



RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER

No. 311-05-1965c

dated 08.08.2023

Re:

amendments to the Rules for the Classification and Construction of Sea-Going Ships, 2023, ND No. 2-020101-174-E

Item(s) of supervision:

ships under construction and in service, technical documentation

Entry-into-force date:

01.09.2023

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Number of pages: 1 + 29

Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Parts I "Classification" and XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships"

Director General

Sergey A. Kulikov

Text of CL:

We hereby inform that the Rules for the Classification and Construction of Sea-Going Ships shall be amended as specified in 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, as well as 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 01.09.2023, in the absence of a contract, during review and approval of the technical documentation on ships requested for review on or after 01.09.2023.
3. Apply the provisions of this Circular Letter during review of the technical documentation on ships under construction and in service by requests of the interested parties.

List of amended and/or introduced paras/chapters/sections:

Part I: para 2.2.58 and Table 2.5

Part XVII: Section 31

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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, para 2.2.58	New para has been introduced containing description and conditions for assignment of distinguishing mark HNLS	311-05-1965c of 08.08.2023	01.09.2023
2	Part I, Table 2.5	New item 2.34 has been introduced containing description and conditions for assignment of distinguishing mark HNLS	311-05-1965c of 08.08.2023	01.09.2023
3	Part XVII, Section 31	New Section has been introduced containing requirements for offshore support vessels carrying limited amount of hazardous and noxious liquid substances in bulk	311-05-1965c of 08.08.2023	01.09.2023

**RULES FOR THE CLASSIFICATION AND CONSTRUCTION
OF SEA-GOING SHIPS, 2023,**

ND No. 2-020101-174-E

PART I. CLASSIFICATION

2 CLASS OF A SHIP

1 **New para 2.2.58** is introduced reading as follows:

"2.2.58 Distinguishing mark HNLS for offshore support vessels carrying limited amount of hazardous and noxious liquid substances in bulk.

If ships comply with the requirements specified in Section 31 of Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", the distinguishing mark **HNLS** (Hazardous and Noxious Liquid Substances) may be added to the character of classification.

Products which may be carried subject to Section 31 of Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" are:

.1 products which are listed in chapters 17 or 18 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (the IBC Code) and the latest edition of the MEPC.2/Circular (Provisional categorization of liquid substances in accordance with MARPOL Annex II and the IBC Code) and their related references to chapters 15 and 19;

.2 oil-based/water-based mud containing mixtures of products listed in chapters 17 and 18 of the IBC Code and the MEPC.2/Circular;

.3 liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen;

.4 contaminated backloads."

2 **Table 2.5. New item 2.34** is introduced reading as follows:

"2.34 HNLS — distinguishing mark for offshore support vessels carrying limited amount of hazardous and noxious liquid substances in bulk

Distinguishing mark	Brief description	Reference to additional RS requirements for the distinguishing mark
HNLS (Hazardous and Noxious Liquid Substances)	The mark is assigned to offshore support vessels intended to carry limited amount of hazardous and noxious liquid substances in bulk	Rules for the Classification and Construction of Sea-Going Ships Part I "Classification", 2.2.58 Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", Section 31

"

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

3 **New Section 31** is introduced reading as follows:

"31 REQUIREMENTS FOR OFFSHORE SUPPORT VESSELS INTENDED TO CARRY LIMITED AMOUNT OF HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES IN BULK (based on IMO resolution A.1122(30) of 06.12.2017, chapter II-2 of SOLAS 74, IBC Code, IGC Code, MARPOL 73/78)

31.1 GENERAL

31.1.1 Application.

31.1.1.1 The requirements of this Section apply to the design, construction and operation of offshore support vessels carrying limited amount of hazardous and noxious liquid substances in bulk¹ for the servicing and resupplying of offshore platforms, mobile offshore drilling units and other offshore installations, including those employed in the search for and recovery of hydrocarbons from the seabed.

31.1.1.2 The Section may apply also to offshore service vessels, other than offshore support vessels when, due to their operation, they are designed and constructed to carry limited amount of hazardous and noxious liquid substances in bulk.

31.1.1.3 Products which may be carried subject to this Section are:

.1 products which are listed in chapters 17 or 18 of the IBC Code² and the latest edition of the MEPC.2/Circular (Provisional categorization of liquid substances in accordance with MARPOL Annex II and the IBC Code) and their related references to chapters 15 and 19; or

.2 oil-based/water-based mud containing mixtures of products listed in chapters 17 and 18 of the IBC Code and the MEPC.2/Circular; or

.3 liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen; or

.4 contaminated backloads.

31.1.1.4 If ships comply with the requirements of this Section, the distinguishing mark **HNLS** (Hazardous and Noxious Liquid Substances) may be added to the character of classification.

31.1.2 Definitions.

For the purpose of this Section the following definitions have been adopted:

31.1.2.1 Safety hazard substance means a substance having an entry of "S" or "S/P" in column "d" in chapter 17 of the IBC Code.

31.1.2.2 Pollution hazard only substance means a substance, which is specified as "P" only in column "d", chapter 17 of the IBC Code.

31.1.2.3 Independent tank means a cargo-containment envelope, which is not contiguous with, or part of, the hull structure. An independent tank is built and installed so as to eliminate whenever possible (or in any event to minimize) its stressing as a result of stressing or motion of the adjacent hull structure.

31.1.2.4 Lightweight means the displacement of an offshore support vessel in metric tons without cargo, fuel, lubricating oil, ballast water, fresh water and feed water in tanks, consumable stores, and crew and their effects.

31.1.2.5 Noxious liquid substance means any substance indicated in the Pollution Category column of chapter 17 or 18 of the IBC Code, or the current MEPC.2/Circular or provisionally assessed under the requirements of regulation 6.3 of MARPOL Annex II as falling into categories X, Y or Z.

31.1.2.6 Integral tank means a cargo-containment envelope which forms part of the ship's hull and which may be stressed in the same manner and by the same loads which stress the contiguous hull structure and which is normally essential to the structural completeness of the ship's hull.

¹ For requirements regulating the transport of dangerous goods and marine pollutants in packaged form, including transport of dangerous goods in portable tanks, refer to the International Maritime Dangerous Goods Code (IMDG Code).

² International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk adopted by the IMO resolution MEPC.119(52).

31.1.2.7 Cargo area is that part of the offshore support vessel where:

.1 a pollution hazard only substance having a flashpoint exceeding 60 °C and not defined as toxic is likely to be present and includes cargo tanks, portable tanks used as deck cargo tanks, slop tanks, cargo pump-rooms, pump-rooms adjacent to cargo tanks and enclosed spaces in which pipes containing cargoes are located. Areas on open deck are not considered part of the cargo area;

.2 a safety hazard substance having a flashpoint exceeding 60 °C and not defined as a toxic is likely to be present and includes cargo tanks, portable tanks used as deck cargo tanks, slop tanks, cargo pump-rooms, pump-rooms adjacent to cargo tanks, hold spaces in which independent tanks are located, cofferdams surrounding integral tanks, enclosed spaces in which pipes containing cargoes are located and the following deck areas:

.2.1 within 3 m of cargo tank installed on deck or portable tanks used as deck cargo tanks;

.2.2 areas on open deck, or semi-enclosed spaces on deck, within 3 m of any cargo tank access outlet;

.2.3 areas on open deck over an integral tank without an overlaying cofferdam plus the open deck area extending transversely and longitudinally for a distance of 3 m beyond each side of the tank;

.2.4 areas on open deck, or semi-enclosed spaces on deck, within 3 m of cargo manifold valve, cargo valve, cargo pipe flange, except spaces within the 3 m zone that are separated by an enclosed bulkhead to the minimum height as given in 31.1.2.7.2.6 below;

.2.5 areas on open deck, or semi-enclosed spaces on deck above and in the vicinity of any cargo tank vent outlet intended for the passage of large volumes of vapour mixture during cargo loading, within a vertical cylinder of unlimited height and 3 m radius centred upon the centre of the outlet, and within a hemisphere of 3 m radius below the outlet;

.2.6 areas on the open deck within spillage coamings surrounding cargo manifold valves and 3 m beyond these, up to a height of 2.4 m above the deck;

.2.7 compartments for cargo hoses;

.3 a substance having a flashpoint not exceeding 60 °C, or defined as toxic (or emitting vapors of such cargo); is likely to be present and includes cargo tanks, portable tanks used as deck cargo tanks, slop tanks, cargo pump-rooms, pump-rooms adjacent to cargo tanks, hold spaces in which independent tanks are located, cofferdams surrounding integral tanks, enclosed spaces in which pipes containing cargoes are located and the following deck areas:

.3.1 within 3 m of cargo tank installed on deck or portable tanks used as deck cargo tanks;

.3.2 areas on open deck, or semi-enclosed spaces on deck, within 4.5 m of gas or vapor outlet, cargo manifold valve, cargo valve, cargo pipe flange, cargo pump-room ventilation outlets and cargo tank openings for pressure release provided to permit the flow of small volumes of gas or vapor mixtures caused by thermal variation;

.3.3 areas on open deck, or semi-enclosed spaces on deck above and in the vicinity of any cargo gas outlet intended for the passage of large volumes of gas or vapour mixture during cargo loading, within a vertical cylinder of unlimited height and 10 m radius centred upon the centre of the outlet, and within a hemisphere of 10 m radius below the outlet;

.3.4 areas on open deck, or semi-enclosed spaces on deck, within 3 m of cargo pump-room entrances, cargo pump-room ventilation inlet, openings into cofferdams;

.3.5 areas on the open deck within spillage coamings surrounding cargo manifold valves and 3 m beyond these, up to a height of 2.4 m above the deck;

.3.6 compartments for cargo hoses;

.3.7 within the hose landing area.

31.1.2.8 Cargo pump-room is a space containing pumps and their accessories for the handling of the products.

31.1.2.9 Backload means contaminated bulk liquids, taken on board a ship offshore, for transport either back to shore or to an alternate offshore site.

31.1.2.10 Vapor pressure is the equilibrium pressure of the saturated vapour above a liquid expressed in pascals (Pa) at a specified temperature.

31.1.2.11 Deadweight means the difference in metric tons between the displacement of an offshore support vessel in water of a density of 1,025 at the load waterline corresponding to the assigned summer freeboard and the lightweight of the vessel.

31.1.2.12 Length (*L*) means 96 % of the total length on a waterline at 85 % of the least moulded depth measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that is greater. In ships designed with a rake of keel, the waterline on which this length is measured shall be parallel to the designed waterline.

31.1.2.13 Blending additives mean small amounts of liquid substances used during blending of products or production processes of cargoes for use in the search for and exploitation of seabed mineral resources used to facilitate such operations.

31.1.2.14 Accommodation spaces are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.

31.1.2.15 Cofferdam means the isolating space between two adjacent steel bulkheads or decks. This space may be a void space or a ballast space.

31.1.2.16 MARPOL 73/78 means the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol 1978 thereto, as amended.

31.1.2.17 Machinery spaces mean all machinery spaces of category A and all other spaces containing main machinery, boilers, fuel oil units, steam and internal combustion engines, generators and other major electrical machinery, fuel oil filling stations, machinery of refrigerating plants, stabilizing equipment, ventilation and air-conditioning installations, and similar spaces, and trunks to such spaces.

31.1.2.18 Machinery spaces of category A mean those spaces and trunks to such spaces which either contain:

- .1 internal combustion machinery used for main propulsion;
- .2 internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
- .3 any oil-fired boiler or oil fuel unit or any oil-fired equipment other than boilers, such as inert gas generators, incinerators, etc.

31.1.2.19 International Gas Carrier Code (IGC Code) means the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IMO resolution MSC.5(48), as amended).

31.1.2.20 IMDG Code means the International Maritime Dangerous Goods Code (IMO resolution MSC.122(75), as amended).

31.1.2.21 Offshore support vessels (OSV) are:

- .1 multi-mission vessels which are primarily engaged in the transport of stores, materials and equipment to and from mobile offshore drilling units, fixed and floating platforms and other similar offshore installations; or
- .2 multi-mission vessels, including well stimulation vessels, but excluding mobile offshore drilling units, derrick barges, pipe-laying barges and floating accommodation units, which are otherwise primarily engaged in supporting the work of offshore installations.

31.1.2.22 Hazardous substance is any substance either listed in chapter 17 of the IBC Code or having a hazard more severe than one of the minimum hazard criteria given in criteria for hazard evaluation of bulk chemicals.

31.1.2.23 Dangerous goods mean the substances, materials and articles covered by the IMDG Code.

31.1.2.24 Dangerous chemicals mean any liquid chemicals designated as presenting a safety hazard, based on the safety criteria for assigning products to chapter 17 of the IBC Code.

31.1.2.25 Offshore portable tank means a portable tank specially designed for repeated use for transport of dangerous goods to, from and between offshore facilities. An offshore portable tank is designed and constructed in accordance with the Guidelines for the approval of offshore containers handled in open seas (MSC/Circ.860).

31.1.2.26 Hose landing area means an area on the main deck, except those in compartments for cargo hoses, where cargo hoses of substances having a flashpoint not exceeding 60 °C and/or defined as toxic are located during cargo transfer.

31.1.2.27 Cargo control station means a location that is manned during cargo transfer operations for the purpose of directing or controlling the loading or unloading of cargo.

31.1.2.28 Control stations are those spaces in which ship's radio or main navigating equipment or the emergency source of power is located or where the fire-recording or fire-control equipment is centralized.

31.1.2.29 Well stimulation vessel means an offshore supply vessel with specialized equipment and industrial personnel that delivers products and services directly into a well-head.

31.1.2.30 A type 1 ship is a chemical tanker intended to transport products specified in chapter 17 of the IBC Code with very severe environmental and safety hazards which require maximum preventive measures to preclude an escape of such cargo.

31.1.2.31 A type 2 ship is a chemical tanker intended to transport products specified in chapter 17 of the IBC Code with appreciably severe environmental and safety hazards which require significant preventive measures to preclude an escape of such cargo.

31.1.2.32 A type 3 ship is a chemical tanker intended to transport products specified in chapter 17 of the IBC Code with sufficiently severe environmental and safety hazards which require a moderate degree of containment to increase survival capability in a damaged condition.

31.1.2.33 Gravity tank (drained by gravity) means a tank having a design pressure not greater than 0,07 MPa (gauge pressure) at the top of the tank.

A gravity tank may be independent or integral. A gravity tank shall be constructed and tested according to recognized standards, taking account of the temperature of carriage and relative density of the cargo.

31.1.2.34 Pressure tank means a tank having a design pressure greater than 0,07 MPa (gauge pressure). A pressure tank shall be an independent tank and shall be of a configuration permitting the application of pressure-vessel design criteria according to recognized standards.

31.1.2.35 Triple point in a single-component system is the point of convergence of the two-phase equilibrium curves in the two-dimensional P (pressure) — T (temperature) phase diagram, corresponding to the stable equilibrium of three phases.

31.1.2.36 Oil fuel unit is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a gauge pressure of more than 0,18 MPa.

31.1.2.37 Breadth (*B*) means the maximum breadth of the ship, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

32.2 TECHNICAL DOCUMENTATION

For the project of an offshore support vessel having the distinguishing mark **HNLS** in the class notation, in addition to those specified in Section 3 of Part I "Classification", the following documentation shall be submitted.

The letter identification (A — approved, AG — agreed, FI — for information) denotes the results of documentation review documented by stamping in accordance with 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.

No.	Documentation description	Stamp	TD ¹	DD ²	PAD ³	Remarks
1.	Information regarding loading arrangement of deck cargoes, weights and their centers of gravity	AG	●	●	●	
2.	Lashing arrangement of deck cargoes	A	●	●	●	
3.	Details of integral liquid cargo tanks including vents and/or overflows height and location	A	●	●	●	
4.	Details of independent liquid and/or dry cargo tanks	A	●	●	●	
5.	Details of independent tank supports and fastening arrangements	A	●	●	●	
6.	Piping diagrams of liquid cargo transfer systems	A	●	●	●	
7.	Piping diagrams of dry bulk cargo transfer systems	A	●	●	●	
8.	Ventilation diagrams of liquid cargoes	A	●	●	●	
9.	Stability calculation	AG	●		●	
10.	Calculation of damage trim and stability	AG	●		●	
11.	Stability Booklet	AG		●	●	
12.	Damage Trim and Stability Booklet	AG		●	●	
13.	General arrangements of cargo areas (refer to 31.1.2.7)	A	●	●	●	
14.	General arrangements of hazardous areas	A	●	●	●	
15.	General arrangements of cargo tanks with adjacent cofferdams	A	●	●	●	
16.	Full particulars of the intended cargo or cargoes and its properties	FI	●	●	●	
17.	Cargo hatches and other openings to cargo tanks	A	●	●	●	
18.	Doors, hatches and other openings to pump-rooms and other hazardous spaces	A	●	●	●	
19.	Ventilation ducts and openings to pump-rooms and other hazardous spaces	A	●	●	●	
20.	Doors, air locks, hatches and other openings to non-hazardous spaces adjacent to cargo area	A	●	●	●	
21.	Cargo pipes with loading and discharging connections for dry bulk cargoes	A	●	●	●	
22.	Vent pipes for cargo tanks	A	●	●	●	

No.	Documentation description	Stamp	TD ¹	DD ²	PAD ³	Remarks
23.	Cargo piping system including drawings showing details such as expansion elements and flange connections	A	•	•	•	
24.	Bilge piping systems in pump-room, cofferdams, and pipe tunnels within the cargo area	A	•	•	•	
25.	Cargo heating systems	A	•	•	•	
26.	Procedures and calculations of cooling down, loading and unloading operations	FI	•	•	•	
27.	Drawings of pressure vacuum valves or high velocity vent valves, their details and installation, relevant calculations of their relieving capacity	A	•	•	•	
28.	Arrangement and capacity of ventilation system in the cargo area	A	•	•	•	
29.	Drawings of fan rotating parts and casings	A	•	•	•	
30.	Portable ventilators	FI	•	•	•	
31.	Arrangement of inert gas supply if applicable	A	•	•	•	
32.	Drawings showing location of all electrical equipment in hazardous areas	A	•	•	•	
33.	List of certified safe equipment	FI	•	•	•	
34.	One-line diagram for intrinsically safe circuits and data	A	•	•	•	
35.	Maintenance manual for electrical installations in hazardous areas	AG	•	•	•	
36.	Arrangement and specifications of fixed fire extinguishing systems	A	•	•	•	
37.	Diagrams of fire and gas detection and alarm systems	A	•	•	•	
38.	Cargo tank level measurement system	A	•	•	•	
39.	Cargo tank overflow protection system	A	•	•	•	
40.	Cargo valves and pump control and monitoring system	A	•	•	•	
41.	Inert gas control and monitoring system if applicable	A	•	•	•	
¹ TD — Technical design. ² DD — Detailed (design) documentation. ³ PAD — Plan approval documentation.						

31.3 TECHNICAL REQUIREMENTS

31.3.1 Cargo tanks arrangement.

31.3.1.1 Cargo tanks containing products subject to the provisions of this Section shall be spaced from the outer shell plating as stated below:

.1 cargo tanks for ship type 1 products (refer to 31.1.2) shall be located at a distance from the side shell plating, not less than the transverse extent of damage as specified in 31.3.3.7.1.1.1, and from the moulded line of the bottom shell plating at centreline, not less than the vertical extent of damage as specified in 31.3.3.7.1.2.1, and in no case nowhere less than 760 mm from the shell plating. This provision does not apply to tanks intended for collection of slops arising from tank washing;

.2 cargo tanks for ship type 2 products (refer to 31.1.2) shall be located at a distance from the moulded line of the bottom shell plating at centreline, not less than the vertical extent of damage specified in 31.3.3.7.1.2, and in no case nowhere less than 760 mm from the shell plating. This provision does not apply to tanks intended for collection of slops arising from tank washing;

.3 cargo tanks for ship type 3 products (refer to 31.1.2) shall be located nowhere less than 760 mm from the shell plating. This provision does not apply to tanks intended for collection of slops arising from tank washing.

31.3.1.2 Tanks containing cargoes, residues of cargoes or mixtures containing cargoes subject to the present chapter shall be segregated from machinery spaces as defined in 31.1.2, accommodation and service spaces and from drinking water and stores for human consumption by means of a cofferdam, void space, cargo pump-room, pump-room, empty tank, oil fuel tank, or other similar space. On-deck stowage of permanently attached deck tanks or installation of independent tanks in otherwise empty hold spaces shall be considered as satisfying this provision.

31.3.1.3 Cargo spaces containing cargoes which react in a hazardous manner with other cargoes or oil fuels shall:

.1 be segregated from such other cargoes or oil fuels by means of a cofferdam, void space, pump-room, empty tank, or tank containing a mutually compatible cargo;

.2 have separate pumping and piping systems which shall not pass through other cargo tanks containing such cargoes, unless encased in a tunnel; and

.3 have separate tank venting systems.

31.3.1.4 Cargo tanks other than those intended to carry substances with flashpoint not exceeding 60 °C, toxic products and acids may extend to the deck plating. Where cargo is handled on the deck area above a cargo tank, the cargo tank may not extend to the deck plating unless a continuous permanent deck sheathing of minimum 50 mm of wood or other suitable material of equivalent thickness and construction is fitted.

31.3.1.5 Cargoes subject to this Section shall not be carried in either the fore or aft peak tanks.

31.3.1.6 Tank type requirements for individual products.

31.3.1.6.1 Requirements for both installation and design of tank types for individual products are shown in column "f" in the table in chapter 17 of the IBC Code.

31.3.1.6.2 Instead of the use of permanently attached cargo deck tanks complying with the requirements of the IBC Code, portable tanks meeting the construction requirements of the IMDG Code or other portable tanks specifically approved by the Register may be used for cargoes indicated in 31.1.1.3, provided that the provisions of 31.3.19 are complied with. The applicable tank instruction for the products listed as dangerous goods in the IMDG Code shall apply. Products with pollution hazard only and a flashpoint above 60 °C falling within the scope of this Section, but for which the IMDG Code is not applicable, when carried in packaged form, shall be shipped under the tank instruction and special tank requirements as included in the IMDG Code for goods with UN number 3082.

31.3.1.7 Arrangement of suction wells.

Suction wells installed in cargo tanks for ship types 2 and 3 products (refer to 31.1.2) may protrude below the inner bottom plating provided that such wells are as small as practicable and the protrusion below the inner bottom plating does not exceed 25% of the depth of the double bottom or 350 mm, whichever is less. Where there is no double bottom, the protrusion

of the suction well of independent tanks below the upper limit of bottom damage shall not exceed 350 mm. Suction wells installed in accordance with this paragraph may be ignored in determining the compartments affected by damage.

31.3.1.8 Access to spaces in the cargo area:

.1 for pollution hazard only substances, at least one access to cargo tanks shall be direct from the open deck and designed such as to ensure complete inspection of those substances;

.2 for safety hazard substances, at least one access to each cargo tank, cofferdams and other spaces in the cargo area shall be direct from the open deck and designed such as to ensure complete inspection of those substances;

.3 access to double bottom spaces within the cargo area may be through a cargo pump-room, pump-room, deep cofferdam, pipe tunnel or similar dry compartments with their own direct access from open deck, subject to consideration of ventilation aspects. Where cofferdams are provided over integral tanks, small trunks may be used to penetrate the cofferdam.

31.3.1.9 For accesses defined in 31.3.1.8 and 31.3.12.1.7 through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person with a self-contained air-breathing apparatus and protective equipment to ascend or descend any stairway without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space. The minimum clear opening shall be not less than 600 × 600 mm.

31.3.1.10 For accesses defined in 31.3.1.8 and 31.3.12.1.7 through vertical openings, or manholes providing passage through the length and breadth of space, the minimum clear opening shall be not less than 600 × 800 mm at a height of not more than 600 mm from the bottom shell or deck plating, unless gratings or other footholds are provided.

31.3.1.11 Smaller dimensions may be approved, if at least one access defined in 31.3.1.8 and 31.3.12.1.7 has dimensions not less than those required in 31.3.1.9 and 31.3.1.10, respectively. The main access shall be identified clearly in an access plan.

31.3.1.12 Cargo pump-rooms shall be so arranged as to ensure unrestricted access to all valves necessary for cargo handling for a person wearing the required personal protective equipment.

31.3.1.13 For access to all spaces, the minimum spacing between cargo tank boundaries and adjacent ship structure shall be 600 mm.

31.3.2 Accommodation, service spaces and control stations.

31.3.2.1 Accommodation, service spaces and control stations shall not be located within the cargo area.

31.3.2.2 For a ship certified to carry safety hazard substances, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations may be accepted in bulkheads facing the cargo deck area if they are located outside the deck areas defined in 31.1.2.2.

31.3.2.3 Unless they are spaced at least 7 m away from the cargo area containing flammable products, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the cargo area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within the 7 m zone specified above, provided the boundaries of the spaces are insulated to A-60 standard. When arranged within the 7 m zone specified above, windows and side scuttles facing the cargo area shall be of a fixed type.

Such side scuttles in the first tier on the main deck shall be fitted with inside covers of steel or equivalent material.

31.3.2.4 In order to guard against the danger of hazardous vapors, due consideration shall be given to the location of air intakes and openings into accommodation, service and machinery spaces and control stations in relation to cargo piping and cargo vent systems.

31.3.3 Stability, unsinkability and subdivision.

31.3.3.1 For all types of service intact stability of the ship shall comply with the requirements of Part IV "Stability".

31.3.3.2 Solid ballast shall not normally be used in double bottom spaces in the cargo area. Where, however, because of stability considerations, the fitting of solid ballast in such spaces becomes unavoidable, then its disposition shall be governed by the need to ensure that the impact loads resulting from bottom damage are not directly transmitted to the cargo tank structure.

31.3.3.3 All OSVs shall be provided with the Stability Booklet complying with the requirements under 1.4.1 of Part IV "Stability", and Damage Trim and Stability Booklet in compliance with 1.4.6 of Part V "Subdivision".

31.3.3.4 OSVs carrying over 1200 m³ of ship type 2 or 3 products or over 150 m³ of ship type 1 products, as well as ships of 80 m in length and above carrying not more than 1200 m³ of ship types 2 or type 3 products, and not more than 150 m³ of ship type 1 products, shall be fitted with a stability instrument¹, capable of verifying compliance with intact and damage stability provisions.

31.3.3.5 Pipelines not intended for cargo discharge and having open ends below the bulkhead deck shall comply with the requirements in 4.3 of Part VIII "Systems and Piping".

31.3.3.6 Permeability of compartments.

Permeability of compartments shall be assumed in compliance with 2.6 of Part V "Subdivision".

31.3.3.7 Damage extent.

.1 For ships carrying more than 1200 m³ of products which are permitted for transporting on type 2 ship or type 3 ship, or more than 150 m³ of products which are permitted for transporting on type 1 ship, the assumed maximum extent of damage shall be as given below:

.1.1 Side damage

	Longitudinal extent	Transverse extent	Vertical extent
1	$1/3L^{2/3}$	$B/5$ (measured inboard from the ship's side at right angles to the centreline at the level of the summer load line)	Upwards without limit measured from the moulded line of the bottom shell plating at centreline

.1.2 Bottom damage

	Location of damage	Longitudinal extent	Transverse extent	Vertical extent
1	Within $0,3L$, measured from the forward perpendicular	$1/3L^{2/3}$	$B/6$	$B/15$ or 6 m, whichever is less, measured from the moulded line of the bottom shell plating at centreline (refer to 31.2.9.2)
2	Any other part of the ship	$1/3L^{2/3}$ or 5 m, whichever is less	$B/6$ or 5 m, whichever is less	$B/15$ or 6 m, whichever is less, measured from the moulded line of the bottom shell plating at centreline (refer to 31.2.9.2)

¹ Refer to paras 2.2.6 and 2.2.7 of the IBC Code, IMO resolution MEPC.250(66).

.2 For ships carrying not more than 1200 m³ of products which are permitted for transporting on type 2 or type 3 ships, and not more than 150 m³ of products permitted for transporting on type 1 ship, the assumed maximum extent of damage shall be as given below:

Side damage:

	Length of a ship	Longitudinal extent	Transverse extent	Vertical extent
1	$24 \leq L \leq 43$ m	0,1L	760 mm (measured inboard from the ship's side at right angles to the centreline at the level of the summer load line ¹)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the ship
2	$43 < L < 80$ m	3 m + 0,03 L	760 mm (measured inboard from the ship's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the ship
3	$80 \leq L \leq 100$ m	$1/3L^{2/3}$	B/20, but not less than 760 mm (measured inboard from the ship's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the ship
4	$L > 100$ m	$1/3L^{2/3}$	B/15, but not less than 760 mm (measured inboard from the ship's side at right angles to the centreline at the level of the summer load line)	From the underside of the cargo deck, or continuation thereof, downward for the full depth of the ship

31.3.3.8 Standard of damage.

Ships shall be capable of surviving damage with the assumptions in 31.3.3.7 determined by the following standards:

.1 a ship that carries more than 150 m³ of ship type 1 products shall be assumed to sustain damage described in 31.3.3.7.1 anywhere along the length;

.2 a ship with a length (*L*) greater than 150 m that carries more than 1200 m³ of ship types 2 and 3 products shall be assumed to sustain damage described in 31.3.3.7.1 anywhere along the length;

.3 a ship with a length (*L*) of 150 m or less that carries more than 1200 m³ of ship types 2 or 3 products as well as a ship that carries not more than 150 m³ of ship type 1 products shall be assumed to sustain damage described in 31.3.3.7.1 anywhere along the length except involving bulkheads bounding a machinery space of category A;

.4 a ship with a length (*L*) greater than 100 m that carries 800 m³ or more but not more than 1200 m³ of ship types 2 and 3 products as well as a ship that carries not more than 150 m³ of ship type 1 products shall be assumed to sustain damage described in 31.3.3.7.2 anywhere along the length;

¹ As specified in LL66.

.5 a ship with a length (L) of 100 m or less that carries 800 m³ or more but not more than 1200 m³ of ship types 2 and 3 products and carries not more than 150 m³ of ship type 1 products shall be assumed to sustain damage described in 31.3.3.7.2 anywhere along the length;

.6 a ship with a length (L) greater than 100 m that carries less than 800 m³ of ship type 2 or 3 products as well as a ship that carries not more than 150 m³ of ship type 1 products shall be assumed to sustain damage described in 31.3.3.7.2 anywhere along the length between transverse watertight bulkheads;

.7 a ship with a length (L) of 100 m or less that carries not more than 800 m³ of ship types 2 or 3 products as well as a ship that carries not more than 150 m³ of ship type 1 products shall be assumed to sustain damage described in 31.3.3.7.2 anywhere along the length between transverse watertight bulkheads.

31.3.3.9 Survival requirements.

31.3.3.9.1 Ships subject to this Section shall be capable of surviving the assumed damage specified in 31.3.3.7 to the standard provided in 31.3.3.8 in a condition of stable equilibrium and shall satisfy the following criteria.

31.3.3.9.2 For ships subject to 31.3.3.7.1:

.1 in any stage of flooding:

.1.1 the waterline, taking into account sinkage, heel and trim, shall be below the lower edge of any opening through which progressive flooding or downflooding may take place. Such openings shall include air pipes and openings which are closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and watertight flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, and side scuttles of the non-opening type;

.1.2 the maximum angle of heel due to unsymmetrical flooding shall not exceed 25°, except that this angle may be increased to 30° if no deck immersion occurs; and

.1.3 the residual stability during intermediate stages of flooding shall never be significantly less than that required by 31.3.3.9.2.1.2;

.2 at final equilibrium after flooding:

.2.1 the righting-lever curve shall have a minimum range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 0,1 m within the 20° range; the area under the curve within this range shall not be less than 0,0175 m-radians. Unprotected openings shall not be immersed within this range unless the space concerned is assumed to be flooded. Within this range, the immersion of any of the openings listed in 31.3.3.9.2 and other openings capable of being closed weathertight may be permitted; and

.2.2 the emergency source of power shall be capable of operating.

31.3.3.9.3 For ships subject to 31.3.3.7.2:

.1 the final waterline, taking into account sinkage, heel and trim, shall be below the lower edge of any opening through which progressive flooding may take place. Such openings shall include air pipes and openings which are closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and watertight flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, and side scuttles of the non-opening type;

.2 in the final stage of flooding, the angle of heel due to unsymmetrical flooding shall not exceed 15°. This angle may be increased up to 17° if no deck immersion occurs; and

.3 the stability in the final stage of flooding shall be investigated and may be regarded as sufficient if the righting-lever curve has, at least, a range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 100 mm within this range. Unprotected openings shall not become immersed at an angle of heel within the prescribed minimum range of residual stability unless the space in question has been included as a floodable space in calculations for damage stability. Within this range, immersion of any openings referred to in 31.3.3.9.3.1 and any other openings capable of being closed weather tight may be authorized.

31.3.4 Piping.

31.3.4.1 Cargo piping shall not pass through any accommodation, service spaces or machinery spaces of category A.

31.3.4.2 If cargo piping systems or cargo venting systems are required to be separated, this separation may be achieved by the use of design or operational methods. Operational methods shall not be used within a cargo tank or a cofferdam surrounding the cargo tanks, if entry into the cofferdam is required, and shall consist of one of the following types:

- .1 removing spool pieces, valves or other piping components and blanking the pipe ends;
- .2 arrangements of two spectacle flanges in series, with provisions for detecting leakage into the pipe between the two spectacle flanges; and
- .3 blind flange valve with double shut-off and with provisions for detecting leakage in valve body.

32.3.4.3 Pumps, ballast lines, vent lines and other similar equipment serving ballast tanks shall be separated from similar equipment serving cargo tanks and of cargo tanks themselves.

31.3.4.4 Piping scantlings.

31.3.4.4.1 The walls thickness of pipes in the cargo piping system shall be in accordance with the requirements of 2.3 in Part VIII "Systems and Piping".

31.3.4.4.2 Pumps, fittings and piping of the cargo piping system shall be designed to withstand the maximum pressure that is likely to be created in service, taking into account the highest set of pressure on any relief valve on the system.

Piping and piping system components which are not protected against excess pressure by a relief valve, or which may be isolated from their relief valve shall be designed to withstand a pressure which is maximum possible in service, with due regard for:

- .1 pressure in cargo tank;
- .2 the maximum delivery pressure of the associated pump and pressure setting of the associated relief valve;
- .3 the maximum possible total pressure head output at the outlet of the associated pumps connected with pipeline when pump discharge relief valves are not installed;
- .4 the saturated vapor pressure of the products being carried corresponding to maximum expected temperature of carriage, but not less than 45 °C;
- .5 the maximum hydrostatic head which may take place during normal cargo handling operations.

31.3.4.4.3 The design pressure shall not be less than 1 MPa except for open-ended lines, where it shall be not less than 0.5 MPa.

31.3.4.4.4 For pipes, the allowable stress to be considered in the strength calculations is the lowest of the following values:

$$R_m/A \text{ or } R_e/B,$$

where R_m = specified minimum tensile strength at ambient temperature (N/mm²);

R_e = specified minimum yield strength at ambient temperature (N/mm²). If the stress/strain curve does not show a defined yield stress, the 0,2 % proof stress applies.

A and B shall have values of at least $A = 2,7$ and $B = 1,8$.

31.3.4.4.4.1 The minimum pipe wall thickness values shall comply with recognized standards.

31.3.4.4.4.2 Where necessary for mechanical strength to prevent damage, collapse, excessive sag or buckling of pipes due to weight of pipes and content and to superimposed loads from supports, ship deflection or other causes, the wall thickness shall be increased. If this is impracticable or would cause excessive local stress, these loads shall be reduced, protected against or eliminated by other design methods.

31.3.4.4.4.3 For flanges, valves and other fittings, compliance with recognized standards shall be ensured, considering the design pressure, as specified in 31.3.4.4.2.

31.3.4.4.4 For flanges not complying with the standards, their dimensions and fixing shall be agreed with the Register.

31.3.4.4.5 After assembly, each cargo piping system shall be subject to a hydrostatic test to at least 1,5 times the design pressure. When piping systems or parts of systems are completely manufactured and equipped with all fittings, the hydrostatic test may be conducted prior to installation aboard the ship. Joints welded on board shall be hydrostatically tested to at least 1,5 times the design pressure.

31.3.5 Cargo piping arrangement.

31.3.5.1 Cargo piping shall not be installed under deck between the outboard side of the cargo-containment spaces and the skin of the ship unless clearances required for damage protection are maintained in accordance with 31.3.1.

Such distances may be reduced where damage to the pipe would not cause release of cargo provided that the clearance required for inspection purposes is maintained.

31.3.5.2 Cargo piping located below the main deck may run from the tank it serves and penetrate tank bulkheads or boundaries common to longitudinally or transversally adjacent cargo tanks, ballast tanks, empty tanks, pump-rooms or cargo pump-rooms provided that inside the tank it serves it is fitted with a stop valve operable from the weather deck and provided cargo compatibility in adjacent tanks is assured.

Where a cargo tank is adjacent to cargo pump-room (CPR), the stop valve operable from the weather deck may be situated on the tank bulkhead on the CPR side, provided an additional valve is fitted between the bulkhead valve and the cargo pump.

A totally enclosed hydraulically operated valve located outside the cargo tank may be accepted, provided that the valve is:

- .1 designed to preclude the risk of cargo leakage;
- .2 fitted on the bulkhead of the cargo tank which it serves;
- .3 suitably protected against mechanical damage;
- .4 fitted at a distance from the shell as required for damage protection; and
- .5 operable from the weather deck.

31.3.5.3 In cargo pump-room where a cargo pump serves more than one cargo tank, a stop valve shall be fitted in the spool pieces to each tank.

31.3.5.4 Cargo piping shall not pass through a tank with incompatible cargo. In this case, piping shall be installed in pipe tunnel.

31.3.5.5 Cargo pipeline installed in pipe tunnels shall comply with the requirements of 31.3.5.1 and 31.3.5.2. Pipe tunnels shall satisfy all tank requirements for construction, location, ventilation and safety of electrical equipment.

Cargo piping intended for incompatible cargoes shall not be installed in a common pipe tunnel.

The pipe tunnel shall not have any other openings except to the weather deck and CPR.

31.3.5.6 Cargo piping passing through bulkheads shall be so arranged as to preclude excessive stresses at the bulkhead. Cargo piping passing through bulkheads shall not utilize flanges bolted through the bulkhead.

31.3.5.7 Filling and discharge sections of the cargo piping shall reach the bottom of cargo tanks with a minimum possible clearance dictated by the service conditions of cargo piping system and special requirements for cargo.

31.3.5.8 Cargo piping serving tanks in which incompatible cargoes are carried shall be disconnected from such tanks by means of removable spool pieces and blank flanges.

No removable spool pieces shall be replaced by stop valves (single or double) and by spectacle flanges.

31.3.5.9 An arrangement shall be provided or cargo piping shall be installed with a permanent slope to ensure draining of the cargo contained in pumps and cargo piping into the cargo tank or another special tank.

31.3.6 Cargo transfer control systems.

31.3.6.1 For the purpose of controlling cargo handling operations, piping shall be provided with:

- .1 one stop valve capable of being manually operated regardless of remote control available on each filling and discharge line, located near the tank penetration;
- .2 one stop valve at each cargo hose connection;

If deep well pumps are used to discharge the contents of cargo tanks, stop valves are not required on the discharge lines.

.3 remote shutdown devices for all cargo pumps and similar equipment which shall be capable of being activated from a dedicated cargo control location and which is manned at the time of cargo transfer and from at least one other location outside the cargo area and at a safe distance from it. Cargo controls located in the ship wheelhouse are acceptable as one of the cargo control locations.

31.3.6.2 For certain products, additional cargo-transfer control requirements are shown in column "o" in the table of chapter 17 of the IBC Code.

31.3.6.3 Pump discharge pressure gauges or readouts shall be provided outside the cargo pump-room.

31.3.7 Ship's cargo hoses.

Ship's cargo hoses shall comply with the requirements in 1.8 of Part VI "Systems and Piping" of the Rules for the Classification and Construction of Chemical Tankers¹.

31.3.8 Cargo tank venting.

OSV venting system shall comply with the requirements in Section 4 of Part VI "Systems and Piping" of the Chem Rules.

31.3.9 Cargo tank gas freeing.

31.3.9.1 The arrangements for gas freeing cargo tanks used for cargoes other than those for which open venting is permitted shall be such as to minimize the hazards due to the dispersal of flammable or toxic vapors in the atmosphere and to flammable or toxic vapour mixtures in a cargo tank. Accordingly, gas freeing operations shall be carried out such that vapour is initially discharged:

.1 through the venting outlets directing the vapour discharge upwards in the form of unimpeded jets and positioned at a height of not less than 6 m above the weather deck. The outlet height referred above may be reduced to 3 m above the weather deck provided that high-velocity venting valves of an approved type with an exit velocity of at least 30 m/s are fitted; or

.2 through outlets located at least 2 m above the cargo tank deck, with a vertical discharge velocity of at least 30 m/s, maintained throughout the venting operation; or

.3 through outlets located at least 2 m above the cargo tank deck, with a vertical discharge velocity of at least 20 m/s, protected by suitable devices to prevent flame propagation.

When the flammable vapor concentration at the outlets reaches 30 % of the lower flammable limit or, in the case of toxic products, the vapor concentration reaches a value which does not present a significant health risk, venting may be continued at cargo tank deck level.

31.3.9.2 Outlets specified in 31.3.9.1.2 and 31.3.9.1.3 may be either fixed or removable pipes.

31.3.9.3 Fans used for the gas freeing systems shall meet the requirements of 8.8 in Part VI "Systems and Piping" of the Chem Rules.

31.3.10 Electrical equipment.

31.3.10.1 The electrical equipment shall comply with the requirements of Part VII "Electrical Equipment" of the Chem Rules.

31.3.11 Fire-fighting requirements.

31.3.11.1 Requirements in this Chapter shall apply to OSVs carrying liquid cargo having a flashpoint not exceeding 60 °C.

31.3.11.2 A liquid cargo with a flashpoint of less than 60 °C for which a regular foam fire-fighting system is not effective, is considered to be a cargo introducing additional fire hazards in this Chapter. The following additional measures are required:

.1 the foam shall be of alcohol-resistant type;

.2 the type of foam concentrates for use in OSVs shall be to the satisfaction of requirements set out in 3.7.1.2 of Part VI "Fire Protection"; and

¹ Hereinafter, the Chem Rules.

.3 the rate of supply of foam solution shall be not less than the greatest of the following:
.3.1 2 l/min per square metre of the cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the ship times the total longitudinal extent of the cargo tank spaces;

.3.2 20 l/min per square metre of the horizontal sectional area of the single tank having the largest such area;

.3.3 10 l/min per square metre of the area protected by the largest monitor of the highest capacity and being entirely forward of the monitor. The capacity thereof shall be at least 1250 l/min.

31.3.11.3 Applicators shall be provided for flexibility of action during fire-fighting operations and to cover areas screened from the monitors. The capacity of any applicator shall be not less than 400 l/min and the applicator throw in still air conditions shall be not less than 15 m. The number of foam applicators provided shall be not less than four. The number and disposition of foam main outlets shall be such that foam from at least two applicators can be directed to any part of the cargo tanks deck area.

31.3.11.4 For OSVs fitted with inert gas systems, a quantity of foam concentrate sufficient for 20 min of foam generation may be accepted.

31.3.11.5 A liquid cargo with a vapor pressure above 0,1 MPa at a temperature of 37,8 °C is considered as a cargo posing an additional fire hazard. Ships transporting such cargo shall meet the following requirements:

.1 for a cargo referenced in column "o" in the table of chapter 17 of the IBC Code to section 15.14 of the IBC Code, a mechanical refrigeration system shall be provided unless the cargo system is designed to withstand the vapour pressure of the cargo at 45 °C. Where the cargo system is designed to withstand the vapour pressure of the cargo at 45 °C, and no refrigeration system is provided, a notation shall be made in the conditions of carriage on the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk to indicate the required relief-valve setting for the tanks;

.2 the mechanical refrigeration plant shall maintain the temperature of the liquid cargo below its boiling point at the design pressure in the cargo tank;

.3 connections shall be provided for the recirculation of gases evaporated during loading to the shore system.

.4 each tank shall be equipped with a pressure gauge showing the pressure in the vapor space above the cargo;

.5 when cargo needs to be cooled, thermometers shall be provided at the top and bottom of each tank.

31.3.11.6 When the hydrocarbon gas concentration reaches a pre-set level which shall not be higher than 10 % of the lower flammable limit, a continuous audible and visual alarm signal shall be automatically effected in the pump-room and cargo control room to alert personnel to the potential hazard. However, existing monitoring systems already fitted having a pre-set level not greater than 30 % of the lower flammable limit may be accepted.

31.3.11.7 Where the fitting of a navigation position above the cargo area is shown to be necessary, it shall be for navigation purposes only and it shall be separated from the cargo tank deck by means of an open space with a height of at least 2 m. The fire protection requirements for such a navigation position shall be those required for control stations, as specified in regulation 9.2.4.2 of part C of chapter II-2 of SOLAS-74 and other provisions for tankers, as applicable.

31.3.11.8 Means shall be provided to keep deck spills away from the accommodation and service areas. This may be accomplished by provision of a permanent continuous coaming of a height of at least 300 mm, extending from side to side. Special consideration shall be given to the arrangements associated with stern loading.

31.3.11.9 Where there is permanent access from the pipeline tunnel to the main pump-room, a sliding door, remotely closed from the bridge, shall be installed. Indicators showing whether the door is open or closed and an audible alarm indicating that the door is closed shall be provided at the control station. The power source, controls and indicators shall be operable in the event of failure of the main power source. The door shall be fitted with an individual manual actuator to ensure the possibility of opening and closing the door manually from both sides.

31.3.11.10 Inerting, purging and gas freeing.

31.3.11.10.1 Arrangements for purging and/or gas freeing shall be such as to minimize the hazards due to dispersal of flammable vapors in the atmosphere and to flammable mixtures in a cargo tank.

31.3.11.10.2 The arrangements for inerting, purging or gas freeing of empty tanks shall be to the satisfaction of the Register and shall be such that the accumulation of hydrocarbon vapors in pockets formed by the internal structural members in a tank is minimized and that:

.1 on individual cargo tanks, the gas outlet pipe, if fitted, shall be positioned as far as practicable from the inert gas/air inlet. The inlet of such outlet pipes may be located either at deck level or at not more than 1 m above the bottom of the tank;

.2 the cross-sectional area of such gas outlet pipe referred above shall be such that an exit velocity of at least 20 m/s can be maintained when any three tanks are being simultaneously supplied with inert gas. Their outlets shall extend not less than 2 m above deck level; and

.3 each gas outlet referred to in 31.3.11.10.2.2 shall be fitted with suitable blanking arrangements.

31.3.11.11 Cargo area protection.

Drip pans for collecting cargo residues in cargo lines and hoses shall be provided in the area of pipe and hose connections under the manifold area. Cargo hoses and tank washing hoses shall have electrical continuity over their entire lengths, including couplings and flanges (except shore connections), and shall be earthed for removal of electrostatic charges.

31.3.11.12 Protection of cargo pump-rooms.

.1 cargo pumps, ballast pumps and stripping pumps, installed in cargo pump-rooms and driven by shafts passing through pump-room bulkheads shall be fitted with temperature sensing devices for bulkhead shaft glands, bearings and pump casings. A continuous audible and visual alarm signal shall be automatically effected in the cargo control room or the pump control station;

.2 lighting in cargo pump-rooms, except emergency lighting, shall be interlocked with ventilation such that the ventilation shall be in operation when switching on the lighting. Failure of the ventilation system shall not cause the lighting to go out;

.3 a system for continuous monitoring of the concentration of hydrocarbon gases shall be fitted. Sampling points or detector heads shall be located in suitable positions in order that potentially dangerous leakages are readily detected. When the flammable vapour concentration reaches a pre-set level, which shall not be higher than 10 % of the lower flammable limit, a continuous audible and visual alarm signal shall be automatically effected in the pump-room, engine control room, cargo control room and navigation bridge to alert personnel to the potential hazard; and

.4 all pump-rooms shall be provided with bilge level monitoring devices together with appropriately located alarms.

31.3.11.13 Closing appliances and stopping devices of ventilation.

31.3.11.13.1 The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated. The means of closing shall be easily accessible as well as prominently and permanently marked and shall indicate whether the shut-off is open or closed.

31.3.11.13.2 Power ventilation of accommodation spaces, service spaces, cargo spaces, control stations and machinery spaces shall be capable of being stopped from an easily accessible position outside the space being served. This position shall not be readily cut off in the event of a fire in the spaces served.

31.3.11.14 Means of control in machinery spaces.

31.3.11.14.1 Means of control shall be provided for opening and closing the skylights, closing the openings in funnels which normally allow exhaust ventilation, and for closing the ventilator dampers.

31.3.11.14.2 Means of control shall be provided for stopping the fans. The controls for power ventilation serving the machinery spaces shall be grouped in such a way that the controls can be operated from two positions, one of which shall be outside such spaces. Means for stopping the power ventilation of the machinery spaces shall be entirely separate from the means provided for stopping ventilation of other spaces.

31.3.11.14.3 Means of control shall be provided for stopping forced and induced draft fans, oil fuel transfer pumps, oil fuel unit pumps, lubricating oil service pumps, thermal oil circulating pumps and oil separators (purifiers).

31.3.11.14.4 The controls required in 31.3.11.14.1 — 31.3.11.14.3 shall be located outside the space they serve so they will not be cut off in the event of fire in that space.

31.3.11.15 Materials.

31.3.11.15.1 Insulating materials.

With the exception of cargo areas, post offices, baggage compartments and refrigerated store-rooms of service spaces, insulating materials shall be non-combustible. Vapor insulating coatings and adhesives used in conjunction with the insulation of cooling water pipes of air conditioning and cooling systems designed to prevent condensation, and the insulation of fittings, shaped elements and connections of these pipelines may be flammable, but their quantity shall be kept to a reasonable minimum and their exposed surfaces shall have slow flame spread characteristics.

31.3.11.15.2 Ceilings and linings.

On OSVs, all linings, ceilings, draught stops and their associated grounds shall be made of non-combustible materials in the following spaces:

.1 in accommodation and service spaces and control stations, in the case of ships for which IC method is specified; and

.2 in corridors and stairway enclosures which serve accommodation, service and control spaces, in the case of ships for which IIC and IIIC methods are specified.

31.3.11.15.3 On OSVs, non-combustible bulkheads, ceilings and linings fitted in accommodation and service spaces may be faced with combustible materials, facings, mouldings, decorations and veneers provided such spaces are bounded by non-combustible bulkheads, ceilings and linings.

31.3.11.15.4 The properties of combustible materials and their extent in the ship's spaces shall be in accordance with 2.1 of Part VI "Fire Protection".

31.3.11.16 Detection and alarm.

31.3.11.16.1 Protection of machinery spaces.

31.3.11.16.1.1 Installation.

A fixed fire detection and fire alarm system shall be installed in:

.1 periodically unattended machinery spaces;

.2 machinery spaces where:

.2.1 the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and

.2.2 the main propulsion and associated machinery, including the main sources of electrical power, are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room; and

.3 enclosed spaces containing incinerators.

The requirements for components of the fixed fire detection and fire alarm system are stated in 4.2.1.4 of Part VI "Fire Protection".

31.3.11.17 Protection of accommodation and service spaces and control stations.

31.3.11.17.1 Smoke detectors in accommodation spaces.

Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces. Consideration shall be given to the installation of special purpose smoke detectors within ventilation ducting.

31.3.11.17.2 The accommodation and service spaces and control stations of OSVs shall be protected by a fixed fire detection and fire alarm system and/or an automatic sprinkler system and fire detection and fire alarm system, depending on the method of protection:

.1 when method IC is used: a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces;

.2 when method IIC is used: a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces. In addition, an automatic sprinkler system shall be so installed and arranged as to protect accommodation spaces, galleys and other service spaces except spaces posing no substantial fire risk such as void spaces, sanitary spaces, etc.;

.3 when method IIC is used: a fixed fire detection and fire alarm system shall be so installed and arranged as to detect the presence of fire in all accommodation and service spaces, providing smoke detection in corridors, stairways and escape routes within accommodation spaces, except spaces posing no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a fixed fire detection and fire alarm system shall be so installed and arranged as to provide smoke detection in all corridors, stairways and escape routes within accommodation spaces. However, there is no need to provide fixed fire detection and fire alarm system in service spaces built away from the accommodation block.

31.3.11.18 Manually operated call points shall comply with 4.2.2 of Part VI "Fire Protection".

31.3.11.19 Measures for preventing flame and smoke spread shall meet the requirements in 2.1.4 of Part VI "Fire Protection".

31.3.11.20 Structural fire protection.

31.3.11.20.1 Protection methods within accommodation spaces.

In way of accommodation and service spaces and control stations one of the following methods of protection shall be adopted:

.1 method IC: construction of internal subdivision bulkheads of non-combustible "B" or "C" class divisions, generally without installation in the accommodation and service spaces of the automatic sprinkler fire extinguishing system and fire detection and fire alarm system;

.2 method IIC: the fitting of an automatic sprinkler system and fire detection and fire alarm system in all spaces in which fire might be expected to originate, generally with no restriction on the type of internal bulkheads;

.3 method IIIC: the fitting of a fixed fire detection and fire alarm system of approved type complying with requirements of 4.1 and 4.2 of Part VI "Fire Protection" in spaces where fire might develop, generally with no restriction on the class of internal subdivision bulkheads, except that in no case shall the area of any accommodation space bounded by "A" or "B" class division exceeds 50 m². The Register may consider increasing this area for public spaces.

31.3.11.20.2 The bulkheads within the area of accommodation spaces shall comply with 2.3.5 of Part VI "Fire Protection".

31.3.11.20.3 Fire integrity of bulkheads and decks shall meet the requirements in 2.3.3 of Part VI "Fire Protection".

31.3.11.20.4 Continuous "B" class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

31.3.11.20.5 External boundaries which are required in regulation 11.2 to be of steel or other equivalent material may be pierced for the fitting of windows and side scuttles provided that there is no requirement for such boundaries of OSVs to have "A" class integrity. Similarly, in such boundaries which are not required to have "A" class integrity.

31.3.11.20.6 Saunas shall comply with the requirements in 31.3.11.20.5.

31.3.11.20.7 Protection of stairways and lift trunks in accommodation and service spaces as well as in control stations shall meet the requirements in 2.1.4.3 of Part VI "Fire Protection".

31.3.11.20.8 Penetrations in fire-resisting divisions shall meet the requirements in 2.1.3.3 — 2.1.3.5 of Part VI "Fire Protection".

31.3.11.20.9 Doors in fire-resisting divisions of OSVs shall meet the requirements in 2.1.3.1, 2.3.7, 2.3.8 of Part VI "Fire Protection".

31.3.11.20.10 Watertight doors need not be insulated.

31.3.11.20.11 Protection of openings in boundary structures of machinery spaces shall meet the requirements in 2.1.4.2 of Part VI "Fire Protection".

31.3.11.20.12 Ventilation systems.

Design and arrangement of ventilation ducts shall meet the requirements in 12.1.11 — 12.1.19 of Part VIII "Systems and Piping".

31.3.11.20.13 Exhaust ducts from galley ranges shall meet the requirements in 12.3.6 of Part VIII "Systems and Piping".

31.3.11.21 Water fire main system.

31.3.11.21.1 OSVs water fire main system shall comply with 3.2 of Part VI "Fire Protection".

31.3.11.21.2 During cargo transfer, water pressure shall be maintained in the fire main system.

31.3.11.21.3 Materials readily rendered ineffective by heat shall not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants shall be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants shall be such as to avoid the possibility of freezing. Suitable drainage provisions shall be provided for fire main piping. Isolation valves shall be installed for all open deck fire main branches used for purposes other than firefighting. In ships where deck cargo may be carried, the positions of the hydrants shall be such that they are always readily accessible and the pipes shall be arranged as far as practicable to avoid risk of damage by such cargo.

31.3.11.21.3 Ventilation of emergency fire pump-room.

Ventilation arrangements to the space containing the independent source of power for the emergency fire pump shall be such as to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space.

31.3.11.21.4 Additional fire pumps for OSVs.

In addition, in OSVs where other pumps, such as general service, bilge and ballast, etc., are fitted in a machinery space, arrangements shall be made to ensure that at least one of these pumps, having the capacity and pressure required by 3.2.1.1 and 3.2.1.10 of Part VI "Fire Protection" is capable of providing water to the fire main.

31.3.11.22 Fire hoses and monitors shall meet the requirements in 5.1 of Part VI "Fire Protection".

31.3.11.23 The arrangement and number of portable fire extinguishers and their spare charges shall meet the requirements in 5.1.9 — 5.1.11 of Part VI "Fire Protection".

31.3.11.24 Fixed fire extinguishing systems.

31.3.11.24.1 Depending on purpose, in addition to water fire main system OSV spaces shall be protected by one of the following fixed fire extinguishing systems:

.1 a fixed gas fire extinguishing system complying with the provisions of the Fire Safety Systems Code;

.2 a fixed high-expansion foam fire extinguishing system complying with the provisions of the Fire Safety Systems Code; and

.3 a fixed pressure water-spraying fire extinguishing system complying with the provisions of the Fire Safety Systems Code.

31.3.11.24.2 The Register may consider the use of other equivalent systems that provide equal protection.

31.3.11.24.3 Fire extinguishing systems using Halon 1211, Halon 1301 and Halon 2402 and perfluorocarbons shall be prohibited.

31.3.11.24.4 Where a fixed gas fire extinguishing system is used, openings which may admit air to, or allow gas to escape from, a protected space shall be capable of being closed from outside the protected space.

31.3.11.24.5 Pumps, other than those serving the fire main, required for the provision of water for fixed fire extinguishing systems, their sources of power and their controls shall be installed outside the spaces protected.

31.3.11.25 Fire extinguishing means in machinery spaces.

31.3.11.25.1 Machinery spaces of category A shall be provided with one of the fixed fire extinguishing systems specified in 31.3.11.24.1.

31.3.11.25.2 Additional fire extinguishing arrangements.

31.3.11.25.2.1 There shall be at least one portable foam applicator unit complying with the provisions of the Fire Safety Systems Code.

31.3.11.25.2.2 There shall be in each such space approved foam-type fire extinguishers, each of at least 45 l capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed onto any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards. In addition, there shall be provided a sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space.

31.3.11.25.3 Fixed local application fire extinguishing systems.

Fixed local application fire extinguishing systems shall comply with the requirements in 3.12 of Part VI "Fire Protection".

31.3.11.26 Fixed gas fire extinguishing systems for dangerous goods.

A ship engaged in the carriage of dangerous goods in any cargo space shall be provided with a fixed gas fire extinguishing system complying with the provisions of the Fire Safety Systems Code or with a fire extinguishing system which, in the opinion of the Register, gives equivalent protection for the cargoes carried.

31.3.11.27 Fire protection of cargo pump-rooms.

31.3.11.27.1 Cargo pump-rooms of an OSV carrying both products with a flashpoint exceeding 60 °C and products with a flashpoint not exceeding 60 °C shall be provided with a fixed carbon dioxide fire extinguishing system. A notice shall be exhibited at the controls stating that the system is only to be used for fire extinguishing and not for inerting purposes, due to the electrostatic ignition hazard. The alarms shall be safe for use in a flammable cargo vapour/air mixture. For the purpose of this requirement, an extinguishing system shall be provided which would be suitable for machinery spaces. However, the amount of gas carried shall be sufficient to provide a quantity of free gas equal to 45 % of the gross volume of the cargo pump-room in all cases.

31.3.11.27.2 Cargo pump-rooms of ships which are dedicated to the carriage of a limited amount of cargoes shall be protected by an appropriate fire extinguishing system approved by the Register.

31.3.11.27.3 If the fire of cargoes to be carried cannot be extinguished by carbon dioxide or equivalent gas fire extinguishing system, the cargo pump-room shall be protected by a fire extinguishing system consisting of either a fixed pressure water-spraying system or high expansion foam system.

31.3.11.28 Fire protection of cargo area.

31.3.11.28.1 The system shall be located and sized to supply simultaneously foam to the deck area as defined in 31.1.2.7.3.3 to 31.1.2.7.3.5 and 31.1.2.7.3.7.

31.3.11.28.2 All parts of the areas shall be protected by either fixed foam monitors or fixed nozzles or a combination of both.

31.3.11.28.3 In case of foam monitors, one monitor may be sufficient and the distance from the monitor to the farthest extremity of the protected area shall not be more than 75% of the monitor throw in still air conditions. The monitor(s) shall be in a location that is not above the cargo tanks and is readily accessible and operable in the event of fire in the areas protected.

31.3.11.28.4 The deck foam system shall be capable of simple and rapid operation. The main control station for the system shall be suitably located outside of the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fires in the areas protected.

31.3.11.28.5 Application rate shall be 10 l/min/m² with sufficient supply for at least 30 min for tanks without an overlying cofferdam and 20 min for tanks with an overlying cofferdam. Water supply to the fixed foam fire extinguishing system shall be in addition to the water supply required for the ship's fire main.

31.3.11.28.6 The foam concentrates shall be compatible with the cargo carried.

31.3.11.28.7 The ship shall carry in a readily available position, at cargo deck level, two portable foam applicator units with at least four portable 20 l containers with foam concentrate, for use with water supplied by the ship's fire main.

31.3.11.29 Mechanical ventilation in the cargo area.

Ventilation system of spaces in the cargo area shall meet the requirements set out in Section 8 of Part VI "Systems and Piping" of the Chem Rules.

31.3.11.30 Fireman's outfit.

The number of fireman's outfit sets, their extent and storage places shall comply with Table 5.1.2, 5.1.15 and Table 5.2.1 of Part VI "Fire Protection".

31.3.11.30 Structural fire integrity.

Material of hull, superstructures, structural bulkheads, decks and deckhouses, machinery spaces shafts, deck plates shall meet the requirements in 2.1.1 of Part VI "Fire Protection".

31.3.11.31 Notification and evacuation from control stations, accommodation and service spaces

31.3.11.31.1 A general emergency alarm system shall be used for notifying crew and passengers of a fire.

31.3.11.31.2 At least two widely separated means of escape shall be provided from all levels of accommodation spaces.

31.3.11.31.3 Below the lowest open deck the main means of escape shall be a stairway and the second escape may be a trunk or a stairway.

31.3.11.31.4 Above the lowest open deck the means of escape shall be stairways or doors to an open deck or a combination thereof.

31.3.11.31.5 No dead-end corridors having a length of more than 7 m shall be accepted.

31.3.11.31.6 The width, number and continuity of escape routes shall be in accordance with the requirements in the Fire Safety Systems Code.

31.3.11.31.7 Dispensation from two means of escape.

Exceptionally, the Register may dispense with one of the means of escape, for crew spaces that are entered only occasionally, if the required escape route is independent of watertight doors.

31.3.11.31.8 In all ships at least two emergency escape breathing device (EEBD) shall be carried within accommodation spaces.

31.3.11.32 Means of escape from machinery spaces.

31.3.11.32.1 Two escape routes from each category A machinery space in compliance with 4.5.10 — 4.5.12 of Part VII "Machinery Installations" shall be provided.

31.3.11.32.2 Machinery spaces of all ships shall be provided with ready-to-use EEBDs for emergency evacuation, placed in clearly visible locations that are easily accessible at all times in the event of fire. The number and location of EEBDs shall be indicated in the fire protection diagram.

31.3.12 Special requirements for products with a flashpoint not exceeding 60 °C, toxic products and acids.

31.3.12.1 General.

31.3.12.1.1 Cargo tanks certified for products or residues of products subject to the provisions of this Chapter shall be segregated from machinery spaces, propulsion shaft tunnels, solid bulk cargo and underdeck access way if fitted, by means of a cofferdam, void space, cargo pump-room, empty tank or other similar space.

31.3.12.1.2 Cargo tanks certified for products subject to the provisions of this Chapter shall be separated from the deck plating by cofferdams.

31.3.12.1.3 Cargo piping shall not pass through any underdeck access way or machinery spaces.

31.3.12.1.4 Discharge arrangements for ballast or fresh water sited immediately adjacent to cargo tanks certified for products or residues of products subject to the provisions of this Chapter shall be outside machinery spaces and accommodation spaces. Filling arrangements may be in the machinery spaces provided that such arrangements ensure filling from main deck level and non-return valves are fitted.

31.3.12.1.5 Bilge pumping systems serving spaces where cargoes or residues of cargoes may occur shall be independent from systems serving spaces outside such areas and shall be entirely situated within the area related to cargoes subject to this Chapter. The bilge system serving these spaces shall be operable from outside the cargo area.

31.3.12.1.6 In order to guard against the danger of hazardous vapors, due consideration shall be given to the location of air intakes and openings into accommodation, passageways, service and machinery spaces and control stations in relation to cargo piping and cargo vent systems as defined in 31.1.2.7.

31.3.12.1.7 All access to cargo tanks, cofferdams, void spaces, cargo pump-rooms, pump-rooms, empty tanks, or other spaces adjacent to cargo tanks certified for products subject to the provisions of this Chapter, shall be direct from the open deck and such as to ensure their complete inspection. The dimensions of the accesses shall be in accordance with 31.3.1.8.

31.3.12.2 Products with a flashpoint not exceeding 60 °C

31.3.12.2.1 Unless they are located at least 7 m away from the deck area as defined in 31.1.2.7.3, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the cargo deck area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within such deck area, provided the boundaries of the spaces are insulated to A-60 standard. When arranged within such deck area, windows and side scuttles facing the deck area shall be of a fixed (non-opening) type. Such side scuttles in the first tier on the main deck shall be fitted with inside covers of steel or equivalent material.

31.3.12.3 Toxic products.

31.3.12.3.1 Outlets of tank venting system shall be located as follows:

.1 at a height of $B/3$ or 6 m, whichever is greater, above the weather deck or, in the case of a deck tank, the access gangway;

.2 not less than 6 m above the fore-and-aft gangway, if fitted within 5 m of the gangway; and

.3 15 m from any opening or air intake to any accommodation and service spaces;

.4 the vent height may be reduced to 3 m above the deck or fore-and-aft gangway, as applicable, provided high-velocity vent valves of a type approved by the Register, directing the vapor/air mixture upwards in an unimpeded jet with an exit velocity of at least 30 m/s, are fitted.

31.3.12.3.2 Tank venting systems shall be provided with a connection for a vapour-return line to the shore installation.

31.3.12.3.3 Tanks intended for transport of toxic products shall:

.1 not be stowed adjacent to oil fuel tanks;

.2 have separate piping systems; and

.3 have tank vent systems separate from tanks containing non-toxic products.

31.3.12.3.4 Cargo tank relief valve settings shall be a minimum of 0,2 bar gauge.

31.3.12.3.5 Unless they are located at least 15 m away from the deck area as defined in 31.1.2.7.3, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the deck area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within such deck area, provided the boundaries of the spaces have equivalent gas tightening to A-60 standard. Wheelhouse doors and wheelhouse windows may be located within the limits specified above so long as they are designed in such a way that a rapid and efficient gas- and vapour-tightening of the wheelhouse can be assured. Windows and side scuttles facing the deck area and on the sides of the superstructures and deckhouses within the limits specified above shall be of the fixed type. Such side scuttles in the first tier on the main deck shall be fitted with inside covers of steel or equivalent material.

31.3.12.3.6 Cargo tanks certified to carry toxic products shall be fitted with fixed tank washing arrangements. Other arrangements allowing cleaning of the tank(s) without the need for personnel to enter during the cleaning process may be fitted, if proper safety equipment is used.

31.3.12.3.7 The cargo deck area shall be such as to promote natural ventilation and to prevent toxic gas from accumulating in closed or partly closed spaces on deck. A high closed cargo rail in the stern is prohibited. However, if proper natural ventilation can be documented, a higher aft bulwark/cargo rail may be accepted.

31.3.12.3.8 Means shall be provided to minimize the range of a possible leak in the hose landing area on the main deck. An example of such means is transverse gutter bars on both sides of the hose landing area in way of the loading stations.

31.3.12.3.9 The set point of the pressure side of the P/V valves shall be set at a minimum 0,6 bar gauge.

31.3.12.4 Acids.

31.3.12.4.1 The ship's shell plating shall not form any boundaries of tanks containing mineral acids.

31.3.12.4.2 Proposals for lining steel tanks and related steel piping systems with corrosion-resistant materials may be considered by the Register. The elasticity of the lining shall not be less than that of the supporting boundary plating.

31.3.12.4.3 Unless constructed wholly of corrosion-resistant materials or fitted with an approved lining, the plating thickness shall take into account the corrosivity of the cargo.

31.3.12.4.4 Flanges of the loading and discharge manifold connections shall be provided with shields, which may be portable, to guard against the danger of the cargo being sprayed; and in addition, drip trays shall also be provided to guard against leakage on to the deck.

31.3.12.4.5 Because of the danger of evolution of hydrogen when these substances are being carried, the electrical arrangements shall comply with 20.11 of Part XI "Electrical Equipment". The certified safe type equipment shall be suitable for use in hydrogen/air mixtures. Other sources of ignition shall not be permitted in such spaces.

31.3.12.4.6 Substances subjected to the requirements of this Section shall be segregated from oil fuel tanks.

31.3.12.4.7 Provision shall be made for suitable apparatus to detect leakage of cargo into adjacent spaces.

31.3.12.4.8 The cargo pump-room bilge pumping and drainage arrangements shall be of corrosion-resistant materials.

31.3.12.4.9 Floors or decks under acid storage tanks and pumps and piping for acid shall have a lining or coating of corrosion-resistant material extending up to a minimum height of 500 mm on the bounding bulkheads or coamings. Hatches or other openings in such floors or decks shall be raised to a minimum height of 500 mm; however, where the compliance with this height requirement is not practicable, a lesser height may be accepted upon agreement with the Register.

31.3.12.4.10 Flanges or other detachable pipe connections shall be covered by spray shields.

31.3.12.4.11 Portable shield covers for connecting the flanges of the loading manifold shall be provided. Drip trays of corrosion-resistant material shall be provided under loading manifolds for acids.

31.3.12.4.12 Spaces for acid storage tanks and acid pumping and piping shall be provided with drainage arrangements of corrosion-resistant materials.

31.3.12.4.13 Deck spills shall be kept away from accommodation and service areas by means of a permanent coaming of suitable height and extension.

31.3.13 Instrumentation and automation systems.

31.3.13.1 General.

31.3.13.1.1 Each cargo tank shall be provided with a means for level indicating.

31.3.13.1.2 If loading and unloading of the ship is performed by means of remotely controlled valves and pumps, all controls and indicators associated with a given cargo tank shall be concentrated in at least one cargo control station.

31.3.13.1.3 Instruments shall be tested to ensure reliability under working conditions and recalibrated at regular intervals. Test procedures for instruments and the intervals between recalibration shall be in accordance with manufacturers' recommendations.

31.3.13.2 Level indicators for cargo tanks.

31.3.13.2.1 Each cargo tank shall be fitted with a liquid level gauging device or devices, arranged to ensure a level reading is always obtainable whenever the cargo tank is operational. The device(s) shall be designed to operate throughout the design pressure range of the cargo tank and at temperatures within the cargo operating temperature range.

31.3.13.2.2 Where the installation of liquid level gauging devices are impractical due to the properties of the cargo, such as liquid muds, a visual means of indicating the cargo tank level shall be provided for cargo loading operations, subject to approval by the Register.

31.3.13.2.3 Where only one liquid level gauge is fitted, it shall be arranged so that it can be maintained in an operational condition without the need to empty or gas free the tank.

31.3.13.2.4 Cargo tank liquid level gauges may be of the following types, subject to special requirements for particular cargoes shown in column "j" in the table of chapter 17 of the IBC Code.

.1 open device, which makes use of an opening in the tanks and may expose the gauge to the cargo or its vapor. An example of this is the ullage opening;

.2 restricted device, which penetrates the tank and which, when in use, permits a small quantity of cargo vapour or liquid to be exposed to the atmosphere. When not in use, the device

is completely closed. The design shall ensure that no dangerous escape of tank contents (liquid or spray) can take place in opening the device; and

.3 closed device, which penetrates the tank but which is part of a closed system and keeps tank contents from being released. Examples are the float-type systems, electronic probe, magnetic probe and protected sight-glass. Alternatively, an indirect device which does not penetrate the tank shell and which is independent of the tank may be used. Examples are weighing of cargo and pipe flowmeter.

31.3.13.3 Cargo overflow control.

31.3.13.3.1 The provisions of this para are applicable where specific reference to chapter 15.19 of the IBC Code is made in column "o" in the table of chapter 17.

31.3.13.3.2 In the event of a power failure on any system essential for safe loading, an alarm shall be given to the operators concerned.

31.3.13.3.3 Loading operations shall be terminated at once in the event of any system essential for safe loading becoming inoperative.

31.3.13.3.4 Level alarms shall be capable of being tested prior to loading.

31.3.13.3.5 The high-level alarm system required under 31.3.13.3.6 shall be independent of the overflow control system required by 31.3.13.3.7 and shall be independent of the cargo tank instrumentation.

31.3.13.3.6 Cargo tanks shall be fitted with a visual and audible high-level alarm which complies with the requirements in 31.3.13.3.1 — 31.3.13.3.5 and which indicates when the liquid level in the cargo tank approaches the normal full condition.

31.3.13.3.7 A tank overflow control system required by this Section shall:

.1 come into operation when the normal tank loading procedures fail to stop the tank liquid level exceeding the normal full condition;

.2 give a visual and audible tank overflow alarm to the ship's operator; and

.3 provide an agreed signal for sequential shutdown of onshore pumps or ship's valves.

The signal, as well as the pump and valve shutdown, may be dependent on operator's intervention. The use of shipboard automatic closing valves shall be permitted only when specific approval has been obtained from the Administration and the port State authority concerned.

31.3.13.3.8 The loading rate (*LR*) of the tank shall not exceed:

$$LR = \frac{3600U}{t} \text{ m}^3/\text{h} \quad (31.3.13.3.8)$$

where *U* — ullage volume (m) at operating signal level;

t — time (s) needed from the initiating signal to fully stopping the cargo flow into the tank, being the sum of times needed for each step in sequential operations such as operator's responses to signals, stopping pumps and closing valves;

and shall also take into account the pipeline system design pressure.

31.3.14 Vapor detection.

31.3.14.1 Ships carrying toxic or flammable products or both shall be equipped with at least two instruments designed and calibrated for testing for the specific vapors in question. If such instruments are not capable of testing for both toxic concentrations and flammable concentrations, then two separate sets of instruments shall be provided.

31.3.14.2 Vapor-detection instruments may be portable or fixed. If a fixed system is installed, at least one portable instrument shall be provided.

31.3.14.3 Vapor-detection requirements for individual products are shown in column "k" in the table of chapter 17 of the IBC Code.

31.3.15 Pollution prevention requirements.

31.3.15.1 Each ship certified to carry noxious liquid substances shall be provided with a Cargo Record Book, a Procedure and Arrangements Manual and a Shipboard Marine Pollution Emergency Plan developed for the ship in accordance with MARPOL 73/78 Annex II and approved by the Administration or an authorized entity on behalf of the Administration.

31.3.15.2 Discharge into the sea of residues of noxious liquid substances permitted for carriage under this Section, tank washings, or other residues or mixtures containing such substances, is prohibited. Any discharges of residues and mixtures containing noxious liquid

substances shall be to port reception facilities. As a consequence of this prohibition, there are no requirements for efficient stripping and underwater discharge arrangements in MARPOL 73/78 Annex II.

31.3.16 Life-saving appliances and arrangements.

31.3.16.1 The scope, arrangement and design of life-saving appliances shall comply with the requirements of chapter III of SOLAS 74 for ships covered by SOLAS-74 as amended or, for ships not covered by SOLAS 74, Part II «Life-Saving Appliances" of the Rules for the Equipment of Sea-Going Ships.

31.3.16.2 In addition to para 31.3.16.1 OSVs carrying cargoes emitting toxic vapors or gases¹, shall carry, in lieu of totally enclosed lifeboats, lifeboats with a self-contained air support system.

31.3.16.3 In addition to para 31.3.16.1, OSVs carrying cargoes having a flashpoint not exceeding 60 °C (closed-cup test) shall carry, in lieu of totally enclosed lifeboats, fire-protected lifeboats.

31.3.17 Personnel protection.

OSVs carrying dangerous cargoes having a reference in column "o" of the table in chapter 17 of the IBC Code to chapter 15.12 of the IBC Code shall be fitted with protection equipment complying with the requirements of Part X "Personnel Protection" of the Chem Rules.

31.3.18 Backload of contaminated liquids in bulk.

31.3.18.1 Contaminated liquids in bulk shall be carried in accordance with the applicable minimum requirements for the carriage of contaminated liquids in bulk as specified in chapter 17 of the IBC Code or in the current version of MEPC.2/Circular.

31.3.18.2 In addition to the provisions stated in 31.3.18.1, the carriage of contaminated liquids in bulk requires detection of hydrogen sulphide H₂S and setting of a lower explosive limit (LEL) for gases as specified below:

.1 by means of fixed vapour detection instruments with audible and visual alarms to indicate H₂S and LEL levels exceeding 5 ppm and 10 % respectively, installed in the venting systems of the relevant tanks; and

.2 by means of portable instruments for all personnel on the working deck.

31.3.19 Discharging and loading of portable tanks on board.

31.3.19.1 General.

This Chapter shall apply when using offshore portable tanks.

Chemicals, including blending additives, transported in portable deck tanks which are considered to fall outside the scope of 31.1.1.3 may be carried in limited amounts. The aggregate amount of such chemicals which may be transported shall not exceed 10 % of the ship's maximum authorized quantity of products subject to the present Section. An individual tank shall contain not more than 10 m³ of these chemicals. The discharge of these chemicals into the sea from OSVs is prohibited.

31.3.19.2 Arrangement of deck spread.

31.3.19.2.1 All pumping equipment, processing equipment, pipework, valves and hoses shall be compatible with the substances being transferred.

31.3.19.2.2 Pipework connecting deck spread tanks to bulk tanks within the cargo area of the ship shall have two valve separation and shall comply with the provisions of 31.3.4.

31.3.19.2.3 In addition to the cargo segregation required by 31.3.1 and 31.3.12, the general stowage and segregation requirements given in chapter 7 of the IMDG Code shall apply.

31.3.19.2.4 Portable tank venting systems permitted in compliance with 31.3.1.6 shall meet the requirements of 31.3.8.

31.3.19.2.5 Arrangements of products with a flashpoint not exceeding 60 °C, toxic products and acids shall comply with the provisions in 31.3.12, as applicable.

31.3.19.2.6 Deck spills shall be kept away from accommodation and service areas by means of coamings of suitable height and extension.

¹ Refer to the products for which emergency escape respiratory protection is required in chapter 17 of the IBC Code (IMO resolution MSC.4(48), as amended), and in chapter 19 of the IGC Code (IMO resolution MSC.5(48), as amended).

31.3.19.3 Shipment of cargo in portable tanks used as deck tanks.

31.3.19.3.1 A procedure for the carriage of portable tanks shall be completed and submitted to the Administration or any organization recognized by it, for consideration and approval prior to arranging the deck spread.

31.3.19.3.2 The portable tank shall be physically secured to the ship, in accordance with the ship's cargo securing manual to prevent loss in the event of an incident while at sea. The arrangements for securing the portable tanks to the ship shall be of such strength as to withstand the forces likely to be encountered during the voyage to and from the area of operation.

31.3.19.3.3 The portable tank(s) and pumping system shall be monitored regularly on the sea passage to ensure the physical security of the portable tanks.

31.3.19.3.4 The pipework and valves shall be secured to prevent movement.

31.3.19.3.5 The loading and unloading of the portable tanks shall not be undertaken at the same time as other deck cargo is being handled.

31.3.19.3.6 Portable tank(s) shall be filled through a manifold system.

31.3.19.3.7 Discharge into the sea of portable tank contents, residues, tank washings, or other residues or mixtures containing such substances, is prohibited. Any discharges of residues and mixtures containing noxious liquid substances shall be to port reception facilities.

31.3.20 Carriage of liquefied gases.

31.3.20.1 The provisions of this chapter shall apply when liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen are carried.

31.3.20.2 Liquid carbon dioxide (high purity and reclaimed quality) and liquid nitrogen shall be carried in accordance with the applicable minimum carriage requirements specified below:

31.3.20.2.1 Nitrogen.

Materials of construction and ancillary equipment such as insulation shall be resistant to the effects of high oxygen concentrations caused by condensation and enrichment at the low temperatures attained in parts of the cargo system. Due consideration shall be given to areas where condensation may occur in order to avoid the stratification of oxygen-enriched atmosphere.

31.3.20.2.2 Carbon dioxide: high purity.

.1 Set pressure for the alarms and automatic actions described in this Section shall be set to at least 0,05 MPa above the triple point for the specific cargo being carried. The "triple point" for pure carbon dioxide occurs at 0,5 MPa gauge and -54,4 °C.

.2 Means of isolating the cargo tank safety valves shall be provided. Discharge piping from safety relief valves shall be designed so they remain free from obstructions that could cause clogging. Protective screens shall not be fitted to the outlets of relief valve discharge piping.

.3 Cargo tanks shall be continuously monitored for low pressure when a carbon dioxide cargo is carried. An audible and visual alarm shall be given at the cargo control position-and on the bridge. If the cargo tank pressure continues to fall to within 0,05 MPa of the "triple point" for the particular cargo, the monitoring system shall automatically close all cargo manifold liquid and vapour valves and stop all cargo compressors and cargo pumps.

.4 All materials used in cargo tanks and cargo piping system shall be suitable for the lowest temperature that may occur in service.

.5 Cargo hold spaces, cargo compressor rooms and other enclosed spaces where carbon dioxide could accumulate shall be fitted with continuous monitoring for carbon dioxide build-up.

31.3.20.3 Accommodation, service and machinery spaces and control stations.

Unless they are located at least 7 m away from the deck area as defined in 31.1.2.7.2, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the cargo deck area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within such deck area, provided the boundaries of the spaces have equivalent gas tightening to A-60 standard. Wheelhouse doors and wheelhouse windows may be located within the limits specified above as long as they are designed in such a way that a rapid and efficient gas and vapour tightening of the wheelhouse can be ensured. Windows and side scuttles facing the deck area and on the sides of the

superstructures and deckhouses within the limits specified above shall be of the non-opening type. Such side scuttles in the first tier on the main deck shall be fitted with inside covers of steel or equivalent material.

31.3.20.4 Design of cargo tanks.

Cargo tanks shall comply with Part IV "Cargo Containment" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk. Design and testing of tanks for liquid nitrogen shall comply with the requirements of Section 23 of Part IV "Cargo Containment" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk.

31.3.20.5 Materials of construction.

Materials of construction shall comply with the requirements of Section 19 of Part IV "Cargo Containment" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk.

31.3.20.6 Venting system for containment system.

Venting system for containment system shall comply with the requirements of 3.18, 5 and 12 of the Part VI of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk.

31.3.20.7 Cargo transfer.

.1 The cargo transfer system shall comply with the requirements of 3 of the Part VI of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk.

.2 Drip trays resistant to cryogenic temperatures shall be provided at manifolds transferring liquefied gases or at other flanged connections in the liquefied gas system.

31.3.20.8 Vapor detection.

Each enclosed space used for handling or storage of a liquefied gas shall be fitted with a sensor continuously monitoring the oxygen content of the space and an alarm indicating low oxygen concentration. For semi-enclosed spaces portable equipment may also be acceptable.

31.3.20.9 Level measurement.

Level measurement arrangements shall comply with the requirements of Part VIII "Instrumentation and Automation Systems" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk.

31.3.20.10 Emergency shutdown system.

Emergency shut-off valves shall be provided in liquid outlet lines from each liquefied gas tank. The controls for the emergency shut-off valves shall meet the provisions given in 31.3.6.1.3 for remote shutdown devices.

31.3.20.11 In the case of transfer operations involving pressures in excess of 5 MPa, arrangements for emergency depressurizing and disconnection of the transfer hose shall be provided. The controls for activating emergency depressurization and disconnection of the transfer hose shall meet the provisions given in 31.3.6.1.3 for remote shutdown devices.

31.3.20.12 Carriage on open deck.

Instead of the use of permanently attached deck tanks, portable tanks meeting the design requirements for type C independent tanks (refer to Section 23 of Part IV of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk) may be used provided that the provisions of 31.3.19.2 are complied with.

Carriage of liquefied gases other than those mentioned in this Section is subject to 18.12 of the Code for The Transport and Handling of Hazardous and Noxious Liquid Substances in Bulk on Offshore Support Vessels (OSV Chemical Code)."