfer of rafts form one side to the other is unfeasible, the seating capacity of each raft shall be no less than 150 %.

<sup>3</sup>Push tugs with length below 30 m can be equipped with liferafts instead of lifeboats.

20B-5.6.2.2 A vessel shall be provided with a duty boat. A lifeboat can serve as a duty boat if it meets requirements set to the duty boat.

20B-5.6.2.3 Oil tankers, chemicals carriers and gas tankers with length below 85 m which operate on coast lines may be provided with one lifeboat of seating capacity sufficient to accommodate 100 % of people onboard if there is a davit to lower a lifeboat from any side.

20B-5.6.2.4 On board the ship, provisions shall be made for immersion suits for each person to be salvaged on a free-fall launching liferaft, should there be no embarkation devices approved by a recognized Classification Society to avoid people getting into the water in raft embarkation.

### **20B-5.6.3 SUPPLY OF RS 3,0 AND RS 2,0 CLASS VESSELS WITH COLLECTIVE LIFE-SAVING APPLIANCES**

20B-5.6.3.1 Passenger vessels of RS 3,0 and RS 2,0 class shall be provided with collective life-saving appliances as per Table 20B-5.6.3.1.

Table 20B-5.6.3.1

Vessel length, m	Number of people provided with collective life-saving appliances, %	
	Lifeboats	Liferafts
30 and less	—	100
above 30	20	80

20B-5.6.3.6 If accommodation capacity of lifeboats on board a vessel is in excess of prescribed rates, the number of liferafts can be cut down to a value that corresponds to the total number of persons to be provided with collective life-saving appliances.

20B-5.6.3.2 It is recommended to provide devices preventing people from getting into water during embarkation for passenger vessels of RS 3,0, RS 2,0 classes with length over 30 m fitted with free-fall liferafts.

20B-5.6.3.3 Passenger vessels shall be provided with motor lifeboats.

20B-5.6.3.4 Self-propelled vessels of RS 3,0, RS 2,0 classes other than passenger vessels shall be supplied with life-saving appliances according to Table 20B-5.6.3.4.

Table 20B-5.6.3.4

Vessel length, m	Number of people provided with life-saving appliances, %			Number of lifebuoys, pcs.		
	Lifeboats from each side	Liferafts	Life jackets	Total	inclusive	
					with self-igniting light	with lifeline
30 and less	50	50	102*	2	1	1
over 30	100	—	102*	4	1	2

\* — number of watchmen should be added.

Notes. 1. On vessels with length below 30 m lifeboats may be replaced with liferafts.

2. On vessels with length from 30 to 85 m lifeboats may be replaced with liferafts (to provide 100 % people on each side) with all liferafts being of the same seating capacity.

3. On vessels with length of 85 m and above It 50 % of lifeboats may be replaced with liferafts provided that least one lifeboat is on each side.

20B-5.6.3.5 Tankers for oil cargo with vapor flashpoint temperature below 60°C shall be provided with fire-proof lifeboats.

20B-5.6.3.7 Harbor and port sailing vessels shall be provided with liferafts of total seating capacity sufficient to accommodate 100 % of people on board.

For summer navigation period, Administration may allow these vessels to replace liferafts with lifebuoys intended for 100 % of people on board.

20B-5.6.3.8 Non-self-propelled crew-operated vessels shall be supplied with life-saving appliances according to Table 20B-5.6.3.8.

Table 20B-5.6.3.8

Vessels of class	Vessel length, m	Number of people provided with collective life-saving appliances, %	
		lifeboats	liferafts
RS 3,0	30 and less	—	100
	over 30	100	—
RS 2,0	—	—	100

20B-5.6.3.9 Non-self-propelled crew-operated oil tankers of RS 3,0, RS 2,0 classes shall be supplied with life-saving appliances according to Table 20B-5.6.3.9.

Table 20B-5.6.3.9

Vessel length, m	Number of people provided with collective life-saving appliances, %	
	lifeboats	liferafts
30 and less	—	100
over 30	100	—

20B-5.6.3.10 Non-self-propelled unmanned vessels may not be fitted with life-saving appliances.

#### **20B-5.6.4 SUPPLY OF VESSELS WITH INDIVIDUAL LIFE-SAVING APPLIANCES**

20B-5.6.4.1 Vessels of RS 3,5 class (except passenger vessels), of RS 3,0 and RS 2,0 class in coastal sailing or on international voyages between ports of two countries bound by mutual Conventions on legitimate derogations from Conventions shall be provided with individual life-saving appliances as per allowances approved by Administration(s) and/or a recognized Classification Society.

#### **20B-5.6.5 REGULATIONS ON LIFE-SAVING APPLIANCES**

20B-5.6.5.1 With reference to vessels stated in 20B-5.6.4.1, as per 20B-5.6.1.1 Administration(s) and/or a recognized Classification Society may approve prescriptions regarding:

- (i) arrangement of collective life-saving appliances on board (lifeboats, rescue boats, boat launching and embarkation aids, liferafts);
- (ii) arrangement of individual life-saving appliances on board (lifebuoys, lifejackets, immersion suits);
- (iii) design of life-saving appliances (lifebuoys, self-igniting lights, lifejackets, liferafts, lifeboats, rescue boats, launching and embarkation aids, embarkation ladders);
- (iv) supply of lifeboats and liferafts.

#### **20B-5.7 WHEELHOUSE**

20B-5.7.1 In addition to Chapter 7 unobstructed searchlight-aided view shall be provided from windows of the wheelhouse at night time.

20B-5.7.2 Arrangement and colour of light signals shall comply with requirements set by Administration of a country internal waterways of which are used by a river-sea navigation vessel.

## 20B-5.8 FIRE FIGHTING EQUIPMENT

20B-5.8.1 From viewpoint of design, fire fighting equipment shall be so designed as to provide reliability and readiness for operation in all operation cases.

20B-5.8.2 No fire-fighting equipment is required on board non-self-propelled unmanned vessels.

20B-5.8.3 Vessels engaged in coastal sailing or on international voyages between ports of two countries bound by mutual agreements on legitimate derogations from Conventions shall be provided with fire-fighting equipment according to the norms prescribed by Administration(s) and/or a recognized Classification Society. Vessels engaged on international voyages and passenger vessels beginning with RS 3,5 class and other vessels as per 20B-1.1.2 beginning with RS 4,5 class whatever destination, shall comply with requirements of International Convention for the Safety of Life at Sea (1974) with amendments and those of International Code for Fire Safety Systems (IMO Resolution MSC.98(73)).

20B-5.8.4 Depending on designation, ship spaces shall be provided with portable fire extinguishers according to Table 20B-5.8.4.

Table 20B-5.8.4

Ship spaces	Fire-extinguisher type	Number of fire-extinguisher per one room
1. Control stations	Carbon dioxide extinguisher or dry powder extinguisher	1
2. Engine rooms with main and auxiliary engines using fuel oil	Foam or powder extinguisher	Two (one allowed for vessels with engine output up to 110 kW)
3. Boiler rooms with self-contained boilers using fuel oil	same	One per each boiler
4. Galleys with gas or oil-fired equipment	"	1
5. Galleys with electrical power equipment	Carbon dioxide extinguisher or dry powder extinguisher	1
6. Store rooms for flammable and combustible materials	Foam or powder extinguisher	1
7. Rooms with electric power generators with total power above 200 kW	Carbon dioxide extinguisher or dry powder extinguisher	One (in addition to supply of a respective room )
8. Rooms with the main switchboard or emergency switchboard	Carbon dioxide extinguisher or dry powder extinguisher	Two (if a switchboard is placed in the engine room, then another extra extinguisher to provide the engine room)

9. Cargo pump rooms and fuel distribution stations	Foam or powder extinguisher	1
10. Enclosed decks	same	One per every 20 m of corridor space
11. Isolated rooms cooled or heated by any equipment using solid fuel, fuel oil or liquefied gas	"	1
12. Open decks on passenger vessels	Foam or powder extinguisher	One per each deck with length up to 20 m and two pcs per each deck with length above 20 m
13. Open decks of other vessels except tankers	same	One for vessels with length up to 25 m or two pcs for vessels with length over 25 m
14. Open decks of tankers	"	Two extinguishers per every complete/incomplete 30-m track of deck yet not less than specified in pos. 13
15. Open decks of vessels fitted to transport dangerous goods	"	One per bow and stern on open decks in addition to those specified in pos. 13
<p>Notes. 1. Smaller rooms (galleys, control stations, stowage rooms, stations, broadcasting stations etc.) with floor up to 4 m<sup>2</sup> may accommodate carbon dioxide or dry powder extinguishers with charge weight of 1,5 kg.</p> <p>2. In rooms with rated 24 V-equipment, carbon dioxide extinguishers may be replaced with foam extinguishers.</p> <p>3. No portable carbon dioxide or other gas extinguishers may be fitted within living spaces.</p>		

20B-5.8.5 Portable fire extinguishers shall be located with due regard of the following requirements:

- (i) fire-extinguishers shall be mounted in places protected against direct sunlight and precipitation, with maximal distance from deck (room floor) to extinguisher handle being 1,5 m and at least 1,5 m away from a heating appliance or any other heat source;
- (ii) fire-extinguishers shall be mounted in special support brackets to provide for secure attachment and prompt release;
- (iii) within living spaces, fire-extinguishers shall not be mounted closer than 15 m off a guarded location. Number of access doors to a fire-extinguisher shall not exceed one;
- (iv) if, as per 20 B-5.8.4, the room is to accommodate several extinguishers, a part of these shall be mounted close to entrances while the rest – close to places with the highest risk of indoor fire;
- (v) should the room or vessel be allotted only one extinguisher, the latter shall be mounted by the entrance or close to a place with the highest risk of fire.

## **20B-6 POWER PLANT AND SYSTEMS**

### **20B-6.1 GENERAL**

20B-6.1.1 Power plant and systems shall be designed, manufactured and installed in compliance with:

- (i) requirements and regulations set by Administration(s) and/or a recognized Classification Society for vessels engaged in coastal routes or on international voyages only between ports of two countries bound by mutual agreements on legitimate derogations from Conventions;
- (ii) either requirements of international Conventions, prescriptions of Administration on legitimate derogations from Conventions depending on the vessel class and operation zone or in compliance with rules of a recognized Classification Society - for vessels engaged on international voyages.

20B-6.1.2 In addition to 8-1.1.2 requirements to the power plant, systems and onboard equipment are based on assumption that outside water temperature be equal to 20 °C (32 °C — for vessels operating in tropic areas), air temperature indoors — below 45 °C, that on the open deck may vary from -25 to + 45 °C.

Thereby it is taken into account that emergency diesel-generators may be operated on fuel oil with vapor flashpoint temperature not less than 43 °C. In some cases, such as in relation to emergency fire pump plants and onboard auxiliary units installed outside engine rooms of category A, it is allowed to use liquid fluids with vapor flashpoint temperature below 55 °C, however, not below 43 °C, if following conditions are satisfied:

- fuel oil tanks, except those located in double-bottom spaces, lie outside engine rooms of category A;
- fuel temperature is measured on the filling line of fuel pump;
- intake and discharge lines of fuel filter are provided with shut-off cocks and/or valves; and
- pipe connections use welded units or seal designs of “ball-cone” type.

20B-6.1.3 Power plant shall provide for vessel operation in standard conditions, under permanent list up to angles 15° inclusive, with concurrent permanent trim up to 5° inclusive, as well as in conditions of dynamic list up to 22,5° inclusive (rolling) with simultaneous dynamic trim up to 7,5° (pitching).

20B-6.1.4 Vessel propulsion plant shall provide for possible sternway operation under standard conditions. Line shaft rotation frequency at steady-state sternway movement shall comprise at least 70 % (for vessels with screw on direct gear – at least 85 %) of shaft design rotation when moving ahead for at least 30 min.

Power of engines operated sternway shall be sufficient to stop a vessel moving full ahead within a distance prescribed for this particular type of vessel, this capacity being attested in trial trips.

20B-6.1.5 The propulsion plant with one main diesel engine shall provide for movement speed sufficient to ensure vessel steerability should one of its turbochargers fail.

### **20B-6.2 STEERING GEAR**

20B-6.2.1 Main and auxiliary engines, transmissions, controllable pitch propellers and other vessel technical aids to provide for ship propulsion and safety shall be equipped with effective

means of control. These means (system) shall be arranged in such a manner that failure of one system does not impair operation of another.

20B-6.2.2 Main engine controls shall be interlocked in such a way as to preclude possibility of unauthorized start-up as well as any start-up of these engines with the shaft-turning gear already engaged.

## **20B-6.3 INTERNAL COMBUSTION ENGINES**

### **20B-6.3.1 GENERAL**

20B-6.3.1.1 Duration of astern program (time span between the moment of controls shift and the moment a propulsor begins to operate in direction reverse to that of shifted control) shall not exceed, depending on vessel speed, following values:

- at full ahead — 25 s;
- at slow speed — 15 s.

20B-6.3.1.2 Engines shall be capable to operate at 10 % overload against rated power performance at least for 1 hour thereby such operating conditions shall recur regularly at least in 6 hours.

In special cases, on approval of Administration and/or recognized Classification Society, permission can be obtained for full power with no overload.

20B-6.3.1.3 In sternway operation, reversible engines intended for use on propulsion plants with a propeller on direct gear shall develop at least 85 % of rated power at ahead maneuver.

## **20B-6.4 PROPELLER SHAFTING, CORROSION PROTECTION OF PROPELLER SHAFTS**

20B-6.4.1 Each shafting shall include an arrestor or interlock to prevent the shaft from turning should the main engine fail or be under repairs.

20B-6.4.2 Propeller shafts manufactured from corrosion-sensitive materials shall be protected against sea water impact either with metal coatings or other coatings approved by Administration and/or recognized Classification Society.

## **20B-6.5 AUTOMATION**

### **20B-6.5.1 GENERAL**

20B-6.5.1.1 Electrical, pneumatic and hydraulic components, equipment and automation systems shall reliably operate under following circumstances:

- (i) ambient temperature:
  - from 0 to +45° C indoors;
  - from -25 to +45° C on the open deck.

Electronics components and devices to be mounted in switchboards, panels or covers shall reliably operate at ambient temperatures up to 55° C.

Temperatures up to 70° C shall not impair automation systems, their elements and devices;

- (ii) at air relative humidity (75±3) % and temperature (45±2) °C or at air relative humidity (80±3) % and temperature (40±2)° C as well as at air relative humidity (95±3) % and temperature (25±2) °C;



- (iii) vibration frequency from 2 to 100 Hz; at frequencies from 2 to 13,2 Hz with displacement amplitude  $\pm 1$  mm and at frequencies from 13,2 to 100 Hz with acceleration  $\pm 0,7g$ .

Automation systems mounted on vibration sources (diesel-engines, compressors etc.) or in the steering room shall reliably operate on vibrations from 2 to 100 Hz: at vibrations from 2 to 25 Hz with displacement amplitude  $\pm 1,6$  mm and at frequencies from 25 to 100 Hz with acceleration  $\pm 4,0$  g.

Automation equipment shall also reliably operate on impacts with acceleration  $\pm 5,0$  g and frequency in the range 40–80 impacts per min;

- (iv) continuous heeling up to  $22,5^\circ$  and in rolling up to  $22,5^\circ$  with the roll period  $(8\pm 1)$  s.

20B-6.5.1.2 Electrical and electronic components and devices shall reliably operate on deviations of supply voltage from the optimal sinewave as well as on deviations from rated power supply values specified in Table 20B-6.5.1.2.

Table 20B-6.5.1.2

Power supply value	Deviation from rated values		
	continuous	transient	
	%	%	c
Voltage	+6–10*	$\pm 20$	1,5
Frequency	$\pm 5$	$\pm 10$	5
*for DC – $\pm 10$ %			

Automatic equipment supplied with power from batteries shall be operated reliably at deviations of voltage from rated values:

- from +30 to –25 % – for equipment connected to the battery while charging;
- from +20 to –25 % – for equipment disconnected from the battery while charging.

Three-time power collapse with 30-sec intervals shall not have effect on serviceability of automatic systems.

Automation hydraulic and pneumatic systems shall reliably operate on fluctuations of charging pressure by  $\pm 20$  % off rated values.

#### **20B-6.5.2 SYSTEMS OF CONTROL, EMERGENCY WARNING, PROTECTION AND DATA DISPLAY**

20B-6.5.2.1 Each of the systems (control, warning, emergency warning, protection and data display) shall be autonomous and fulfill only one corresponding function. malfunctions or failures in one system shall not interfere with operation of other systems. It is admissible to partially combine control, emergency and protection systems including use of shared sensors for emergency warning and protection systems provided the high fail-safety degree of these systems is ensured.

20B-6.5.2.2 The emergency warning system shall send sound and light signals at the same time thereby provision shall be available to simultaneously indicate more than one fault. Reception of one signal shall not interfere with reception of another. Failure of one component (device) shall not entail failure of the total emergency warning system.

The emergency warning system shall communicate to mechanics quarters and to each of mechanic's berths via an intercom switch which ensures communication to at least one of these berths.

The sound alert may well be common for all systems of emergency warning and possible to cut off provided it stays ready for operation immediately after cutting off to receive new alarm signals. Thereby, shutting a sound alarm in the wheelhouse and living quarters shall not lead to its shutdown in the engine room.

Light signals shall indicate reasons of emergency warning release and deploy well discernible signals corresponding to a particular situation or failure. Engaged in case of some failure, a signal device shall generate a blinking light alarm. On its acknowledgement, a blinking light signal shall be transformed into a continuous light signal and be automatically cut off only in case the fault is remedied or equipment, system or part of warning system in question is shut down.

If common displays are deployed instead of individual signal devices, there shall be at least two of such displays.

20B-6.5.2.3 Sound alarm of emergency warning system shall be different from other sound signals.

20B-6.5.2.4 Whatever the scope of automation and monitoring procedures, the emergency warning system shall advise when:

- (i) controlled parameters attain their limiting values;
- (ii) the protection system is triggered;
- (iii) power to supply separate automation systems is missing or standby power source is engaged;
- (iv) other parameters or conditions to be advised on by requirements of present provisions undergo some change.

Signaling the faults of technical aids shall be provided for on remote control stations intended to control such aids.

20B-6.5.2.5 Provision shall be made for signalization to call up a mechanic to the engine room (central control station) which is actuated:

- (i) manually from the central control station or from the main engine local control station;
- (ii) automatically, if an emergency warning signal related to the power plant is not confirmed. i.e. its has not caught attention at destination throughout a certain period of time (for example, 2 min).

Such signaling shall be indicated on overall signaling panels inside living and service quarters attended by power plant servicing staff.

20B-6.5.2.6 Provision shall be made for the signal "Men in engine room" to confirm in the wheelhouse that the mechanic on duty is safe at work and stays within the engine room unattended.

Such signalization shall be switched into standby mode for a certain period up to 30 min.:

- (i) manually by a duty mechanic on regular visits to the engine room and shall be switched off on leaving;

- (ii) automatically, on release of power plant emergency warning, when a duty mechanic has to call the engine room for response remedial actions. It shall be possible to shutdown “Men in engine room” only after an emergency warning signal is acknowledged.

20B-6.5.2.7 Protection systems shall be independent from control- and emergency warning systems including sensors so that malfunctions and damage to these systems (power supply including) do not interfere with operation of protection system.

Anticipated protection shutoff devices shall preclude any inadvertent engagement. Provisions shall be made for the “protection circuit breaker on” light indicator to be placed over control panels.

20B-6.5.2.8 Actions shall be taken to provide for protection system self-control, so that an emergency warning signal shall be available at least for such failures as shorts, open circuit and fault to frame.

20B-6.5.2.9 The protection system shall be released automatically at developing faults which cause emergency conditions of technical aids so that:

- (i) normal operating conditions are restored ( through start-up of standby units);
- (ii) technical equipment is temporarily adjusted to meet developed conditions (by reducing its load);
- (iii) engines and boilers are shut down and cut off fuel to secure against emergency status.

## **20B-6.6 GENERAL SHIP SYSTEMS**

20B-6.6.1 Drain, ballast, gas exhaust systems, systems of overflow and measuring pipes, cooling and compressed air, boiler feed water system shall meet requirements of Administration and/or recognized Classification Society. Systems of tanker liquid fuel, air- and gas outlet ducts, ventilation, fire-fighting, fuel and oil system of vessels in coastal sailing or on international voyages between ports of two countries bound by mutual agreements on legitimate derogations from Conventions shall comply with requirements set by Administration and/or recognized Classification Society. Oil tanker system of fuel oil, systems of air- and gas outlet ducts, ventilation, fire-fighting, fuel and oil systems of vessels engaged on international voyages and passenger vessels beginning with RS 3,5 class and other ships beginning with RS 4,5 class as per 20B-1.1.2, whatever their destination, shall comply with requirements of International Convention for the Safety of Life at Sea (1974) with amendments and those of International Code on Fire Safety Systems (IMO Resolution MSC.98(73)).

## **20B-7 (LEFT VOID)**

## **20B-8A PREVENTION OF POLLUTION**

### **20B-8A.1 EQUIPMENT FOR COLLECTION AND TREATMENT OF OIL CONTAINING WATER AND SEWAGE WATER**

20B-8A.1.1 As per 20B-6.1.1, vessels whose design, equipment and operation are covered by provisions of the International Convention for Prevention of Pollution from Ships of 1973 with the amended protocol of 1978 (MARPOL 1973/78) shall have valid International Certificates on prevention of oil, sewage and garbage pollution.

20B-8A.1.2 As per 20B-6.1.1, vessels to which MARPOL 1973/78 may not apply, shall have respective certificates required by Administration(s) and/or a recognized Classification Society.

20B-8A.1.3 In some cases, Administrations may impose more stringent requirements to prevention of pollution for vessels in operation on inland waterways compared to requirements of International Conventions for vessels operating in sea areas.

## **20B-8A.2 EQUIPMENT FOR COLLECTION AND TREATMENT OF DRY GARBAGE**

20B-8A.2.1 Vessels shall meet practicable provisions of Annex V “Regulations for the prevention of pollution by garbage from ships” to MARPOL 1973/78.

## **20B-8A.3 PREVENTION OF AIR POLLUTION**

20B-8A.3.1 As per 20B-6.1.1, vessels covered by MARPOL 1973/78 shall have valid International Certificate on air pollution prevention.

20B-8A.3.2 As per 20B-6.1.1, vessels to which MARPOL 1973/78 may not apply, shall have respective certificates required by Administration(s) and/or recognized Classification Society.

20B-8A.3.3 Throughout the vessel stay within the SO<sub>x</sub>-emission control area as determined by the regulation 14(3), Annex VI to MARPOL 1973/78, at least one of two following requirements shall be complied with:

- (i) sulfur content in fuel oil used on vessels operating in the SO<sub>x</sub>-emission control area shall not exceed 1,5 % m/m;
- (ii) exhaust gas clean-up system shall be used which is approved by Administration with due regard of the guidelines to be developed by IMO to reduce sulfur oxide exhausts from ships, including main and auxiliary engines, down to 6,0 g SO<sub>x</sub> /kW·h or less, estimated as the total weight of sulfur dioxide emissions. Due to use of this equipment, wastes shall not be dumped in closed ports, harbors and estuaries unless the vessel can prove that such wastes dumping has no detrimental impact on ecosystems of closed ports, harbors and estuaries, validating this claim by documentary basis, from criteria supplied to the country of port authority by IMO (IMO supplies all parties to Convention with these criteria); or
- (iii) application shall be made of any other verifiable process which is feasible in constraining SO<sub>x</sub> -emissions down to the level described in sub-item (ii). Such processes shall be approved by Administration with consideration given to guidelines to be developed by IMO.

## **20B-9 ELECTRICAL EQUIPMENT**

### **20B-9.1 GENERAL**

Requirements set to electrical equipment installed on river-sea going vessels shall, in full scope, comply with requirements of Chapter II, International Convention for Safety of Life at Sea (1974) with amendments in parts of corresponding relevance.

## **20B-9.6 CONSUMERS OF EMERGENCY ELECTRIC POWER**

In addition to 9-2.16 and Chapter II of SOLAS 1974.

If certain about ensuring the required safety level, Administration can set the time to provide consumers with electrical power generated by emergency source at least to 3 hours for cargo vessels of RS 2,0, RS 3,0 classes not engaged on international voyages.

## **20B-9A RADIO COMMUNICATION AIDS**

### **20B-9A.1 RADIO EQUIPMENT STOCK**

Each self-propelled river-sea going vessel operating in sea areas shall be fitted with communication equipment necessary to provide for effective participation in Global Maritime Distress and Safety System (GMDSS) in strict compliance with Chapter IV, "Radio communication" of SOLAS. At the same time, Administration may grant partial or conventional derogations as per Regulation 3 of abovementioned Chapter IV.

### **20B-9B.1 NAVIGATION AIDS**

20B-9B.1.1 Unless otherwise stated, self-propelled river-sea navigation vessels, operating in sea areas, shall be equipped with navigation aids in compliance with Chapter V "Navigation Safety" of SOLAS.

20B-9B.1.2 Administration may grant derogations for vessels with essential restrictions as to sea navigation areas and seasons, in particular:

- (i) vessels of RS 2,0 class with gross tonnage of 300 and above (other than passenger vessels) may not have the log installed if there are speed- and travel repeaters from terrestrial radio navigation system receiver-indicator available on the ship control station;
- (ii) vessels of RS 2,0 class with gross tonnage of 500 and above (other than passenger vessels) may not have the gyrocompass installed if heading data are provided from the magnetic compass or any other course indicating aid specified in item 2.5.1 Regulation 19 of the mentioned Chapter V;
- (iii) on vessels of RS 3,0 class, the gyrocompass can be substituted by the satellite compass provided the requirements of items 2.5.1, 2.5.2 and 2.5.3 Regulation 19 of the mentioned Chapter V are complied with.

20B-9B.1.3 Administration shall determine in what scope shall requirements of 20B-9B.1.1 apply to vessels operated exclusively inshore off baselines specified in accordance to international laws and also to vessels:

- (i) with gross tonnage below 150 which navigate to any destination;
- (ii) with gross tonnage below 500, not engaged on international voyages.

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