RUSSAIN MARITIME REGISTER OF SHIPPING

RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF INLAND NAVIGATION SHIPS (for the Danube)

2001

Notice

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2007

This Notice has been approved in accordance with the established approval procedure and comes into force since 1 July, 2007.

The Notice contains the requirements for inland navigation ships, carrying dangerous goods by the European inland waterways, based on the Regulations annexed to the European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (AND).

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PART I. CLASSIFICATION

1.1 EXPLANATIONS

1.1.2 has been supplemented by a new paragraph reading as follows:

"XIV "Requirements for Ships Carrying Dangerous Goods.".

1.1.3 has been amended to read:

"**1.1.3** As regards classification, the Register also applies to:

.1 the following parts of the Rules for the Classification and Construction of Sea-Going Ships:

Part I "Classification", Section 4 "Classification of Refrigerating Plants";

Part VIII "Systems and Piping", Chapter 9.14 "Monitoring the Composition of Atmosphere in Cargo Area";

Part X "Boilers, Heat Exchangers and Pressure Vessels";

Part XII "Refrigerating Plants";

Part XIII "Materials";

Part XIV "Welding";

Part XVI "Hull Structure and Strength of Glass-Reinforced Plastic Ships and Boats";

.2 the following parts of the Rules for the Classification and Construction of Gas Carriers:

Part IV "Cargo Tanks", Section 11 "Construction and Testing";

Part V "Fire Protection", Chapter 3.5 "Inert Gas System";

Part VI "Systems and Piping", Section 3 "Cargo System", Section 4 "Cargo Pressure/Temperature Control", Section 5 "Vent Piping System";

Part VIII "Instrumentation";

.3 the following parts of the Rules for the Classification and Construction of Chemical Tankers:

Part VI "Systems and Piping", Section 1 "Cargo Piping System", Section 2 "Cargo Temperature Control", Section 4 "Cargo Tank Venting";

Part VIII "Instrumentation".".

4.1 TECHNICAL DESIGN DOCUMENTATION OF THE SHIP UNDER CONSTRUCTION

Has been supplemented by paragraph **4.1.14** reading as follows:

"**4.1.14 Documentation on a ship fitness for the carriage of dangerous goods**:

.1 design justification confirming compliance of the ship's structure, equipment and outfit and cargo spaces and/or open deck with the requirements for the carriage of dangerous goods by the European inland waterways;

.2 documents according to 1.3.3 of Part XIV "Requirements for Ships Carrying Dangerous Goods".".

PART II. HULL

1.1 GENERAL

1.1.1.1 has been amended to read:

"**1.1.1.1** Types of ships.

Cargo ships are ships intended for the carriage of cargoes (dry cargo ships, tankers, combination carriers, refrigerators, etc.).

Dry cargo ships are ships intended for the carriage of different cargoes (general cargoes, timber, containers, bulk cargoes, etc.) except for liquid cargoes in bulk.

Tankers are ships intended for the carriage of liquid cargoes in bulk including the following types (refer to Fig. 1.1.1.1):

tanker of type **N** is a tanker intended for the carriage of liquids;

tanker of type **C** is a tanker intended for the carriage of liquids and is of the flush-deck/double-hull type with double-hull spaces, double bottoms but without trunk. The cargo tanks may be formed by the ship inner hull or may be installed in the hold spaces as independent tanks;

tanker of type **G** is a tanker intended for the carriage of gases under pressure or under refrigeration.

Tugs are ships intended for the towage and pushing of other ships and floating structures.

Pushers are ships provided with a pushing coupling and intended for the towage of specially-equipped non-self-propelled ships by push-towing.

Push-tugs are ships intended both for the towage of self-propelled or non-self-propelled ships and for the pushing of non-self-propelled ships.

Combination carriers are ships intended for the carriage of crude oil and oil products in bulk, as well as bulk cargoes (ore/oil carriers, oil/ bulk dry cargo carriers, etc.).

Cargo push-ships are ships intended both for the carriage of different cargoes, except for liquid cargoes in bulk, and for the pushing of specially equipped non-self-propelled ships by push-towing.

Passenger ships are ships intended for or carrying more than 12 passengers.

1.1.1.5 Heading has been amended to read:

"**1.1.1.5** Sections of the ship's length and ship's spaces".

Has been supplemented by the following definitions:

"Hold is a part of the ship which, whether covered by hatchway covers or not, is bounded fore and aft by bulkheads and which is intended to carry goods in packages or in bulk. The upper boundary of the hold is the upper edge of the hatchway coaming. Cargo extending above the hatchway coaming shall be considered as loaded on deck.

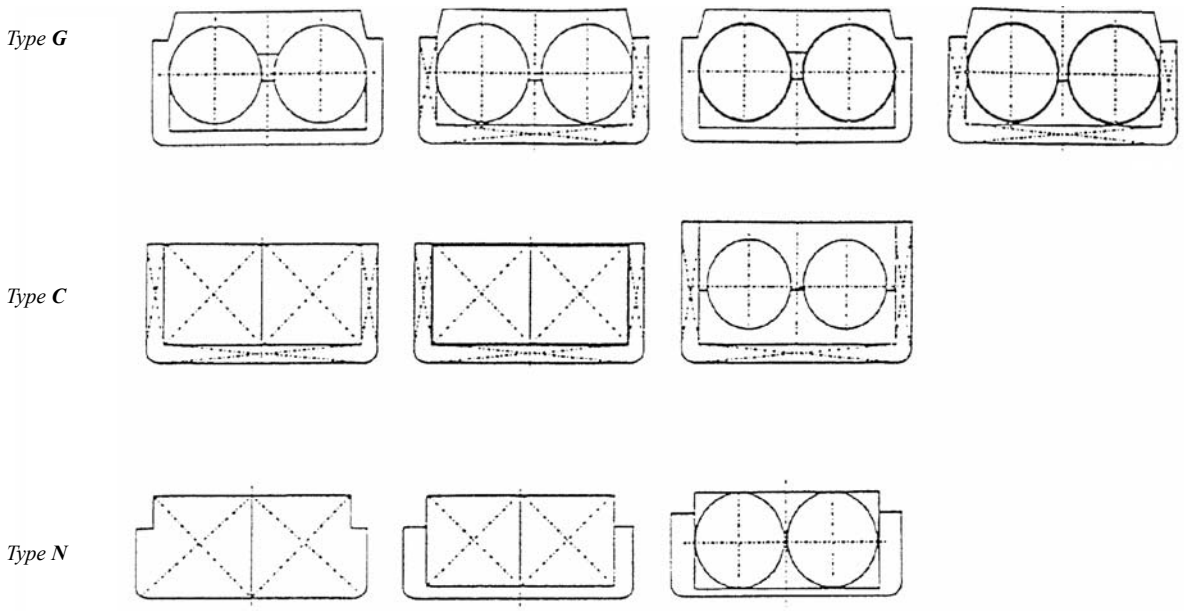

Fig. 1.1.1.1".

Cargo area is a space of the tanker between two vertical planes perpendicular to the ship's centerline, which comprises cargo tanks, hold spaces, cofferdams, double-hull spaces and double bottoms; these planes normally coincide with the cofferdam bulkheads or end bulkheads of cargo tanks. Their intersection line with the deck is referred to as the boundary of the cargo area part below deck. For a trunk ship or a ship with independent cargo tanks, the deck is in line with the deck of cargo tanks.

Cargo tank is a tank attached to the tanker, the boundaries of which are either formed by the ship's hull itself or by the walls separate from the hull, and which is intended for the carriage of cargoes in bulk.

Integral cargo tank is a tank permanently attached to the ship being part of the ship's structure.

Independent cargo tank is a tank permanently attached to the ship not being part of the ship's structure.

Cofferdam is an athwartship compartment, which is bounded by watertight bulkheads and which may be inspected. The cofferdam extends over the whole area of the end bulkheads of the cargo tanks. The bulkhead not facing the cargo area extends from one side of the ship to the other and from the bottom to the deck in one frame plane.

Hold space is an enclosed part of the ship, which is bounded fore and aft by watertight bulkheads and which is intended only to carry cargo tanks independent of the ship's hull.

Cargo pump room is a service space where the cargo pumps and stripping pumps are installed together with their operational equipment.

Service space is a space, which is accessible during the operation of the ship and which is neither part of the accommodation nor of the cargo tanks, with the exception of the forepeak and after peak, provided no machinery has been installed in the latter spaces.

Pressure tank is a tank designated and approved for a working pressure ≥ 400 kPa.".

2.2 BOTTOM FRAMING ON SHIPS WITHOUT DOUBLE BOTTOM AND IN AREAS WHERE DOUBLE BOTTOM IS UNAVAILABLE

2.2.1.3 has been amended to read:

"**2.2.1.3** The section modulus of solid floors W, in cm³, in the cargo hold, under loading condition "A" shall not be less than that determined by the following formula:

$$W = 4{,}4ka_1B_1^2(d + 0{,}6) \qquad (2.2.1.3)$$

where a_1 = solid floors spacing, in m;

B_1 = solid floor span measured between its supports, but not less than $0{,}5B$, in m.
Solid floor supports are considered the ship's hull sides, longitudinal bulkheads, as well as inner skins, if they comply with 2.9.10;

k = factor equal to:
1,2 – for longitudinal framing of bottom and sides;
1,6 – for transverse or longitudinal framing of bottom and transverse side framing;
1,75 – for transverse bottom framing and longitudinal side framing;
2,0 – for longitudinal bottom and side framing on ships for the carriage of ore and heavy cargoes;
3,0 – for transverse or longitudinal bottom framing and transverse or longitudinal side framing on ships for the carriage of ore and heavy cargoes.

The value of W obtained from Formula (2.2.1.3) may be reduced by 20 per cent under loading condition "B".".

2.2.1.8 has been amended to read:

"**2.2.1.8** The section modulus of solid floors W, in cm³, in the engine room shall not be less than that determined by the following formula:

$$W = 6{,}5a(d + 0{,}6)B^2 + 200. \quad (2.2.1.8)$$

Floors shall be made of welded T-sections. The floor depth at the place of an opening for engine shall be as large as possible; the floor section modulus in this cross-section shall be at least 75 per cent of the value required by Formula (2.2.1.8). The floor face plate shall be stiffened by brackets fitted at opening corners (refer to Fig. 2.2.1.8).

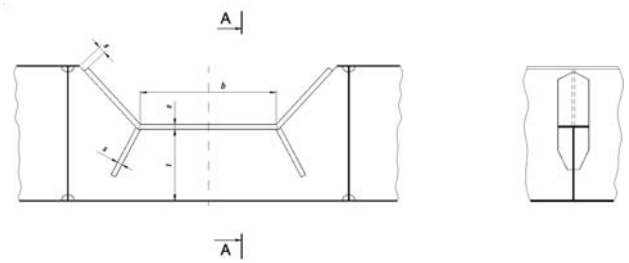

Fig. 2.2.1.8".

2.2.2 has been amended to read:

"**2.2.2 Bottom frames.**

2.2.2.1 The section modulus of bottom frames W, in cm³, between solid floors shall not be less than that determined by the following formula:

$$W = 7{,}1a(d + 0{,}6)b^2 \quad (2.2.2.1)$$

where b = bottom frame span measured between supports, but not less than $B/4$, in m. Bottom frame supports are considered the ship's hull sides, longitudinal bulkheads, inner skins, pillars and solid side girders.

2.2.2.2 The moment of inertia of bottom frames I, in cm⁴, shall not be less than that determined by the following formula:

$$I = 3\left(2 - \frac{a}{d - a_1}\right)(s/a)\, B_1^4 \quad (2.2.2.2)$$

where b = refer to Formula (2.2.2.1);
s = thickness of bottom plating, in cm.

2.2.2.3 On ships of rectangular pontoon shape, intermediate bottom frames having the section modulus equal to 60 per cent of that for side frames according to 2.3.2 but not less than 6 cm³, shall be fitted within the forepeak between solid floors.".

2.7 BULKHEADS

2.7.1 has been amended to read:

"**2.7.1 Bulkheads arrangement.**

2.7.1.1 A forepeak bulkhead extended from the ship's bottom to the upper deck shall be fitted on all ships.

A distance from the forepeak bulkhead to the fore perpendicular, in m, shall not be less than $0{,}04L$ and not more than $0{,}04L + 2$.

The different arrangement of the forepeak bulkhead is subject to special consideration by the Register.

If the ship has a pontoon-shaped hull, it is not recommended to arrange the forepeak bulkhead in way of the dead rise.

2.7.1.2 A transverse afterpeak bulkhead extended from the ship's bottom to the upper deck shall be fitted on all ships having a length of 15 m and over.

Distance from the afterepeak bulkhead to the aft perpendicular shall be at least $0{,}04L$ but not less than 1,4 m.

2.7.1.3 On self-propelled ships and non-self-propelled ships with machinery inside the ship's hull, the engine room shall be bounded by watertight bulkheads. Where the engine room is arranged aft, the aft watertight bulkhead specified in 2.7.1.2 may be considered as an aft bulkhead bounding the engine room.

Accommodation spaces with the deck below the load waterline level shall be bounded by watertight bulkheads.

Watertight bulkheads shall be arranged at ends of cargo compartments.

2.7.1.4 On dry cargo ships, the total minimum number of tight transverse bulkheads, including the forepeak and afterpeak ones, shall be:

3 – for ships having a length of 20 m – 60 m;
4 – for ships having a length of 61 m – 80 m;
5 – for ships having a length of 81 m – 100 m;
6 – for ships having a length of 101 m and over.

2.7.1.5 All transverse tight bulkheads shall extend from the ship's bottom to the freeboard deck.

2.7.1.6 No doors and access holes are allowed in the forepeak and afterpeak bulkheads. Where doors and access holes are fitted in other transverse tight bulkheads, they shall be tight and closed on both sides.

2.7.1.7 All pipes, cables and moving parts of steering ropes and shafts penetrating tight bulkheads shall be laid in bulkhead sockets using stuffing boxes or other devices, which design ensures the bulkhead tightness.

2.7.1.8 On ships with double bottom and double sides, transverse bulkheads within cargo hold may be omitted.

In this case, tight bulkheads shall be fitted in a double-hull space with an interval of not more than 20 m. Thickness of tight bulkheads shall be equal to that of solid floors and their framing shall meet the requirements of 2.7.3.".

2.8 TANKS

2.8.1 The last sentence has been amended to read:

"The strength of watertight bulkheads required in 2.7.1 and bounding the tanks shall meet the requirements of 2.7.".

2.8.2 has been amended to read:

"**2.8.2** The plating thickness for vertical tank bulkheads s, in mm, shall not be less than that determined by the following formula:

$$s = 4{,}3a\sqrt{z} + 1 \quad (2.8.2)$$

where a = stiffeners spacing, in m;

z = height measured from the upper edge of a bulkhead to the air pipe end, in m, but not less than 1 m,

but not less than 4 mm.

The plate thickness for plating of decks (platforms) bounding tanks shall be increased by 1 mm as compared with the value determined by Formula (2.8.2) at a height h measured from the horizontal bulkhead (platform) level to the air pipe end.".

2.9 STRUCTURE OF DOUBLE BOTTOM AND DOUBLE SIDE IN WAY OF CARGO HOLD

2.9.1 – 2.9.11 have been amended to read:

"**2.9.1 Double bottom.**

2.9.1.1 Where the double bottom is provided, it shall be designed as the watertight part of the ship's hull.

2.9.1.2 A possibility to monitor the presence of water in the double bottom and its pumping-out, including the ship's loading condition at the maximum loading capacity, shall be provided with any design of the inner bottom.

2.9.1.3 The depth of a double bottom shall be at least 650 mm. By agreement with the Register, the double bottom depth may be reduced.

2.9.1.4 Where the depth of the double bottom is inadequate for welding the plating from the inside, the welding procedure on the outside and calculations of local strength of double bottom structures shall be submitted to the Register for approval. The terms of including the plates of inner bottom plating, welded in this way, as an effective flange into the cross-sections of double bottom members shall be approved by the Register.

2.9.1.5 Outside the double bottom, the plates of inner bottom plating shall be extended beyond bulkheads by means of horizontal brackets, fitted at every side girder, having a length of at least $0{,}1B$ and a width of $0{,}05B$ at the bulkhead, or in other equivalent way.

2.9.1.6 Side frames shall be attached to the inner bottom plating with brackets.

2.9.2 Inner bottom plating.

The thickness of inner bottom plating s, in mm, shall not be less than that determined by the following formula:

$$s = (L/20 + 2)a/0{,}5. \qquad (2.9.2)$$

This thickness shall be increased by at least 3 mm where cargo handling provides for the use of grabs or other mechanized means.

2.9.3 Solid floors.

2.9.3.1 The solid floor spacing is specified in 2.2.1.1 and 2.2.1.2. If transverse system of framing is adopted, bracket floors shall be fitted between the solid floors arranged not at each frame.

2.9.3.2 For double side ships, solid floors in the double-hull space are an extension of solid floors in the double bottom and may have a varying depth reducing towards the side. The floor depth at the outer side shall not be less than the radius of a bilge rounding.

2.9.3.3 The web of a solid floor in a double bottom compartment not used as a tank, shall have a thickness s, in mm, not less than that determined by the following formula:

$$s = 0{,}60\sqrt{L}\,. \qquad (2.9.3.3)$$

2.9.3.4 The web of a solid floor in a double bottom compartment, used as a tank for ballasting or bunkering, shall have a thickness s, in mm, not less than that determined by the following formula:

$$s = 0{,}60\sqrt{L} + 0{,}5. \qquad (2.9.3.4)$$

2.9.3.5 The web of a solid floor in a double bottom compartment under cargo holds, where grabs are used in cargo handling, shall have a thickness s, in mm, not less than that determined by the following formula:

$$s = 0{,}60\sqrt{L} + 2{,}5, \qquad (2.9.3.5)$$

but not greater than 8 mm.

2.9.3.6 The section modulus of a solid floor shall meet the requirements of 2.2.1.3, 2.2.1.5, 2.2.1.7, 2.2.1.8 and 2.2.1.12.

Inner bottom plate, if is taken into account in calculation of the section modulus of a solid floor, shall be welded in accordance with Table 1.4.3.2 (joints Nos. 2.1 and 2.5). Welding by another way shall be subject to special consideration by the Register.

2.9.4 Bracket floors.

2.9.4.1 The ends of bottom and reverse frames of bracket floors shall overlap the brackets for a length of not less than two depths of the appropriate frame section (refer to Fig. 2.9.4.1).

2.9.4.2 The bracket thickness shall not be less than that adopted for solid floors in this region.

For the double bottom depth of 800 mm and over, the free edges of brackets shall be provided with flanges or welded face plates 10 thicknesses wide, but not more than 90 mm.

2.9.4.3 The bracket width on either side of a central girder and at a bilge shall not be less than a half of the double bottom depth. The bracket width at a side girder shall not be less than 0,3 times the double bottom depth.

2.9.4.4 The section modulus of reverse frames of the bracket floor, in cm^3, shall not be less than that determined by Formula (2.2.2.1).

2.9.4.5 The section modulus of bottom frames of the bracket floor, in cm^3, shall not be less than that determined by Formula (2.9.6.2), where $k = 7{,}1$ and l is the frame span measured between supports but not less than $B/4$, in m. The supports are considered the ship's hull sides, longitudinal bulkheads, inner skins, pillars and solid side girders.

For ships where grabs are used for cargo handling, W is determined by Formula (2.9.6.6), where l is the bottom frame span of a bracket floor, in m; a is the floor spacing, in m.

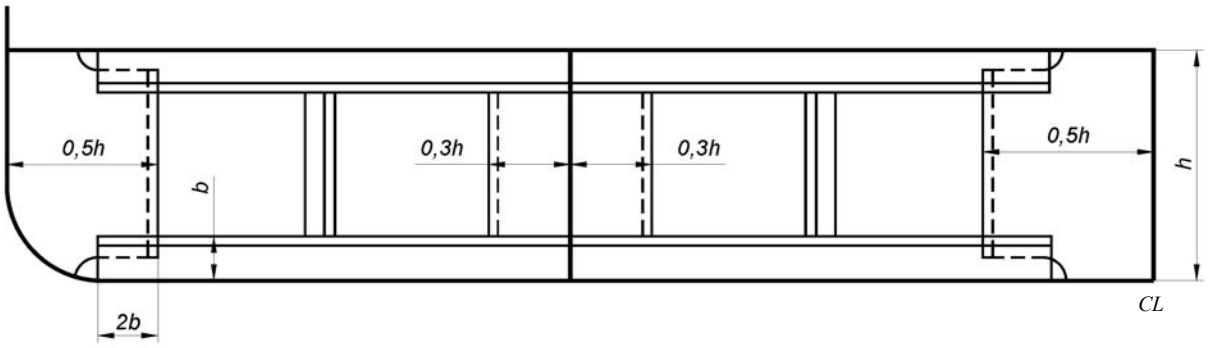

Fig. 2.9.4.1

2.9.4.6 Where cross ties (intermediate struts) dividing a bracket spacing in two are fitted between the brackets, the section moduli of bottom and reverse frames may be reduced by 40 per cent.

The cross-sectional area of a cross tie shall not be less than that of the lesser frame of the floor.

Where intermediate struts are fitted, brackets of side girders may be replaced by struts having the section of the bottom frame and fitted on one side of the girder.

No intermediate struts are allowed where grabs are used for cargo handling.

2.9.5 Centre girder and side girders.

2.9.5.1 The centre girder web in the centerplane shall have a thickness s, in mm, not less than that determined by the following formula:

$$s = 0{,}8\sqrt{L}\,. \qquad (2.9.5.1)$$

The thickness of side girders shall be equal to that of solid floors.

2.9.5.2 If longitudinal system of double bottom framing is adopted, brackets shall be fitted on each side of the centre girder at a distance not exceeding two spacings. Each of these brackets shall be extended to the nearest longitudinal or the additional side girder and welded thereto. The bracket thickness shall be equal to that of the floors. Free edges of brackets shall be provided with flange or a face plate.

2.9.5.3 The distance between a centre girder and side girder and longitudinal bulkhead or side shall not exceed 3,0 m.

The girders shall be extended as far forward and aft as practicable.

2.9.5.4 In the engine room the arrangement of side girders shall be consistent with that of the machinery seatings, so that at least one of the longitudinal girders under the seating is fitted in line with the side girder. In this case, an additional side girder shall be provided under the seating in line with the second longitudinal.

Where side girders cannot be arranged under the seatings in line with longitudinal girders, additional side girders shall be fitted under each longitudinal girder.

Additional side girders may be replaced by half height side girders welded to the inner bottom plating and floors only, if approved by the Register.

2.9.6 Bottom and inner bottom longitudinals.

2.9.6.1 Bottom longitudinals shall meet the requirements of 2.2.3.

2.9.6.2 Inner bottom longitudinals shall have the section modulus W, in cm^3, not less than that determined by the following formula:

$$W = k\,a\,D\,l^2 \qquad (2.9.6.2)$$

where k = 7,1 – for longitudinals without cross ties at mid-span between solid floors;
k = 4,25 – the same, but with cross ties;
l = longitudinal span measured between solid floors (without regard to brackets), in m.

2.9.6.3 The sectional area of a cross tie, if fitted between the bottom and inner bottom longitudinals, shall not be less than that of the lesser longitudinal to be joined.

2.9.6.4 Bottom and inner bottom longitudinals shall be continuous at non-tight floors.

2.9.6.5 Longitudinals may be cut at watertight floors. In this case, they shall be attached to the floors by the brackets having a width of 2,5 times the bottom longitudinal height.

The other ways of attachment may be also used, if approved by the Register.

2.9.6.6 On ships where grabs are used for cargo handling, the section modulus of bottom frames of the bracket floors and inner bottom longitudinals, in cm^3, shall not be less than that determined by the following formula:

$$W = 90\,a\,l \qquad (2.9.6.6)$$

where a = longitudinals spacing, in m;
l = the maximum floors spacing, in m.

For a grab crane of 20 t lifting capacity, the value determined by Formula (2.9.6.6) shall be increased by 50 per cent.

2.9.7 Double bottom tanks.

The arrangement of double bottom tanks shall meet the following additional requirements:

.1 thickness of inner bottom plating above the tank shall meet the requirements of 2.8.2 for deck (platform) plating bounding the tanks;

.2 thickness of a floor or side girder bounding the tank shall not be less than that specified in 2.8.2 for vertical bulkheads bounding the tanks.

2.9.8 Bilge wells and sea chests.

Open bilge wells in the double bottom shall have a depth not greater than half the depth of the double bottom.

The thickness of floors, side girders and inner bottom plating forming the walls of sea chests and bilge wells shall be by 2 mm greater than that required by 2.9.3.4 and 2.9.2, and shall meet the requirements of 2.9.7.

2.9.9 Double side.

2.9.9.1 The breadth of a double side shall not be less than 600 mm.

2.9.9.2 The section modulus of web frames is determined for the entire cross section of the double side with due regard to the effective flange of shell and inner platings.

The section modulus of web frames shall meet the requirements of 2.3.6.4, 2.3.6.5 and 2.3.6.7.

2.9.9.3 The section modulus W, in cm^3, of struts (of both side shell and inner skin) forming the web frame shall not be less than that determined by the following formula:

$$W = 3{,}8 a_p D l^2 \qquad (2.9.9.3)$$

where l = distance, as measured along the side, between the upper edge of the floor and the lower edge of the beam, in m;
a_p = web frames spacing, in m.

2.9.9.4 Struts shall be interconnected with a cross tie fitted at a mid-span or in another equivalent way.

The cross-sectional area of the cross tie f, in cm^2, shall not be less than that determined by the following formula:

$$f = 1{,}4 a_p D l^2. \qquad (2.9.9.4)$$

2.9.9.5 Scantlings of frames cross section shall be determined according to the requirements of 2.3.2.

2.9.9.6 Scantlings of side longitudinals cross section shall be determined according to the requirements of 2.3.5.

2.9.9.7 Scantlings of inner skin struts shall be determined according to the requirements of 2.7.3 (where the double-hull space is a dry compartment) or 2.8.3 (for tanks).

2.9.9.8 The thickness of inner skin plating shall be equal to that of inner bottom plating as required by Formula (2.9.2).

For double-hull spaces used as tanks, the thickness of inner skin plating shall meet the requirements of 2.8.2.

2.9.9.9 The beam depth within the ship's double sides shall not be less than $0{,}12D$, and the beam thickness – not less than $0{,}75\sqrt{L}$.".

3.1 TANKERS

Has been amended to read:

"**3.1 TANKERS**

3.1.1 Application.

3.1.1.1 The requirements of the present Chapter apply to tankers intended for the carriage of crude oil and oil products, as well as other dangerous goods allowed for the carriage on tankers of type **N** and type **C**.

Hull structure of tankers intended for the carriage of other liquids, as well as of tankers of type **G** is subject to special consideration by the Register.

The requirements for design of the pressure cargo tanks are subject to special consideration by the Register. The strength of the pressure cargo tank structure shall be tested for a working pressure of 400 kPa according to the procedure approved by the Register.

3.1.1.2 The requirements of Chapters 1, 2 and Section 3.2 for cargo ships under loading condition "A", adopted in this Part of the Rules, apply to the hull structural members not defined in this Section.

3.1.1.3 Tankers as to their hull structure may be of three basic types:

tanker without double bottom and double sides, which bottom, sides, deck and bulkheads form the cargo tanks;

tanker with dry and ballast compartments in double sides and double bottom;

tanker with independent of the ship's hull fixed cargo tanks.

3.1.1.4 The present Chapter contains the requirements for a single-deck tanker, which bottom (inner bottom), sides (inner skins), deck and bulkheads form the cargo tanks.

Hull structure of tankers with independent tanks shall comply with the requirements of Section 2. The requirements of 3.1 apply to the tankers with independent tanks to the extent approved by the Register.

For the tankers intended for the carriage of dangerous goods in bulk on the Danube, the hull structure shall meet the requirements of the European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (AND).

For the tankers intended for the carriage of dangerous goods in bulk, apart from the Danube, on other European rivers, the hull structure shall meet the requirements of the Regulation for the Carriage of Dangerous Substances on the Rhine (ADNR).

3.1.2 General instructions.

3.1.2.1 Subdivision of cargo area in tanks.

3.1.2.1.1 A longitudinal watertight bulkhead shall be fitted in the ship's centerplane along the entire length of the cargo area on tankers of 6 – 12 m in breadth, as well as on the ships where length of the cargo area, including forward and aft cofferdams, exceeds $0{,}7L$.

On the tankers having breadth of 12 m and above, two longitudinal bulkheads, spaced not more than $0{,}6B$ apart, shall be fitted within the cargo area.

If approved by the Register, the longitudial bulkheads may be omitted or their number may be reduced, provided

that a calculation demonstrates the sufficient longitudinal and transverse strength of the ship's hull and stability, including damage stability, under any loading condition of cargo in bulk.

3.1.2.1.2 The cargo area of tankers shall be divided into independent cargo tanks by transverse watertight bulkheads extended from side to side in line perpendicular to the centerplane.

The number of transverse bulkheads shall be determined on the basis of the following items:

each tank capacity shall not be more than that specified in Table 3.1.2.1.2;

spacing between transverse bulkheads (except for the independent cylindrical tanks) shall not be more than 0,2L, in m, or 10 m, whichever is greater.

Table 3.1.2.1.2

$L \cdot B \cdot D$, m³	Maximum permissible capacity of a cargo tank, m³
< 600	$L \cdot B \cdot D \cdot 0{,}3$
600 – 3750	$180 + (L \cdot B \cdot D - 600) \cdot 0{,}0635$
> 3750	380

For trunk ships, D shall be replaced by D', where

$$D' = D + (h_t \cdot b_t / B \cdot l_t / L) \qquad (3.1.2.1.2)$$

where h_t = trunk height, in m (distance between trunk deck and main deck measured on trunk side at $L/2$);
b_t = trunk breadth, in m;
l_t = trunk length, in m.

For cylindrical independent tanks, spacing of transverse bulkheads and tank diameter ratio shall not exceed 7.

3.1.2.2 Cofferdams, hold spaces, double-hull spaces and double bottoms.

3.1.2.2.1 Cargo tanks shall be separated from the engine room, accommodation spaces, boiler room and the ship's peaks by the cofferdams extended for not less than 600 mm.

For the tanker of type **N**, a cofferdam may be used as a service space if the latter is bounded on all sides by the waretight bulkheads extended to the bottom plating. The entrance into this space shall be provided from the deck only.

3.1.2.2.2 On the tankers designed for the carriage of oil products having a flash point 60 °C and below, cargo tanks and pump room, if the latter is arranged under the deck, shall be separated from all accommodation and service spaces by cofferdams of the same length. Cofferdams shall not be used for other purposes.

3.1.2.2.3 Independent cargo tanks and end bulkheads of the hold space shall not be less than 500 mm apart or the end bulkheads shall be of "A-60" class.

3.1.2.2.4 Pressure tanks and end bulkheads of a hold space shall not be less than 200 mm apart.

3.1.2.2.5 Hold spaces, wherein independent tanks, are fitted and cofferdams of tankers shall not be used for water ballasting.

3.1.2.2.6 Double-hull spaces and double bottoms may be filled with water ballast, provided the cargo tanks are unloaded.

If the cargo tanks are loaded, double-hull spaces and double bottoms may be filled with ballast, provided that a loading condition has been considered in the Loading Manual, the ship's stability in this loading condition has been checked and the ballast tanks are filled within 90 per cent of their total capacity.

3.1.2.2.7 Double bottom may be used for arrangement of storage tanks for fuel, provided its depth is not less than 600 mm.

3.1.2.2.8 For tanker of type **C** with integral cargo tanks, the breadth of a double-hull space shall not be less than 1,0 m.

This breadth may be reduced to 800 mm, provided the ship's hull is strengthened (in relation to the relevant Sections) as follows:

.1 the thickness of a deck stringer shall be increased by 25 per cent;

.2 the thickness of side shell plating shall be increased by 15 per cent;

.3 if the side is longitudinally framed, longitudinals shall be fitted, spaced not more than 500 mm apart, with a depth of not less than 150 mm, and the cross-section area of a face plate of not less than 7 cm²;

.4 if the side is transversely framed, side stringers shall be fitted, spaced not more than 800 mm apart, with a depth exceeding that of frames by not less than 150 mm, and the cross-section area of a face plate of not less than 7 cm². Side stringers shall be welded to the frames;

.5 side stringers and side longitudinals shall be supported by the diaphragms spaced not more than 1,80 m apart.

3.1.2.2.9 For tanker of type **C** with independent cargo tanks, the breadth of a double-hull space shall not be less than 800 mm.

3.1.2.2.10 For tanker of type **C** with integral cargo tanks, the average depth of double bottom shall be 700 mm, but not less than 600 mm. The depth of double bottom in way of suction wells of cargo pumps may be reduced to 500 mm.

3.1.2.2.11 For tanker of type **C** with independent cargo tanks, the depth of double bottom shall not be less than 600 mm.

3.1.2.3 Superstructures and deckhouses.

3.1.2.3.1 The superstructures, wherein crew's quarters and galleys are located, shall not be arranged above the cargo tanks and vertical cofferdams.

Wheelhouse windows located not less than 1 m above the deck may be inclined in the forward direction.

3.1.2.3.2 Windows and sidescuttles in outer structures of superstructures and deckhouses facing the cargo tanks shall be of the fixed (non-opening) type.

3.1.2.3.3 Superstructures shall be made of steel.

3.1.2.4 Expansion tanks.

Every cargo tank shall be provided with an extension tank. The expansion tank capacity shall be not less than 0,5 per cent of the total cargo tank capacity. The height of the expansion tank coaming above the deck shall not be less than 300 mm, and its thickness shall be equal to that of the deck plating, but not less than 5,5 mm.

Cargo tanks may have no expansion tanks, provided the capacity and the relevant ullage (the tank top-to-cargo level distance) to compensate a heat expansion of liquid cargo en route, depending on the cargo density and the temperature variations, are specified in the Loading Manual.

3.1.3 Hull structure within cargo tanks.

3.1.3.1 Solid floors.

3.1.3.1.1 Solid floors shall be fitted on each frame where transverse system of framing is adopted and not more than on each fourth frame where longitudinal system of framing is adopted.

3.1.3.1.2 The section modulus of floors W, in cm^3, shall not be less than that determined by the following formula:

$$W = k a_1 B_1^2 (D + h) \qquad (3.1.3.1.2)$$

where k = factor equal to:
- 5,0 – for transverse or longitudinal system of bottom framing and transverse system of side framing;
- 3,7 – for longitudinal system of bottom and side framing;

a_1 = solid floors spacing, in m;
$B_1 = 1{,}0B$ – without longitudinal bulkheads, in m;
$B_1 = 0{,}5B$ – with one longitudinal bulkhead, in m;
$B_1 = 0{,}4B$ – with two longitudinal bulkheads, in m;
$h = h_t + h_{ex} + 0{,}5$ – additional design head, in m;
h_t = trunk height, in m (distance between trunk deck and main deck);
h_{ex} = depth of expansion tank in centerplane (distance between the top edge of expansion tank and the top edge of tank), in m;
h_k = head, in m, corresponding to the setting pressure of a safety relief valve, where relevant;
for all types of tankers: $h_{ex} + 0{,}5 \geq h_k$;
for tankers of type **N**: $h_{ex} + 0{,}5 \geq 1{,}0$ m;
for tankers of type **C**: $h_{ex} + 0{,}5 \geq 1{,}5$ m.

3.1.3.1.3 Floor webs shall not be cut at the longitudinal bulkhead.

Where floor webs do not pass through the longitudinal bulkhead, they shall be attached to it by the brackets, which free edge length over the floor shall be equal to 1,5 times the floor depth, and over the bulkhead – to the floor depth. The brackets thickness shall be by 2 mm greater than that of the floor web. Floor ends and the bulkhead shall not be more than 40 mm apart.

3.1.3.1.4 Where the single bottom and longitudinal system of bottom framing are provided, if the floor span is over 4,5 m, the brackets attached to the bottom longitudinal (refer to Fig. 3.1.3.1.4) shall be fitted on both sides at the floor mid-span. Brackets may be replaced by a solid side girder.

3.1.3.1.5 Where the single bottom is provided, on agreement with the Register, the solid floors may be fitted across the upper edges of the bottom longitudinals (refer to Fig. 3.1.3.1.5).

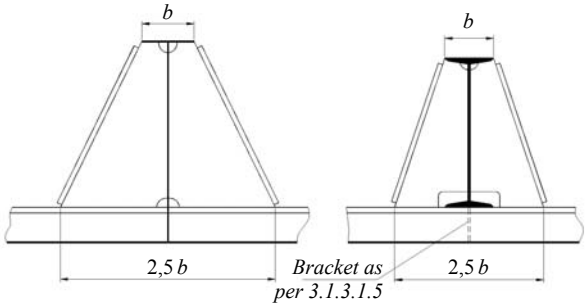

Fig. 3.1.3.1.4

In this case, floors shall be designed so that their upper and lower face plates are equal. The section modulus value of floors, as required in 3.1.3.1.2, is valid only for floors without effective flange. Where bulb profiles are used for the bottom longitudinals, their attachment to the floor shall be reinforced by brackets according to Fig. 3.1.3.1.5.

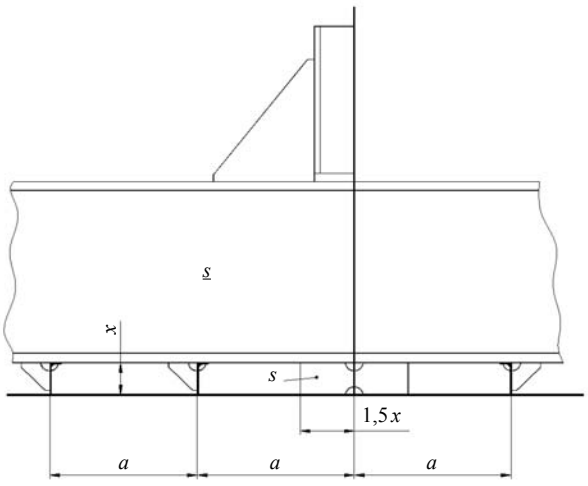

Fig. 3.1.3.1.5

3.1.3.1.6 The thickness of the solid floor webs shall meet the requirements of 2.9.3.3 and 2.9.3.4.

3.1.3.2 Bottom and inner bottom longitudinals.

The section modulus of bottom longitudinals (where the single bottom is provided) and inner bottom longitudinals W, in cm^3, shall not be less than that determined by the following formula:

$$W = 4a\left(D + h + \frac{L}{50}\right) l^2 \qquad (3.1.3.2)$$

where a, l = refer to 2.2.3.3;
h = refer to 3.1.3.1.2.

Where the double bottom is provided, bottom and inner bottom longitudinals shall also meet the requirements of 2.9.6.

3.1.3.3 Centre girder and side girders.

3.1.3.3.1 Where the single bottom is provided, the centre girder and side girders shall be fitted in accordance with the requirements of 2.2.4. At that, a distance between them or between a side girder and a longitudinal bulkhead or the ship's side may be increased up to 3 m. Scantlings of the side girders shall meet the requirements of 2.2.4.5.

Where the double bottom is provided, the centre girder and side girders shall meet the requirements of 2.9.5.

3.1.3.3.2 Where bottom is longitudinally framed, the absence of side girders is subject to special consideration by the Register.

3.1.3.4 Longitudinal bulkheads terminating at the end transverse bulkheads of a cargo tank shall be extended by brackets with smooth transition into longitudinals within a cofferdam. The brackets shall be dimensioned according to Fig. 3.1.3.4.

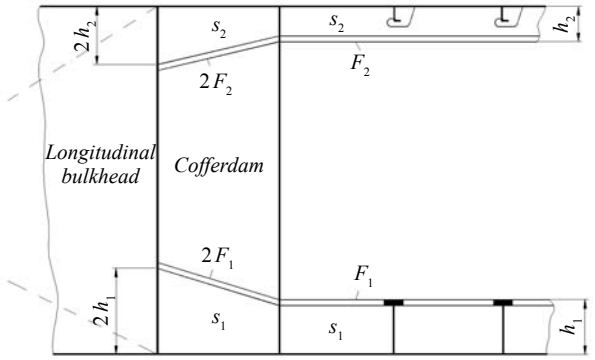

Fig. 3.1.3.4

3.1.3.5 Frames and vertical stiffeners of inner skin.

3.1.3.5.1 The section modulus of side shell frames (in the absence of inner skin) and vertical stiffeners of inner skin W, in cm^3, shall not be less than that determined by the following formula:

$$W = 2{,}5a(D + 2h)D^2 + 5 \qquad (3.1.3.5.1)$$

where h = refer to 3.1.3.1.2.

If a frame is supported by a side stringer, the section modulus obtained from Formula (3.1.3.5.1) may be reduced by 30 per cent.

3.1.3.5.2 Frames are attached to the floors and beams by the brackets meeting the requirements of 1.3.4.

Joints of frames to the bottom and deck longitudinals – refer to 2.3.3.2. No overlapping joints are allowed.

3.1.3.5.3 Where the inner skin is provided, scantlings of frames and vertical stiffeners of the inner skin shall meet the requirements of 2.10.

3.1.3.6 In the absence of the inner skin and where bottom and deck are longitudinally framed, web frames scantlings shall be equal to those of a solid floor and deck transverse at the lower end and upper end, respectively. Transverse deep members shall be joined as shown in Fig. 2.3.6.

3.1.3.7 Side and inner skin longitudinals.

3.1.3.7.1 The section modulus of side longitudinals (in the absence of inner skin) and inner skin longitudinals W, in cm^3, shall not be less than that determined by the following formula:

$$W = 6{,}3a(D + h)l^2 \qquad (3.1.3.7.1)$$

where h = refer to 3.1.3.1.2;
l = refer to 2.3.5.1.

3.1.3.7.2 Where side and deck are longitudinally framed, vertical flanged brackets spaced not more than 1 m apart shall be fitted between the upper side longitudinal and the deck longitudinal nearest to the ship's side.

Thickness of brackets s shall be equal to that of the side plating, and the flange width – to 10s. Brackets shall be welded to longitudinals, as well as to the deck and side plating (refer to Fig. 3.1.3.7.2).

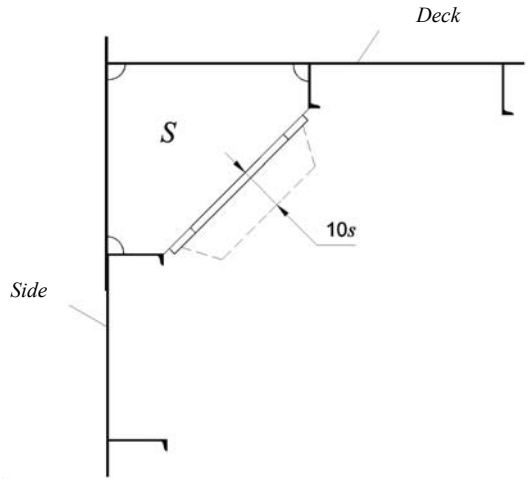

Fig. 3.1.3.7.2

3.1.3.7.3 Where the inner skin is provided, scantlings of the side and inner skin longitudinals shall meet the requirements of 2.10.

3.1.3.8 Beams and deck transverses in cargo tanks.

3.1.3.8.1 The section modulus of beams and deck transverses W, in cm^3, shall not be less than that determined by the following formula:

$$W = k a_1 h l^2 \qquad (3.1.3.8.1)$$

where k = factor equal to:
6 – for beams of the transversely framed deck;
5,3 – for deck transverses with longitudinally framed deck and transversely framed side;
4,5 – for deck transverses with longitudinally framed deck and side;
a_1 = beams or deck transverses spacing, in m;
h = refer to 3.1.3.1.2;
l = for beams – refer to 2.5.2.1;

$l = B_1$ – for deck transverses (refer to 3.1.3.1.2).

3.1.3.8.2 Beams shall be attached to frames and vertical stiffeners of the longitudinal bulkhead by brackets meeting the requirements of 1.3.4. Where beams are cut at the bulkhead, brackets shall be fitted on both sides of the bulkhead. Thickness of brackets shall be by 2 mm greater than that of the longitudinal bulkhead plating according to 3.1.3.13.2, and the end beams shall be fitted not more than 25 mm from the bulkhead.

Where deck transverse webs do not penetrate the longitudinal bulkhead, they shall be attched to it by brackets, which length of the free edge over the deck transverse is equal to 1,5 times the beam height, and over the bulkhead – to the beam height. Thickness of brackets shall be by 2 mm greater than that of the beam web. End deck transverses shall be fitted not more than 40 mm from the bulkhead.

3.1.3.9 Deck longitudinals in cargo tanks.

The section modulus of deck longitudinals W, in cm^3, shall not be less than that determined by the following formula:

$$W = 4a\left(h + \frac{L}{50}\right)l^2 \qquad (3.1.3.9)$$

where l = deck longitudinals span, including attachments of their ends, in m, but not less than 2 m;
h = refer to 3.1.3.1.2;
a = deck longitudinals spacing, in m.

3.1.3.10 Deck girders in cargo tanks.

3.1.3.10.1 The number of deck girders for transversely framed deck is determined such that a beams span does not exceed 3,0 m. Deck girders shall be fitted as an extension of longitudinal bulkheads of a cargo hold and extended as far as possible towards the ship's ends.

3.1.3.10.2 The section modulus of deck girders W, in cm^3, shall not be less than that determined by the following formula:

$$W = k\,h\,b\,l^2 + 35 \qquad (3.1.3.10.2)$$

where k, b, l = refer to 2.5.5.2;
h = refer to 3.1.3.1.2.

3.1.3.10.3 Where deck is longitudinally framed, the absence of deck girders is subject to special consideration by the Register.

3.1.3.11 The transition from a longitudinal bulkhead to a deck girder within a cofferdam shall be effected with a bracket. Brackets shall be dimensioned according to Fig. 3.1.3.4.

3.1.3.12 Pillars in cargo tanks.

The cross-sectional area of a pillar f, in cm^2, and its minimum moment of inertia I, in cm^4, shall not be less than those determined by the following formulae:

$$f = 2{,}2\,h\,b\,l; \qquad (3.1.3.12\text{-}1)$$

$$I = 2{,}4\,h\,b\,l\,l_1^2 \qquad (3.1.3.12\text{-}2)$$

where b, l, l_1 = refer to 2.5.6;
h = refer to 3.1.3.1.2.

3.1.3.13 Plating of cargo tank bulkheads.

3.1.3.13.1 The plating thickness of transverse bulkheads of cargo tanks is determined by Formula (2.7.2.1) at the value of z measured from the lower edge of a bulkhead to the upper edge of an expansion tank plus 0,5 m, but not less than 1 m (for tankers of type **N**) and 1,5 m (for tankers of type **C**) above the deck, but not less than the head corresponding to the setting pressure of a safety relief valve, where relevant, and at k = 2. In any case, the thickness of buklhead plating shall not be less than 5 mm.

3.1.3.13.2 The plating thickness of longitudinal bulkhead and inner skin plating amidships shall be 0,5 mm greater than that of transverse bulkheads required by 3.1.3.13.1. Outside the above area, that thickness shall be equal to that of the plating of transverse bulkheads.

3.1.3.13.3 The plating thickness of cofferdam bulkheads having no contact with cargo tanks is determined by Formula (2.8.2) at the value of h measured to the top of an air pipe, but not less than 1,5 m above the deck. The thickness shall not be less than 5 mm.

3.1.3.14 Framing of cargo tank and cofferdam bulkheads.

3.1.3.14.1 The section modulus of stiffeners of the cargo tank and cofferdam bulkheads W, in cm^3, shall not be less than that determined by the following formula:

$$W = k\,a\,(l + 2\,h)\,l^2 \qquad (3.1.3.14.1)$$

where k = factor equal to:
3,0 – for bracketless joint of stiffener ends;
2,0 – for attachment of upper and lower ends of stiffeners with brackets;
2,1 – for attachment of upper and lower ends of stiffeners at longitudinal bulkheads with brackets;
l = stiffeners span (including end brackets, if any), in m;
h = refer to 3.1.3.1.2.

3.1.3.14.2 The section modulus of horizontal stiffeners of longitudinal bulkheads shall not be less than that determined by the following formula:

$$W = 4a\,(D + h + 0{,}01\,L)\,l^2 \qquad (3.1.3.14.2)$$

where l = stiffener span measured between its supports, in m;
h = refer to 3.1.3.1.2.

3.1.3.14.3 If longitudinal system of framing is adopted, profile of vertical stiffeners of longitudinal bulkheads shall be at their lower end the same as of solid floors, and at the upper end – as of deck transverses. The profile of the vertical stiffener shall be smoothly changed over its length.

3.1.3.15 Corrugated bulkheads shall meet the requirements of 2.7.5 where h is replaced by its value according to 3.1.3.1.2, and the factor c is taken equal to 15.

3.1.3.16 Holes in webs of framing members.

The webs of floors and side girders shall be provided with drain holes, and the webs of beams and deck girders shall be provided with holes for gas passing.

In scalloped frames the arrangement of such holes is not compulsory.”.

3.2 PUSHERS AND PUSHED BARGES

3.2.2.2 has been amended to read:

“**3.2.2.2** Regardless of a framing system, the following minimum thicknesses shall be kept (the greatest of the values obtained below is adopted for the bottom plating):

deck stringer $s = 0{,}07L + 4;$ (3.2.2.2-1)

bottom plating $s = 0{,}055L + 3;$ (3.2.2.2-2)

bottom plating $s = 5{,}5a\sqrt{L + 0{,}6};$ (3.2.2.2-3)

bottom plating $s = 10a;$ (3.2.2.2-4)

side plating $s = 1{,}55a\sqrt{L}.$ (3.2.2.2-5)

The thickness of side plating at the ship’s ends over the length of not less than the ship’s breadth shall be equal to that of the plating amidships.

The thickness of deck plating of pushed barges s, in mm, at the ship’s ends shall not be less than that determined by the following formula:

$$s = (0{,}05L + 3)\frac{a}{0{,}5} \qquad (3.2.2.2\text{-}6)\text{”}.$$

The Section has been supplemented by Chapter 3.7 reading as follows:

“3.7 DRY CARGO SHIPS FOR THE CARRIAGE OF DANGEROUS GOODS

3.7.1 The requirements of the present Chapter apply to dry cargo ships for the carriage of dangerous goods.

3.7.2 Dry cargo ships for the carriage of dangerous goods shall have the double bottom and double side in way of cargo tanks.

3.7.3 The requirements of the present Chapter do not revoke those in Sections 1, 2 and in Chapters 3.2 – 3.6, if the latter are applicable.

3.7.4 The cargo hold shall be separated from fuel storage tanks by a cofferdam extended for not less than 500 mm.

3.7.5 The depth of double bottom shall not be less than 500 mm.

It may be reduced to 400 mm under a bilge well, provided the capacity of the latter does not exceed 0,03 m^3.

Where fuel storage tanks are arranged in the double bottom, its depth shall not be less than 600 mm.

3.7.6 The breadth of double side shall not be less than 800 mm.

On agreement with the Register, it may be reduced to 600 mm, provided the side framing is reinforced according to 3.7.6.1 or 3.7.6.2, and also to 3.7.6.3 and 3.7.6.4.

3.7.6.1 Where double side is longitudinally framed, the frames spacing shall not exceed 600 mm. Longitudinals shall be supported by diaphragms according to 3.7.7, which are spaced within 1,8 m apart.

3.7.6.2 Where double side is transversely framed, two alternatives for reinforcements are allowed:

.1 fitting of not less than two longitudinal side stringers. In this case, their spacing and the distance between the upper side stringer and deck stringer shall not exceed 800 mm.

The thickness of the side stringer web shall not be less than that of a web frame, the cross section area of the face plate shall not be less than 15 cm^2.

Side stringers shall be supported by diaphragms according to 3.7.7 spaced within 3,6 m apart.

Side shell frames and vertical stiffeners of the inner skin bulkhead shall be joined at the lower part of the double-hull space with a bracket of not less than 900 mm in height and with a thickness equal to that of the bottom plating;

.2 fitting of diaphragms according to 3.7.7 in each spacing.

3.7.6.3 The deck stringer shall be supported by transverse bulkheads spaced within 32 m apart.

On agreement with the Register, other design ensuring transverse strength of the ship’s structure may be used.

3.7.7 Diaphragm is a vertical plate structure extended athwartships from the side shell to the inner skin bulkhead, and from the deck stringer to the bottom plating or floor throughout the height.

The diaphragm thickness s, in mm, shall not be less than that determined by the following formula:

$$s = 0{,}78\sqrt{L}\,. \qquad (3.7.7)$$

The total width of openings in one section of the diaphragm shall not exceed 0,6 of the double side breadth.”.

Part has been supplemented by Appendix 1 reading as follows:

APPENDIX 1

TIGHTNESS TEST OF SHIP'S HULL

During construction of every ship, its hull shall be subjected to tightness test according to the provisions of this Table and methods approved by the Register.

Table

Item number	Hull structure to be tested	Test methods and standards	Remarks
1	2	3	4
1	Forepeak and afterpeak:		
	.1 used as water compartments	Filling with water with head up to the top of overflow[1]	The afterpeak shall be tested with the stern-tube and rudder tube fitted
	.2 not intended for filling with water	Filling with water with head up to the highest point of the deck located above the load waterline level and by hose test above that level[1]	If hatch coamings of the forepeak or afterpeak, not intended for filling with water, are less than 0,3 m in height, these compartments shall be filled with water up to the level of the upper edge of the hatch coaming
2	Double bottom tanks (including the duct keel):		
	.1 intended for liquids	Filling with water with head up to the height of 2,50 m above double bottom plating or up to the top of overflow (whichever is greater)[1]	
	.2 not intended for liquids	Filling with water with head up to the height of 0,50 m above the load waterline level[1]	
3	Double side tanks:		
	.1 intended for liquids	Filling with water with head up to the top of overflow, but not below the bulkhead deck[1]	
	.2 not intended for liquids	For ships with double bottom: hose test above the double bottom level[2] For ships without double bottom: filling with water with head up to the top of floors, but not less than 0,35 m from the shell plating at a keel and hose test above that level[2]	
4	Cargo holds of dry cargo ships, engine and boiler rooms, electric propulsion motor rooms:		
	.1 for ships with double bottom	Hose test over the entire surface above the double bottom level[2]	
	.2 for ships without double bottom	Filling with water with head up to the top of floors, but not less than 0,35 m from the bottom shell plating at a keel and hose test above that level[2]	
5	Tanks in 'tween deck space	Hose test[2]	
6	Tanks located outside the double bottom including fuel storage, circulation and daily service tanks, tanks (on dry cargo ships and catcher boats) for storage of vegetable oil, whale oil and other liquid cargoes	Filling with water with head up to the top of overflow, but not below the bulkhead deck and not less than 2,5 m from the tank top[1]	For tanks with overflow pipes led into a manifold, water head during the test is taken to the top of the manifold, but not less than 2,5 m from the tank top
7	Cargo tanks of tanker:		
	.1 cargo tanks of tanker of type **N**	Filling with water with head up to 0,5 m from the top of expansion tank, but not less than 1 m from the highest point of the deck forming the tank top[1], but not less than the head corresponding to the setting pressure of a safety relief valve, where relevant	If compartment (hold) structures do not withstand the water head specified, such compartments are tested in two stages: I – on berth: filling with water up to the level exceeding the ship's draught after launching by 0,5 m and hose test above that level;

Table – continued

1	2	3	4
			II – afloat: filling with water with head up to 0,5 m from the top of expansion tank, but not less than 1 m from the highest point of the deck forming the tank top, but not less than the head corresponding to the setting pressure of a safety relief valve, where relevant
	.2 cargo tanks of tanker of type **C**	Filling with water with head up to 1,5 m from the highest point of the deck forming the tank top[1], but not less than the head corresponding to the setting pressure of a safety relief valve, where relevant	If compartment (hold) structures do not withstand the water head specified, such compartments are tested in two stages: I – on berth: filling with water up to the level exceeding the ship's draught after launching by 0,5 m and hose test above that level; II – afloat: filling with water with head up to 1,5 m from the highest point of the deck forming the tank top, but not less than the head corresponding to the setting pressure of a safety relief valve, where relevant
8	Cofferdams	Filling with water with head up to the top of overflow[1], but not less than 1,5 m from the highest point of the deck	
9	Sea chests, ice boxes	Filling with water with head up to the level of 1,25 times the ship's depth, but not less than the pressure in the blowing system	At tests of ice boxes (when heated by steam), the test head shall not, in any cases, be less than the design pressure of the heating system. Where the blowing system is absent, sea boxes are tested at the water head by 0,35 m above the box cover
10	Shaft tunnel, enclosures and escape trunks, as well as tight trunks (including machinery casings, boiler uptakes and funnel casings), vent ducts located inside the hull, superstructures and deckhouses	Hose test[2]	Where the shaft tunnel or trunks pass through the compartments tested by filling with water or by leak test, the appropriate areas of the tunnel and trunks are checked during the test of compartments. Vent ducts are tested similarly, unless provided otherwise in technical documentation
11	Chain lockers:		
	.1 located abaft the collision bulkhead	Hose test[2]	
	.2 located forward of the collision bulkhead	Hose test[2]	Chain locker structures (or parts thereof) located forward of the collision bulkhead, which were under the pressure during filling forepeak with water, need not be subjected to hose test
12	Tanks within the stern counter	Filling with water with head up to the level of waterline of the ship in the load condition; hose test above that level[2]	
13	Superstructures and deckhouses (including exposed parts of machinery and funnel casings)	Hose test[2]	
14	Exposed parts of decks (including superstructure and deckhouse decks)	Hose test[2]	Parts of exposed decks in the cargo area of tankers are tested simultaneously with the relevant compartments (refer to item 7 of the Table)
15	Hatchway and ventilator coamings on exposed parts of the upper deck, as well as decks of superstuctures and deckhouses	Hose test[2]	Hatch coamings up to 100 mm in height may be tested by wetting with kerosene
16	Closing appliances of openings in tight structures of the ship's hull: doors in subdivision bulkheads;	Hose test (dispersed water jet)[2]	Closing appliances of openings in tight structures of the ship's hull located inside the hull, superstructures and deckhouses may be tested by means of a compressed air jet.

1	2	3	4
	doors in outer sides of superstructures and deckhouses; shell doors; hatch covers of skylights and companionways; side scuttles in the upper decks and the sides of the main hull, as well as in decks and outer bulkheads of superstructures and deckhouses; covers of manholes in tight decks, platforms and bulkheads; outer side parts of rubbish-shoots; steel covers of cargo hatchways		Closing appliances of openings (covers of manholes and hatches, slide valves, etc.), as well as air, sounding and other pipes within the double bottom and other compartments, which are tested by filling with water, shall be tested simultaneously with these compartments. If separately tested, they shall be subjected to filling with water with the head corresponding to the test head of that compartment. Doors of subdivision bulkheads shall be pressure tested to a water head up to the bulkhead deck, but not less than 5 m H_2O either before or after the door is fitted in place
17	Anchor hawse pipes and chain pipes	Hose test[2]	
18	Hollow (streamlined) rudders, hollow nozzles and hollow elements of foil structure	Filling with water with head up to the level of 1 m above the upper edge of the rudder (nozzle)	
19	Independent water, fuel and lubricating oil tanks	Filling with water with head up to the top of overflow and air pipe. For fuel and lubricating oil tanks, the head shall not be less than 0,85 m from the highest point of the tank[1]	Independent tanks shall be tested twice: before and after their installation in the ship with all pipings connected
20	Sewage tanks	Filling with water with head equal to 1,5 times the water head from the tank bottom to the lower indicator[1]	
21	Thruster compartments, buoyancy tanks, log and echo sounder trunks	Filling with water with head of 0,50 m above the load waterline level[1]	

[1] On agreement with the Register, the tests of compartments by filling them with water may be replaced by leak test with an excessive pressure of 30 kPa.
[2] For welded joints, except overlap connections, hose test may be replaced by wetting with kerosene.

PART III. EQUIPMENT, ARRANGEMENTS AND OUTFIT

Has been supplemented by a new Section 13 reading as follows:

"13 ADDITIONAL REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS

13.1 DRY CARGO SHIPS

13.1.1 Accommodation and service spaces.

13.1.1.1 The accommodation shall be separated from the holds by metal bulkheads having no openings.

13.1.1.2 Gastight closing appliances shall be provided for openings in the accommodation and the wheelhouse facing the holds.

13.1.1.3 No entrances or openings of the engines rooms and service spaces shall face the protected area.

13.1.1.4 Spaces the entrances or exits of which are partly or fully immersed in damaged condition shall be provided with an emergency exit not less than 0,1 m above the damage waterline. This does not apply to forepeak and afterpeak.

13.2 TANKERS OF TYPE G

13.2.1 The use of wood, aluminium alloys and plastic materials within the cargo area is permitted for:

gangways and external ladders;

masts and similar round timber.

The use of plastic materials or rubber within the cargo area is permitted for gaskets (e.g. for hatch covers, etc.).

13.2.2 The use of plastic materials for ship's boats is permitted only if the material does not readily ignite.

13.2.3 The lower edges of door-openings in the sidewalls of superstructures, and coamings of access hatches of under-deck spaces shall have a height of not less than 0,5 m above the deck.

This requirement need not be complied with if the wall of the superstructure facing the cargo area extends from one side of the ship to the other and has doors the sills of which have a height of not less than 0,5 m above the deck. The height of this wall shall be not less than 2 m. In this case, the lower edges of door-openings in the sidewalls of superstructures and the coamings of access hatches behind this wall shall have a height of not less than 0,1 m above

the deck. However, the sills of engine room doors and the coamings of its access hatches shall always have a height of not less than 0,5 m.

13.2.4 The bulwarks, foot-rails, etc. shall be provided with sufficiently large openings which are located directly above the deck.

13.2.5 The bulkheads bounding the hold spaces shall be watertight. The cargo tanks as well as the bulkheads bounding the cargo area shall have no openings or penetrations below deck. The bulkhead between the engine room and service spaces within the cargo area or between the engine room and a hold space may be fitted with penetrations provided that they comply with the requirements of 2.3.22, Part XIV "Requirements for Ships Carrying Dangerous Goods".

13.2.6 A space in the cargo area below deck may be arranged as a service space, provided that the bulkhead bounding this service space extends vertically to the bottom, and the bulkhead not facing the cargo area extends from one side of the ship to the other in one frame plane. This service space shall only be accessible from the deck.

This service space shall be watertight with the exception of its access hatches and ventilation inlets.

13.2.7 Where service spaces are located within the underdeck cargo space, they shall be arranged so that they are readily accessible and ensure the safe use of equipment therein for personnel in protective clothes and with an air-breathing apparatus. They shall be designed so as to allow an injured or unconscious personnel to be removed from such spaces without difficulty, if necessary by means of fixed equipment.

13.2.8 Hold spaces and other accessible spaces within the cargo area shall be arranged so as to ensure that they may be completely inspected and cleaned in an appropriate manner. The dimensions of openings, except for those of double-hull spaces and double bottoms which do not have a wall adjoining the cargo tanks, shall be sufficient to allow a person wearing breathing apparatus to enter or leave the space without difficulty. These openings shall have a minimum cross-sectional area of 0,36 m^2 and a minimum side length of 0,50 m. They shall be designed so as to allow injured or unconscious personnel to be removed from the bottom of such spaces without difficulties, if necessary by means of fixed equipment. In these spaces, the distance between the reinforcements shall not be less than 0,50 m. In double bottoms the distance may be reduced to 0,45 m. Cargo tanks may have circular openings with a diameter of not less than 0,68 m.

13.2.9 Accomodation spaces and the wheelhouse shall be located outside the cargo area forward of the fore vertical plane or abaft the aft vertical plane bounding the part of cargo area below deck. Windows of the wheelhouse which are located not less than 1 m above the bottom of ther wheelhouse may tilt forward.

13.2.10 Entrances to spaces and openings of superstructures shall not face the cargo area. Doors opening outward and not located in a recess the depth of which is at least equal to the width of the doors shall have their hinges facing the cargo area.

13.2.11 Entrances from deck and openings of spaces facing the weather deck shall be capable of being closed. The following instruction shall be displayed at the entrance of such spaces:

"DO NOT OPEN DURING LOADING, UNLOADING OR GAS-FREEING WITHOUT THE PERMISSION FROM THE MASTER. CLOSE IMMEDIATELY".

13.2.12 Entrances and windows of superstructures and accommodation spaces which can be opened, as well as other openings of these spaces shall be located not less than 2 m from the cargo area. No wheelhouse doors and windows shall be located within 2 m from the cargo area, except where there is no direct connection between the wheelhouse and the accommodation.

13.2.13 Spaces the entrances and exits of which are likely to become partly or completely immersed in the damaged condition, shall have an emergency exit which is situated not less than 0,1 m above the damage waterline. This does not apply to forepeak and afterpeak.

13.3 TANKERS OF TYPE C

13.3.1 The requirements of 13.2.1 to 13.2.4 and 13.2.8 to 13.2.13 are also applicable to tankers of type **C**.

13.3.2 The bulkheads bounding the cargo tanks, cofferdams and hold spaces shall be watertight. The cargo tanks and the bulkheads bounding the cargo area shall have no openings or penetrations below deck.

The bulkhead between the engine room and the cofferdam or service space in the cargo area, or between the engine room and a hold space may be fitted with penetrations provided that they comply with the requirements of 2.3.22, Part XIV "Requirements for Ships Carrying Dangerous Goods".

The bulkhead between the cargo tank and the cargo pump room below deck may be fitted with penetrations provided that the loading pipes are fitted with shut-off devices at the outlet of the cargo tank.

13.3.3 The cofferdam, the centre part of the cofferdam or other space below deck in the cargo area may be arranged as a service space provided the bulkheads bounding that service space extend vertically to the bottom. The service space shall only be accessible from the deck. The service space shall be watertight with the exception of its access hatches and ventilation inlets.

13.4 TANKERS OF TYPE N

13.4.1 The requirements of 13.2.1, 13.2.2 and 13.2.8 to 13.2.12 are applicable to tanker of type **N**. The requirements of 13.2.3 and 13.2.4 also apply to tanker of type **N** except open ships.

13.4.2 The engine room shall be accessible from the deck; the entrances shall not face the cargo area. Where the doors are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area.

13.4.3 Cofferdams or cofferdam compartments located next to the service space which has been arranged in ac-

cordance with 13.3.3 shall be accessible through an access hatch. Where the cofferdam is connected with the double bottom, an access from the latter to the cofferdam is adequate. Regarding the deck openings leading to the double bottom, the provisions of 12.2.4 apply. In this case, a possibility to assure from the deck that the cofferdam is empty, shall be provided.

13.4.4 An access hatch and ventilation inlets shall be located not less than 0,5 m above the deck.".

PART IV. STABILITY, SUBDIVISION AND FREEBOARD

1.3 SCOPE OF SUPERVISION

1.3.2.1 has been amended to read:

"**.1** prior to the construction:

review and approval of technical documentation relating to the ship's stability, subdivision and assignment of freeboard;".

1.3.2.2 has been amended to read:

"**.2** during construction and trials of the ship:

supervision of the inclining test and light-weight check;

review and approval of Information on Stability and Damage Control Plan;".

1.4 GENERAL TECHNICAL REQUIREMENTS

1.4.10.1 The words "issued to the ship" at the the end of the first sentence have been replaced by the words "issued to every ship:".

1.4.10.1 has been supplemented by new paragraphs **1.4.10.1.5** and **1.4.10.1.6** reading as follows:

"**.5** brief list of the requirements for stability and the diagram of the limiting gravity-center heights of the ship (limiting moments or minimum metacentric heights) plotted taking into account the requirements of the present Part of the Rules;

.6 instructions for the master on proper securing of deck cargo, including containers, to prevent their shifting during ship heeling due to a dynamic wind action.".

The Chapter has been supplemented by a new paragraph **1.4.10.2** reading as follows:

"**1.4.10.2** Information on Stability for the ship, to which the subdivision requirements are applicable according to the present Part of the Rules, shall additionally include the following information:

.1 information necessary to maintain the stability of an intact ship sufficient to withstand, in accordance with the requirements of this Part of the Rules, the most dangerous extent of the design damage; instructions on loading and ballasting the ship, including recommendations on distributing cargo, stores and ballast in a manner reasonable as regards the subdivision adopted and satisfying at the same time the requirements for trim, stability and strength of the ship; brief list of requirements for damage trim and stability;

.2 diagram of the limiting gravity-centre heights of the ship (limiting moments or minimum metacentric heights) plotted taken into account the subdivision requirements;

.3 list of results of flooding calculations including the parameters of a static stability curve under the worst flooding conditions;

.4 data on structural measures to ensure ship subdivision, instructions on the use of covers, cross flooding arrangements and emergency appliances, as well as on possible consequences of flooding relating to the particular features of the ship and on advisable and prohibited actions of the crew under normal conditions of service and in case of damage involving flooding.".

1.4.10.3 and **1.4.10.5** have been deleted. The following paragraphs have been renumbered accordingly.

1.4.11 has been amended to read:

"**1.4.11** The ships, to which the subdivision requirements are applicable according to the present Part of the Rules, shall be provided with the Damage Control Plan approved by the Register.

Damage Control Plan shall be made on the scale acceptable for operation, but not less the 1:200. On passenger ships, the Plan shall be permanently exhibited on the navigating bridge. On cargo ships the Plan shall be permanently exhibited or be readily available on the navigating bridge. The Plan containing the longitudinal section, plans of decks, double bottom and transverse sections shall include:

boundaries of watertight compartments and tanks;

ballast, bilge, overflow (discharge) systems and arrangements to correct heel caused by flooding;

location of openings in watertight compartments, their closing appliances and the location of their local and remote controls, position indicators and alarms;

location of doors in the shell of the ship, position indicators, leakage detection and surveillance devices;

location of weathertight closing appliances above the bulkhead deck and on the lowest exposed weather deck, together with location of controls and position indicators, if applicable;

location of all bilge flood and ballast pumps, their control stations and valves.".

1.5 INCLINING TEST

1.5.5 has been supplemented by the following text:

"The lightweight and the centre of gravity of the ship intended for the carriage of dangerous goods shall be determined by means of the inclining test or by detailed mass and moment calculations. In the latter case, the lightweight shall be checked by means of the light-weight check with a resuling difference of not more than ± 5 % between mass

determined by the calculation data and the displacement determined by the draught readings.”.

2.4 METACENTRIC HEIGHT

The first paragraph has been amended to read:

“The corrected initial metacentric height for all ships under all loading conditions, including all stages of loading, unloading and the final loading condition, except for the lightship condition, shall not be less than 0,2 m.”.

In the second paragraph the words “as well as a negative initial metacentric height” have been deleted.

3.3 CARGO SHIPS

3.3.1 The first paragraph has been supplemented by the following text:

“The carriage of a non-secured deck cargo, including containers, therewith, is prohibited with an appropriate entry made in the Classification Certificate.”.

The Chapter has been supplemented by new paragraphs reading as follows:

“**3.3.4** Tankers of type **C** and **N** intended for the carriage of dangerous goods and having cargo tanks over 0,70*B* wide shall additionally comply with the following stability requirements.

3.3.4.1 In the positive area of the righting lever curve up to immersion of the first non-watertight opening there shall be a righting lever of not less than 0,1 m.

3.3.4.2 The area under the righting lever curve up to immersion of the first non-watertight opening, and in any event up to the angle of heel ≤ 27°, shall be not less than 0,024 m·rad.

3.3.4.1 and 3.3.4.2 shall be complied with considering all free surfaces in the ship tanks at all stages of loading and unloading.

3.3.5 Subdivision of cargo ships intended for the carriage of dangerous goods.

3.3.5.1 Under all loading conditions to be encountered in service and which are in agreement with the purpose of the ship, the trim and stability of an intact ship shall be sufficient for satisfying damage trim and stability requirements.

3.3.5.2 Calculations to confirm compliance with damage trim and stability requirements shall be performed for such a number of loading conditions to be encountered in service and being the most unfavourable from the point of view of trim and stability (within operational draughts of ship), such distribution and extent of damage determined in 3.3.5.4, 3.3.5.5 and 3.5.5.8, that proceeding from those calculations one could assure that in all other cases the damaged ship would be in a better condition as regards damage stability, the residual freeboard, distance from a damage waterline to openings through which the ship may be flooded and heeling angles.

3.3.5.3 Calculations to confirm compliance with damage trim and stability requirements shall be performed for both the final stage of flooding and critical intermediate stages of flooding.

3.3.5.4 Except for the cases specially provided for, the following extent of damage shall be assumed in calculations of damage trim and stability:

side damage:

longitudinal extent: 0,10*L*, but not less than 5,00 m;

transverse extent: 0,59 m;

vertical extent: from the baseline upwards without limit;

bottom damage:

longitudinal extent: 0,10*L*, but not less than 5,00 m;

transverse extent: 3,00 m;

vertical extent measured at centerline from the moulded line of hull: 0,49 m, the sump excepted.

3.3.5.5 Damage trim and stability requirements shall be satisfied for the following locations of side and bottom damages:

side damage – anywhere in the ship’s length except the engine room. Such engine room shall be considered as a separate floodable compartment. All the bulkheads within the damage area shall be considered as damaged;

bottom damage – anywhere in the bottom.

3.3.5.6 In damage trim and stability calculations, the permeability of a flooded space shall be assumed equal to 0,95. Where the average permeability of a particular compartment according to a special calculation is less than 0,95, it may be used in the damage trim and stability calculations. The special calculation of permeability shall be submitted to the Register for approval. However, the permeability shall not be assumed less than the following minimum values:

0,85 – for an engine room;

0,95 – for accommodation spaces;

0 or 0,95 (whichever results in the more severe requirement) – for double bottoms, fuel oil tanks, ballast tanks, etc.

3.3.5.7 Requirements for damage trim and stability characteristics.

3.3.5.7.1 In the final stage of flooding, the initial metacentric height of a ship in the upright condition determined by the constant displacement method shall be positive.

3.3.5.7.2 An angle of heel in the final stage of flooding shall not exceed 12°.

3.3.5.7.3 The righting lever curve of a damaged ship (Fig. 3.3.5.7.3) shall have a sufficient positive righting arm section within angles of heel from 0° to 27° (flooding angle considered). In this case, the maximum righting arm of the curve shall be at least 0,05 m, the positive righting arm section within the said extent shall not be less than 0,0065 m·rad. The angle of submersion of the openings, considered as open, through which water may spread to the undamaged compartments shall be taken as flooding angle.

3.3.5.7.4 When cross-flooding openings are provided for reduction of unsymmetrical flooding, the time for equalization shall not exceed 15 min.

3.3.5.7.5 In intermediate stages of flooding, the maximum righting arm of a righting lever curve shall be at least 0,05 m, and the length of its positive part shall be not less than 7°.

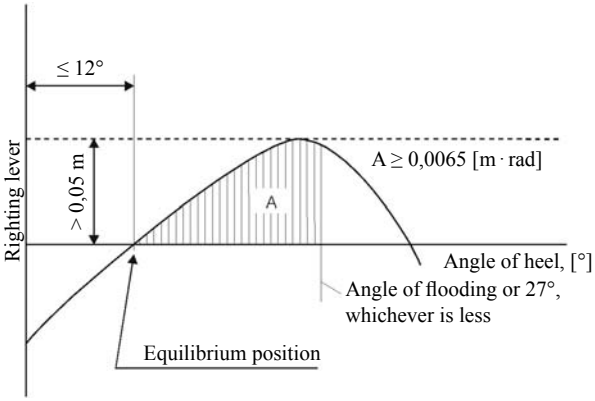

Fig. 3.3.5.7.3

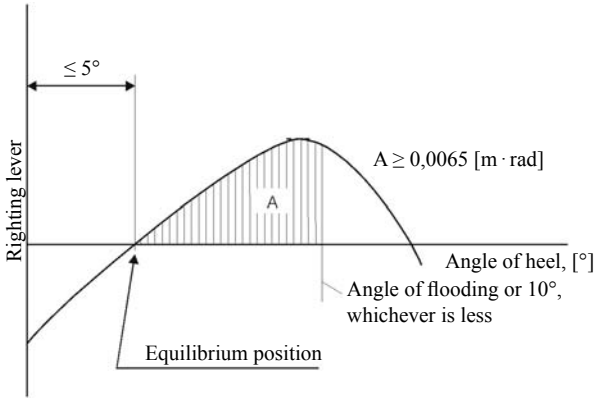

Fig. 3.3.5.8.1.2

3.3.5.7.6 Before, during and after equalization the damage waterline shall be by at least 0,10 m below the openings, being closed by means of weathertight covers, through which through which water may spread to the undamaged compartments (e.g. doors, windows, access hatches).

3.3.5.8 Additional requirements for damage trim and stability

3.3.5.8.1 Inland navigation ships carrying loose containers.

3.3.5.8.1.1 An angle of heel in the final stage of flooding shall not exceed 5°.

3.3.5.8.1.2 The righting lever curve of a damaged ship (Fig. 3.3.5.8.1.2) shall have a sufficient positive righting arm section within angles of heel from 0° to 10° (flooding angle considered). In this case, the maximum righting arm of the curve shall be at least 0,05 m, the positive righting arm section within the said extent shall not be less than 0,0065 m·rad. The angle of submersion of the openings, considered as open, through which water may spread to the undamaged compartments shall be taken as flooding angle.

3.3.5.8.2 Tankers of type **G**, **C** and **N**.

The following extent of damage shall be assumed in calculations of damage trim and stability:

.1 side damage:

longitudinal extent: 0,10*L*, but not less than 5,00 m;

transverse extent: 0,79 m;

vertical extent: from the baseline upwards without limit;

.2 bottom damage:

longitudinal extent: 0,10*L*, but not less than 5,00 m;

transverse extent: 3,00 m;

vertical extent measured at centerline from the moulded line of hull: 0,59 m, the sump excepted.".

PART V. FIRE PROTECTION

4.3 WATER FIRE MAIN SYSTEM

Has been supplemented by a new paragraph **4.3.7** reading as follows:

"**4.3.7 Additional requirements for water fire main system on ships carrying dangerous goods.**

4.3.7.1 The system shall be supplied by two independent fire or ballast pumps, one of which shall be ready for use at any time. These pumps, as well as their drives and electrical equipment shall not be installed in the same space.

4.3.7.2 The system shall be provided with a water main with at least three hydrants, located in the protected area above deck, for which suitable and sufficiently long hoses with nozzles shall be provided. It shall be possible to reach any point of the deck in the protected area simultaneously with at least two jets of water which do not emanate from the same hydrant. A spring-loaded non-return valves shall be fitted to ensure that no gases can escape through the water fire main system into accommodation and service spaces outside the protected area.

4.3.7.3 The capacity of pumps supplying the system shall be sufficient for a jet of water to reach a distance of not less than the ship's breadth from any location on board with two spray nozzles being used at the same time."

Has been supplemented by a new Chapter **4.7** reading as follows:

"4.7 FIRE-EXTINGUISHING SYSTEMS FOR SHIPS CARRYING DANGEROUS GOODS

4.7.1 For the protection of engine rooms, boiler rooms, pump rooms and any spaces containing special equipment (switchboards, compressors, etc.) for the refrigerant equipment, only permanently fixed systems using the following extinguishing agents are permitted:

.1 CO_2 (carbon dioxide);

.2 HFC-227ea (heptafluoropropane);

.3 IG-541 (52 % nitrogen, 40 % argon, 8 % carbon dioxide).

Other extinguishing agents are permitted only by agreement with the Register.

4.7.2 The extinguishing agent shall be routed and distributed in the space to be protected by means of a permanent piping system. Piping installed in the space to be protected and the reinforcements it incorporates shall be made of steel. This shall not apply to the connecting nozzles of tanks and compensators provided that the materials used have equivalent fire-retardant properties. Piping shall be protected against corrosion both internally and externally.

4.7.3 Triggering device of the system shall meet the following requirements:

.1 automatically activated fire-extinguishing systems are not permitted;

.2 it shall be possible to activate the system from a suitable point located outside the space to be protected;

.3 triggering devices shall be so installed that they can be activated in the event of a fire and so that the risk of their breakdown in the event of a fire or an explosion in the space to be protected is reduced as far as possible.

Systems which are not mechanically activated shall be supplied from two power sources independent of each other. These power sources shall be located outside the space to be protected. The control lines located in the space to be protected shall be so designed as to remain capable of operating in the event of a fire for a minimum of 30 min. The electrical installations are deemed to meet this requirement if they conform to the IEC 60331-21:1999 standard.

When the triggering devices are so placed as not to be visible, the component concealing them shall carry the "Fire-extinguishing system" symbol, each side being not less than 10 cm in length, with the following text in red letters on a white ground: "Fire-extinguishing system";

.4 if the fire-extinguishing system is intended to protect several spaces, it shall comprise a separate and clearly-marked triggering device for each space;

.5 the instructions shall be posted alongside all triggering devices and be clearly visible and indelible. The instructions shall be in a language the crew members can read and understand and if the language is not English, French or German, they shall be in English, French or German. They shall include the information concerning:

the activation of the fire-extinguishing system;

the need to ensure that all persons have left the space to be protected;

the correct behaviour of the crew in the event of activation;

the correct behaviour of the crew in the event of the failure of the fire-extinguishing system to function properly;

.6 the operating instructions shall mention that prior to the activation of the fire-extinguishing system, combustion engines installed in the space and aspirating air from the space to be protected, shall be shut down.

4.7.4 In addition to the requirements of 4.5, the carbon dioxide system shall meet the following requirements:

.1 CO_2 cylinders shall be placed in a gastight space or cabinet separated from other spaces. The doors of such storage spaces or cabinets shall open outwards; they shall be capable of being locked and shall carry on the outside the symbols "Warning: danger", not less than 5 cm high, and "CO_2" in the same colours and the same size;

.2 storage cabinets or spaces for CO_2 cylinders located below deck shall only be accessible from the outside. These spaces shall have an artificial ventilation system with extractor heads and shall be completely independent of other ventilation systems on board;

.3 the opening of cylinder valves and the control of the valve discharging CO_2 into the space to be protected shall correspond to two different operations;

.4 the appropriate period of time mentioned in 5.17.2 shall be at least 20 s.

4.7.5 Fire-extinguishing systems using HFC-227ea (heptafluoropropane) shall meet the following requirements:

.1 where there are several spaces with different gross volumes, each space shall be equipped with its own fire-extinguishing system;

.2 every tank containing HFC-227ea placed in the space to be protected shall be fitted with a device to prevent overpressure. This device shall ensure that the contents of the tank are safely diffused in the space to be protected if the tank is subjected to fire, when the fire-extinguishing system has not been brought into service;

.3 every tank shall be fitted with a device permitting control of the gas pressure;

.4 the level of filling of tanks shall not exceed 1,15 kg/l. The specific volume of depressurised HFC-227ea shall be taken equal to 0,1374 m^3/kg;

.5 the concentration of HFC-227ea in the space to be protected shall be not less than 8 % of the gross volume of the space. This quantity shall be released within 10 s;

.6 tanks of HFC-227ea shall be fitted with a pressure monitoring device which triggers an audible and visual alarm in the wheelhouse in the event of an unscheduled loss of propellent gas. Where there is no wheelhouse, the alarm shall be triggered outside the space to be protected;

.7 after discharge, the concentration of HFC-227ea in the space to be protected shall not exceed 10,5 % (volume);

.8 the fire-extinguishing system shall not comprise aluminium parts.

4.7.6 Fire-extinguishing systems operating with IG-541 shall meet the following requirements:

.1 where there are several spaces with different gross volumes, each space shall be equipped with its own fire-extinguishing system;

.2 every tank containing IG-541 placed in the space to be protected shall be fitted with a device to prevent overpressure. This device shall ensure that the contents of the tank are safely diffused in the space to be protected if the tank is subjected to fire, when the fire-extinguishing system has not been brought into service;

.3 each tank shall be fitted with a device for checking the contents;

.4 the filling pressure of the tanks shall not exceed 200 kg/cm^2 at a temperature of +15 °C;

.5 the concentration of IG-541 in the space to be protected shall be not less than 44 % and not more than 50 % of the gross volume of the space. This quantity shall be released within 120 s.".

5 FIRE DETECTION AND FIRE ALARM SYSTEM

Has been supplemented by a new Chapter **5.17** reading as follows:

"**5.17 ALARM DEVICE**

5.17.1 Permanently fixed fire-extinguishing systems shall be fitted with an audible and visual alarm device.

5.17.2 The alarm device shall be set off automatically as soon as the fire-extinguishing system is first activated. The alarm device shall function for an appropriate period of time before the extinguishing agent is released; it shall not be possible to turn it off (see also 4.7.4.4).

5.17.3 Alarm signals shall be clearly visible in the spaces to be protected and their access points and be clearly audible under operating conditions corresponding to the highest possible sound level. It shall be possible to distinguish them clearly from all other sound and visual signals in the space to be protected.

5.17.4 Sound alarms shall also be clearly audible in adjoining spaces, with the communicating doors shut, and under operating conditions corresponding to the highest possible sound level.

5.17.5 If the alarm device is not intrinsically protected against short circuits, broken wires and drops in voltage, it shall be possible to monitor its operation.

5.17.6 A sign with the following text in red letters on a white ground shall be clearly posted at the entrance to any space the extinguishing agent may reach: "Warning, fire-extinguishing system! Leave this space immediately when the ... (description) alarm is activated!".

PART VI. MACHINERY INSTALLATIONS

4 MACHINERY SPACES, ARRANGEMENT OF MACHINERY AND EQUIPMENT

Has beem supplemented by a new paragraph **4.2.6** reading as follows:

"**4.2.6** On ships carrying dangerous goods, the main and auxiliary combustion engines shall be located outside the cargo area. Entrances and other openings of engine rooms shall be at a distance of not less than 2 m from the cargo area.".

4.2.6 to **4.2.10** have been renumbered 4.2.7 to 4.2.11 respectively.

Has beem supplemented by a new paragraph **4.5.9** reading as follows:

"**4.5.9** On ships carrying dangerous goods, the engine rooms shall be accessible from the deck. The entrances shall not face the cargo area. Where the doors are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area.".

4.5.9 has been renumbered 4.5.10 respectively.

Has been supplemented by a new paragraph **4.6.3** reading as follows:

"**4.6.3** On ships carrying dangerous goods, the surface temperature of the outer parts of engines used during loading and unloading operations, as well as that of their air inlets and exhaust ducts shall not exceed the allowable temperature according to the temperature class of the substance carried.".

PART VII. SYSTEMS AND PIPING

8 CARGO PIPING SYSTEM OF OIL TANKERS. OIL RECOVERY SYSTEM OF OIL RECOVERY SHIPS

Has been supplemented by a new Chapter **8.6** reading as follows:

"**8.6 INERT GAS SYSTEMS FOR DRY CARGO SHIPS AND OIL TANKERS CARRYING DANGEROUS GOODS**

8.6.1 The inert gas system shall be capable of maintaining a permanent minimum pressure of 7 kPa (0,07 bar) in the spaces to be inerted. In addition, the inerting facility shall not increase the pressure in the cargo tank to a pressure greater than that at which the pressure valve is regulated. The pressure to which the vacuum valve is regulated shall be 3,5 kPa.

8.6.2 A sufficient quantity of inert gas for loading or unloading shall be on board or shall be capable of being produced if it is not possible to obtain it on shore. Besides, a sufficient quantity of inert gas to offset normal losses occurring during carriage shall be on board.

8.6.3 Spaces to be inerted shall be fitted with connecting pipes to supply inert gas and monitoring devices so as to ensure the correct atmosphere on a permanent basis.

8.6.4 If inert gas pressure or concentration in the gaseous phase falls below the set value, the monitoring device shall give a visual or audible alarm in the deckhouse. When the deckhouse is unattended the alarm shall be accepted in the place where one crewmember is present.".

9.1 AIR PIPES

Has been supplemented by **9.1.17** reading as follows:

"**9.1.17** The air pipes of all oil fuel tanks shall be led to 0,50 m above the open deck. Their open ends and the open ends of the overflow pipes leaking to the deck shall be fitted with a protective device consisting of a gauze grid or a perforated plate.".

Section 9 has been supplemented by a new Chapter **9.7** reading as follows:

"9.7 BLOWING-OFF AND VENTILATION OF SPACES IN THE CARGO AREA

9.7.1 Each cargo tank shall have two openings the dimensions and location of which shall be such as to permit effective ventilation of any part of the space. If there are no such openings it shall be possible to fill the cargo tanks with inert gas or dry air.

9.7.2 Double hull spaces and double bottoms within the cargo area which are not arranged for being filled with ballast water and cofferdams between engine rooms and pump rooms (if they exist) shall be provided with ventilation systems.

9.7.3 Any service spaces located in the cargo area below deck shall be provided with a system of forced ventilation with sufficient power for ensuring at least 20 changes of air per hour based on the volume of the space. The ventilator fan shall be designed so that no sparks may be emitted on contact of the impeller blades with the housing and no static electricity may be generated.

The ventilation exhaust ducts shall extend down to 50 mm above the bottom of the service space. The air shall be supplied through a duct at the top of the service space. The air inlets shall be located not less than 2 m above deck, at a distance of not less than 2 m from tank openings and 6 m from the outlets of safety valves.

The extension pipes, which may be necessary, may be of the hinged type.

9.7.4 Ventilators used for gas-freeing of cargo tanks shall be designed so that no sparks may be emitted on contact of the impeller blades with the housing and no static electricity may be generated.

9.7.5 Notice boards shall be fitted at the ventilation inlets indicating the conditions when they shall be closed. All ventilation inlets of accommodation and service spaces leading outside shall be fitted with fire flaps. Such ventilation inlets shall be located not less than 2 m from the cargo area.

Ventilation inlets of service spaces in the cargo area below deck may be located within such area.".

11.4 VENTILATION OF MACHINERY SPACES AND TUNNELS

Has been supplemented by new paragraphs **11.4.5**, **11.4.6** and **11.4.7** reading as follows:

"**11.4.5** On ships intended for the carriage of dangerous goods ventilation inlets of engines rooms and engine air intakes shall be located not less than 2 m from the protected area if air is not taken from the engine room itself (see 1.2, Part XIV "Requirements for Ships Carrying Dangerous Goods").

11.4.6 On ships intended for the carriage of packaged dangerous goods on dry cargo ships and in bulk on oil tankers and gas carriers (see 1.2, Part XIV "Requirements for Ships Carrying Dangerous Goods") additional requirements are imposed on ventilation of machinery spaces.

11.4.6.1 The combustion air required by the combustion engines which ensure propulsion shall not come from spaces protected by permanently fixed fire-extinguishing systems. This requirement is not mandatory if the ship has two independent main engine rooms with a gastight separation or if, in addition to the main engine room, there is a separate engine room installed with a bow thruster that can independently ensure propulsion in the event of a fire in the main engine room.

11.4.6.2 All forced ventilation systems in the space to be protected shall be shut down automatically as soon as the fire-extinguishing system is activated.

11.4.6.3 All openings in the space to be protected which permit air to enter or gas to escape shall be fitted with devices enabling them to be closed rapidly. It shall be clear whether they are open or closed.

11.4.6.4 Air escaping from the pressure-relief valves of the pressurised air tanks installed in the engine rooms shall be evacuated to the open air.

11.4.6.5 Overpressure or negative pressure caused by the diffusion of the extinguishing agent shall not destroy the constituent elements of the space to be protected. It shall be possible to ensure the safe equalisation of pressure.

11.4.6.6 Protected spaces shall be provided with a means of extracting the extinguishing agent. If extraction devices are installed, it shall not be possible to start them up during extinguishing.

11.4.6.7 Requirements of 11.4.6 are not mandatory for ships specified in 2.2, Part XIV "Requirements for Ships Carrying Dangerous Goods".

11.4.7 Ventilation of a closed engine room shall be arranged so that at an ambient temperature of 20 °C the mean temperature in the engine room shall not exceed 40 °C.".

11.6 VENTILATION OF CARGO SPACES ADAPTED FOR THE CARRIAGE OF DANGEROUS GOODS

11.6.1 has been amended to read:

"11.6.1 Ventilation of each cargo hold shall be provided by means of two mutually independent extraction ventilators having a capacity of not less than five changes of air per hour based on the volume of an empty hold. The extraction ducts shall be positioned at the extreme ends of the hold and extend down to not more than 50 mm above the bottom. The extraction of gases and vapours through the duct shall be also ensured for carriage in bulk.

Ventilators are not required on ships only carrying goods packed in containers. If the extraction ducts are movable they shall be suitable for the ventilator assembly and capable of being firmly fixed. Protection shall be ensured against bad weather and spray. The air intake shall be ensured during ventilation. Supply ventilation may be natural.

11.6.2 The ventilation system of a hold shall be arranged so that dangerous gases cannot penetrate into the accommodation, wheelhouse or engine room.”.

12.7 FUEL OIL TANKS

Has been supplemented by **12.7.8** reading as follows:

“12.7.8 Double bottoms within the hold area intended for the carriage of dangerous goods may be arranged as fuel oil tanks provided their depth is not less than 0,60 m. Fuel oil pipes and openings of such tanks are not permitted in the holds.”.

A new Part XIV ”Requirements for Ships Carrying Dangerous Goods” has been introduced:

“PART XIV. REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS

1 GENERAL

1.1 SCOPE OF APPLICATION

1.1.1 The requirements of this Part refer to ships carrying dangerous goods.

1.1.2 This Part establishes special additional requirements for ships to be complied with during carriage of dangerous goods in bulk on dry cargo ships and oil tankers.

1.1.3 The requirements of this Part do not apply to ship stores. Requirements for ship stores in respect of storage of flammable liquids, compressed air cylinders etc. are set forth in relevant parts of the present Rules.

1.2 DEFINITIONS

1.2.1 The following definitions have been adopted in this Part of the Rules.

A D N means European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterway as adopted by the Diplomatic Conference on 25 May 2000, Geneva.

A D N R e g u l a t i o n s mean the Regulations enclosed to ADN.

D a n g e r o u s g o o d s mean substances and articles the carriage of which is prohibited by ADN or authorized only under the conditions prescribed by ADN. The list of dangerous goods is set forth in Chapter 3.2 “List of Dangerous Goods” of ADN Regulations including: in numerical order – in Table A, in alphabetical order – in Table B and those accepted for carriage in tank ships in numerical order – in Table C.

C a r g o t a n k – see definitions in 1.1.1.5, Part II “Hull”.

A c c o m m o d a t i o n s p a c e s are the premises intended for the use of persons normally living on board, including galleys, food stores, lavatories, washrooms, bathrooms, laundries, alleyways, but excluding wheelhouse.

P r o t e c t e d a r e a means:

the hold or holds (when anti-explosion protection is required, comparable to zone 1);

the space situated above the deck (when anti-explosion protection is required, comparable to zone 2) bounded:

athwart ships, by vertical planes corresponding to side plating;

fore and aft, by vertical planes corresponding to end bulkheads of the hold;

upwards, by horizontal plane 2 m above the upper level of the load, but at least by a horizontal plane 3 m above the deck.

F l a m m a b l e g a s d e t e c t o r means a device allowing measuring of any significant concentration of flammable gases given off by the cargo below the lowest explosive limit and which clearly indicates the presence of higher concentrations of such gases. Flammable gas detectors may be designed for measuring flammable gases only but also for measuring both flammable gases and oxygen. This device shall be designed so that measurements are possible without the necessity of entering the spaces to be checked.

O x y g e n m e t e r means a device allowing measuring of any significant reduction of oxygen content in the air. Oxygen meters may either be a device for measuring oxygen only or part of a combination device for measuring both flammable gas and oxygen. This device shall be so designed that measurements are possible without the necessity of entering the spaces to be checked.

C o f f e r d a m – see definition in 1.1.1.5, Part II “Hull”.

N a k e d l i g h t means a source of light using a flame which is not enclosed in a flameproof enclosure.

C a r g o p u m p r o o m – see definition in 1.1.1.5, Part II “Hull”.

B u l k h e a d means a metal, generally vertical wall inside the ship and which is bounded by the bottom, the side plating, a deck, hatchway covers or by another bulkhead.

B u l k h e a d (w a t e r a n d g a s t i g h t):

in a tank ship means a bulkhead constructed to withstand a water pressure of 1 m above the deck;

in a dry cargo ship means a bulkhead constructed so that it can withstand water pressure with a head of 1 m above the deck, but at least to the top of the hatchway coaming.

Service space – see definition in 1.1.1.5, Part II "Hull".

Breathing apparatus (ambient air-dependent) means an apparatus which protects the person wearing it when working in a dangerous atmosphere by means of a suitable fiter.

Oil separator vessel means an open type **N** tank ship with a dead weight of up to 300 t, constructed and fitted to accept and carry oily and greasy wastes from the operation of ships.

Supply vessel means an open type **N** tank ship with a dead weight of up to 300 t constructed and fitted for the carriage and delivery to other ships of products intended for the operation of ships.

Tanker – see definition in 1.1.1.1, Part II "Hull".

Noxious gas meter means a device enabling to measure any significant concentration of noxious gases emitted by cargo. Such device shall be designed so that measurement could be performed without entry into space liable to measurement.

Hold – see definition in 1.1.1.5, Part II "Hull".

Hold space – see definition in 1.1.1.5, Part II "Hull".

Types of ships: **G** type, **C** type and **N** type – see definition in 1.1.1.1, Part II "Hull".

Other definitions referring to ADN Regulations are given in Chapter 1.2 "Definitions and Units of Measurement", Part 1, ADN Regulations.

1.3 SCOPE OF TECHNICAL SUPERVISION

1.3.1 General provisions referring to the procedure of classification, technical supervision of construction, classification surveys as well as the scope of technical documentation submitted to the Register for review and approval are set forth in General Regulations for the Classification and Other Activity and Part I "Classification" of the present Rules.

1.3.2 Structure, equipment and ship stores ensuring safe carriage of dangerous goods within the scope of requirements set forth in the present Part are liable to technical supervision by the Register.

1.3.3 When the ship is allowed to carry dangerous goods the documents listed in 8.1.2.1 d), e), f), g) and h) of Section 8.1 "General Requirements Applicable to Vessels and Equipment" of Part 8, ADN Regulations shall be submitted to the Register as well as those additionally provided in 8.1.2.2 b) and c) for dry cargo ships and 8.1.2.3 a), b), c), d), e), f), h), i), j), k) and l) for tankers. Damage Control Plan and intact stability documents shall be submitted to the Register for approval as well as all conditions of intact stability of ship taken into consideration during calculation of stability.

Documents shall be submitted in language comprehendible by ship crew and be translated into English.

2 REQUIREMENTS FOR STRUCTURE, EQUIPMENT AND SUPPLY OF SHIPS CARRYING DANGEROUS GOODS

2.1 REQUIREMENTS FOR DRY CARGO SHIPS CARRYING PACKAGED DANGEROUS GOODS OR DANGEROUS GOODS IN BULK AND NOT COMPLYING WITH THE REQUIREMENTS OF SECTION 2.8, PART VI "FIRE PROTECTION" OF RULES FOR THE CLASSIFIICATION AND CONSTRUCTION OF SEA-GOING SHIPS

2.1.1 The ship's hull shall be constructed of shipbuilding steel or other metal, provided that this metal has at least equivalent mechanical properties and resistance to the effects of temperature and fire.

2.1.2 Cargo holds shall comply with the following requirements:

.1 each hold shall be bounded fore and aft by watertight metal bulkheads;

.2 the holds shall have no common bulkhead with the oil fuel tanks;

.3 the bottom of the holds shall be such as to permit them to be cleaned and dried;

.4 the hatchway covers shall be spraytight and weathertight and comply with requirements of 9.5, Part III "Equipment, Arranqements and Outfit" or be covered by waterproof tarpaulins. Tarpaulins used to cover the holds shall not readily ignite;

.5 no heating appliances shall be installed in the holds.

2.1.3 Ventilation of cargo holds shall comply with requirements of 11.6, Part VII "Systems and Piping". Ventilation of cargo holds is needed if this is required by 7.1.6.12, ADN Regulations or additional prescription "VE..." in column 10, Table A, Chapter 3.2, ADN Regulations.

2.1.4 Accommodation spaces and service spaces shall comply with requirements of 13.1.1, Part III "Equipment, Arrangements and Outfit".

2.1.5 The double-hull spaces and double bottoms may be arranged for being filled with water ballast.

2.1.6 Engines shall comply with requirements of 1.1.2, Part VI "Machinery Installations".

2.1.7 Ventilation openings of engine rooms and air intakes of engines shall comply with requirements of 11.1 and 11.4, Part VII "Systems and Piping".

2.1.8 Sparking shall be precluded in the protected area.

2.1.9 Fuel oil tanks shall comply with requirements of 4.3, Part VI "Machinery Installations" and 12.7, Part VII "Systems and Piping".

2.1.10 Engine exhaust pipes shall be provided with spark arresters and shall comply with requirements of Section 10, Part VII "Systems and Piping".

The exhaust outlets shall be located not less than 2 m from the hatchway openings.

2.1.11 Cargo hold bilge system shall comply with the requirements of 6.11, Part VII "Systems and Piping".

2.1.12 Water fire main system shall comply with the requirements of 4.3.7, Part V "Fire Protection".

2.1.13 A single fire or ballast pump shall suffice on board pushed barges without their own means of propulsion.

2.1.14 Engine room shall be provided with a permanently fixed gas fire-extinguishing system complying with the requirements of 4.7, Part V "Fire Protection".

2.1.15 Ventilation of engine rooms protected by permanently fixed gas fire-extinguishing systems shall comply with requirements of 11.4.5, Part VII "Systems and Piping".

2.1.16 The space to be protected by permanently fixed gas fire-extinquishing systems shall be monitored by an appropriate fire alarm system. The alarm signal shall be audible in the wheelhouse, the accommodation and the space to be protected.

2.1.17 Spaces protected by permanently fixed gas fire-extinguishing systems shall be equipped with the fire warning alarms complying with requirements of 5.17, Part V "Fire Protection".

2.1.18 The outlets of funnels shall be located not less than 2 m from the hatchway openings. Arrangements shall be provided to prevent the escape of sparks and the entry of water.

2.1.19 Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. The installation in the engine room or other separate space of heating appliances fuelled with liquid fuel having a flashpoint above 55 °C is, however, permitted. Cooking and refrigerating appliances are permitted only in wheelhouses with metal floor and in the accommodation.

Electric lighting appliances only are permitted outside the accomodation and the wheelhouse.

2.1.20 It shall be possible to isolate the electrical equipment in the protected area by means of centrally located switches except cases when the electrical equipment complies with the requirements of 2.9, Part IX "Electrical Equipment".

2.1.21 Accumulators shall be located outside the protected area.

2.1.22 Ventilators of cargo holds shall comply with requirements of 11.6.4, Part VII "Systems and Piping".

2.1.23 Electrical cables and sockets located in the protected zone shall comply with the requirements of 2.9.7 to 2.9.12, Part IX "Electrical Equipment".

2.1.24 All metal wires passing over the cargo holds and all masts shall be earthed, unless they are electrically bonded to the metal hull of the ship through their installation.

2.1.25 The notice boards displaying the prohibition of admittance shall be clearly legible from either side of the ship.

2.1.26 The notice boards displaying the prohibition of smoking shall be clearly legible from either side of the ship.

2.1.27 Notice boards indicating the circumstances under which the prohibition applies shall be fitted near the entrances to the spaces where smoking or the use of fire or naked light is not always prohibited.

2.1.28 Ashtrays shall be provided close to each exit of the accommodation and the wheelhouse.

2.1.29 Double-hull ships intended to carry dangerous goods of Classes 2, 3, 4.1, 4.2, 4.3, 4.3, 5.1, 5.2, 6.1, 7, 8 or 9, except those for which danger label No. 1 is specified in column 5, Table A, Chapter 3.2, ADN Regulations, in quantities exceeding those referred to in 7.1.4.1.1, ADN Regulations shall comply with the requirements of 2.9, Part II "Hull", 13.1.1.4, Part III "Equipment, Arrangements and Outfit" and 3.3.5, Part IV "Stability, Subdivision and Freeboard".

2.2 REQUIREMENTS FOR DRY CARGO SHIPS CARRYING PACKAGED DANGEROUS GOODS OR DANGEROUS GOODS IN BULK AND COMPLYING WITH THE REQUIREMENTS OF SECTION 2.8, PART VI "FIRE PROTECTION" OF RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS

2.2.1 Ships shall comply with the requirements of 2.1.1, 2.1.5, 2.1.7, 2.1.8, 2.1.10, 2.1.18, 2.1.19, 2.1.24 to 2.1.29.

2.2.2 Only internal combustion engines running on a fuel having a flashpoint above 60 °C, are allowed.

2.2.3 Double-hull ships intended to carry dangerous goods of Classes 2, 3, 4.1, 4.2, 4.3, 4.3, 5.1, 5.2, 6.1, 7, 8 or 9, except those for which danger label No. 1 is specified in column 5, Table A, Chapter 3.2, ADN Regulations, in quantities exceeding those referred to in 7.1.4.1.1, ADN Regulations shall comply with the requirements of 2.9, Part II "Hull", 13.1.1.4, Part III "Equipment, Arrangements and Outfit" and 3.3.5, Part IV "Stability, Subdivision and Freeboard".

2.3 REQUIREMENTS FOR TANKERS OF TYPE G

2.3.1 The shipl's hull and the cargo tanks shall be constructed of shipbuilding steel or other at least equivalent metal.

The independent cargo tanks may also be constructed of other materials, provided these have at least equivalent mechanical properties and resistance against the effects of temperature and fire.

2.3.2 Every part of the ship including any installation and equipment which may come into contact with the cargo shall consist of materials which can neither be dangerously affected by the cargo nor cause decomposition of the cargo or react with it so as to form harmful or hazardous products.

2.3.3 It is prohibited to use wood, aluminium alloys or plastic materials except where explicitly permitted in 2.3.4 below within cargo spaces.

2.3.4 The use of wood, aluminium alloys or plastic materials within cargo area is only permitted for:

products listed in 13.2.1, Part III "Equipment, Arrangements and Outfit";

movable items of equipment;

chocking of cargo tanks which are independent of the ship's hull and chocking for installations and equipment;

engine parts;

parts of the electrical installation;

lids of boxes which are placed on the deck.

The use of wood or plastic materials within the cargo area is only permitted for supports and stops of any kind.

The use of plastic materials or rubber within the cargo area is only permitted for:

products listed in 13.2.1, Part III "Equipment, Arrangements and Outfit";

electric cables;

hoses for loading and unloading;

insulation of cargo tanks and of hoses for loading and unloading.

2.3.5 All permanently fitted materials in the accommodation or wheelhouse, with the exception of furniture, shall not readily ignite. They shall not evolve fumes or toxic gases in dangerous quantities, if involved in a fire (see 1.6, Part VI "Fire Protection" of Rules for the Classification and Construction of Sea-Going Ships).

2.3.6 The paint used in the cargo area shall not be liable to produce sparks in case of impact.

2.3.7 Ship lifeboats shall comply with the requirements of 13.2.2, Part III "Equipment, Arrangements and Outfit".

2.3.8 The ship shall be designed so as to prevent gases from penetrating into the accommodation and the service spaces.

2.3.9 Requirements of 13.2.2 to 13.2.5, Part III "Equipment, Arrangements and Outfit" shall be complied with in respect of protection against penetration of gases into accommodation and service spaces.

2.3.10 Cargo tanks shall comply with the requirements of 3.1.2.1, Part II "Hull".

2.3.11 Within cargo area hull shall be designed in compliance with the requirements of 3.1, Part II "Hull".

2.3.12 The hold spaces shall be separated from the accommodation and service spaces outside the cargo area below deck by A-60 class bulkheads.

All spaces in the cargo area shall be capable of being ventilated. Means for checking their gas-free condition shall be provided.

2.3.13 The bulkheads bounding the hold spaces shall comply with requirements of 13.2.5, Part III "Equipment, Arrangements and Outfit".

2.3.14 Double-hull spaces and double bottoms in the cargo area shall be arranged for being filled with ballast water only. Double bottoms may, however, be used as oil fuel tanks, provided they comply with the requirements of 2.3.31.

2.3.15 A space in the cargo area below deck may be arranged as a service space provided it shall comply with the requirements of 13.2.6 and 13.2.7, Part III "Equipment, Arrangements and Outfit".

2.3.16 Pipes for loading and unloading may be fitted in the cargo pump rooms below deck only if the requirements of 2.3.23 are complied with.

2.3.17 Hold spaces and other accessible spaces within the cargo area shall comply with the requirements of 13.2.8, Part III "Equipment, Arrangements and Outfit".

2.3.18 Ventilation system shall comply with the requirements of 9.7 and 11.6, Part VII "Systems and Piping".

2.3.19 Ship stability shall comply with the requirements of 3.3.5, Part IV "Stability, Subdivision and Freeboard".

2.3.20 Engine rooms shall comply with the requirements of 4.2.6 and 4.5.9, Part VI "Machinery Installations".

2.3.21 Accommodation and service spaces, wheelhouse shall comply with the requirements of 13.2.9 to 13.2.12, Part III "Equipment, Arrangements and Outfit".

2.3.22 Penetrations through the bulkheads shall comply with the following requirements:

.1 driving shafts of the bilge and ballast pumps within cargo area may penetrate through the bulkhead between the service space and the engine room, provided the arrangement of the service space is in compliance with 2.3.15. The penetration of the shaft through the bulkhead shall be gastight and shall be approved by the Register. The necessary operating instructions shall be displayed;

.2 penetrations through the bulkhead between the engine room and the service space in the cargo area, and the bulkhead between the engine room and the hold spaces may be provided for the electric cables, hydraulic lines and piping for control for measuring control and alarm systems, provided that penetrations are gastight. Penetrations through A-60 bulkhead shall have equivalent fire protection;

.3 pipes may pass through the bulkhead between the engine room and the service space in the cargo area provided that these are pipes between the machinery in the engine room and the service space which do not have any openings within the service space and which are provided with shut-off devices at the bulkhead in the engine room;

.4 irrespective of requirements of 2.3.22.3 the pipelines from the engine room may pass through the service space in the cargo area, cofferdam, hold or double side if they are thick and have neither flanges nor openings within this service space;

.5 where a driving shaft of auxiliary machinery penetrates through a bulkhead located above the deck the penetration shall be gastight.

2.3.23 A service space located the cargo area below deck shall not be used as cargo pump room except where:

.1 the pump room is separated from the engine room or from service spaces outside the cargo area by a cofferdam a bulkhead with an A-60 fire protection insulation;

.2 the A-60 bulkhead required above doesn't include penetrations referred to in 2.3.22.1;

.3 ventilation exhaust outlets are located not less than 6 m from entrances and openings of the accommodation and service spaces;

.4 the access hatches and ventilation inlets can be closed from outside;

.5 all pipes for loading and unloading shall be laid on open deck above the pump room. The necessary cargo operations, starting and stopping pumps or compressors shall be effected from upper deck;

.6 there shall be atmosphere control system complying with the requirements of 9.14, Part VIII "Systems and Piping" of Rules for the Classification and Construction of Sea-Going Ships installed in cargo pump room;

.7 ventilation system shall comply with requirements of 9.7.3, Part VII "Systems and Piping" at a capacity of at least 30 air changes per hour.

2.3.24 The following instruction shall be displayed at the entrance of the cargo pump room: "Before entering the cargo pump room check whether it is free from gases and contains sufficient oxygen. Do not open doors and entrance openings without the permission of the master. Leave immediately in the event of alarm".

2.3.25 There shall be an inert gas system onboard complying with the requirements of 3.5, Part VI "Fire Protection" of Rules for the Classification and Construction of Gas Carriers.

2.3.26 Cargo tanks shall be fitted with the instruments according to the requirements of Part VIII "Instrumentation" of Rules for the Classification and Construction of Gas Carriers.

2.3.27 Cargo tanks openings and cargo pipes shall be located within cargo area and be fitted with shut-off fittings tailored for the test pressure of cargo tank. Test pressure of cargo tanks shall be assigned in accordance with requirements of Section 11, Part IV "Cargo Tanks" of Rules for the Classification and Construction of Gas Carriers. Pipelines of cargo and gas exhaust systems shall be within cargo area and comply with requirements of Part VI "Systems and Piping" of Rules for the Classification and Construction of Gas Carriers.

2.3.28 In cases specified in column 9, Table C, Chapter 3.2, ADN Regulations the ships shall be equipped with two independent refrigerant equipments complying with requirements of Section 4, Part VI "Systems and Piping" of Rules for the Classification and Construction of Gas Carriers.

2.3.29 When water-spray system is required in column 9, Table C, Chapter 3.2, ADN Regulations a water-spray system shall be installed whithin the cargo area on deck intended for spraying of the whole cargo area surface by water. The spray-nozzles shall be installed so that to cover the whole area of cargo deck.

Such system shall be equipped with a connection device to feed it from shore.

The system shall be operated from wheelhouse or from deck.

The outflow of water shall be supplied through spray-nozzles at least 50 l per 1 m^2 of cargo deck per hour.

2.3.30 Engines shall comply with the requirements of 1.1.2, 4.6.3 and 5.3.3.4, Part VI "Machinery Installations" as well as 11.1.8 and 11.1.9, Part VII "Systems and Piping".

2.3.31 Fuel oil tanks shall comply with requirements of 4.3, Part VI "Machinery Installations" and 12.7, Part VII "Systems and Piping".

2.3.32 Engine exhaust pipes shall be fitted with spark arresters and they shall comply with requirements of Section 10, Part VII "Systems and Piping".

2.3.33 Water fire main system shall comply with the requirements of 4.3.7, Part V "Fire Protection".

2.3.34 The engine room, the cargo pump room and all spaces containing special equipment (switchboards, compressors etc.) for the refrigerant equipment, if any, shall be equipped with permanently fixed gas fire-extinguishing system complying with requirements of 4.7, Part V "Fire Protection".

2.3.35 Ventilation of engine rooms protected by permanently fixed gas fire-extinguishing systems shall comply with requirements of 11.4.6, Part VII "Systems and Piping".

2.3.36 The space to be protected by permanently fixed gas fire-extinguishing system shall be monitored by an appropriate fire alarm system. The alarm signal shall be audible in the wheelhouse, the accommodation and the space to be protected.

2.3.37 Spaces to be protected by permanently fixed gas fire-extinguishing systems shall be equipped with the fire warning alarms complying with requirements of 5.17, Part V "Fire Protection".

2.3.38 The outlets of funnels shall be located not less than 2 m from the hatchway openings. Arrangements shall be provided to prevent the escape of sparks and the entry of water.

2.3.39 Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels.

The installation in the engine room or other separate space of heating appliances fuelled with liquid fuel having a flashpoint above 55 °C is, however, permitted. Cooking and refrigerating appliances are permitted only in wheelhouses with metal floor and in the accommodation.

Electric lighting appliances only are permitted outside the accomodation and the wheelhouse.

2.3.40 Electrical equipment shall comply with requirements of 19.2, Part IX "Electrical Equipment".

2.3.41 In cargo space metal parts of electrical equipment shall be earthed according to the requirements of 2.5, Part IX "Electrical Equipment".

Independent tanks shall be earthed to hull.

There shall be capability for earthing to hull of metal containers and tank containers used as tanks for cargo residues or slop tank.

2.3.42 Electrical cables and sockets located in the protected area shall comply with the requirements of 2.9.12 to 2.9.17, Part IX Electrical Equipment".

2.3.43 Shower and sink in a place directly accessible from cargo space shall be fitted onboard.

2.3.44 The notice boards displaying the prohibition of admittance shall be clearly legible from either side of the ship.

2.3.45 The notice boards displaying the prohibition of smoking shall be clearly legible from either side of the ship.

2.3.46 Notice boards indicating the circumstances under which the prohibition is applicable shall be fitted near the entrances to the spaces where smoking or the use of fire or naked light is not always prohibited.

2.3.47 Ashtrays shall be provided close to each exit of the accommodation and the deckhouse.

2.3.48 Emergency exit from spaces shall be provided according to the requirements of 13.2.13, Part III "Equipment, Arrangements and Outfit".

2.4 REQUIREMENTS FOR TANKERS OF TYPE C

2.4.1 Tankers of type **C** shall comply with the requirements of 2.3.1 to 2.3.12, 2.3.14, 2.3.16 to 2.3.18, 2.3.20 to 2.3.25, 2.3.29 to 2.3.48.

2.4.2 Cargo tanks shall comply with the requirements of 3.1, Part II "Hull".

2.4.3 Within cargo area the ship shall be designed in accordance with the requirements of 3.1.3, Part II "Hull".

2.4.4 There shall be facilities for ventilation of all spaces located within the cargo area. Detection of gas or vapours of transported cargo in accordance with 9.14.1 and 9.14.2, Part VIII "Systems and Piping" of Rules for the Classification and Construction of Sea-Going Ships.

2.4.5 Bulkheads bounding cargo tanks, cofferdams and holds shall comply with the requirements of 13.3.2, Part III "Equipment, Arrangements and Outfit".

2.4.6 Cofferdam, the central part of cofferdam or other space below deck within cargo area may be equipped as service space if they comply with the requirements of 13.3.3, Part III "Equipment, Arrangements and Outfit".

2.4.7 There shall be facility for filling cofferdams with water and drying them by means of a pump which is required by 13.3.3, Part III "Equipment, Arrangements and Outfit". Filling shall take not more than 30 min. This requirement is not applicable if a bulkhead between engine room and cofferdam is A-60 fire protected or when a cofferdam is equipped as a service space. Cofferdams shall have no charging valve.

It is not allowed to connect cofferdam with other ship pipelines outside cargo area by permanent pipe.

Ventilation openings shall be fitted with flame arresters.

2.4.8 Ship stability shall comply with requirements of 3.3.5, Part IV "Stability, Subdivision and Freeboard".

2.4.9 Cargo tanks shall be fitted with safety and control devices according to requirements of Part VIII "Instrumentation" of Rules for the Classification and Construction of Chemical Tankers.

2.4.10 Openings and pipelines of cargo tanks shall be fitted with closing devices capable to withstand cargo tank test pressure. Pipelines of cargo and gas exhaust system and inert gas system shall be located within cargo area and comply with requirements of Part VI "Systems and Piping" of Rules for the Classification and Construction of Chemical Tankers.

2.4.11 There shall be at least one tank for cargo residues and one settling tank onboard which shall comply with 9.3.2.26, ADN Regulations.

2.4.12 Cargo heating system shall comply with the requirements of Section 2, Part VI "Systems and Piping" of Rules for the Classification and Construction of Chemical Tankers.

2.5 REQUIREMENTS FOR TANKERS OF TYPE N

2.5.1 Tankers of type **N** shall comply with requirements of 2.4 as well as requirements of 13.4, Part III "Equipment, Arrangements and Outfit".

2.5.2 Some requirements of 2.4 may not be applied to open type **N** tankers or oil recovery ships and supply vessels if there is a special recommendation in 9.3.3, ADN Regulations.

2.6 REQUIREMENTS FOR SUPPLY OF SHIPS

2.6.1 In addition to the fire-extinguishing appliances prescribed in Section 6, Part V "Fire Protection" each ship shall be equipped with at least two additional portable fire-extinguishers having the same capacity. The fire-extinguishing agent contained in these additional portable fire-extinguishers shall be suitable and sufficient in quantity for fighting fires involving the dangerous goods carried.

2.6.2 Insofar as the provisions of Tables A or C, Chapter 3.2, ADN Regulations require, the following equipment shall be available on board:

.1 PP: for each member of the crew, a pair of protective goggles, a pair of protective gloves, a protective suit and a suitable pair of protective shoes (or protective boots, if necessary). On board tank ships, protective boots are required in all cases;

.2 EP: a suitable escape device for each person on board;

.3 EX: a flammable gas detector with the instructions for its use;

.4 TOX: a toximeter with the instructions for its use;

.5 A: a breathing apparatus ambient air-dependent.

2.6.3 Additional protective outfit and equipment specified by shipper in written instructions shall be submitted by the shipper and be kept onboard.

2.6.4 In case of pushers or moored groups it is enough that pushers or ships escorting moored groups are fitted with equipment listed in 2.4.2 if this equipment is listed in Tables A and C, Chapter 3.2, ADN Regulations.

2.7 REQUIREMENTS FOR SHIPS IN SERVICE

2.7.1 Ships in service shall comply with applicable requirements of ADN Regulations keeping due note of provisions of 1.6.7 "Transitional Provisions Concerning Vessels", Part 1, "General Provisions", ADN Regulations.".

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