RUSSIAN MARITIME REGISTER OF SHIPPING

Electronic version of printed document
approved on 30.06.14

RULES

FOR THE CLASSIFICATION AND CONSTRUCTION OF CHEMICAL TANKERS

НД № 2-020101-081-E

Saint-Petersburg
2014

Rules for the Classification and Construction of Chemical Tankers have been approved in accordance with the established approval procedure. The date of coming into force of the present Rules is 1 July 2014.

The present edition of the Rules is based on the Rules for the Classification and Construction of Chemical Tankers, 2006, taking into account additions and amendments developed immediately before publication.

The provisions of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk with relevant amendments thereto implemented by resolutions MSC.219(82) and MEPC.166(56) of the International Maritime Organization have been taken into consideration in the Rules.

The Rules establish requirements, which are specific for ships carrying dangerous chemicals in bulk, and supplement the Rules for the Classification and Construction of Sea-Going Ships and Rules for the Equipment of Sea-Going Ships of Russian Maritime Register of Shipping.

ISBN 978-5-89-331-269-0

CONTENTS

PART I. CLASSIFICATION

PART II. STRUCTURE OF CHEMICAL TANKER

PART III. CARGO CONTAINMENT

PART IV. STABILITY, SUBDIVISION AND FREEBOARD

PART V. FIRE PROTECTION

PART VI. SYSTEMS AND PIPING

PART VII. ELECTRICAL EQUIPMENT

PART VIII. INSTRUMENTATION

PART IX. MATERIALS OF CONSTRUCTION

PART X. EMERGENCY OUTFIT

PART I. CLASSIFICATION

1 GENERAL

1.1 APPLICATION

1.1.1 The requirements of the Rules for the Classification and Construction of Chemical Tankers[1] apply to specially constructed or converted ships, irrespective of gross tonnage and propulsion power, intended for carriage of dangerous chemicals in bulk.

The requirements of the Rules for the Equipment of Sea-Going Ships, the Rules for the Cargo-Handling Gear of Sea-Going Ships, the Load Line Rules for Sea-Going Ships and the Rules for the Prevention of Pollution from Ships fully apply to the chemical tankers. The requirements of General Regulations for the Classification and Other Activity, as well as the Rules for the Classification and Construction of Sea-Going Ships[2] apply to the chemical tankers to the extent, specified in the text of the present Rules.

1.1.2 The dangerous chemicals reviewed in these Rules are listed in Part XI "Summary of Technical Requirements".

1.2 DEFINITIONS AND EXPLANATIONS

See circular 860

1.2.1 Definitions.

Biological hazard, defined by irritant or toxic effect exerted by the cargo carried on the living organism when coming in to contact with skin or penetrating through respiratory tract, and allowing for such properties of the cargo as water solubility, volatility, odour, taste, vapour, pressure and density.

Noxious substance means any substance, which if discharged into the sea, is capable of presenting hazard to human health, causing damage to living resources, marine flora and fauna, reducing amenities or causing harm to other legitimate uses of the sea.

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[1] Hereinafter referred to as "the Rules".

[2] Hereinafter referred to as "the Rules for the Classification".

Gas dangerous spaces are such spaces within the cargo area, which are not provided with instruments and equipment to ensure safe state of the atmosphere in these spaces as well as enclosed spaces outside the cargo area, which contain cargo piping.

The gas-dangerous spaces include:

integral cargo tanks;

hold spaces with independent cargo tanks; spaces adjacent to integral cargo tanks; cargo pump-and cargo compressor rooms;

spaces containing pipelines or vessels and equipment used in connection with the cargo, including rooms for contaminated cargo hoses or any other equipment used for loading/unloading or transferring cargo;

cargo sample storerooms;

enclosed or semi-enclosed spaces having a direct opening into any gas-dangerous space or zone.

Gas-dangerous zones are areas on the open deck or semi-enclosed spaces on the deck, which are situated within a distance of:

3 m from any cargo tank opening; the cargo pipe flanges; cargo valves; or openings to the gas-dangerous spaces which contain potential gas sources, e.g. cargo pipe flanges. Cargo valves or cargo pumps;

4,5 m from ventilation outlets from cargo pump-rooms;

5 m from cargo pressure/vacuum valves;

10m from gas outlets from cargo tanks during loading (measured horizontally);

open deck 3 m aft and forward of the cargo area up to a height of 2,4 m above the deck.

For ships of less than 100 m in length lesser distances may be allowable subject to special consideration by the Russian Maritime Register of Shipping[1].

Cargo area is that part of the ship, restricted by the shell plating and deck, which contains cargo tanks, holds spaces, slop tanks, cargo pump-and compressor rooms, cofferdams, ballast or void spaces adjacent to cargo tanks or slop tanks and deck areas throughout the entire length and breadth of the part of the ship over the above mentioned spaces.

Corrosive aggression is the property of a substance having a destructive effect on the materials coming into contact therewith.

The maximum quantity of cargo allowed for carriage in any cargo tank shall be equal to:

1250 m^3 for chemical tanker type 1;

3000 m^3 for chemical tanker type 2;

[1] Hereinafter referred to as "the Register".

unlimited for chemical tanker type 3.

Incompatible cargoes are substances that when being interacted come into a dangerous reaction or form new dangerous substances.

Lining is an acid-resistant material that is applied to the tank or piping system in a solid state with a defined elasticity property.

Marine pollution hazard is defined by:

bioaccumulation with attendant risk to aquatic life or human health or causing tainting to edible mollusks;

damage to living resources;

hazard to human health;

reduction of amenities.

Cargo reactivity hazard is expressed by instability of a chemical, tendency to polymerization or tendency to come readily into reaction with water or by corrosive aggression.

Dangerous liquid chemicals are liquids with absolute vapour pressure not exceeding 28 kPa at the temperature of 37,8 °C, and solid substances carried or reloaded in molten state and having at least one of the following properties: fire-, explosion- or biological hazard or dangerous reactivity.

Vapour density is the ratio of a vapour or gas (with no air present) density to the density of an equal volume of air at the same pressure and temperature.

Fire and explosion hazard is defined by flashpoint, boiling point, explosive limit range and autoignition temperature of the chemical.

Explosive range is the range of gas or vapour concentrations (per cent by volume in air) which will burn or explode if an ignition source is present.

Void space is an enclosed space not intended for direct filling with liquid cargo and its vapour, other than a ballast space, fuel oil tank, pump- or compressor room, hold space or any other spaces in normal use by personnel.

Design vapour pressure P_0 is the maximum pressure at the top of the cargo tank, which has been used in the tank structure design.

Flashpoint is the minimum temperature in degrees Celsius at which a liquid will give off enough flammable vapour to be ignited if an ignition source is present. Values are those of "closed-cup test" determined by an approved flashpoint apparatus.

Boiling point is the temperature in degrees Celsius at which a liquid boils at the atmospheric pressure.

Chemical tanker is a tanker constructed or intended for the carriage of dangerous chemicals in bulk.

1.2.2 Explanations.

Biological hazard specific for each ship has been taken into account in the Rules when assigning class of structural protection, type of the tank, vapour detection system, special requirements (refer to Part XI "Summary of Technical Requirements"), etc.

Various degrees of the cargo reactivity and corrosive aggression is taken into account when prescribing differentiated requirements for each kind ofcargo (refer to Part XI "Summary of Technical Requirements").

1.3 ABBREVIATIONS

1.3.1 The following abbreviations have been adopted in the Rules:

CPR — cargo pump rooms;

the Code — International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk;

MARPOL 73/78 — International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto;

PTFE — polytetrafluoroethylene;

CCR — cargo control room;

MCS — main control station.

2 EQUIVALENTS

2.1 The Register may allow use of any materials, structures of a ship, arrangements and articles intended to be fitted on board the ship, which are other that stipulated by the Rules; in this case deviation from the Rules covered by the Code may be allowed by the Register only in the cases when such deviations are permitted by this Code.

In the cases mentioned, the Register shall be given the particulars which make it possible to establish compliance of these materials, structures and articles with the conditions that ensure safety of the ship, human life, reliable carriage of cargo and prevention of pollution from ships.

3 DOCUMENTS

3.1 Ships complying with the requirements of the Rules and the Code and in addition to the documents stipulated in the General Regulations for the Classification and Other Activity in the Rules for the Classification and Construction of Sea-Going Ships, shall receive an International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk[1], based on the satisfactory results of surveys reflected in the survey reports.

The period of validity of the Certificate of Fitness for the Chemical Tanker shall not exceed 5 years.

3.2 The Certificate of Fitness for the Chemical Tanker shall be available on board for inspection at all times.

3.3 In the case when the Register allows equivalents on board the ship, specified by Section 2, the Certificate of Fitness for the Chemical Tanker shall reflect contents of such equivalents.

4 CLASS NOTATION AND CLASSIFICATION SURVEYS

4.1 CLASS NOTATION OF THE SHIP

4.1.1 The character of classification and additional distinguishing marks shall be assigned in conformity with the provisions of 2.2, Part I "Classification" of the Rules for the Classification.

4.2 DESCRIPTIVE NOTATION

4.2.1 Ships complying with the requirements 2.2.**11**, Part I "Classification" of the Rules for the Classification and the requirements of these Rules are assigned the descriptive notation "Chemical tanker" added to the character of classification.

4.2.2 Depending on the extent to which the ship meets the requirements of Part IV "Stability, Subdivision and Freeboard" as well as on the arrangement of cargo tanks in relation to the shell plating and on maximum quantity of cargo allowed for carriage in any one tank to the descriptive notation "Chemical tanker" the words "type **1**" or "type 2" or "type **3**" are added.

[1] Hereinafter referred to as "the Certificate of Fitness for the Chemical Tanker".

4.2.3 If the chemical tanker is intended for carriage of only one particular cargo, the name of such cargo shall be added to the class notation, e.g. "a Chemical tanker type 3 (sulphuric acid)". In this case, the requirements imposed upon the ship shall take account of the hazards associated with the carriage of such cargo.

4.2.4 If the chemical tanker is intended for carriage of several particular cargoes, the requirements shall be prescribed, reasoning from the whole complex of properties of the most dangerous cargoes being carried.

4.3 CLASSIFICATION SURVEYS

4.3.1 Initial and/or periodical surveys of the chemical tankers to assign and/ or confirm a class shall be carried out in conformity with Section 3, Part III "Additional Surveys of Ships Depending on their Purpose and Hull Material)) of the Rules for the Classification Surveys of Ships.

4.3.2 Survey of the ship for issuance of the Certificate of Fitness for the Chemical Tanker shall be carried out during initial or periodical survey of the ship.

4.4 The annual surveys of the ship shall be carried out within 3 months before or after the anniversary date of the Certificate of Fitness for the Chemical Tanker and serve to ascertain that the ship equipment, fittings, arrangements and materials satisfy the appropriate requirements of the Rules.

Such surveys shall be endorsed on the Certificate of Fitness for the Chemical Tanker.

4.5 Ships intended for carriage of dangerous chemicals and these chemicals themselves are subject to special consideration by the Register in each case.

5 PLAN APPROVAL DOCUMENTATION OF A SHIP UNDER CONSTRUCTION

5.1 In addition to the technical documentation listed in Section 3, Part I "Classification" of the Rules for the Classification the following technical data and documents confirming fulfillment of the requirements of the Rules shall be submitted to the Register:

.1 list of cargoes intended for carriage on board the ship.

The list shall include the following:

name and chemical formula for each cargo;

basic physical properties: density, flashpoint, boiling point, autoignition temperature, melting point, vapour density and pressure;

basic chemical properties: corrosive aggression, reactivity with air, water and other substances, tendency to polymerization;

basic hazards associated with carriage and storage of cargo: toxicity, maximum permissible vapour concentration, explosive range;

marine pollution hazard referred to an Appendix I of Annex II of MARPOL **73/78**;

.2 cargo tank arrangement and capacity plans with indication of distance from the side and bottom shell to the tanks, including information on the materials used and coverings;

.3 tank strength drawings and calculations;

.4 drawings of support and staying of independent cargo tanks or tanks installed on deck;

.5 damage stability calculations;

.6 drawings of the cargo piping system including details such as expansion elements, flange connections, shut-off and regulating fittings;

.7 drawings of cargo pumps including driving machinery;

.8 drawings and calculations of bilge and ballast systems in the cargo area, pump-rooms, cofferdams, pipe tunnels and hold spaces;

.9 diagrams and equipment for drainage of cargo pumps and pipelines in the pump-room;

.10 diagrams and equipment for cargo tank stripping and drainage/ stripping of cargo pipelines;

.11 diagrams of tank washing;

.12 arrangement plans and equipment of underwater outlets for discharge of noxious chemical wastes;

.13 drawings of quick-closing devices of the cargo containment system;

.14 diagrams of cargo heating or cooling systems and heat transfer calculation;

.15 diagrams of thermal insulation (if used) and justification of suitability of the insulation materials for use in the cargo area;

.16 arrangement and location plans of decontamination showers and eyewashes including water supply and freezing equipment;

.17 drawings and specification of inert gas system;

.18 justification of suitability of the fire extinguishing media, fire detection and extinction equipment for the cargoes being carried as well as documents confirming assumed time of fire extinction, rate of supply of fire extinguishing media and adequate supply of fire extinguishing media on board the ship, which have been taken in the design;

.19 arrangement plans and specification of fixed fire smothering systems in gas-dangerous spaces and zones;

.20 arrangement plans and specifications of ventilation system in cargo area and other spaces access to which shall be provided to carry out cargo handling operations. The plans shall include information on suitability of materials used for manufacture of air ducts and impellers and casings of fans;

.21 drawings of portable ventilators and diagrams showing where and how these are to be fitted;

.22 specification and diagrams of gas-freeing of cargo tanks and pipelines as well as equipment for tank ventilation;

.23 diagrams and calculations of cargo tank venting system;

.24 diagrams and specifications of gastight bulkhead stuffing boxes;

.25 drawings and specification of all monitoring systems and devices for liquid level and characteristics and gas detection;

.26 drawings of pressure- and vacuum-relief valves of cargo tanks;

.27 diagrams of cargo pressure and temperature control systems;

.28 circuit diagrams of electric measuring and alarm systems;

.29 circuit diagrams of automatic and remote switch-off of electric equipment, remote valve control, and hull structures heating;

.30 arrangement plans of electric equipment in gas-dangerous zones;

.31 drawings of cable run in explosion-hazardous spaces;

.32 diagrams of earthing of electric equipment, cables, pipelines installed in gas-dangerous spaces and zones;

.33 list of safe-type equipment with reference to drawings and certificates of a competent body confirming explosion-proofness.

5.2 A general arrangement plan of the ship or individual drawings shall give location of:

cargo hatches, tank cleaning hatches and any other openings for the cargo tanks;

doors, hatches and any other openings to pump-rooms and other gas-dangerous spaces;

venting pipes, ventilating pipes and openings for cargo tanks, pump-rooms and other gas-dangerous spaces;

doors, sidescuttles, air locks, ventilating pipe outlets and other openings to superstructure spaces and spaces adjacent to cargo area including spaces in and below the forecastle;

cargo pipelines and gas return pipes over the deck with shore connections including stern pipes for cargo discharge;

deckplan showing location of all monitoring equipment for cargo handling (specifying its type) such as, level gauging, overflow control, temperature measuring, etc.

5.3 Additional plans, specifications or information may be required depending on the structure and equipment used in the design.

PART II. STRUCTURE OF CHEMICAL TANKER

1 GENERAL

1.1 The basic structural type of chemical tanker is considered to be a ship with machinery aft.

1.2 The cargo area of chemical tanker shall terminate in cofferdams extending from side to side along the entire height of the ship.

1.3 Requirements for the structure and size of cofferdams given in 2.7.5.2, Part II "Hull" of the Rules for the Classification.

1.4 Pump-rooms, ballast tanks, hold spaces encompassing independent cargo tanks, fuel oil tanks may be also considered as cofferdams.

1.5 If a deckhouse has been fitted instead a poop the forward bulkhead of the deckhouse shall be extended from side to side as a coaming of not less than 600 mm in height above the horizontal portion of the deck.

1.6 Cargoes listed in the List of Cargoes are not allowed to be carried in forepeak and afterpeak tanks.

Cargoes carried by chemical tankers type **3** are allowed to be carried in cargo tanks arranged in double side and double bottom spaces.

1.7 Arrangement and location of cargo tanks, void spaces and other spaces in the cargo area shall ensure unrestricted access for their complete inspection by the personnel wearing protective clothing and individual breathing apparatus as well as ensure unrestricted emergency escape of an unconscious person on a stretcher or in a safety cradle.

1.8 Access to cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area shall be direct from the open deck. Access to double bottom spaces may be through CPR, pump-rooms, deep cofferdams, pipe tunnels, special trunks, provided that adequate ventilation of such spaces and trunks is ensured.

1.9 As a rule, two independent means of escape as widely separated as possible shall be provided in cargo area.

Cargo tanks may have one mean of escape.

1.10 Clear dimensions of the means of escape shall be at least:

600 × 600 mm for means of escape through horizontal openings, man holes, hatches;

600 × 800 mm for means of escape through vertical openings and manholes to provide passage through the length and breadth of the spaces. The lower edge of the opening shall be situated at a height of not more than 600 mm from the bottom shell plating unless gratings or other footholds are provided.

Smaller dimensions may be approved in particular cases after special consideration by the Register.

1.11 Pipe tunnels shall have at least two independent means of escape in the opposite ends of the tunnel, ensuring access to open deck.

Subject to agreement with the Register, means of escape from the tunnel to pump-rooms or void spaces within the cargo area may be accepted. These means of escape shall have closing arrangement approved by the Register.

1.12 Size and arrangement of pipe tunnel shall ensure unrestricted inspection and repair of piping as well as emergency escape of unconscious

1.13 Pumps, pipelines, valves and other fittings of systems arranged in cargo area shall have distinctive marking to identify the tank which they serve.

2 LOCATION OF CARGO TANKS

2.1 Location of cargo tanks shall satisfy the following requirements:

.1 for Chemical tankers type 1 cargo tanks shall be located outside the transverse extent of side damage and vertical extent of bottom damage specified in 3.2.1.2 and 3.4.6.2, Part V "Subdivision" of the Rules for the Classification, and nowhere less than 760 mm from the shell plating (Fig. 2.1.1);

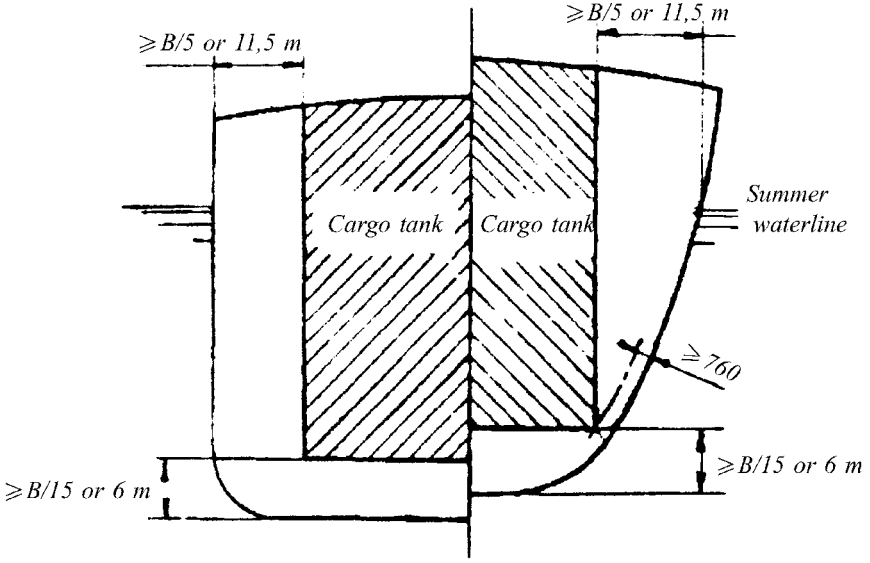

Fig. 2.1.1

.2 for Chemical tankers type 2 cargo tanks shall be located outside the vertical extent of bottom damage, specified in 3.4.6.2, Part V "Subdivision" of the Rules for the Classification, and nowhere less than 760 mm from the shell plating (Fig. 2.1.2).

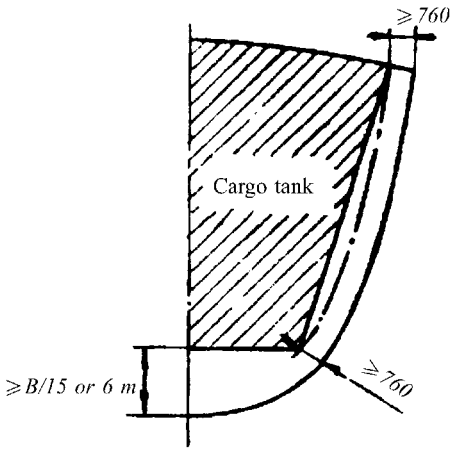

Fig. 2.1.2

For chemical tankers type 3 no requirements apply to the location of the cargo tanks.

2.2 Requirements of 2.1.1 and 2.1.2 do not apply to tanks for diluted slops.

2.3 Suction wells, except for chemical tankers type 1, installed in cargo tanks may protrude into the vertical extent of bottom damage specified in 3.4.6.2, Part V "Subdivision" of the Rules for the Classification if such wells are as small as practicable and the protrusion below the inner bottom plating does not exceed 25 per cent 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 calculation of damage trim and stability.

2.4 Solid ballast shall not normally be used in the double bottom space in the cargo area.

Where, however, 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 resulted from bottom damage are not directly transmitted to the cargo tank structure.

3 CONTROL STATIONS, ACCOMMODATION, SERVICE AND MACHINERY SPACES

3.1 No control stations, accommodation, service and machinery spaces shall be located in way of cargo tanks, cofferdams and spaces separating them and used as cofferdams, except over pump-room recess that complies with 2.4.7, Part VI "Fire Protection" of the Rules for the Classification.

No cargo or slop tanks shall be aft of the forward end of any accommodation.

Accommodation, service and machinery spaces, and potable water tanks, shall be separated from cargo tanks by cofferdams, CPR, pump-rooms, fuel oil tanks or other similar spaces.

3.2 Location and arrangement of air inlets, doors, sidescuttles and other openings in accommodation, service and machinery spaces and control stations shall meet the requirements imposed upon oil tankers in 2.4.4 and 2.4.5, Part VI "Fire Protection" and in 12.4, Part VIII "Systems and Piping" of the Rules for the Classification applied to the oil tankers.

4 CARGO PUMP ROOMS (CPR)

4.1 Cargo and stripping pumps, cargo handling control equipment and valves shall be situated in a separate room with no direct communication with other spaces, except for pipe tunnels. Such space shall be separated from other spaces by gastight bulkheads.

4.2 Driving machinery for cargo and stripping pumps and fans in CPR shall be installed in compliance with the requirements of 4.2.5, Part VII "Machinery Installations" of the Rules for the Classification.

4.3 CPR shall be also arranged as to ensure unrestricted access to all valves necessary for cargo handling for persons wearing the required personnel protective equipment and unrestricted passage at all times from the floor and any ladder platform.

4.4 Access ladders shall not be fitted vertical and shall incorporate platforms at the intervals of not more than **6** m in vertical extent. Continuous guard railings shall be installed on all ladders and platforms.

4.5 CPR shall be equipped with permanent arrangements for safe hoisting an unconscious person wearing protective equipment with a rescue line.

4.6 Pump discharge pressure gauges shall be provided at the pumps and outside CPR.

4.7 Means shall be provided to deal with drainage and any possible leakage from cargo pumps, valves and pipelines in CPR. The bilge system serving CPR shall be operable from outside CPR.

PART III. CARGO CONTAINMENT

1 DEFINITIONS

1.1 The cargo tank types are identified as follows:

.1 according to design:

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;

independent tank means a cargo-containment envelope which is not contiguous with, or part of, the hull structure and is installed so as to eliminate its stressing or motion of the adjacent hull structure;

.2 according to design pressure:

gravity tank means a tank designed for carriage of cargo at design pressure not greater than 0,07 MPa gauge at the top of the tank. Such tanks may be either integral or independent;

pressure tank means a tank designed for carriage of cargo at design pressure greater than 0,07 MPa gauge. Such tanks shall be independent.

2 GENERAL REQUIREMENTS

2.1 Gravity tanks shall be designed for strength at design pressure which shall not be greater than 0,07 MPa gauge. When cargo with higher vapour pressure is carried a cooling system will be required.

2.2 Pressure tanks shall be designed for strength corresponding to design pressure. Their design and test methods shall comply with the requirements of Part X "Boilers, Heat Exchangers and Pressure Vessels" of the Rules for the Classification and are subject to special consideration by the Register in each case.

2.3 Attachment of independent tanks shall eliminate or minimize its stressing because of stressing or motion of the adjacent hull structures. The weight of independent tanks and the loads generated by them shall be distributed uniformly over the hull structures.

2.4 Maximum dimensions of cargo tanks shall be consistent with limit volumes of cargo specified in **1.2.1**, Part I "Classification".

2.5 Material used for tank construction shall be inert towards cargo or cargo tanks shall have protective coating approved by the Register.

2.6 Cargo tank hatch and manhole covers shall be tight and approved by the Register. Their design shall comply with the requirements of Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification, as far as applicable to the dangerous cargoes.

3 TANK TYPE REQUIREMENTS FOR INDIVIDUAL PRODUCTS

3.1 Tanks designed for carriage of a product which for its preservation requires heating or cooling, shall be equipped with a system to maintain the required product temperature approved by the Register. If necessary, such tanks or compartments where these tanks are located shall be segregated.

3.2 Tanks designed for carriage of incompatible products shall be separated by cofferdams, void spaces, empty tanks or tanks with mutually compatible products.

3.3 Tank types for individual products are shown in Part XI "Summary of Technical Requirements".

PART IV. STABILITY, SUBDIVISION AND FREEBOARD

1 STABILITY

1.1 Stability of a chemical tanker shall comply with the requirements of Part IV "Stability" of the Rules for the Classification.

See circular 848

2 SUBDIVISION AND DAMAGE STABILITY

2.1 Subdivision and damage stability shall comply with the requirements of Part V "Subdivision" of the Rules for the Classification.

2.2 In case of small ships having descriptive notation "Chemical tanker type 2" or "Chemical tanker type 3", for which the fulfillment of the subdivision and damage stability requirements involves significant degradation of the operational performance, a deviation from these requirements may be accepted by the Register if the same degree of safety is maintained. Any such deviation shall be noted in the Certificate of Fitness for the Chemical Tanker.

2.3 Calculations of damage trim and stability shall be made for all conditions of loading anticipated in service with due regard for variations in draught and trim.

2.4 The scope of calculations made in accordance with **2.3** shall be sufficient to develop curves (table) of the permissible minimum values of metacentric height or limiting values of center of gravity height depending on the ship's draught and the level of filling of the damage cargo compartments.

It is recommended that each of such curves (tables) would be constructed separately for each case of expected damage.

If for a certain case of damage an evidence will be presented to the effect that this damage is not dangerous in relation to the damage trim and stability such curves, (table) may be not constructed and the scope of calculations may be reduced accordingly.

2.5 According to the shipowner desire, calculations of damage stability may be made for a limited number of load conditions. In this case, curves (tables) required by **2.3** may be not constructed and the design load conditions shall be entered in the Certificate of Fitness for the Chemical Tanker as operational restrictions.

2.6 When making calculations in accordance with 2.4 filling of the floodable cargo compartments before damaging shall be taken to be equal to 25, 50, 75 and 100 per cent.

2.7 In case where damage trim and stability comply with the requirements of Part V "Subdivision" of the Rules for the Classification for the conventional load condition given in 2.8, calculations in accordance with 2.3 — 2.6 may be dispensed with.

2.8 The conventional load condition shall be such at which the ship has maximum draught and trim, the greatest possible center of gravity height (with due regard for free surface effect of liquids and stores) and void compartments in way of expected damage.

2.9 For chemical tankers type 1 and chemical tankers type 2 requirements for damage trim and stability shall be also fulfilled when the ship has sustained local side damage at any place within the cargo area. The transverse extent of the damage is taken to be equal to 760 mm and is measured inboard from the side shell at right angles to be centerline.

2.10 At final stage of flooding the emergency source of power shall be capable of operating.

2.11 The requirements of 2.3 — 2.10 apply only to the case where dangerous chemicals are carried in bulk. The normal residues of such cargoes in compartment after discharging the ship are ignored.

2.12 When carrying several products presenting different degree of hazard the requirements for damage trim and stability shall correspond to those imposed upon ships carrying the most dangerous product in bulk.

3 FREEBOARD

3.1 Chemical tankers shall be assigned the freeboard in compliance with the requirements of the Load Line Rules for Sea-Going Ships. The requirements of 3.2.11.1 of the Load Line Rules for Sea-Going Ships applied to provision of valves fitted to discharges are limited by the following:

.1 each discharge of pipelines which have or may have open in board ends shall be provided with one non-return valve with a positive means of closing from above the freeboard deck. The positive means of closing of the valves shall be readily accessible and equipped with an indicator showing whether the valve is open or shut;

.2 where the vertical distance from the summer load waterline to the inboard end of the discharge pipe exceed 0,01L, two non-return valves without positive means of closing may be fitted to the discharge pipe. One of these valves shall be installed nearby ship's side and another valve shall be situated above the deepest waterline in salt water, admitted for this ship, in a position to be always accessible for examination under service conditions.

PART V. FIRE PROTECTION

1 GENERAL

1.1 Structural fire protection of chemical tankers, irrespective of tonnage, shall comply with the requirements of 2.1 and 2.4, Part VI "Fire Protection" of the Rules for the Classification, as they would apply to oil tankers, except for the requirement for location of CCR.

1.2 Fire extinguishing systems and fire-fighting outfit of machinery spaces of the chemical tankers irrespective of tonnage shall comply with the requirements of Sections 3 and 5, Part VI "Fire Protection" of the Rules for the Classification, as they would apply to oil tankers of 2000 gross tonnage and over.

1.3 Chemical tankers intended only for the carriage of products which are non flammable shall comply with the requirements of Part VI "Fire Protection" of the Rules for the Classification, except for the requirements of Table 3.1.2.1 for protection of cargo spaces by fixed fire extinguishing systems. Requirements of Sections 2 and 3 of the present Part do not apply to such ships.

1.4 Structural fire protection, fire extinguishing systems and fire-fighting outfit of chemical tankers intended only for the carriage of products with a flashpoint above 60 °C may be the same as used on board oil tankers intended for the carriage of oil products with a flashpoint above 60 °C in compliance with the requirements given in Part VI "Fire Protection" of the Rules for the Classification.

2 CARGO PUMP ROOMS (CPR)

2.1 CPR shall be provided with a carbon dioxide smothering system as specified in 3.8, Part VI "Fire Protection" of the Rules for the Classification (with a factor 0,45 in Formula (3.8.1.1) of the above mentioned Part).

This carbon dioxide smothering system may not be used for inerting purpose to which effect a notice shall be exhibited at the controls starting the system.

Audible alarm warning of starting of the carbon dioxide smothering system shall meet the requirements of 4.3.5, Part VI "Fire Protection" of the Rules for the Classification and shall be of explosion-proof type.

2.2 Chemical tankers dedicated to the carriage of a restricted number of cargoes the Register, depending on the properties of these cargoes, may reduce the range of requirements for protection of CPR.

2.3 If cargoes are to be carried which are not suited to extinguishment by carbon dioxide, CPR shall be protected by a high-expansion foam system or a pressure water-spraying system. The Certificate of Fitness for the Chemical Tanker shall reflect this conditional requirement.

2.4 The CPR of chemical tankers of 500 gross tonnage and over constructed before 1 January 2009 shall be protected in compliance with the requirements of resolution MSC.219(82).

3 CARGO AREA

3.1 Every chemical tanker shall be provided with a fixed deck foam fire-extinguishing system in accordance with the requirements of 3.2 — 3.11.

3.2 Only one type of foam concentrate shall be supplied, and it shall be effective for the maximum possible number of cargoes intended to be carried. For other cargoes for which this foam concentrate is not effective, additional fire extinguishing arrangements to the satisfaction of the Register shall be provided.

3.3 Foam applicators and monitors shall be so arranged as to be capable of delivering foam to the entire cargo area as well as into any cargo tank, the deck of which is assumed to be ruptured.

3.4 The main control station for the system shall be suitably located outside of the cargo area, adjacent to the accommodation spaces. It shall be readily accessible and operable in the event of fires in the areas protected.

3.5 The rate of supply of foam solution shall be not less than the greatest of the following:

.1 2 l/min per square meter 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;

.2 20 l/min per square meter of the horizontal sectional area of the single tank having the largest such area;

.3 10 l/min per square meter of the deck area protected by the largest monitor, such area being entirely forward of the monitor but not less than 1250 l/min.

For ships of less than 4000 tonnes deadweight, the minimum capacity of the monitor shall be not less than 800 1/min.

3.6 Sufficient foam concentrate shall be supplied to ensure at least 30minutes of foam generation when using the highest of the solution rates and at least 20 minutes for ships equipped with an inert gas system.

3.7 Foam from the fixed foam system shall be supplied by means of monitors and foam applicators. At least 50 per cent of the design foam quantity with a foam rate of at least 50 per cent out of required in 3.5.1 or 3.5.2 shall be delivered from

each monitor. The capacity of any monitor shall be at least 10 l/min of foam solution per square meter of the deck protected by the monitor, such area being entirely forward of the monitor. Such capacity shall be not less than 1250 l/min.

3.8 The distance from the monitor to the farthest extremity of the protected area forward of that monitor shall be not more than 75 per cent of the monitor throw in still air conditions.

3.9 A monitor and hose connection for a foam applicator shall be situated both port and starboard at the poop front or accommodation spaces facing the cargo spaces.

3.10 Applicators shall be provided 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 area.

3.11 Cut-off valves shall be provided in the foam main, and in the fire main where this is an integral part of the foam system, immediately forward of any monitor position to isolate damaged sections of those mains.

3.12 Chemical tankers, which are dedicated to the carriage of a restricted number of cargoes may be protected by alternative provisions to the satisfaction of the Register when they are just as effective for the products concerned as the foam system required for flammable cargoes.

No carbon dioxide smothering system and steam-smothering systems are allowed.

3.13 At least four portable fire extinguishers suitable for the products to be carried shall be provided.

3.14 Where flammable cargoes are to be carried, all sources of ignition shall be excluded from hazardous locations.

3.15 Chemical tankers fitted with bow or stern loading and unloading arrangements shall be provided with one additional foam monitor (refer to 3.7) and one additional foam applicator (refer to 3.10) to protect cargo loading and unloading arrangements outside the cargo area.

3.16 Operation of a deck foam fire extinguishing system at its required output shall permit the simultaneous use of the minimum required number of jets of water at the required pressure from the fire main.

4 SPECIAL REQUIREMENTS

4.1 Fire extinguishing media effective for certain products are listed in Part XI "Summary of Technical Requirements".

PART VI. SYSTEMS AND PIPING

1 CARGO PIPING SYSTEM

1.1 An independent fixed cargo piping system arranged in cargo area shall be provided for cargo handling operations.

1.2 PIPING SCANTLINGS

1.2.1 The walls thickness of pipes in the cargo piping system shall be in accordance with the requirements **2.3**, Part VIII "Systems and Pipings" of the Rules for the Classification.

1.2.2 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 vapour 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.

1.2.3 The design pressure shall not be less than **1** MPa gauge except for open-ended lines, where it shall be not less than 0,5 MPa gauge.

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

$$\frac{R_m}{A} \text{ or } \frac{R_e}{B}$$

where R_m — specified minimum tensile strength at ambient temperature (N/mm^2);

R_e — specified minimum yield stress at ambient temperature (N/mm^2). If the stress-strain curve does not show a defined yield stress, the 0,2 per cent proof stress applies; A and B shall have values of at least $A = 2,7$ and $B = 1,8$.

1.2.5 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.

1.2.6 Pipe joints, gates valves, valves and other fittings shall be in accordance with recognized standards, taking into account the design pressure defined under **1.2.2**.

1.3 MANUFACTURE OF PIPING AND ITS ELEMENTS

1.3.1 Cargo piping shall be generally joined by welding and meet the requirements of Part XIV "Welding" of the Rules for the Classification, except:

.1 for approved connections to shut-off valves and expansion joints;

.2 for other cases specifically considered by the Register.

The welded joints of pipes shall be subjected to radiographic testing in accordance with the requirements of **3.2.3**, Part XIV "Welding" of the Rules for the Classification.

1.3.2 The following types of welded joints of pipes are allowed:

.1 butt-welded joints with complete penetration at the root. Such joints may be used for any piping;

.2 slip-on welded joints with sleeves having the dimensions in accordance with recognized standards. Such welded connections may be used for the pipes with an external diameter 50 mm or less. This type of joint shall not be used when crevice corrosion expected to occur.

1.3.3 Screwed connections, in accordance with recognized standards shall only be used for accessory lines and instrumentation lines with external diameters of 25 mm or less.

1.3.4 Use of flange connections requires special consideration by the Register in each case. Flange types A, B and C shall be in accordance with the requirements of **2.4.3**, Part VIII "Systems and Piping" of the Rules for the Classification. Their manufacture and testing shall comply with recognized standards.

1.3.5 Heat expansion of pipes shall normally be allowed for by the provision of expansion loops (V-shaped) or bends of the pipelines provided that:

.1 use of bellows is subject to special consideration by the Register in each case;

.2 glands shall not be used.

1.4 PIPELINES TESTING

1.4.1 Cargo piping system shall be tested in accordance with the requirements of Section 21, Part VIII "Systems and Piping" of the Rules for the Classification.

1.4.2 Any element of cargo piping system including joints welded on board the ship shall be subject to hydraulic test by a pressure equal to 1,5 times the dessign pressure (P_d).

1.4.3 After assembly on board the ship the pipelines of the cargo piping system shall be checked for leakage by a pressure equal to 1,0 P_d.

1.5 PIPING ARRANGEMENTS

1.5.1 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 2.1.1 and 2.1.2, Part II "Structure of Chemical Tanker".

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.

1.5.2 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 CPR 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 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 in accordance with the requirements of 1.5.3; and

.5 operable from the weather deck.

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

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

1.5.5 Cargo pipeline installed in pipe tunnels shall comply with the requirements **1.5.1** and **1.5.2**.

Pipe tunnels shall satisfy all tank requirements for construction, location, ventilation and safely 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.

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

1.5.7 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 requirement for cargo.

1.5.8 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.

1.5.9 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.

1.5.10 Cargo tank stripping system shall comply with the requirements of 3.5, Part III "Requirements for Ship's Construction, Equipment and Arrangements for the Prevention of Pollution when Carrying Noxious Liquid Substances in Bulk" of the Rules for the Prevention of Pollution from Ships.

1.6 CARGO SYSTEM CONTROL FITTINGS

1.6.1 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 deepwell pumps are used to discharge the contents of cargo tanks stop valves are not required on the discharge lines.

1.6.2 Shut-off fittings located below the upper deck shall be provided with remote control operated from the weather deck.

1.6.3 Devices shall be provided for remote shutdown of the cargo pumps and similar machinery; one of such devices shall be installed in CCR and the other in a readily accessible location nearby CPR.

1.7 BOW AND STERN LOADING AND UNLOADING ARRANGEMENTS

1.7.1 Upon agreement with the Register, chemical tanker may be fitted with permanently installed cargo piping and cargo system arrangements to permit bow and stern loading and unloading.

Non-fixed arrangements shall not be permitted for this purpose.

1.7.2 Cargo piping and cargo system arrangements mentioned in **1.7.1** shall not be used for the transfer of cargoes required to be carried in Chemical tankers type **1** as well as sulphur (molten) transportation.

1.7.3 Cargo piping to permit bow and stern loading and unloading shall comply with the requirements applied to the cargo piping located in the cargo area.

Additionally, the following requirements apply:

.1 the piping outside the cargo area shall be fitted at least **760** mm inboard on the open deck;

.2 such piping shall be fitted with a shut-off valve at its connection to the cargo piping system within the cargo area. At this location, it shall be also capable of being separated by means of removable spool piece and blank flanges when not in use;

.3 the shore connection shall be fitted with a shut-off valve and a blank flange;

.4 the piping shall be full-penetration butt-welded, and shall be fully subjected to a **100** per cent non-destructive inspection.

Flange connections in the piping shall only be permitted within the cargo area and at the shore connection;

.5 spray shields used to avoid considerable spraying of cargo shall be provided at the connections specified in **1.7.3.2** as well as collecting trays of sufficient capacity, with means for the disposal of drainage;

.6 an arrangement shall be provided or the cargo piping shall be installed with a permanent slope to ensure self-draining of cargo contained in the piping, into the cargo tank or another special tank;

.7 arrangements shall be made to allow such piping to be purged after use and maintained gas-safe when not in use. The relevant connections to the piping shall be provided with a shut-off valve and blank flange.

1.7.4 Entries, air inlets and opening to accommodation, service and machinery spaces and control stations shall not face cargo shore-connection location of bow and stern loading and unloading arrangements. They shall be located on the outboard side of the superstructure or deckhouse at a distance of at least 4 per cent of the ship length, but not less than 3 m from the end of superstructure or deckhouse facing the cargo shore-connection location of the bow and stern loading and unloading arrangements. This distance, however, need not to exceed 5 m. Sidescuttles facing the loading and unloading arrangements and located on the sides of the superstructure or deckhouse within the distance mentioned above shall be of the fixed (non-opening) type, where in case of transportation of cargoes with a flashpoint below 60 °C the sidescuttles shall be of type A-60. During the use of the bow and stern loading and unloading arrangements all doors, ports and other openings on the corresponding superstructure or deckhouse side shall be kept closed.

1.7.5 Air pipes and other openings to enclosed spaces not listed in **1.7**.4 shall be shielded from any spray which may come from a burst hose or connection.

1.8 SHIP'S CARGO HOSES

1.8.1 Cargo hoses being a part of the cargo system and carried permanently on board the ship shall be resistant to the cargoes and suitable for their temperature and comply with the requirements of Section 6, Part VIII "Systems and Piping" of the Rules for the Classification.

1.8.2 Hoses subject to tank pressure or the discharge pressure of pumps shall be designed for a bursting pressure not less than 5 times the pressure the hose will be subjected to during cargo transfer.

1.8.3 Each new type of cargo hose, complete with end-fittings, shall be prototype-tested at a normal ambient temperature with 200 pressure cycles from zero to at least twice the specified maximum working pressure. After this cycle pressure test has been carried out, the prototype test shall demonstrate a bursting pressure of at least 5 times its specified maximum working pressure at the extreme service. Hoses used for prototype testing shall not be used for cargo service. Thereafter, before being placed in service each new length of cargo hose produced shall be hydrostatically tested at ambient temperature to a pressure not less than 1,5 times its specified maximum working pressure but not more than tow-fifths of its bursting pressure. The hoses shall be stenciled or otherwise marked with the date of testing, its specified maximum working pressure and, if used in services other than the ambient temperature services, its maximum and minimum service temperature as applicable. The specified maximum working pressure shall not be less than 1 MPa gauge.

2 CARGO TEMPERATURE CONTROL

2.1 If a temperature control is required for certain cargoes during carriage, the chemical tankers shall be provided with cargo heating or cooling systems.

2.2 Materials used in the construction of cargo heating or cooling systems shall be suitable for use with the product intended to be carried.

2.3 Heating or cooling media shall be compatible with the cargo to be carried. The maximum/minimum surface temperature of heating/cooling coils or equivalent arrangements shall preclude dangerous reactions from localized overheating or overcooling of cargo.

2.4 Where products with a significant toxic hazard are being heated or cooled, the heating or cooling media shall operate in a circuit:

.1 which is independent of other ship's services, except for another cargo heating or cooling system, and which does not enter the machinery space; or

.2 which is external to the tank carrying toxic products; or

.3 where the medium is sampled to check for the presence of cargo before it is re-circulated to other services of the ship or into the machinery space. The sampling equipment shall be located within the cargo area.

2.5 Heating or cooling systems shall be provided with valves to isolate the system for each tank and to allow manual regulation of the medium flow. The systems shall be isolated by means of shut-off valves fitted at the inlet and outlet of the cargo tank.

2.6 In any heating or cooling system, means shall be provided to ensure that, when in any condition other than empty, a higher pressure could be maintained within the system than maximum pressure head that could be exerted by the cargo-tank contents on the system.

2.7 Where a heating or cooling system is fitted, means shall be provided for measuring the cargo temperature. When overheating or overcooling could result in dangerous condition, an alarm system, which monitors the cargo temperature, shall be provided

2.8 The manifolds of cargo heating or cooling system shall be fitted on the weather deck. Pipes of this system shall not penetrate the cargo tank boundaries other than on the top of the tank.

2.9 To reduce the temperature of cargo with a boiling point approaching the ambient temperature or susceptible to a dangerous reaction at the temperatures approaching the ambient temperature, a pressure water-spraying system may be provided on the weather deck as well as on the tank parts above this deck or other equivalent arrangements. Such system or arrangements are subject to special consideration by the Register in each case.

3 ENVIRONMENTAL CONTROL

3.1 Vapour spaces within cargo tanks and, in some cases, spaces surrounding cargo tanks (see Part XI "Summary of Technical Requirements") on the chemical tankers may require to have specially controlled atmospheres in compliance with the requirements of Section 6 and the present Section.

3.2 Depending on the product being carried, there are four different types of control for cargo tanks, as follows:

.1 inerting — by filling the cargo tank and associated piping systems and, where specified in Part XII "Special Requirements", the spaces surrounding the cargo tanks, with a gas or vapour which will not support combustion and which will not react with the cargo, and maintaining that condition;

.2 padding — by filling the cargo tank and associated piping systems with a liquid, gas or vapour which separates the cargo from the air, and maintaining that condition;

.3 drying — by filling the cargo tank and associated piping systems with moisture-free gas or vapour with a dewpoint of — 40 °C or below at atmospheric pressure, and maintaining that condition;

.4 ventilation — forced or natural.

Reasons for the environmental control type, inerting medium, padding medium and drying substance conditions chosen for each product requiring use of the environmental control shall be submitted to the Register.

See circular 860

3.3 THE REQUIREMENTS FOR CHEMICAL TANKERS WHERE INERTING OR PADDING OF CARGO TANKS IS REQUIRED

3.3.1 Chemical tankers where inerting or padding of cargo tanks is required shall be provided with a plant to manufacture a sufficient volume of inert gas or padding medium, or an adequate supply of these media for use in filling and discharging the cargo tanks shall be carried unless a shore supply is available. In addition, sufficient inert gas shall be available on the ship to compensate for normal losses during transportation, which shall be confirmed by calculations.

3.3.2 The inert gas and padding systems on board the ship shall be able to maintain a pressure of at least 0,007 MPa within the cargo tanks and piping serving these tanks at all times. However, this pressure shall not raise the cargo tanks pressure to more than tank's pressure/vacuum valves setting.

3.3.3 Inerting or padding arrangements or both, where used with readily flammable cargoes, shall be such as to minimize the creation of static electricity during the admission of the inerting medium.

3.3.4 The inert gas or padding liquid shall be non-combustible and compatible with the cargo being carried. They shall not enter into dangerous reaction with the cargo carried and shall not support combustion.

3.3.5 Means shall be provided for monitoring ullage spaces containing a gas blanket to ensure that the required atmosphere is being maintained. Oxygen content of the inert gas shall not exceed the value specified in **3.9.1.3**, Part VI "Fire Protection" of the Rules for the Classification.

For certain cargoes oxygen content shall be reduced (refer to Part XI "Summary of Technical Requirements").

3.4 Where drying is used and dry nitrogen is used as the medium similar arrangements for supply of the drying agent shall be made to those required in **3.3**. Sufficient drying agent shall be available on the ship to compensate for normal losses during transportation, taking into consideration the duration of the voyage, the diurnal temperature range and expected humidity that shall be confirmed by calculations.

3.5 The required types of environmental control for certain products are shown in Part XI "Summary of Technical Requirements".

3.6 In ships where incompatible cargoes are carried simultaneously the piping to supply inert gas to individual cargo tanks shall be provided with two valves: shut-off valve and non-return valve.

3.7 Isolation of one cargo tank from those served by the inert gas plants shall not raise the pressure in the remaining cargo tanks in excess of the permissible limits.

3.8 Connections used for gas-freeing and purging the elements of cargo piping system by inerting medium shall be made as spool pieces, removable ones if necessary, provided with shut-off valves and blank flanges.

4 CARGO TANK VENTING

4.1 All cargo tanks and tanks used to collect leakages of water contaminated by cargo shall be provided with a venting system appropriate to the cargo being carried. The venting system shall be designed so as to minimize the possibility of cargo vapour accumulating about the decks, entering accommodation, service and machinery spaces and control stations and, in the case of flammable vapours, entering or collecting in spaces or areas containing sources of ignition. Thank venting systems shall be arranged to prevent entrance of water into the

cargo tanks and, at the same time, vent outlets shall direct the vapour discharge upwards in the form of unimpeded jets.

4.2 The venting systems shall be connected to the top of each cargo tank and as far as far as practicable the cargo vent lines shall be self-draining back to the cargo tanks under all normal operational conditions of list and trim. Where it is necessary to drain venting systems above the level of any pressure/vacuum valve, capped or plugged shall be provided.

4.3 Provisions shall be made to ensure that the maximum level of liquid in any tank shall not exceed the test level of that tank. Suitable high-level alarms, overflow control systems or spill valves, together with gauging devices and tank filling procedures, may be accepted for this purpose.

Where the means of limiting cargo tank overpressure includes an automatic closing valve, the valve shall comply with the appropriate provisions of Section 19, Part XII "Special Requirements".

4.4 Tank venting systems shall be designed and operated so as to ensure that neither pressure nor vacuum created in the cargo tanks during loading or unloading exceeds tank design parameters. The main factors to be considered in the sizing of a tank venting system are as follows:

.1 design loading and unloading rate;

.2 value of cargo vapour evolution during loading shall be calculated by multiplying the maximum loading rate by a factor of at least **1,25**;

.3 cargo vapour density;

.4 resistance (pressure loss) in vent piping and across valves and fittings;

.5 pressure/vacuum settings of relief devices.

4.5 Tank vent piping connected to cargo tanks of corrosion-resistant material, or to tanks, which are lined or coated to handle special cargoes, according to the requirements of Part IX "Materials of Construction", shall be similarly lined or coated or constructed of corrosion-resistant material.

4.6 The maximum permissible loading and unloading rates for each tank or group of tanks consistent with the design of the venting system shall be available on board the ship. In the cases where the cargo vapours are vented at maximum loading rate, pressure difference between the vapour space of the cargo tank and atmosphere shall not exceed of 0,02 MPa, and as for the independent cargo tanks — maximum working pressure in the tank.

4.7 It is allowed to use one of the two types of tank venting systems — open or controlled.

4.7.1 An open tank venting system is a system which offers no restriction except for friction and resistance losses to the free flow of cargo vapours to and from the cargo tanks during normal operations. An open venting system shall be

used solely for cargoes with a flashpoint exceeding 60 °C which do not present hazard to human health.

An open tank venting system may consist of individual vents from each tank, or such individual vents may be combined into a common header (headers) with due regard to compatibility of cargoes being carried. In no case shall shut-off valves (as well as other shut-off fittings, blanking or blank flanges) be fitted either to the individual vents or to the header.

4.7.2 A controlled tank venting system is a system in which pressure/ vacuum valves are fitted to each tank to limit the overpressure or vacuum in the tank. Such system shall be used for the cargoes other than those for which the open tank venting system may be accepted. A controlled venting system may consist of individual vents from each tank. Such individual vents may be combined into a common header (headers) only in case of tank overpressure, with due regard to compatibility of cargoes.

In no case shall shut-off valves be fitted either above or below pressure/ vacuum safety valves. Provision may be made for bypassing a pressure/vacuum valve under certain operating conditions provided that the requirement of **4.7** is maintained and that there is shut-off fitting with suitable indication to show whether or not the valve is open.

4.7.3 The controlled tank venting system shall consist of the main (primary) and auxiliary (secondary) means of allowing full flow relief of vapour to prevent over-pressure or under-pressure in the event of failure of one means. Alternatively, the auxiliary means may consist of pressure gauge fitted in each tank with a monitoring system in CCR or position from which cargo operations are normally carried out. Such monitoring equipment shall also provide an alarm facility which is activated by detection of over-pressure or under-pressure within a tank.

4.7.4 Type of tank venting system shall be selected in compliance with Part XI "Summary of Technical Requirements", depending on the kind of cargo being carried.

4.8 The position of vent outlets of a controlled tank venting system shall be arranged:

.1 at a height of not less than 6 m above the weather deck or above a raised walkway with service platforms, if fitted within **4** m of the raised walkway;

.2 at a distance of at least **10** m measured horizontally from the nearest air intake or opening to accommodation, service and machinery spaces and ignition sources.

The vent outlet height may be reduced to 3 m above the weather deck or above a raised walkway with service platforms, as applicable, provided that high-velocity venting valves approved by the Register, directing the vapour/air

mixture upwards in an unimpeded jet with an exit velocity of at least 30 m/s, are fitted.

4.9 The vent outlets shall be reliably protected against entrance of water into the cargo tanks and, at the same time, vent outlets shall direct the vapour discharge upwards in the form of unimpeded jets, avoiding thereby spraying cargo over the decks.

4.10 The vent outlets of tanks carrying cargo having a flashpoint not exceeding 60 °C shall be fitted with renewable flame arresting fittings readily accessible for inspection and cleaning approved by the Register.

Flame arresting fittings shall be in compliance with circular MSC/Circ.677, as well as MSC/Circ.1009 and MSC/Circ.1324 as amended.

4.11 Due attention is to be paid in the design of flame arresters, pressure/vacuum valves and vent heads to the possibility of the blockage of these devices by the freezing of cargo vapours or by icing up in adverse weather conditioning.

4.12 For tanks fitted with gauging device of open or restricted type the tank venting system including flame arresting fitting, if fitted, shall be sized to permit loading at a design rate without overpressing in the tank.

4.13 For particularly dangerous toxic cargoes (refer to Part XI "Summary of Technical Requirements") provision shall be made for a closed circuit return of cargo vapours formed during the cargo handling operations to the shore installation. Such system shall maintain pressure in the tank being filled not higher than 80 per cent of the opening pressure of the pressure/vacuum valve.

Instead of a fixed piping, each cargo tank may be fitted with vapour-return branch pieces for hose connection.

Where inert gas system is combined with the vapour return system, a fixed piping shall be installed on board the ship and the connections of the vapour return system shall be arranged as close to the vapour-return main as possible.

4.14 Valves of the tank venting system for cargoes carried in inert gas environment shall be actual by inerting medium.

4.15 For chemical tankers which cargo tanks are designed for carriage crude oil and oil products having a flashpoint of 60 °C and below in bulk the cargo tank venting system shall comply with the requirements of 9.7 — 9.9, Part VIII "Systems and Piping" of the Rules for the Classification.

5 CARGO TANK GAS-FREEING

5.1 The arrangements for gas-freeing cargo tanks used for cargoes other than those for which open venting is permitted (see 4.3.1) shall ensure discharging flammable and/or toxic cargo vapours and be such as to minimize the fire and health hazard.

5.2 Gas-freeing system shall be such that the cargo vapours are discharged:

See circular 860

.1 through the vent outlets specified in 4.8; or

.2 through vent outlets at least 2 m above the cargo-tank deck level with a vertical efflux velocity of at least 30 m/s maintained during the entire gas-freeing operation; or

.3 through vent outlets at least 2 m above the cargo deck level with a vertical efflux velocity of at least 20 m/s which are protected with flame arresting fittings.

When the readily flammable vapour concentration has been reduced to less than 30 per cent of the lower flammable limit and/or, in the case of toxic products, the vapour concentration does not present a significant health hazard, gas-freeing may be continued at cargo tank deck level.

5.3 The vents referred to in 5.2 may be fixed or portable pipes.

5.4 Fans used for the gas-freeing systems shall meet the requirements of 8.8.

6 INERT GAS SYSTEM

6.1 Every chemical tanker of 20000 t deadweight and more shall be fitted with an inert gas system for to protect cargo tanks intended for the carriage of flammable products referred to in Part XI "Summary of Technical Requirements" and Appendix 1, provided that capacity of each cargo tank exceeds 3000 m^3, or that the ship is fitted with tank washing machines with a nozzle capacity exceeding 17,5 m^3/h or a total throughput capacity of the washing machines per a single tank more than 110 m^3/h.

Chemical tankers when transporting crude oil or oil products with a flashpoint of 60 °C and below shall comply the inert gas requirements of the Rules for the Classification of oil tankers.

6.2 In addition to the requirements 3.1.3.2.8, 3.9.1.2, 3.9.1.3, 3.9.1.4.1, 3.9.2.1, 3.9.3 — 3.9.7, 3.9.9.1, 3.9.9.5 — 3.9.9.10, Part VI "Fire Protection" of the Rules for the Classification the inert gas system shall comply with the requirements of 6.3 — 6.12 of the present Part.

6.3 The inert gas system shall prevent outbreak of fire by rendering and maintaining the atmosphere of the cargo tanks non-flammable, except when such tanks are empty and gas free.

6.4 Systems may be allowed in which the inert gas is supplied by one or more oil fired generators.

The Register may accept systems using other inert gas sources provided an equivalent of safety is achieved. Each inert gas source is to be fitted with automatic combustion control to provide for fulfillment of the requirements of 3.9.1.3, Part VI "Fire Protection" of the Rules for the Classif cation.

6.5 A low capacity of the system than that specified in 3.9.2.1, Part VI "Fire Protection" of the Rules for the Classification is allowed on condition that the cargo discharge rate from the tanks being protected is restricted to **80** per cent of the inert gas capacity.

6.6 The inert gas generators shall be located outside the cargo area in the compartment reserved solely for their use or in the machinery space.

6.7 The compartment reserved solely for the use or in the machinery space of the inert gas generators shall comply with the requirements applied the machinery spaces of Category A the definition of which is given in 1.2, Part VII "Machinery Installations" of the Rules for the Classification. Such compartment shall be provided with adequate positive pressure type mechanical ventilation and separated from the control stations, accommodations and service spaces by gastight steel structures, having no doors or other openings to these spaces.

Where such compartment is located in the afterpart of the ship, access to this compartment shall be from an open deck outside the cargo area and arranged in the aft bulkhead of the superstructure or a deckhouse or/and in the adjacent outer bulkheads at a distance of 4 per cent of the length of the ship but not less than 3 m from the end of the house facing the cargo shore-connection location of the bow or stern loading and unloading arrangements. This distance, however, need not exceed 5 m.

6.8 The inert gas supply main shall not be located in the control stations, accommodation and service spaces.

6.9 The inert gas supply main (mains) shall be fitted with branch piping leading to each cargo tank.

Each cargo tank shall be provided with suitable arrangements to enable to connection to the inert gas main by means of:

.1 removing spool piece, valves or other section of piping and fitting blanking arrangements on the pipe ends;

.2 two blank flanges fitted in series on the piping on condition that a leakage detector is provided between these flanges.

6.10 Two blowers shall be fitted to the inert gas generator which together are capable of delivering at least the volume of required by 3.9.2.1, Part VI "Fire Protection" of the Rules for the Classification.

There shall be established equal supply for each blower, but at any rate for each of them it shall not be less than 1/3 of aggregate required supply.

The Register may permit only one blower if it is capable of delivering to the protected cargo spaces the total volume of gas required by 3.9.2.1, Part VI "Fire Protection" of the Rules for the Classification, provided sufficient spares for the blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified by the ship crew.

6.11 The Register may accept replacement of a water seal required by 3.9.5.1, Part VI "Fire Protection" of the Rules for the Classification by an alternative arrangement of double shut-off valves fitted in series and venting arrangement between the valves. Provision in this case shall be made for:

.1 automatic operation of shut-off valves. Signals indicating whether the valves are open or shut shall be transmitted directly from the device recording inert gas flow or pressure difference in the main upstream and downstream of the valve;

.2 audible and visual alarms to indicate failure in operation of shut-off valves in case where the blower delivering inert gas is stopped and the valve is open.

6.12 Indication units of the alarms required in 3.9.7.6.3, 3.9.7.6.4 and 3.9.7.6.6, Part VI "Fire Protection" of the Rules for the Classification shall be placed in the space specified in 6.6 of the Rules and in CCR (if any) in a position where the alarm may be immediately received by the responsible members of the crew.

Indicating units of all remaining types of alarms listed in 3.9.7.6, Part VI "Fire Protection" of the Rules for the Classification and 6.11.2 of the present Part shall be so placed that the alarm may be received by the responsible members of the crew, either individually or in combination.

7 BILGE AND BALLAST ARRANGEMENTS IN CARGO AREA

7.1 BILGE ARRANGEMENTS IN CARGO AREA

7.1.1 Bilge pumping arrangements for CPR, pump rooms, void spaces, slop tanks, double bottom tanks and similar spaces shall be situated entirely within the cargo area except for void spaces, double bottom tanks and ballast tanks where such tanks are separated from tanks containing cargo or residues of cargo by a double bulkhead.

7.1.2 Tanks shall be provided to collect cargo leakages and bilge water contaminated by cargo. Such tanks shall be situated within cargo area, meet the requirements imposed on the cargo tanks and have connections with shore and other installations to discharge the collected cargo leakages and bilge water contaminated by cargo.

7.1.3 Bilge pumps and ejectors requiring attendance shall be situated in pump rooms which shall meet the requirements of Section 4, Part II "Structure of Chemical Tanker". If such attendance is not required they may be situated in separate compartments or just in the spaces to be drained.

Bilge pumps and ejectors may be situated in CPR provided that the cargoes being transferred by the cargo piping are compatible with water.

7.1.4 Bilge pumps, ejectors, piping valves and other fittings situated within the cargo area shall be stable under the action of the cargoes being carried.

7.2 BALLAST ARRANGEMENTS IN CARGO AREA

7.2.1 Pumps, ballast lines, air pipes and other similar equipment serving segregated ballast tanks shall be independent of cargo and fuel oil tanks as well as with the equipment and arrangements serving cargo and fuel oil tanks.

7.2.2 Pumps and discharge lines of ballast tanks adjacent to cargo tanks shall be independent and situated within the cargo area.

7.2.3 Pumps and filling lines of ballast tanks may be situated in machinery spaces provided that they ensure filling from a level above the maximum possible cargo level in cargo tanks and non-return valves are fitted.

7.2.4 General service pumps may be used as ballast pumps provided that the filling line of ballast tanks shall be fitted with non-return and shut-off valves and installed within the cargo area above the maximum possible cargo level in the cargo tanks.

7.2.5 Filling of ballast in cargo tanks may be arranged by pumps serving segregated ballast tanks provided that:

.1 filling will be arranged from deck level above the maximum possible cargo level in the cargo tanks; and

.2 filling line communicates with the cargo piping through the removable spool piece and is fitted with a non-return valve.

7.2.6 Provision shall be made for an effective monitoring arrangement and alarm to warn of the presence of cargo in ballast water.

7.2.7 Ballast pumping out system shall be capable of discharging ballast into the shore tanks.

7.2.8 Cargo tanks intended for carriage of cargoes incompatible with water shall be separated from the segregated ballast tanks by cofferdams. No cofferdam shall be required if independent cargo tanks are situated in the space adjacent to the ballast tank.

7.2.9 Ballast piping, sounding and vent piping to ballast shall not pass through cargo tanks. Exemptions from this requirement may be granted for short lengths of piping, provided that they are completely welded or equivalent.

8 VENTILATION OF SPACES IN THE CARGO AREA

8.1 CPR and other enclosed spaces which contain cargo-handling equipment and similar spaces in which work is performed on the cargo and which are normally entered during cargo-handling operations shall be fitted with mechanical ventilation systems having a capacity of not less than 30 air changes per hour, based upon the total volume of the empty space.

8.2 For spaces referred to in **8.1** the mechanical ventilation systems shall be capable of being controlled from positions situated outside such spaces, in the immediate vicinity of the entrance. An interlocking arrangement shall be provided to ensure that no entry into the spaces and start-up of the equipment is possible until the ventilation system of such spaces has been in operation for not less than 10 min. Warning notices to this effect shall be placed near the entrance into these spaces.

8.3 Ventilation systems serving spaces referred to in **8.1** shall be permanent and independent of other ventilation systems.

Ventilation ducts of these systems shall not be led through machinery, service, accommodation and other similar spaces.

8.4 For all spaces referred to in **8.1** the ventilation systems shall be of the extraction type. Mechanical ventilation inlets and outlets shall be arranged to ensure sufficient air movement through the space, including space below the

floor plates, to avoid the accumulation of toxic and/or flammable vapours (taking into account their vapour densities). Appropriate air amount shall be delivered to ensure sufficient oxygen to provide a safe working environment.

8.5 In rooms housing motors driving cargo pumps, the ventilation shall be of the positive-pressure type. An overpressure shall be produced in the rooms. The doors of such rooms shall open outside. An instrument to indicate the overpressure and pressure difference shall be provided.

8.6 Ventilation exhaust ducts from spaces within the cargo area shall discharge upwards in locations at least 10 m in the horizontal direction from ventilation intakes and openings to accommodation, service and machinery spaces and control stations and other spaces outside the cargo area and shall be situated at least 4 m above the upper deck.

Ventilation intakes to spaces within the cargo area shall be so arranged as to minimize the possibility of recycling hazardous vapours from any ventilation discharge opening.

8.7 Pump-rooms and other enclosed spaces normally entered which are not covered by **8**.1 shall be fitted with mechanical ventilation systems complying with the requirements of **8**.2 and **8**.4. Their capacity shall not be less than 20changes of air per hour, based upon the total volume of empty space.

8.8 For chemical tankers intended for the carriage of flammable products electric motors driving fans shall be placed outside the ventilation ducts.

Ventilation fans, ventilation fittings and ventilation ducts shall be of non-sparking construction complying with the requirements of 5.3.3, Part IX "Machinery" of the Rules for the Classification.

8.9 Spaces not normally entered (double bottoms, cofferdams, duct keels, pipe tunnels, hold spaces and other spaces where cargo vapours may accumulate) shall be capable of being ventilated to ensure a safe environment when entry into the space is necessary.

Where a permanent ventilation system is not provided for such spaces, means of portable mechanical ventilation approved by the Register shall be provided.

Where necessary owing to the arrangement of spaces (for instance hold spaces) essential ducting for ventilation shall be permanently installed.

For permanent installations the capacity of **8** air changes per hour shall be provided and for portable systems the capacity of **16** air changes per hour. Fans shall comply with the requirements of **8.8**.

PART VII. ELECTRICAL EQUIPMENT

1 GENERAL

1.1 Electrical equipment of chemical tankers, transporting fire- and explosion-hazardous cargoes shall meet the requirements of the present Part and the requirements imposed upon the electrical equipment of oil tankers as put forward in Part XI "Electrical Equipment" of the Rules for the Classification.

1.2 Electrical equipment of chemical tankers shall be such as to minimize the risk of ignition and explosion from flammable cargoes. Electrical equipment complying with the requirements of the present Part shall not be considered a possible source of ignition.

1.3 The materials used in electrical apparatus installed in locations where contact with cargo or cargo vapours is possible, shall be resistant against attach of the cargo and its vapours.

Copper, aluminum and insulating materials used in electrical equipment shall be protected, as far as practicable, to prevent contact with cargo and/or its vapours which may provoke corrosion (e.g. hermetically sealed).

1.4 Installation of electrical equipment and cable laying shall not be installed in the hazardous locations, other than the equipment specially designated for the operation in the appropriate medium and certified by the relevant authorities which permit installation of the above equipment in the explosive atmosphere in compliance with Part XI "Summary of Technical Requirements".

1.5 Electrical requirements for individual products are shown in Part XI "Summary of Technical Requirements".

1.6 Absence of instructions in Part XI "Summary of Technical Requirements" for any particular kind of cargo does not provide reason enough to use electrical equipment of non-safe type. It is necessary to take into account if the flashpoint of the cargo intended for carriage is in excess of 60 °C. In case of heated cargo, carriage conditions may require not to apply the requirements specified in Section **2** for the cargoes with a flashpoint exceeding 60 °C.

1.7 Use of submersible electrical cargo pumps is subject to special consideration by the Register in each case.

2 HAZARDOUS LOCATIONS AND SELECTION OF ELECTRICAL EQUIPMENT

2.1 Classification of hazardous locations of the chemical tankers shall comply with the requirements in 19.**2.3**, Part XI "Electrical Equipment" of the **R**ules for the Classification.

2.2 The selection of the electrical equipment to be installed in the hazardous locations shall be carried out in compliance with 19.**2.4**, Part XI "Electrical Equipment" of the **R**ules for the Classification.

2.3 The restrictions of this **S**ection do not preclude the use of structurally safe (intrinsically safe) circuits (systems, instruments, etc.) which are specially designed to be used in hazardous locations of Zone **0** including cargo piping. It is particularly recommended that intrinsically safe systems and circuits are used for measurements, monitoring, control and communication purposes.

2.4 REQUIREMENTS FOR CARGO TRANSPORTATION WITH A FLASHPOINT EXCEEDING 60 °C

2.4.1 The use of submerged cargo-pump motors and their associated cables may, in exceptional circumstances for the cargoes of strictly particular class due consideration having been given to the chemical and physical characteristics of the cargo. **S**pecial arrangements shall be made to prevent the energizing of motors and cables in flammable gas-air mixtures and automatically to de-energize the motors and cables in the event of low liquid level. **S**uch a shutdown shall be indicated by an alarm at CC**R**.

2.4.2 Where electrical equipment is located in CP**R**, due consideration shall be given to the use of types of apparatus with ensure the absence of arcs or sparks and hot spots during normal operation, or which are a certified safe type.

2.4.3 Where the cargo is heated to within 15 °C of its flash point value and less, CP**R** shall be considered as a dangerous area as well as areas within **3** m of openings from tanks and of the entrance or ventilation openings to CP**R**.

Electrical equipment installed within these hazardous locations shall be of a certified safe type.

2.5 REQUIREMENTS FOR CARGO TRANSPORTATION WITH A FLASHPOINT NOT EXCEEDING 60 °C

2.5.1 Installation of additional electrical equipment in the rooms and spaces.

2.5.1.1 In addition to intrinsically safe systems and circuits, the only electrical installations permitted in hazardous locations are the following:

.1 void spaces adjacent to, above or below integral tanks:

.1.1 through runs of cables. Such cables shall be installed in heavy gauge steel pipes (with gastight joints). Expansion bends shall not be fitted in such spaces.

.1.2 electrical depth-sounding or log devices and impressed-current cathodic protection system electrodes (anodes). These devices shall be housed in gastight enclosures; associated cables shall be protected as referred to in **2.5.1.1.1.1**;

.2 cargo spaces containing independent cargo tanks:

.2.1 through runs of cables without any additional protection against mechanical damage;

.2.2 flame-proof type lighting fittings with pressurized enclosure or of the safe-type.

The lighting system shall be divided between at least two independent branch circuits. All switches and protective devices shall interrupt all poles or phases and shall be located in non-hazardous location;

.3 CPR and pump rooms in the cargo area:

.3.1 flame-proof type lighting fittings with pressurized enclosure or of the safe-type. The lighting system shall be divided between at least two independent branch circuits. All switches and protective devices shall interrupt all poles or phases and shall be located in non-hazardous location;

.3.2 electrical motors for driving cargo pumps and any associated auxiliary pumps which shall be separated from the pumps and from the cargo spaces by a gastight bulkheads or decks. Flexible couplings or other means of maintaining alignment shall be fitted to the shafts and in addition glands shall be provided where the shafts pass through the gastight bulkheads or decks. Such electrical motors shall be located in compartments having positive-pressure ventilation;

.3.3 safe-type general alarm sound devices (bells, sirens etc.);

.4 zones on open deck, or semi-enclosed spaces on open deck, within **3** m of any cargo-tank outlets, (hatches, flanges, etc.) gas or vapour outlets, cargo-pipe flange, cargo valve or entrance and ventilation openings to **CPR**; cargo area on open deck over all cargo tanks and cargo-tank holds including ballast tanks and cofferdams within the cargo-tank block, to the full width of the ship, plus **3** m fore and aft and up to a height of **2,4** m above the deck:

.4.1 electrical and other equipment of a certified safe-type, adequate for open deck use;

.4.2 through runs of cables;

.5 enclosed or semi-enclosed spaces in which pipes containing cargoes are located; enclosed or semi-enclosed spaces immediately above cargo tanks (e.g. between decks) or having the bulkheads above or in line with cargo-tank bulkheads; enclosed or semi-enclosed spaces immediately above CPR adjacent to the cargo tanks, unless separated by a gastight deck and suitably ventilated; and compartments for cargo hoses:

.5.1 lighting fittings of a certified type.

The lighting system shall be divided between at least two branch circuits. All the switches and protective devices shall interrupt all poles or phases and shall be located in non-hazardous locations;

.5.2 through runs of cables;

.6 enclosed or semi-enclosed spaces having direct openings into any hazardous location:

.6.1 electrical equipment complying with the requirements for the spaces or zones into which the openings lead.

2.5.2 In cargo tanks and cargo piping (Zone 0) installation of electrical equipment other than electrical equipment other than intrinsically safe-type circuit is not permitted.

3 BONDING

3.1 Independent cargo tanks as well as sections of cargo and other piping within the cargo area shall be electrically bonded to the hull.

3.2 To ensure electrostatic safety the requirements of **2.10**, Part XI "Electrical Equipment" of the Rules for the Classification shall be met.

PART VIII. INSTRUMENTATION

1 GENERAL

1.1 Each cargo tank, depending on the kind of cargo to be carried, shall be fitted with cargo tank level gauging devices, cargo temperature measuring devices, cargo vapour or inert medium pressure measuring devices as well as high level and overflow alarms in accordance with the requirements of Part XI "Summary of Technical Requirements".

1.2 Gauging and measuring devices shall be one of the following types:

.1 open device which makes use of an opening in the tanks and may expose the gauger to the cargo or its vapour (e.g. ullage openings);

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

A restricted device could be a sounding pipe with inside diameter not exceeding 200 mm, with vapour tight cover in compliance with **2.1**.8, Part VIII "Systems and Piping" of the Rules for the Classification and Construction of Sea-Going Ships;

.3 closed device which penetrates the tank, but which is part of closed system and keeps tank contents from being released (e.g. the float-type systems, electronic probe, magnetic probe and protected sight-glass);

If a closed device cannot be mounted directly on the tank, it may be connected to the tank through a pipe and shut-off valve which shall be situated on the tank or as close as possible to the tank;

.4 indirect device which does not penetrate the tank shell and is independent of the tank. For determining amount of cargo, weighing of cargo, pipe flow meter, etc. are used.

1.3 Open gauging and restricted gauging shall be allowed only where:

.1 open venting is allowed; or

.2 means are provided to relieving tank pressure before the gauge is operated.

1.4 Gauging devices shall be independent of the equipment required under Section **19**, Part XII "Special Requirements".

2 CARGO TANK LEVEL GAUGING DEVICES

2.1 Each cargo tank shall be provided with at least one liquid level gauging device. Type of gauging device shall comply with the requirements of Part XI "Summary of Technical Requirements", depending on the kind of cargo to be carried.

2.2 In case where oil or oil products are carried, the cargo tanks shall be fitted with liquid level gauging devices in conformity with the requirements of 9.**11**, Part VIII "Systems and Piping" of the Rules for the Classification.

3 CARGO TEMPERATURE MEASURING DEVICES

3.1 Cargo tanks intended for the carriage of cargo at a specified temperature shall be fitted with cargo temperature measuring devices. Type of the device shall comply with the requirements of Part XI "Summary of Technical Requirements", depending on the kind of cargo to be carried.

3.2 Number and arrangement of the temperature measuring devices shall comply with the requirements of Part XI "Summary of Technical Requirements", depending on the kind of cargo to be carried.

4 CARGO VAPOUR PRESSURE MEASURING DEVICES

4.1 Cargo tanks intended for carriage of cargoes with a vapour pressure greater than 0,**1013** MPa absolute at **37**,8 °C transportation shall be equipped with cargo vapour pressure measuring devices.

In case where toxic products are carried the cargo vapour measuring devices shall be generally mounted without purging valves and, if the purging valves are fitted, purged gas shall be led to safe area.

5 CARGO VAPOUR DETECTION DEVICES

5.1 Chemical tankers intended for carriage of flammable and/or toxic products shall be equipped with two instruments (gas analyzers) designed for detecting the cargo vapours in compliance with the requirements of Part XI "Summary of Technical Requirements", depending on the kind of cargo to be carried.

5.2 One of such instruments may be fixed and serve:

.1 CPR;

.2 CCR if they are not considered as gas-safe spaces;

.3 other enclosed spaces within the cargo area where cargo vapours may accumulate, including hold spaces for independent tanks, except for the cargo tanks themselves.

5.3 Vapour detection instruments may be mounted in CCR, on the navigating bridge or in other appropriate locations.

If such instruments are mounted in gas-safe spaces the following conditions shall be met:

.1 cargo vapour-sampling pipes shall be provided with flame arresters. Cargo vapours samples shall be vented to the atmosphere through a special discharge pipe located in a safe space;

.2 cargo vapour-sampling pipes shall be provided with shut-off valves or similar arrangements to preclude communication with gas-dangerous spaces;

.3 fittings providing passage of the cargo vapour-sampling pipes through the gastight bulkhead which separate gas-safe and gas-dangerous zones, shall be of the approved type and have the same fire resistance level as the bulkhead;

.4 instruments and equipment for gas analyzing shall be housed in a special hermetically sealed steel cabinet. One measuring point shall be located inside the cabinet. Where the concentration of dangerous gases inside the cabinet reaches a value which is above 30 per cent of the lower flammability limit, supply of the cargo vapour to the gas analyzer is to be automatically stopped;

.5 where it is impossible to fit a cabinet with instruments and equipment on the gastight bulkhead the cargo vapour-sampling pipes shall be as short as possible, made of steel or equivalent material and have no detachable connections, except for the connections with the cabinet and valves mentioned in 5.3.2.

5.4 Arrangement of fixed vapour sampling devices shall be determined with consideration for the vapour density and reduction of concentration due to purging and ventilation of spaces.

5.5 Pipes going from the fixed vapour sampling devices shall not be led through gas-safe spaces, except for the cases where this is permitted by 2.3.

5.6 In spaces not normally entered, situated within the cargo area, use of portable gas analyzers with devices for external connection thereof is permitted.

5.7 When toxic-vapour detection equipment is not available for some products which require such detection as indicated in Part XI "Summary of Technical Requirements", the Register may exempt the ship from the requirement, provided the number of breathing apparatus is increased (refer to 5.1.15.1.5, Part VI "Fire Protection" of the Rules for the Classification). An entry to this effect shall be made on the Certificate of Fitness for the Chemical Tanker and attention shall be drawn to the provisions of 4.1.2 of Appendix 1.

6 ALARM SYSTEMS

6.1 Alarm systems shall meet the requirements of Part XI "Summary of Technical Requirements" of the present Rules, as well as 2.**4**, Part XV "Automation" of the Rules for the Classification.

6.2 Cargo tanks intended for carriage of cargoes for which references to Part XI shall be fitted with high level alarm operating in CCR and MCS, be independent of the alarms required by 2.**1** and 2.2 and indicate that liquid level in the cargo tank approaches the normal full condition.

6.3 When carrying cargoes for which the requirement for a tank overflow control is made, a tank-overflow-control system shall be provided. This system 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 tank-overflow alarm to the ship operator of CCR; and

.3 provide an agreed signal for sequential shutdown of onshore pumps and for valves and of the ship cargo valves. The signal, as well as pump and valve shutdown, may be dependent on the operator intervention.

The use of shipboard automatic closing valves on cargo loading pipe may be permitted only when specific approval has been obtained from the administration of the loading port.

6.4 The system required under **6.3** shall be independent of devices referred to in 2.**1**, 2.2 and **6**.2.

6.5 Arrangements shall be provided to test the level alarm required under **6**.2 and **6.3** prior to loading.

6.6 MCS and CCR shall be provided with alarms giving signals to indicate the following conditions:

.1 power failure on any system essential for cargo-handling operation;

.2 failure of mechanical ventilation system in cargo tanks;

.3 submersible pumps are out of service;

.4 overheating of cargo (for each grade of cargo) where a reference to this item is made in Part XI "Summary of Technical Requirements";

.5 overflow.

PART IX. MATERIALS OF CONSTRUCTION

1 GENERAL

1.1 Structural materials used for tank construction together with associated piping, pumps, valves, vents and their jointing materials shall be suitable at the temperature and pressure for the cargo to be carried in accordance with the requirements of the Register.

Steel is assumed the normal material of construction.

1.2 The following shall be taken into account in selecting the material of construction:

.1 notch ductility at the operating temperature;

.2 corrosive effect of the cargo;

.3 possibility of hazardous reactions between the cargo and the material of construction; and

.4 suitability of linings and coatings.

PART X. EMERGENCY OUTFIT

1 EMERGENCY OUTFIT

1.1 The following items of emergency outfit intended to remove faults within the cargo area, made of materials eliminating the possibility of dangerous reactions with anyone product to be carried and having sufficient chemical resistance to the effect of these products, shall be kept on chemical tankers as a part of the emergency outfit specified in Table 9.**2.1**, Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification or as addition thereto:

patches;

rigging and fitter's tools; stretchers and wedges;

pipes and couplings of dimensions used on the chemical tanker;

plugs, end-pieces and etc.;

sheet materials for gaskets, packing material.

2 PROTECTIVE EQUIPMENT

2.1 For the protection of crew members who are engaged in loading and discharging operations, the ship shall have on board protection equipment suitable to the products to be carried and consisting of the following:

large aprons;

special gloves with long sleeves; protective footwear; coveralls;

tight-fitting goggles and/or face shields.

2.2 Protective equipment shall be used in any operation, which may entail danger to personnel.

2.3 In any case the number of protective equipment stored on board the chemical tanker is normally to be a minimum of three sets.

2.4 Work clothes and protective equipment shall be kept in easily accessible places and in special lockers. Such equipment shall not be kept within accommodation spaces.

3 SAFETY EQUIPMENT

3.1 Ships carrying toxic cargoes for which references to special requirements are listed in Part XI "Summary of Technical Requirements" shall have on board sufficient (but not less than three) complete sets of safety equipment, each permitting personnel to enter a gas-filled compartment and perform emergency or repair work there for at least 20 min.

3.2 One complete set of safety equipment shall consist of the following:

.1 one self-contained air-breathing apparatus, not using stored oxygen, of a type approved by the Register;

.2 protective clothing, boots, gloves and tight-fitting goggles;

.3 lifelines with a steel core and belt;

.4 explosion-proof lamps.

3.3 For the safety equipment required in **3.1** all ships shall carry either:

.1 one set of fully charged spare air bottles for each breathing apparatus;

.2 a special air compressor suitable for the supply of high-pressure air of requirement purity;

.3 a charging manifold capable of dealing with sufficient spare air bottles for the breathing apparatus or fully charged spare air bottles with a total free air capacity of 6000 l for each breathing apparatus.

3.4 CPR on ships carrying cargoes for which toxic-vapour detection equipment is required but not available shall have either:

.1 a low-pressure line system with hose connections suitable for use with the breathing apparatus required by **3.2**. This system shall provide sufficient high-pressure air capacity to supply, through pressure-reduction devices, enough low-pressure air to enable two men to work in gas-dangerous space for at least 1 h without using the air bottles of the breathing apparatus. Means shall be provided for recharging the fixed air bottles from a special air compressor; or

.2 an equivalent quantity of spare bottled air in lieu of the low-pressure airline.

3.5 At least one set of safety equipment as required by **3.1** shall be kept in a suitable clearly marked locker in a readily accessible place near CPR. The other sets of safety equipment shall also be kept in suitable, clearly marked, easily accessible places.

3.6 A stretcher which is suitable for hoisting an injured person up from spaces such as CPR shall be placed in a readily accessible location.

3.7 The ship shall have on board medical first-aid equipment including oxygen resuscitation equipment and anti-dotes for cargoes carried.

3.8 Ships intended for the carriage of cargoes for which a reference to special requirements is indicated in Part XI "Summary of Technical Requirements" shall be provided with suitable respiratory and eye protection sufficient for every person on board for emergency escape purposes, subject to the following:

.1 filter-type respiratory protection is acceptable, if only this filter is suitable for all cargoes the carriage of which is permitted on the ship concerned;

.2 emergency escape respiratory protection shall have normally at least a duration of service of 15 min;

.3 emergency escape respiratory protections shall not be used for fire-fighting or cargo-handling purposes and shall be marked to that effect.

3.9 Suitably marked decontamination showers and eyewash shall be available on deck in convenient locations. The showers and eyewash shall be operable in all ambient conditions.

PART XI. SUMMARY OF TECHNICAL REQUIREMENTS

Refer ro Chapter 17 of the Code.

PART XII. SPECIAL REQUIREMENTS

Refer ro Chapter 16 of the Code.

OPERATIONAL REQUIREMENTS

1 MAXIMUM ALLOWABLE QUANTITY OF CARGO PER TANK

1.1 The quantity of cargo allowable for carriage in any one tank has been indicated in 1.2.1, Part I "Classification".

2 CARGO INFORMATION

2.1 A copy of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, or these Rules shall be on board every ship covered by this Code.

2.2 Any cargo offered for bulk shipment shall be indicated in the shipping documents by the product name, under which it is listed in Part XI "Summary of Technical Requirements" or in Appendix 4 of the Rules. Whese the cargo is a mixture, an analysis indicating the dangerous components contributing significantly to the total hazard of the product shall be provided, or a complete analysis if this is available. Sush an analysis shall be certified by the manufacturer or by an independent expert recognized by the Register.

2.3 Information shall be on board and kept in a readily accessible place, giving the necessary data for the safe carriage of cargo. Such information shall include a cargo stowage plan and also the following data:

.1 a full description of the physical and chemical properties, including reactivity, necessary for safe containment of the cargo;

.2 action to be taken in the event of spills or leaks;

.3 countermeasures against accidental personal contact;

.4 fire-fighting procedures and fire-fighting media;

.5 procedures for cargo transfer, tank cleaning, gas-freeing and ballasting;

.6 list of cargoes required to be stabilized or inhibited in accordance with Section 2; 6.1.11; 15.2, Part XII "Special Requirements".

2.4 If sufficient information necessary for the safe transportation of the cargo is not available, the cargo shall be refused.

2.5 Cargoes which evolve highly toxic imperceptible vapours shall not be transported unless perceptible additives are introduced into the cargo.

2.6 Where Part XI "Summary of Technical Requirements" refers to the requirements, the cargo viscosity at 20 °C shall be specified in the information on safe carriage of cargo. If the cargo viscosity exceeds 50 MPa, the temperature, at which the cargo has a viscosity of 50 MPa shall be specified in the information.

2.7 Where Part XI "Summary of Technical Requirements" refers to the requirements, the cargo melting point shall be indicated in the information on safe carriage of cargo.

3 PERSONNEL TRAINING

3.1 Each crew member shall be able to use protective equipment and have basic training in the procedures appropriate to his duties necessary under emergency conditions.

3.2 Personnel involved in cargo operations shall be adequately trained in cargo handling procedures.

3.3 Officers shall be trained in emergency procedures to deal with conditions of leakage, spillage or fire involving the cargo.

Sufficient number of them shall be instructed and trained in first medical aid for crew members injured due to contact with cargo carried.

4 ENTRY INTO CARGO TANKS

4.1 Crew members shall not enter cargo tanks, void spaces around such tanks, cargo-handling spaces or other enclosed spaces unless:

.1 the compartment is free of toxic vapours and not deficient in oxygen; or

.2 personnel wear breathing apparatus and other necessary protective equipment, and the entire operation in under the supervision of a responsible officer.

4.2 Crew members shall not enter such spaces when the only hazard is of purely flammable nature, except under the supervision of a responsible officer.

5 OPENINGS IN TANKS

5.1 During handling and carriage of cargoes producing flammable and/or toxic vapours or when ballasting after the discharge of such cargo, cargo-tank lids shall always be kept closed.

With any hazardous cargo, cargo-tank lids, ullage and sighting ports and tank washing access covers shall be open only when necessary.

6 STOWAGE OF CARGO SAMPLES

6.1 Cargo samples shall be stowed in a designated space situated in the cargo area.

6.2 The stowage space shall be:

.1 cell-divided to stow bottles with cargo;

.2 made of material resistant to the different liquids intended to be stowed; and

.3 equipped with adequate ventilation arrangements.

6.3 Samples which react with each other dangerously shall not be stowed close to each other.

6.4 Samples shall not be retained on board longer than necessary.

7 CARGOES NOT TO BE EXPOSED TO EXCESSIVE HEAT

7.1 Where the possibility exists of polymerization, decomposition or evolution of gas, resulting from local overheating of the cargo, such cargo shall be loaded and carried adequately segregated from other products whose temperature is sufficiently high.

7.2 Heating coils in tanks carrying this product shall be blanked off.

7.3 Products which are not permitted to be heated, shall not be carried in deck tanks which are not insulated.

8 ADDITIONAL MEASURES FOR THE PROTECTION OF THE MARINE ENVIRONMENT

8.1 General.

8.1.1 The requirements of this section apply to ships carrying cargoes noted as category **X**, Y or Z noxious liquid substances in Chapter **17** of the Code.

8.2 Conditions of carriage.

8.2.1 The conditions of carriage of products listed in the Certificate of Fitness for the Chemical Tanker shall meet the requirements of regulation **5A** of Annex II to **MARPOL 73/78**.

8.2.2 Substances with a melting point equal to or greater than **15** °C shall only be carried in a cargo tank fitted with a cargo heating system.

Such substances shall not be carried in cargo tanks any boundary of which is formed by the ship shell plating.

8.3 Procedures and Arrangements Manual.

8.3.1 Each ship shall be provided with a Procedures and Arrangements Manual developed for the ship in accordance with the provisions of the Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances and approved by the Register.

8.3.2 Each ship shall be fitted with equipment and arrangements identified in its Procedures and Arrangements Manual.

APPENDIX 2

MANUAL FOR INSPECTION, CLEANING, PASSIVATION AND LOADING OF TANKS FOR THE CARRIAGE OF HYDROGEN PEROXIDE SOLUTIONS 8 — 60 PER CENT BY MASS

1 GENERAL

1.1 Tanks having contained cargoes other than hydrogen peroxide shall be inspected, cleaned and passivated before re-use for the transportation of hydrogen peroxide solutions.

1.2 Unless otherwise specified, all steps in inspection, cleaning and passivation apply to the tanks and to all associated piping and equipment having been in contact with the other cargo.

1.3 Inspections and cleaning of tanks as given in Section **2**, shall be carried out under the supervision of the master or the shipper.

1.4 Cleaning and passivation of tanks specified in Sections **2** and **3** as well as loading the hydrogen peroxide solutions specified in Section 5, shall be carried out under the supervision and responsibility of a representative of the hydrogen peroxide manufacturer or under super vision and responsibility of another person familiar with the safety-relevant properties of this product.

2 INSPECTIONS AND CLEANING OF STAINLESS STEEL AND PURE ALUMINIUM TANKS

2.1 After unloading the previous cargo all residues, scale and rust shall be removed from the tank and the tank shall be inspected to ensure that no residues, scale and rust are present therein.

2.2 Tanks and associated equipment shall be washed with clean filtered water. The water to be used shall at least have the quality of potable water with a low chlorine content.

2.3 Trace residues and vapours of the previous cargo shall be removed by steaming of tank and equipment.

2.4 Tanks and equipment shall be washed again with clean water, as specified in **2.2** and dried, using filtered, oil-free air.

2.5 The atmosphere in the tank shall be sampled and investigated for the presence of organic vapours and oxygen concentration.

2.6 The tank shall be checked again for residues of the previous cargo, scale and rust as well as for any smell of the previous cargo.

2.7 If inspection or measurements indicate the presence of residues of the previous cargo or its vapours, steps **2.2** to **2.4** shall be repeated.

3 CLEANING AND PASSIVATION OF STAINLESS STEEL TANKS

3.1 Tank and equipment made from stainless steel which have contained other cargoes than hydrogen peroxide or which have been under repair shall be cleaned and passivated in accordance with the requirements of **3.1.1** to **3.1**.8, regardless of any previous passivation.

3.1.1 Welds and repaired parts shall be cleaned, ground and finished using stainless steel wire brush, chisel, sandpaper or buff.

3.1.2 Fatty and oily residues shall be removed by the use of appropriate organic solvents or detergent solutions in water.

The use of chlorine-containing compounds shall be avoided as they can seriously interfere with passivation.

3.1.3 The residues of the degreasing agent shall be removed, followed by a washing with water.

3.1.4 In the next step, scale and rust shall be removed by the application of acid (e.g. a mixture of nitric and hydrofluoric acids), followed again by a washing with clean water.

3.1.5 All the metal surfaces which can come into contact with hydrogen peroxide solutions shall be passivated by the application of nitric acid of a

concentration between 10 and 35 per cent by mass. The nitric acid must be free from heavy metals, other oxidizing agents or hydrogen fluoride.

The passivation process shall continue for 8 to 24 hours, depending upon the concentration of acid, the ambient temperature and other factors. During this time a continuous contact between the surfaces to be passivated and the nitric acid shall be ensured. In the case of large surfaces this may be achieved by recirculating the acid.

Hydrogen gas may be evolved in the passivation process, leading to the presence of an explosive atmosphere in the tanks. Therefore, appropriate measures must be taken avoid the evolvement of hydrogen gas and build-up of ignition of such an atmosphere.

3.1.6 After passivation the surfaces shall be thoroughly washed with clean filtered water. The washing process shall be repeated until the effluent water has the same pH value as the incoming water.

3.1.7 Structures passivated according to the above steps may cause some surface erosion when coming into contact with hydrogen peroxide solution for the first time. This process will cease after a short time (usually within two or three days). Therefore, an additional flushing of the passivated surfaces with hydrogen peroxide solutions for a period of at least two days is recommended.

3.1.8 Only degreasing and acid cleaning agents which have been recommended for this purpose by the manufacturer of the hydrogen peroxide shall be used in the process.

4 CLEANING AND PASSIVATION OF ALUMINIUM TANKS

4.1 Tanks and equipment made from aluminium and which have contained cargoes other than hydrogen oxide, or which have been under repair, shall be cleaned and passivated in accordance with the requirements of **4.1.1** to **4.1.5**.

4.1.1 The tank shall be washed with a solution of sulphonated detergent in hot water, followed by a washing with water.

4.1.2 The surfaces shall then be treated for 15 to 20 min with a solution of sodium hydroxide of a concentration of 7 per cent by mass or treated for a longer period with a less concentrated solution (e.g. for 12 h with 0,4 to 0,5 per cent sodium hydroxide).

To prevent excessive corrosion at the bottom of the tank when treating with more concentrated solutions of sodium hydroxide water shall be added continuously to dilute the sodium hydroxide solution which collects there.

4.1.3 Tanks shall be thoroughly washed with clean, filtered water.

As soon as possible after washing, tanks shall be passivated by the application of nitric acid of a concentration between 30 and 35 per cent by mass.

The passivation process shall continue for 16 to 24 h. During this time a continuous contact between the surfaces to be passivated and the nitric acid shall be ensured.

4.1.4 After passivation all the surfaces shall be thoroughly washed with clean, filtered water. The washing process shall be repeated until the effluent water has the same pH value as the incoming water.

4.1.5 A visual inspection shall be made to ensure that all surfaces have been adequately passivated.

It is recommended that an additional flushing of the surface passivated is carried out for 24 h with hydrogen peroxide solutions of a concentration of 3 per cent by mass.

5 LOADING OF TANKS

5.1 The concentration and stability of the hydrogen peroxide solution shall be determined during loading.

5.2 The hydrogen peroxide solution is loaded under visual supervision of the interior of the tank from an appropriate opening.

5.3 If bubbling is observed which does not disappear within 15 min after the completion of loading, the hydrogen peroxide solutions shall be unloaded and disposed of in an environmentally safe manner. The tanks shall then be cleaned and repassivated as described above.

6 PREPARATION OF TANKS FOR THE CARRIAGE OF OTHER CARGOES

6.1 All steps specified in this paragraph shall apply both to the cargo tanks and to all the piping and equipment having been in contact with hydrogen peroxide.

6.1.1 All hydrogen peroxide cargo residues shall be drained as completely as possible from tanks and equipment.

6.1.2 Tanks and equipment shall be rinsed with clean water, and subsequently thoroughly washed with clean water.

6.1.3 The interior of the tanks shall be dried and inspected for any residues.

6.1.4 All steps shall be carried out under the supervision ofthe master or the shipper. Inspection referred to in 6.1.3 shall be carried out by a person familiar with the safety relevant properties of the chemical to be transported and of hydrogen peroxide.

7 PRECAUTIONS

7.1 Hydrogen peroxide decomposition may enrich the atmosphere with oxygen and, therefore, appropriate precautions shall be observed.

7.2 Hydrogen gas may be evolved in the passivation processes described in 3.1.5, 4.1.2 and 4.1.3, leading to the presence of an explosive atmosphere in the tank. Therefore, special measures must be taken to avoid the build-up of such an atmosphere.

APPENDIX 3

NAMES AND SYNONYMS OF VEGETABLE OIL, COD-LIVER OIL AND ADIPOSE

CASTOR OIL

BP Castor oil
BSS Castor oil
Commercial Castor oil
First Pressure Castor oil
Fractionated Castor oil
Hydrogenated Castor oil
Interesterified Castor oil
No. 1 Castor oil
Pharmaceutical Grade Castor oil
Ricinus oil

COCOA BUTTER

Cocoa butter Degummed
Cocoa butter Pressed Degummed Deodorized
Crude Cocoa butter
Deodorized Cocoa butter
Deodorized Degummed Cocoa butter
PPP (Pure Prime Pressed) Cocoa butter

COCONUT OIL

Cochin Coconut oil
Coconut Palm oil
Copra oil
Crude Coconut oil
Degummed Coconut oil
Fractionated Coconut oil
Free Coconut oil
Hydrogenated Coconut oil
Interesterified Coconut oil
RBD Coconut oil

CORN OIL

Crude Corn oil
Crude Degummed Corn oil
Fractionated Corn oil
Hydrogenated Corn oil
Interesterified Corn oil
Maize oil
Refined & Bleached Corn oil
Refined, Bleached & Winterized Corn oil
RBD Corn oil
RBD Maize oil
RBDW Corn oil
RBDW Maize oil

COTTONSEED OIL

Cotton oil
Fractionated Cottonseed oil
Hydrogenated Cottonseed oil
Interesterified Cottonseed oil
PBSY Cottonseed oil
Semi-refined Cottonseed oil

FISIL OIL

Anchovy oil
Capeline oil
Cod oil
Crude Fish oil
Fractionated Fish oil
Herring oil
Hydrogenated Fish oil
Interesterified Fish oil
Menhaden oil
Menhaden Stearin Salmon oil
Sardine oil

GROUNDNUT OIL

Arachis oil
Crude Groundnut oil
Fractionated Groundnut oil
Hydrogenated Groundnut oil
Interesterified Groundnut oil
Peanut oil
Refined Groundnut oil

'ILLIPE OIL

Borneo Tallow
Fractionated Illipe oil
Green butter
Hydrogenated Illipe oil
Illipe butter
Interesterified Illipe oil
Tengkawang butter

'LARD

Choice Kettle lard
Crude lard Edible lard
Fractionated lard
Hydrogenated lard
Inedible lard
Interesterified lard
Leafilard
Steam lard

'LINSEED OIL

Flaxseed oil
Crude Linseed oil
Fractionated Linseed oil
Hydrogenated Linseed oil
Interesterified Linseed oil
Raw Linseed oil

MANGO KERNEL OIL

Fractionated Mango Kernel oil
Hydrogenated Mango Kernel oil
Interesterified Mango Kernel oil
Mangifea Indica oil
Mango butter
Mango Seed oil

OLIVE OIL

Crude Olive oil
Extra Virgin Olive oil
Lampante Virgin Olive oil
Olive-Pomace oil
Ordinary Virgin Olive oil
Refined Olive oil
Virgin Olive oil

RAPESEED OIL

Canola oil
Crude Degummed Rapeseed oil
Crude Rapeseed oil
Fractionated HE Rapeseed oil
Fractionated Rapeseed oil
Genetically Modified Rapeseed oil
HE Rapeseed oil
HEAR oil
High Erucic Acid Rapeseed oil
Hydrogenated HE Rapeseed oil
Hydrogenated Rapeseed oil
Interesterified HE Rapeseed oil
Interesterified Rapeseed oil
LEAR oil
Low erucic acid rapeseed oil
RBD Canola oil
RBD Rapeseed oil
Refined Canola oil
Refined Rapeseed oil
Technical Rapeseed oil

RICE BRAN OIL

Fractionated Rice Bran oil
Hydrogenated Rice Bran oil
Interesterified Rice Bran oil

SAFFLOWER OIL

Safflower-seed oil
Fractionated Safflower oil
Hydrogenated Safflower oil
Interesterified Safflower oil
Thistle-seed oil

SHEA BUTTER

Karite butter
Karitenut butter
Shea Butter oil
Shea Butter olein
Shea Butter stearin
Sheanut butter

SOYA BEAN OIL

Aceite Crude Desgomado De Soya (S)
Aceite Crudo De Soya (S)
Aceite De Soya (S)
Crude Degummed Soya bean oil
Crude Degummed Soya bean oil
Crude Degummed Soya bean oil of Edible Grade
Crude Soya bean oil
Crude Soya bean oil
Crude Superdegummed Soya bean oil
Expelled Soya bean oil
Fractionated Soya bean oil
Genetically Modified Soya bean oil
Huile Brute De Soya (F)
Huile Brute De Soya Desgommee (F)
Huile De Soya (F)
Hydrogenated Soya bean oil
Interesterified Soya bean oil
RBD Soy oil
RBD Soya bean oil

Refined Soya oil
Soya oil
Soya bean oil

SUNFLOWER-SEED OIL

Crude Sunflower oil
Crude Sunflower-seed oil
Crude Sunflower-seed oil of Edible Grade
Fractionated Sunflower-seed oil
Genetically Modified Sunflower-seed oil
High Oleic Sun oil
Hydrogenated Sunflower-seed oil
Interesterified Sunflower-seed oil
Refined Sunflower-seed oil
Sun oil
Sunflower oil

TALLOW

"A" tallow
All Beef Packer tallow
All White tallow
Barso tallow
Beef tallow
Bleachable Fancy tallow
Bulk tallow
Choice White Grease
Choice White tallow
Crude tallow oil
Edible tallow
Extra Fancy tallow
Fancy tallow
Feed Grade tallow
Fractionated tallow
Gannet tallow
Good Soap tallow
Government Certified Edible Beef tallow

High Energy Feed Fat
Hydrogenated tallow
Inedible Beef tallow
Inedible tallow
Inedible Unbleached Technical tallow
Interesterified tallow
Laundry Grade tallow
Low Grade tallow
Low Titre tallow
Mutton tallow
Poultry oil Prime tallow
Pure Beef tallow
Special tallow
Tallow oil
Technical Edible tallow
Technical tallow
Toilet Grade tallow
Top White tallow
Yellow Grease

TUNG OIL

China Wood oil
Raw Tung oil
Raw Wood oil
Wood oil

PALM OIL

Bleached palm oil
Crude palm oil (CPO)
Fractionated palm oil
Hydrogenated palm oil
Interesterified palm oil
Neutralized and bleached palm oil
Neutralized palm oil
NBD palm oil
Palm fruit oil

Palm mesocarp oil
Red palm oil
RBD palm oil
RBD Sustainable palm oil
Sustainable palm oil
Technical palm oil
Non-edible industrial grad palm oil

PALM OLEIN

Bleached palm olein Red palm olein
Crude palm olein
RBD palm olein
Neutralized and bleached palm olein
Palm liquid fraction
Sustainable palm olein
RBD Sustainable palm olein
Palm superolein
Hydrogenated palm olein
Fractionated palm olein
Interesterified palm olein
Neutralized palm olein
Neutralized bleached and deodorized (NBD) palm olein
Palm-based used cooking oil

PALM STEARIN

Crude palm stearin
RBD palm stearin
Neutralized and bleached palm stearin
Palm oil solid fraction
Sustainable palm stearin
RBD Sustainable palm stearin
Soft stearin
Hydrogenated palm stearin
Fractionated palm stearin
Interesterified palm stearin
Bleached palm stearin

Red palm stearin
Neutralized palm stearin
Neutralized bleached and deodorized
NBD palm stearin

PALM KERNEL OIL

Crude palm kernel oil (CPKO)
RBD palm kernel oil
Neutralized and bleached palm kernel oil
Sustainable palm kernel oil
RBD sustainable palm kernel oil
Hydrogenated palm kernel oil
Fractionated palm kernel oil
Interesterified palm kernel oil
Bleached palm kernel oil
Neutralized palm kernel oil
Neutralized bleached and deodorized (NBD) palm kernel oil

PALM KERNEL STEARIN

Crude palm kernel stearin
RBD palm kernel stearin
Neutralized and bleached palm kernel stearin
Palm kernel oil solid fraction
Sustainable palm kernel stearin
RBD Sustainable palm kernel stearin
Hydrogenated palm kernel stearin
Fractionated palm kernel stearin
Interesterified palm kernel stearin
Bleached palm kernel stearin Neutralized palm kernel stearin
Neutralized bleached and deodorized (NBD) palm kernel stearin

PALM KERNEL OLEIN

Crude palm kernel olein
RBD palm kernel olein
Fractionated palm kernel olein
Interesterified palm kernel olein
Bleached palm kernel olein
Neutralized palm kernel olein
Neutralized bleached and deodorized
NBD palm kernel olein
Palm kernel oil liquid fraction
Sustainable palm kernel olein
RBD Sustainable palm kernel olein
Hydrogenated palm kernel olein
Neutralized and bleached palm kernel olein

PALM FATTY ACID DISTILLATE (PFAD)

Palm oil fatty acid distillate
Fatty acid distillate from palm oil
Palm deodorizer distillate
Hydrogenated palm fatty acid distillate (HPFAD)
Distilled palm fatty acid distillate

PALM ACID OIL (PAO)

Acid oil from palm oil
Acid oil from palm oil chemical refining
Acidulated palm oil soap stock
Hydrogenated palm acid oil

PALM KERNEL FATTY ACID DISTILLATE (PKFAD)

Palm kernel oil fatty acid distillate
Fatty acid distillate from Palm kernel oil
Palm kernel deodorizer distillate
Hydrogenated palm kernel fatty acid distillate (HPKFAD)
Distilled palm kernel fatty acid distillate

PALM KERNEL ACID OIL (PKAO)

Acid oil from Palm kernel oil
Acid oil from Palm kernel oil chemical refining
Acidulated Palm kernel oil soap stock
Hydrogenated palm kernel acid oil

PALM MID FRACTION

Crude palm mid fraction
RBD palm mid fraction
Neutralized palm mid fraction
Neutralized and bleached palm mid fraction
Sustainable palm mid fraction
Hydrogenated palm mid fraction
Fractionated palm mid fraction
Interesterified palm mid fraction
Bleached palm mid fraction
Red palm mid fraction

HIGH FFA PALM OIL

High FFA crude palm oil
High FFA Technical palm oil
High FFA Non-edible Industrial Grade palm oil
Residue palm oil
Spent clay oil
Low grade palm oil

ABBREVIATIONS

The following abbreviations have been adopted in this Appendix:
BP — British Pharmacopeia;
BSS — British Standard Specification;
FFA — Free Fatty Acid;
HE — High Erucic;
HEAR — High Erucic Acid Rapeseed;

LEAR — Low Erucic Acid Rapeseed;
NBD — Neutralised Bleached Deodorised;
PBSY — Prime Bleachable Summer Yellow;
RBD — Refined Bleached Deodorised;
RBDW — Refined Bleached Deodorised Winterised.

Note. Basic names are withen in bold type (Roman and Italic), the other names are synonyms.

APPENDIX 4

LIST OF CHEMICALS TO WHICH THE CODE DOES NOT APPLY

Refer to Chapter 18 ofithe Code.

LIST OF CIRCULAR LETTERS AMENDING/SUPPLEMENTING NORMATIVE DOCUMENT

ND 2-020101-081-E

Rules for the Classification and Construction of Chemical Tankers (2014)

(Normative document No. and title)

Item No.	Circular letter No., date of approval	List of amended and supplemented paras
1.	314-14-848c dated 23.10.2015	Part IV: para 1.2.
2.	312-19-860c dated 30.12.2015	Part I: 1.2.1. Part VI: 3.3, 5.2.

RUSSIAN MARITIME REGISTER OF SHIPPING

HEAD OFFICE

CIRCULAR LETTER № 314-14-848c dated 23.10.2015

Re:

Amendments to the Rules for the Classification and Construction of Chemical Tankers, 2014, ND 2-020101-081

Item of supervision:

Chemical tankers

Implementation 01.01.2016

Valid: till

Validity period extended till

Cancels / amends / adds circular letter № dated

Number of pages: 1

Appendices:

Technical Director - Director of Classification Directorate Vladimir I. Evenko

Amends Rules for the Classification and Construction of Chemical Tankers, 2014, ND № 2-020101-081.

We hereby inform that taking into account the provisions of IMO Resolutions MEPC.249(66), MEPC.250(66), MSC.369(93) and MSC.376(93), Section 1 "Stability", Part IV "Stability, Subdivision and Freeboard" of the Rules will be supplemented with new para 1.2:

"1.2 Each chemical tanker shall be fitted with a stability instrument capable of verifying compliance with intact and damage stability requirements, approved by the Register."

It is necessary to do the following:

1) Bring the content of the circular letter to the notice of the surveyors of the RS Branch Offices and interested organizations in the area of the RS Branch Offices' activity.
2) Apply provisions introduced by the circular letter.

Person in charge: Vitaliy S. Odegov Department 314 +7 (812)312-85-72

DMS THESIS № ID 264550

RUSSIAN MARITIME REGISTER OF SHIPPING
HEAD OFFICE

CIRCULAR LETTER **No.** 312-19-860c dated 30.12.2015

Re:

Amendments to the Rules for the Classification and Construction of Chemical Tankers, 2014, ND No. 2-020101-081-E

Item of technical supervision:

Chemical tankers

Implementation	01.01.2016
Valid: till	-
Validity period extended till	-
Cancels / Amends/ Supplements Circular Letter No.	- dated -

Number of pages:	2
Appendices:	-

Technical Director - Head of Classification Directorate Vladimir I. Evenko

Amends Rules for the Classification and Construction of Chemical Tankers, 2014, ND No. 2-020101-081-E

With regard to implementation of IMO resolutions MEPC.250(66) and MSC.369(93), the following amendments shall be introduced into the Rules for the Classification and Construction of Chemical Tankers, 2014, ND No. 2-020101-081-E.

1. In para 1.2.1, Part I "Classification" new definitions shall be introduced reading as follows:

"**Purging** means the introduction of inert gas into a tank which is already in an inert condition with the object of further reducing the oxygen content; and/or reducing the existing hydrocarbon or other flammable vapours content to a level below which combustion cannot be supported if air is subsequently introduced into the tank.

Gas-freeing means the process where a portable or fixed ventilation system is used to introduce fresh air into a tank in order to reduce the concentration of hazardous gases or vapours to a level safe for tank entry.".

2. The heading of Chapter 3.3, Part VI "Systems and Piping" shall be supplemented with a sign of Footnote 1. The Chapter shall be supplemented with Footnote 1 reading as follows: "[1] Refer to requirements in column "h", Chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code)".

3. Para 5.2 of Part VI "Systems and Piping" shall be amended to read:

"**5.2** When the application of inert gas is required by 11.1.1, before gas-freeing, the cargo tanks shall be purged with inert gas through outlet pipes with cross-sectional area 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. The outlets shall extend not less than 2 m above the deck level. Purging shall continue until the concentration of hydrocarbon or other flammable vapours in the cargo tanks has been reduced to less than 2 per cent by volume.".

It is necessary to do the following:

1. Familiarize the RS surveyors, interested organisations and persons in the area of the RS Branch Offices' activity.
2. Apply provisions introduced by the Circular Letter.

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DMS "THESIS" No.	15-352191		

Российский морской регистр судоходства

Правила классификации и постройки химовозов
2014 г.

Russian Maritime Register of Shipping

Rules for the Classification and Construction of Chemical Tankers
2014

The edition is prepared
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