



RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER

No. 312-09-1795c

dated 15.07.2022

Re:

amendments to the Rules for the Classification and Construction of Sea-Going Ships, 2022, ND No. 2-020101-152-E

Item(s) of supervision:

ships under construction and technical documentation

Entry-into-force date:

01.08.2022

Cancels / amends / adds Circular Letter No.

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Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Part I "Classification", Part VI "Fire Protection" and Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the Rules for the Classification and Construction of Sea-Going Ships

Director General

Konstantin G. Palnikov

Text of CL:

We hereby inform that the Rules for the Classification and Construction of Sea-Going Ships shall be amended as specified in the Appendices to the Circular Letter.

It is necessary to do the following:

1. Bring the content of the Circular Letter to the notice of the RS surveyors, interested organizations and persons in the area of the RS Branch Offices' activity.
 2. Apply the provisions of the Circular Letter during review and approval of the technical documentation on ships (or equipment installed on board the ships, or products/machinery installed on board the ships) contracted for construction or conversion on or after 01.08.2022, in the absence of a contract, during review and approval of technical documentation on ships requested for review on or after 01.08.2022.
 3. Apply the provisions of the Circular Letter during review of technical documentation on ships under construction and in service upon requests of interested organizations.
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List of the amended and/or introduced paras/chapters/sections:

Part I: Table 2.5, paras 3.2.8.1.4 — 3.2.8.1.8, 3.2.8.2.10 — 3.2.8.2.17, 3.3.8.12 — 3.3.8.15 and 3.4.8.1 — 3.4.8.6

Part VI: para 6.7.1

Part XVII: paras 9.10.2.4 — 9.10.2.7, 9.10.3.5 — 9.10.3.7, 9.10.4.1, 9.10.4.4, 9.10.6 and Section 24

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**Information on amendments introduced by the Circular Letter
(for inclusion in the Revision History to the RS Publication)**

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
1	Part I, Table 2.5	New item 2.29 has been introduced containing description of distinguishing mark Open cargo hatch	312-09-1795c of 15.07.2022	01.08.2022
2	Part I, paras 3.2.8.1.4 — 3.2.8.1.8	Para 3.2.8.1.4 has been deleted. Existing paras 3.2.8.1.5 — 3.2.8.1.8 and references thereto have been renumbered 3.2.8.1.4 — 3.2.8.1.7 accordingly	312-09-1795c of 15.07.2022	01.08.2022
3	Part I, paras 3.2.8.2.10 — 3.2.8.2.17	Para 3.2.8.2.10 has been deleted. Existing paras 3.2.8.2.11 — 3.2.8.2.17 have been renumbered 3.2.8.2.10 — 3.2.8.2.16 accordingly	312-09-1795c of 15.07.2022	01.08.2022
4	Part I, paras 3.3.8.12 — 3.3.8.15	Para 3.3.8.12 has been deleted. Existing paras 3.3.8.13 — 3.3.8.15 have been renumbered 3.3.8.12 — 3.3.8.14 accordingly	312-09-1795c of 15.07.2022	01.08.2022
5	Part I, paras 3.4.8.1 — 3.4.8.6	Para 3.4.8.1 has been deleted. Existing paras 3.4.8.2 — 3.4.8.6 have been renumbered 3.4.8.1 — 3.4.8.5 accordingly	312-09-1795c of 15.07.2022	01.08.2022
6	Part VI, para 6.7.1	Requirements for protection of hatchcoverless cargo holds of container ships and ships equipped for the carriage of containers by a fixed water-spraying system have been introduced	312-09-1795c of 15.07.2022	01.08.2022
7	Part XVII, para 9.10.2.4	Requirement for tank connection spaces of an independent LNG tank has been specified	312-09-1795c of 15.07.2022	01.08.2022
8	Part XVII, para 9.10.2.5	Requirement for automatic shutdown of submersible fuel pumps has been introduced	312-09-1795c of 15.07.2022	01.08.2022
9	Part XVII, para 9.10.2.6	Requirement for provision of additional pressure indicators has been introduced	312-09-1795c of 15.07.2022	01.08.2022
10	Part XVII, para 9.10.2.7	Requirement for fuel tanks has been introduced	312-09-1795c of 15.07.2022	01.08.2022

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
11	Part XVII, para 9.10.3.5	Requirement for equipment of fuel tanks with high liquid level alarms has been introduced	312-09-1795c of 15.07.2022	01.08.2022
12	Part XVII, para 9.10.3.6	Requirement has been introduced for an additional sensor that operates independently of high liquid level alarm	312-09-1795c of 15.07.2022	01.08.2022
13	Part XVII, para 9.10.3.7	Requirements for arrangements for overriding the overflow control system have been introduced	312-09-1795c of 15.07.2022	01.08.2022
14	Part XVII, para 9.10.4.1	List of spaces to be fitted with effective gas detection systems has been specified. Reference to table with measures to automatically shut down gas-fuel supply to the space has been amended	312-09-1795c of 15.07.2022	01.08.2022
15	Part XVII, para 9.10.4.4	Requirement for gas detection equipment, audible and visible alarms has been introduced. Requirements of existing para 9.10.4.4 have been transferred to new para 9.10.6.2. References to para 9.10.4.4 have been renumbered 9.10.6.2	312-09-1795c of 15.07.2022	01.08.2022
16	Part XVII, para 9.10.6	New para 9.10.6 containing requirements for safety system functions has been introduced	312-09-1795c of 15.07.2022	01.08.2022
17	Part XVII, Table 9.10.6.2	New monitored parameters have been introduced	312-09-1795c of 15.07.2022	01.08.2022
18	Part XVII, para 9.10.6.3	New para has been introduced containing list of monitored parameters for fuel installation using gases or low-flashpoint fuels	312-09-1795c of 15.07.2022	01.08.2022
19	Part XVII, Section 24	New Section has been introduced containing requirements for ships carrying containers and general cargo ships with partially or completely hatchcoverless cargo holds	312-09-1795c of 15.07.2022	01.08.2022

**RULES FOR THE CLASSIFICATION AND CONSTRUCTION
OF SEA-GOING SHIPS, 2022**

ND No. 2-020101-152-E

PART I. CLASSIFICATION

2 CLASS OF A SHIP

1 **Table 2.5. New item 2.29** is introduced reading as follows:

2.28 Distinguishing mark confirming the possibility of ship operation with open cargo hatches or partially or completely hatchcoverless cargo holds		
Open cargo hatch	Distinguishing mark assigned to: general cargo ships, the cargo hatches of which may be completely or partially open, or the hatch covers of which are temporarily removed during sea voyage; container ships and ships equipped for the carriage of containers designed such that one or more cargo holds are not fitted with hatch covers	Rules for the Classification and Construction of Sea-Going Ships Part VI "Fire Protection", 1.2.1, footnote 9 in Table 3.1.2, 3.1.2.13, 3.2.6.2, 3.8.1.5, 4.2.1.7, 4.3.1, 5.1.2, items 3.5 and 19 of Table 5.1.2, 5.1.24, 7.2 Part VIII "Systems and Piping", 7.6.13 Part XI "Electrical Equipment", 2.1.2.2, Section 3, 9.4 Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", Section 24

3 TECHNICAL DOCUMENTATION

2 **Para 3.2.8.1.4** is deleted. **Existing paras 3.2.8.1.5 — 3.2.8.1.8** and references thereto are renumbered **3.2.8.1.4 — 3.2.8.1.7** accordingly.

3 **Para 3.2.8.2.10** is deleted. **Existing paras 3.2.8.2.11 — 3.2.8.2.17** are renumbered **3.2.8.2.10 — 3.2.8.2.16** accordingly.

4 **Para 3.3.8.12** is deleted. **Existing paras 3.3.8.13 — 3.3.8.15** are renumbered **3.3.8.12 — 3.3.8.14** accordingly.

5 **Para 3.4.8.1** is deleted. **Existing paras 3.4.8.2 — 3.4.8.6** are renumbered **3.4.8.1 — 3.4.8.5** accordingly.

PART VI. FIRE PROTECTION

**6 REQUIREMENTS FOR FIRE PROTECTION OF SPECIAL PURPOSE SHIPS
AND SPECIAL FACILITIES ON SHIPS**

6 **Para 6.7.1** is replaced by the following text:

"6.7.1 For open-top container holds and on deck container stowage areas on container ships and other ships designed to carry containers on or above the weather deck, fire

protection arrangements shall be provided for the purpose of containing a fire in the space or area of origin and cooling adjacent areas to prevent fire spread and structural damage.

Hatchcoverless cargo holds of container ships and ships equipped for the carriage of containers shall be fitted with a fixed water-spraying system in compliance with 24.10.1 — 24.10.3 of Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships".

PART XVII. DISTINGUISHING MARKS AND DESCRIPTIVE NOTATIONS IN THE CLASS NOTATION SPECIFYING STRUCTURAL AND OPERATIONAL PARTICULARS OF SHIPS

9 REQUIREMENTS FOR SHIPS EQUIPPED FOR USING GASES OR LOW-FLASHPOINT FUELS

7 **Para 9.10.2.4** is replaced by the following text:

9.10.2.4 A drain well in each space for tank connections of an independent LNG tank shall be provided with level indicators and temperature indicating devices. As a result of temperature sensor activation, the master gas valve of the tank shall be automatically closed.

Upper level indicator shall activate an alarm. The "level indicator" is understood as a device designed to indicate an alarm status only, e.g. a float switch installed in LNG tank storage space."

8 **Para 9.10.2.5** is replaced by the following text:

9.10.2.5 The LNG tanks shall be provided with level indicators as well as arrangements giving visual and audible lower liquid level signals and ensuring automatic shutdown of motors of fixed and submersible fuel pumps with subsequent visual and audible alarm. These signals shall be given at the navigation bridge, continuously manned central control station or onboard safety centre.

The automatic shutdown of submersible fuel pumps may be accomplished by sensing low pump discharge pressure, low motor current, or low-liquid level."

9 **New para 9.10.2.6** is introduced reading as follows:

9.10.2.6 FST hold spaces and interbarrier spaces without open connection to the atmosphere shall be provided with pressure indicators."

10 **New para 9.10.2.7** is introduced reading as follows:

9.10.2.7 Except for fuel storage tanks of type C supplied with vacuum insulation system and pressure build-up fuel discharge unit, fuel tanks shall be provided with devices to measure and indicate the temperature of the fuel in at least three locations: the bottom and middle of the tank as well as the top of the tank below the highest allowable liquid level."

11 **New para 9.10.3.5** is introduced reading as follows:

9.10.3.5 Liquefied gas fuel tanks shall be fitted with high liquid level alarms operating independently of other liquid level indicators and giving an audible and visual warning when activated."

12 **New para 9.10.3.6** is introduced reading as follows:

9.10.3.6 An additional sensor shall be provided that operates independently of the high tank liquid level alarm and automatically closes the master gas valve of the tank in a manner that will both avoid excessive liquid pressure in the bunkering line and prevent the fuel tank from becoming liquid full."

13 **New para 9.10.3.7** is introduced reading as follows:

"**9.10.3.7** Where arrangements are provided for overriding the overflow control system, they shall be such that inadvertent operation is prevented. When this override is operated continuous visual indication is to be provided at the navigation bridge, continuously manned central control station or onboard safety centre."

14 **Para 9.10.4.1** is replaced by the following text:

"**9.10.4.1** All enclosed and semi-enclosed gas-dangerous spaces, except for fuel storage hold spaces of independent tanks of type C, as well as ventilation inlets to accommodation and machinery spaces if required based on the risk assessment shall be provided with effective gas detection systems in areas of its possible accumulation and leakage.

The number of detectors to be fitted in each space is subject to special consideration in each case with due regard to the size and configuration of the space.

When the gas concentration equal to 20 % of the lower explosion limit is reached in the controlled space, visual and audible alarm is to be given on the bridge. In ventilation ducts containing gas-fuel pipes, the alarm shall be given when the concentration equal to 30 % of the lower explosion limit is reached. If the concentration equal to 40 % of the lower explosion limit is reached, measures (at least those stated in Table 9.10.6.2) to automatically shut down gas-fuel supply to the space shall be taken."

15 **Para 9.10.4.4** is replaced by the following text:

"**9.10.4.4** The gas detection equipment shall be of a type approved (by the Register) and comply with IEC 60079-29-1:2016. Audible and visible alarms from the gas detection equipment shall be located on the navigation bridge or in the continuously manned central control station. Gas detection shall be continuous without delay."

16 **New para 9.10.6** is introduced reading as follows:

"9.10.6 Safety system functions.

9.10.6.1 Gas compressors, pumps and fuel supply shall be arranged for manual remote emergency stop from the following locations as applicable:

- navigation bridge;
- cargo control room;
- onboard safety centre;
- engine control room;
- fire control station;
- adjacent to the exit of fuel preparation rooms.

The gas compressors shall also be arranged for manual local emergency stop.

9.10.6.2 Where gas-fuel leakage is found and in case of system failure, the safety system shall automatically activate regulating functions stated in Table 9.10.6.2.

Table 9.10.6.2

Monitored parameter	Alarm	Automatic closure of master gas fuel valve ⁷	Automatic shutdown of gas supply to consumers in machinery space	Notes
Gas detection in gas fuel tank storage room above 20 % LEL	x			Except for fuel storage hold spaces for type C independent tanks
Gas detection by two detectors ¹ in gas fuel tank storage room above 40 % LEL	x	x		Except for fuel storage hold spaces for type C independent tanks
Gas detection in tank connection space above 20 % LEL	x			
Gas detection by two detectors ¹ in tank connection space above 40 % LEL	x	x		
Fire detection in gas fuel tank storage room	x	x		
Bilge well high level in tank connection space	x			
Bilge well low temperature in tank connection space	x	x		

Monitored parameter	Alarm	Automatic closure of master gas fuel valve ⁷	Automatic shutdown of gas supply to consumers in machinery space	Notes
Gas detection in the duct between gas fuel tank and machinery space containing gas consumers above 20 % LEL	x			
Gas detection by two detectors ¹ in the duct between gas fuel tank and machinery space containing gas consumers above 40 % LEL	x	x ²	x ²	
Gas detection in fuel preparation room above 20 % LEL	x			
Gas detection by one of two detectors ¹ in fuel preparation room above 40 % LEL	x	x ²		
Gas detection in gas compressor room above 20 % LEL	x			
Gas detection by one of two detectors ¹ in gas compressor room above 40 % LEL	x	x ²		
Gas detection in the duct inside machinery space containing gas consumers above 30 % LEL	x			If double pipes are provided for gas supply to consumers
Gas detection by two detectors ¹ in a duct inside machinery space containing gas consumers above 60 % LEL	x		x ³	If double pipes are provided for gas supply to consumers
Gas detection in machinery space containing gas consumers above 20 % LEL	x			Gas detectors are required for protection of gas-dangerous machinery spaces only
Gas detection by one of two detectors ¹ in machinery space containing gas consumers above 40% LEL	x		x	Gas detectors are required only for protection of gas-dangerous machinery spaces containing gas consumers. The non-explosion proof equipment in the machinery spaces with gas consumers shall be also disconnected
Loss of ventilation in the duct between tank and machinery space containing gas consumers ⁶	x		x ^{2,4}	
Loss of ventilation in the duct inside machinery space containing gas consumers ⁶	x		x ^{3,4}	If double pipes are provided for gas supply to consumers
Loss of ventilation in machinery space containing gas consumers	x		x	For protection of gas-dangerous machinery spaces only
Fire detection in machinery space containing gas consumers	x		x	
Abnormal gas pressure in gas supply pipe	x		x ⁴	
Failure in valve control system	x		x ⁵	Time delay as found necessary
Automatic shutdown of engine (engine failure)	x		x ⁵	
Emergency shutdown of engine (manually or by operator)	x		x	
<p>¹ Two independent gas detectors located close to each other are required for redundancy reasons. If gas detectors are of self-monitoring type, the installation of a single gas detector is permitted.</p> <p>² If the gas fuel tank is supplying gas to more than one consumer and different supply pipes are completely separated and fitted in separate ducts with an individual master valve fitted outside of the duct, only the master valve leading into the duct where gas or loss of ventilation is detected shall close.</p> <p>³ If the gas fuel is supplied to more than one consumer and different supply pipes are completely separated and fitted in separate ducts with an individual master valve fitted outside of the duct and machinery space, only the master valve leading into the duct where gas or loss of ventilation is detected shall close.</p> <p>⁴ This parameter shall not lead to shutdown of gas supply for single-fuel gas engines. Applicable for dual-fuel gas engines only.</p> <p>⁵ Only for the case of 3 valves activation, as specified in 9.5.4.4.</p> <p>⁶ If the duct is protected by inert gas (refer to 9.5.5.1.1), then loss of inert gas pressure shall lead to the same actions, as specified in this table.</p> <p>⁷ Valves specified in 9.5.4.1.</p>				

9.10.6.3 Monitored parameters of the fuel installation using gases or low-flashpoint fuels, measuring points, limiting values of parameters and types of automatic protection and indication shall be found in Table 9.10.6.3.

Table 9.10.6.3

Nos.	Monitored parameter	Indication, alarm	Automatic protection
1	Fuel storage system		
1.1	Fuel level in fuel storage tank	●↑↓	■ ¹
1.2	Pressure in tank where fuel is stored as liquefied gas	●↑↓ ²	—
1.3	Submersible fuel pump, low liquid level in tank	↓	□
1.4	Submersible fuel pump, low motor current	↓	□
1.5	Submersible fuel pump, discharge pressure in discharge line	↓	□
1.6	Temperature of fuel in tank	●	—
1.7	Pressure in fuel storage hold space without open connection to the atmosphere	●	—
1.8	Pressure in interbarrier space without open connection to the atmosphere	●	—
2	Fuel supply system		
2.1	Fuel pump, discharge pressure in discharge line	●	—
2.2	Bunker line, pressure in liquid fuel line	●	—
2.3	Bunker line, pressure in gas vapour line	●	—
2.4	Gas pressure at heat exchanger outlet	●↑↓	—
2.5	Gas temperature at heat exchanger outlet	●↓	—
2.6	Heating medium temperature at heat exchanger outlet	↓	—
2.7	Heating medium flow in heat exchanger	↓	—
2.8	Heating medium expansion tank for fuel heating system, level of heating medium in tank	↓	—
3	Compressors		
3.1	Gas compressor, suction pressure	↓	×
3.2	Gas compressor, discharge pressure	●↑↓	×
3.3	Gas compressor, discharge temperature	↑	×
3.4	Lubricating oil pressure	↓	×
3.5	Lubricating oil temperature	↑	×
3.6	Rotor displacement or vibration ³	↑	×
3.7	Bearing temperature ³	↑	×
3.8	Temperature of bulkhead shaft glands and bearings	●↑	—
4	Spaces, gas monitoring devices		
4.1	Airlock, more than one door moved from closed position	○	—
4.2	Airlock, gas concentration in space	↑	—
4.3	Bunkering station, gas concentration in space (if required)	↑	—
4.4	Heating medium expansion tank for fuel heating system, gas concentration in tank	↑	—
4.5	O ₂ concentration in N ₂ generation and storage space	↓	—
<p>Symbols:</p> <ul style="list-style-type: none"> ● — remote indication; ↑ — alarm for high value; ↓ — alarm for low value; ○ — alarm; □ — pump shutdown; ■ — automatic closure of master valve of fuel tank; × <p>¹Three independent devices for indication, alarm and closure of master valve. ²Low-pressure alarm if vacuum protection is required. ³For centrifugal compressors.</p>			

17 **New Section 24** is introduced reading as follows:

"24 REQUIREMENTS FOR SHIPS CARRYING CONTAINERS AND GENERAL CARGO SHIPS WITH PARTIALLY OR COMPLETELY HATCHCOVERLESS CARGO HOLDS

24.1 GENERAL PROVISIONS AND SCOPE OF APPLICATION

24.1.1 The requirements for the distinguishing mark **Open cargo hatch** are based on the provisions of IMO circular MSC/Circ.608/rev.1 "Interim Guidelines for Open-top Containerships", adopted on 5 July 1994.

The application of the provisions of this Section and the IMO circular mentioned above for any sea voyage shall be agreed with the Register and the Flag State Maritime Administration, including agreement on the possibility of drawing up and issuing an exemption certificate in accordance with the International Convention on Load Lines (application to MA is required only for ships, to which the provisions of the International Convention on Load Lines are applicable).

24.1.2 The distinguishing mark **Open cargo hatch** may be inserted into the class notation of:

container ships and ships equipped for the carriage of containers designed such that one or more cargo holds are not fitted with hatch covers; or

general cargo ships where the cargo hatches may be completely or partially open or where the hatch covers are temporarily removed during sea voyage, and complying with the provisions of IMO circular MSC/Circ.608/rev.1 "Interim Guidelines for Open-top Containerships", adopted on 5 July 1994, taking into account the provisions of this Section.

24.2 DEFINITIONS

24.2.1 The definitions in this Section are additional to those specified in 1.1 of Part I "Classification", Part IV "Stability", Part V "Subdivision", in 1.2 of the Load Line Rules for Sea-Going Ships.

Maximum sustained speed is defined as the maximum service speed taking into account speed loss due to resistance increase in regular waves. Voluntary speed loss in waves is not taken into consideration.

Minimum ship manoeuvring speed is defined to be the minimum speed which maintains directional control and is consistent with the operating characteristics of the ship.

Green water is large mass of sea water other than spray shipped aboard the ship under normal operational conditions.

24.3 TECHNICAL DOCUMENTATION

24.3.1 To assess compliance with the provisions of this Section, the following documentation shall be submitted to the Register (AG — for agreement, taking into account 8.2 of Part II "Technical Documentation" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships):

.1 Assessment of seaworthiness and ingress of green water (AG), containing, as a minimum, a report with the results of:

computational modelling of motions in regular and irregular waves and ingress of green water;

model tests of seaworthiness and ingress of green water in the ship model basin (model tests shall comply with 24.4), documentation of the process of carrying out model experiments shall be accompanied by a video recording to be attached to the report;

freeboard calculation.

.2 Analysis of the conformity of the means for cargo hold bilge dewatering with the requirements of IMO circular MSC/Circ.608/rev.1 (AG);

.3 stability and damage stability calculations taking into account the possible flooding of cargo holds (AG);

.4 calculations of general longitudinal and local strength of the hull taking into account the possible flooding of cargo holds (AG).

24.4 PROCEDURE OF MODEL TESTS

24.4.1 The model tests shall be carried out in long-crested, irregular waves. The Pierson-Moskowitz, JONSWAP, Bretschneider wave spectrum generated for the purpose of these experiments shall have a significant wave height of approximately 11 m with 3 % probability of exceeding level, at the most unfavourable realistic wave period as determined by calculation or previous testing experience.

For ships of restricted service, model tests may be carried in waves with a height corresponding to the limit set out for the given area of navigation in accordance with 2.2.5 of Part I "Classification".

24.4.2 For ships operating in restricted areas of navigation, in agreement with the Register and if necessary with the MA, other spectra may be allowed for model tests.

24.4.3 The effect of wind generated spray need not be simulated during the tests.

24.4.4 The model experiments shall be carried out for at least the following wave directions:

- .1** following seas (0°/360°);
- .2** stern-quartering seas (45°/315°);
- .3** beam seas (90°/270°);
- .4** bow-quartering seas (135°/225°);
- .5** head seas (180°).

24.4.5 The model tests shall be carried out for at least the following speeds:

- .1 maximum sustained speed in head seas and quarter head seas;
- .2 minimum ship manoeuvring speed in following seas and in quarter following seas;
- .3 zero ship speed (dead ship condition) in beam seas.

24.4.6 The Register may require additional tests if necessary.

24.4.7 The model tests shall be carried out with a self-propelled, unrestrained model without the necessity to change course and the time period of each experiment shall correspond to at least one hour real time.

24.4.8 The loading condition used for the tests shall correspond to the maximum loaded draught with level trim. If operational trim values or trim values from damage stability calculations differ substantially from level trim, additional trim values shall be included in the model test programme.

24.4.9 The KG value selected for the model shall correspond to the value most likely to be encountered during the ship's service. If KG values which may be expected during the operation of the ship differ substantially from this selected KG value, additional KG values shall be included in the model test programme.

24.4.10 In running tests, the cargo holds open during sea voyage shall be simulated as having no cargo. Cargoes shall not be used as a means to prevent shipping of water into an empty hold when they are located on the deck or near the coaming of an open hold. Tarpaulin covers for the open holds shall not be simulated in the model tests.

24.4.11 In addition to the usual parameters measured (ship motions, ship speed, relative motions, rudder angles, etc.) the volume of water entering open cargo holds shall be measured for each experiment. The water taken aboard the model shall be removed after each test run so that the metacentric height, moment of inertia and displacement are not disturbed by any accumulation of water during the test programme.

24.4.12 Where freeing ports are fitted, an additional model test for evaluation of the adequacy of the discharge rates from cargo hold freeing ports shall be conducted at a draught which corresponds to the condition of the ship fully loaded with cargo and open holds flooded to the static equilibrium level with freeing ports open. A hold permeability index of 0,7 shall be assumed. Tests shall be conducted at zero speed in beam seas.

24.4.13 A report shall be drawn up on the results of the tests. In the conclusion to the report, in addition to the measurement results and their processing, the following shall also be reflected:

- .1 maximum hourly rate of ingress of green water into each cargo hold determined from model testing;
- .2 evaluation of the adequacy of the discharge rates from freeing ports (if they are fitted);
- .3 freeboard calculation taking into account 24.5.

24.5 FREEBOARD

24.5.1 A conventional freeboard and minimum bow height shall be calculated assuming that hatch covers are fitted.

24.5.2 The freeboard shall be such that the maximum hourly rate of ingress of green water in each open hold determined from model testing, Q , in m³/h, does not exceed the value determined by the formula:

$$Q = S_h \cdot 0.4 \quad (24.5.2)$$

where S_h = cargo hatch area, in m².

24.5.3 The freeboard and minimum bow height assigned to the ship shall not be less than those corresponding to the model test conditions.

24.5.4 Seasonal load lines are not applicable if corresponding seasonal freeboards (assuming hatch covers fitted) are less than the freeboard for which the model tests were satisfactorily carried out.

24.6 STRENGTH

24.6.1 The general and local strength of the hull shall be sufficient in the intact flooded condition of the hold, while:

structural members of container ships and ships with a wide deck opening shall comply with the requirements of 3.1 of Part II "Hull";

structural members of other types of ships shall comply with the applicable requirements of Sections 1 and 2 of Part II "Hull".

24.7 STABILITY

24.7.1 When determining the flooding angle, the cargo hold freeing ports are not taken into account, provided that they comply with the requirements of this Section.

24.7.2 With all open holds completely filled with water (permeability of 0,70 for holds) to the level of the top of the hatch coaming or, in the case of a ship fitted with cargo hold freeing ports, to the level of those ports, the stability of the fully laden ship shall meet the survival criteria with factor $s_i = 1$ determined in accordance with 2.5 of Part V "Subdivision".

24.7.3 For the condition with flooded holds for a container ship, the free surfaces may be determined based on the assumption that the holds are empty. The correction to metacentric height and righting levers shall be made on the basis of real flooding.

The correction to the metacentric height and righting levers may be determined in another way if the designer submits the relevant calculations to the Register for agreement.

24.7.4 Intermediate conditions of hold flooding shall be considered in the stability calculations if they may lead to more severe consequences.

24.8 DAMAGE STABILITY

24.8.1 The coamings of open holds shall be considered as downflooding areas in the damage stability calculations.

24.9 HOLD BILGE DEWATERING SYSTEM AND FREEING PORTS

24.9.1 The cargo hold bilge pumping system shall have a required capacity to pump:

.1 maximum hourly rate of green water shipped in cargo holds as established by the model testing;

.2 amount equal to rainfall of 100 mm/hour penetrated through the total area of the gaps between the panels of weathertight covers or regardless of the installation of tarpaulin covers;

.3 amount of green water shipped in holds measured during the model tests for the dead ship condition in beam seas, multiplied by safety factor 2;

.4 133 % of the amount of water required for fire-fighting purposes in the largest hold;

.5 amount of water equal to the required capacity of the bilge system for ships with equivalent closed hold as per 7.1.6 and 7.2.2 of Part VIII "Systems and Piping";

whichever is the greater.

24.9.2 The pumping of hold bilges shall be possible by at least three bilge pumps complying with the requirements in Section 7 of Part VIII "Systems and Piping".

24.9.3 At least one of these pumps shall have a capacity of not less than the required capacity as defined in 24.9.1 and shall be dedicated to bilge and ballast service only. It shall be located in such a way that it will not be affected by a fire or other casualty to the space containing the pumps required in 24.9.4 or the space containing the main source of power and shall be supplied from the emergency switchboard complying with the requirements in 9.4 of Part XI "Electrical Equipment".

24.9.4 The combined output of at least two pumps shall not be less than the required capacity as defined in 24.9.1. These pumps shall be supplied from the main source of electrical power required in accordance with Section 3 of Part XI "Electrical Equipment" or any other source of power independent of the emergency switchboard required in accordance with 9.4 of Part XI "Electrical Equipment".

24.9.5 The bilge pumping system, including the piping system, shall incorporate sufficient redundancy features so that the system will be fully operational and capable of

dewatering the hold spaces at the required capacity in the event of failure of any one system component.

24.9.6 The bilge pumping system shall be arranged to be effective within the limiting angles of inclination specified in 2.1.2.2 of Part XI "Electrical Equipment" and bilge wells shall be readily accessible for cleaning.

24.9.7 All open cargo holds shall be fitted with high bilge level alarms. The alarms shall annunciate in the machinery spaces and the control locations and be independent of bilge pump controls.

24.9.8 If the loss of suction prevents the proper functioning of the bilge system, special measures to prevent this shall be considered, as for instance, the installation of level indicators.

24.9.9 Open cargo hold drain wells shall be designed to ensure unobstructed discharge of water and easy access for cleaning under all conditions.

24.9.10 Freeing ports shall be fitted on both sides of cargo hold, subject to the following:

.1 number, size and location of the freeing ports on each side of cargo holds shall be sufficient to prevent the accumulation of water above the level defined in 24.4.12;

.2 two efficient means of closure to prevent the accidental ingress of water shall be provided. Such means shall be operated from the freeboard deck. For ice-class ships, measures shall be taken to prevent freezing of water in freeing ports in addition to the requirements set out in 4.3.1.2 of Part VIII "Systems and Piping".

24.10 FIRE PROTECTION

24.10.1 Hatchcoverless cargo holds of container ships and ships equipped for the carriage of containers shall be protected by a fixed water spray system. The system shall be capable of spraying water into the cargo hold from deck level downward. The system shall be designed and arranged to take account of the specific hold and container configuration¹.

24.10.2 The water spray system shall be able to effectively contain a fire in the container bay of origin. The spray system shall be subdivided, with each subdivision to consist of a ring-line at deck level in an open cargo hold around a container bay.

24.10.3 The water spray system shall be capable of spraying the outer vertical boundaries of each container bay in an open cargo hold and of cooling the adjacent structure. The uniform application density shall be not less than 1.1 l/min/m². At least one dedicated fire extinguishing pump for the hold water spray system with a capacity to serve all container bays in any one open-top container hold simultaneously shall be provided. The pump(s) shall be installed outside the open-top area. The availability of water to the water spray system shall be at least 50 % of the total capacity, with adequate spray patterns in the open-top container hold, and with any one pump inoperable. For the case of a single dedicated water spray pump this may be accomplished by an interconnection on the weather deck connecting the water spray system to an alternative source of water.

24.10.4 Whenever a fire detection alarm system is required in the open hold area, it shall be designed and arranged to take account of the specific hold and container configuration and ventilation arrangement.

24.10.5 Multipurpose general dry cargo ships shall comply with the requirements set out in 6.7 of Part VI "Fire Protection".

24.11 DANGEROUS GOODS

24.11.1 Dangerous goods for which "on deck only" stowage is specified in the IMDG Code, shall not be carried in or vertically above hatchcoverless container holds.

24.11.2 In addition to the provisions of 24.11.1, containers with dangerous goods extending more than 1 m above the top of the watertight upper boundary around a hold without hatch cover (open-top container hold) and containing liquids, gases or vapours heavier than air and for which "on deck only" stowage is specified, shall not be carried within one container space¹ horizontally from the boundary of the container holds without hatch covers.

24.11.3 Dangerous goods other than those described in 24.11.1 shall not be carried in or vertically above container holds without hatch covers unless such holds are in full compliance

¹ Container positions in bays, rows and tiers on a container ship are numbered according to ISO 9711-1:1990.

with the requirements specified in 7.2 of Part VI "Fire Protection", applicable to enclosed container cargo spaces, as appropriate for the cargo carried.

24.11.4 Containers with dangerous goods extending more than 1 m above the top of the watertight upper boundary around a container hold without hatch covers shall not be carried within one container space, horizontally from the boundary of the hold unless that hold is in full compliance with the requirements specified in 7.2 of Part VI "Fire Protection", applicable to enclosed container cargo spaces, as appropriate for the cargo carried.

24.12 STOWAGE AND SEGREGATION OF DANGEROUS GOODS

24.12.1 Stowage and segregation of containers on board container ships without hatch covers shall be carried out in accordance with Table 7.4.3.3 of the IMDG Code.

24.13 INSPECTIONS

24.13.1 The operability and condition of the hold bilge dewatering system and freeing port (if they are fitted) on ships with the distinguishing mark **Open cargo hatch** shall be inspected by the crew on a monthly basis and recorded in the ship's log for annual check by the surveyor to the Register and/or flag MA.

¹ Container space means a distance of not less than 6 m fore and aft or not less than 2,4 m athwartships."