

RULES

FOR THE CLASSIFICATION AND CONSTRUCTION OF CHEMICAL TANKERS

PART VI SYSTEMS AND PIPING

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RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF CHEMICAL TANKERS

Rules for the Classification and Construction of Chemical Tankers of Russian Maritime Register of Shipping (RS, the Register) have been approved in accordance with the established procedure and come into force on 1 January 2022.

The present edition of the Rules is based on the 2021 edition taking into account the amendments developed immediately before publication.

The provisions of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) with relevant amendments thereto implemented by resolutions MSC.460(101) and MEPC.318(74) of the International Maritime Organization (IMO) 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.

The Rules are published in the following parts:

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 "Personnel Protection";

Part XI "Summary of Technical Requirements";

Part XII "Special Requirements";

The Annexes to the Rules are published separately.

REVISION HISTORY

(purely editorial amendments are not included in the Revision History)

For this version, there are no amendments to be included in the Revision History.

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 Piping" of the Rules for the Classification and Construction of Sea-Going Ships¹.

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/mm²);
 R_e – specified minimum yield stress at ambient temperature (N/mm²). If the stress-strain curve does not show a defined yield stress, the 0,2 % proof stress applies;
 A and B shall have values of at least $A = 2,7$ and $B = 1,8$.

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](#) of the Rules for the Classification and Construction of Chemical Tankers².

¹ Hereinafter referred to as "the Rules for the Classification".

² Hereinafter referred to as "these Rules".

1.3 MANUFACTURE OF PIPING AND ITS ELEMENTS

1.3.1 Cargo piping shall be joined by welding and meet the requirements of Part XIV "Welding" of the Rules for the Classification, except approved connections to shut-off valves and expansion joints.

The welded joints of pipes shall be subjected to radiographic testing in accordance with the 3.3.3, 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 is 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 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 or bends of the pipelines. Use of bellows is allowed, 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 design 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 $1,0P_d$.

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 of [1.5.1](#) and [1.5.2](#).

Pipe tunnels shall satisfy all tank requirements for construction, location, ventilation and safety of electrical equipment.

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

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

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.

1.6 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 % nondestructive 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 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 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 2/5 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.

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](#) of these Rules and this 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 $-40\text{ }^{\circ}\text{C}$ 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.

3.3 THE REQUIREMENTS FOR CHEMICAL TANKERS WHERE INERTING OR PADDING OF CARGO TANKS IS REQUIRED¹

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 9.16.1.3, Part VIII "Systems and Piping" 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.

¹ Refer to requirements in column "h", Chapter 17 of the IBC Code.

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. Tank 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 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 IMO circular MSC/Circ.677, as well as IMO circulars 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 % 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 actuated by inerting medium.

4.15 For chemical tankers which cargo tanks are designed for carriage of 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 (refer to 4.7.1) shall ensure discharging flammable and/or toxic cargo vapours and be such as to minimize the fire and health hazard.

5.2 When the application of inert gas is required, 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 % by volume.

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 8000 t deadweight and more shall be fitted with an inert gas system to protect cargo tanks intended for the carriage of flammable products referred to in Part XI "Summary of Technical Requirements" and Annex 1, provided that capacity of each cargo tank exceeds 3000 m³, or that the ship is fitted with tank washing machines with a nozzle capacity exceeding 17,5 m³/h or a total throughput capacity of the washing machines per a single tank more than 110 m³/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 specified in 3.1.3.2.8, 3.9, Part VI "Fire Protection" and 9.16, Part VIII "Systems and Piping" of the Rules for the Classification the inert gas system shall comply with the requirements of [6.3 to 6.12](#) of these Rules.

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.

Systems using other inert gas sources may be allowed, 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 Classification.

6.5 A lower capacity of the system than that specified in 9.16.2.1, Part VIII "Systems and Piping" of the Rules for the Classification is allowed on condition that the cargo discharge rate from the tanks being protected is restricted to 80 % 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 to 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 connection to the inert gas main by means of the following:

.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 inert gas required by 9.16, Part VIII "Systems and Piping" 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.

Only one blower may be allowed if it is capable of delivering to the protected cargo spaces the total volume of gas required by 9.16, Part VIII "Systems and Piping" 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 9.16.5, Part VIII "Systems and Piping" 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 the following:

.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 Indicating units of the alarms required in 9.16.7, Part VIII "Systems and Piping" of the Rules for the Classification shall be placed in the space specified in [6.6](#) of this Part 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 9.16.7, Part VIII "Systems and Piping" of the Rules for the Classification and [6.11.2](#) of this 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 20 changes 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](#).

Russian Maritime Register of Shipping

Rules for the Classification and Construction of Chemical Tankers
Part VI
Systems and Piping

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