

# RULES

## FOR THE CLASSIFICATION AND CONSTRUCTION OF SHIPS CARRYING LIQUEFIED GASES IN BULK

### PART V

#### FIRE PROTECTION

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# **RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SHIPS CARRYING LIQUEFIED GASES IN BULK**

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Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk of Russian Maritime Register of Shipping (RS, the Register) have been approved in accordance with the established approval 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 Rules establish requirements, which are specific for ships carrying liquefied gases 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 "Ship Arrangement";

Part III "Stability. Subdivision. Freeboard";

Part IV "Cargo Containment";

Part V "Fire Protection";

Part VI "Systems and Piping";

Part VII "Electrical Equipment";

Part VIII "Instrumentation and Automation Systems";

Part IX "Materials and Welding";

Part X "Special Requirements".

The Annexes to the Rules are published separately.

**REVISION HISTORY<sup>1</sup>**

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

| Amended<br>paras/chapters/sections | Information on amendments  | Number and date<br>of the Circular<br>Letter | Entry-into-force<br>date |
|------------------------------------|--|--|--------------------------|
| <a href="#">Annotation</a>         | Annotation has been<br>amended   | —  | 15.04.2022               |
| <a href="#">Para 3.3.2</a>         | Requirements have been<br>specified in connection with<br>implementation of IACS<br>Unified Interpretation (UI)<br>GC38 (Mar 2022) | 313-14-1773c<br>of 24.05.2022                | 01.07.2022               |

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<sup>1</sup> Amendments and additions introduced at re-publication or by new versions based on circular letters or editorial amendments.

## **1 APPLICATION**

**1.1** The requirements of this Part of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk<sup>1</sup> apply to ship's structural fire protection, fire extinguishing systems as well as to fire fighting equipment and outfit of ships carrying liquefied gases in bulk<sup>2</sup>. The LG carriers are also covered by all the applicable requirements of Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships<sup>3</sup>.

**1.2** The fire protection requirements relating to the structural members of the ship hull, machinery and electrical equipment, system and piping are set out in the relevant parts of the LG Rules.

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<sup>1</sup> Hereinafter referred to as "the LG Rules".

<sup>2</sup> Hereinafter referred to as "the LG carriers".

<sup>3</sup> Hereinafter referred to as "the Rules for the Classification".

## **2 STRUCTURAL FIRE PROTECTION**

**2.1** The applicable requirements of 2.4, Part VI "Fire Protection" of the Rules for the Classification, except 2.4.5 and 2.4.12, shall be complied with.

**2.1.1** Windows and sidescuttles facing the cargo area and on the sides of the superstructures and deckhouses within the distance of at least 4 % of the length of the ship but not less than 3 m from the end of the superstructure or deckhouse facing the cargo area (this distance, however, need not exceed 5 m) shall be of fixed (non-opening) type. Such windows and sidescuttles, except wheelhouse windows, shall be constructed to "A-60" class.

Wheelhouse windows may be non-fixed if they are designed in a manner that a rapid and efficient gas and vapour tightening of the wheelhouse can be ensured.

Sidescuttles in the shell below the uppermost continuous deck and in the first tier of the superstructure or deckhouse shall be of fixed (non-opening) type.

**2.2** All sources of ignition shall be excluded from spaces where flammable vapour may be present.

If electrical equipment is fitted in such spaces, it shall be documented that the equipment is safe for use in dangerous environment, to which it may be exposed.

**2.3** Hold spaces shall be located forward of machinery spaces of category A. They shall be separated from adjacent machinery spaces of category A, accommodation and service spaces, control stations, chain lockers, storerooms, drinking water and domestic water tanks by cofferdams or fuel tanks.

A gastight "A-0" class division is acceptable if there is no source of ignition or fire hazard in the adjoining spaces.

In ships with cargo tanks without secondary barrier, gastight "A-60" class bulkheads may be used instead of cofferdams and fuel tanks.

Alternative arrangements, including locating machinery spaces of category A forward, may be accepted, based on 1.7, Part VI "Fire Protection" of the Rules for the Classification, after further consideration of involved risks, including that of cargo release and the means of mitigation.

Turret compartments segregation from machinery spaces of category A, accommodation and service spaces, control stations, chain lockers, storerooms, drinking water and domestic water tanks or spaces either below or outboard of the turret compartment that contain a source of ignition or fire hazard, shall be effected by cofferdams or an A-60 class division. A gastight "A-0" class division is acceptable if there is no source of ignition or fire hazard in the adjoining spaces.

In addition, the risk of fire propagation from turret compartments to adjacent spaces shall be evaluated by a risk analysis in accordance with 1.1.11 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk<sup>1</sup> and further preventive measures, such as the arrangement of a cofferdam around the turret compartment, shall be provided if needed.

**2.4** Passages for safe escape from areas of the regasification unit, suction drum and export manifold shall be arranged. Shielding from fire and heat radiation shall be provided for, as necessary. Two escape ways from normally manned areas shall be arranged, one way shall be accessible after any accidental event.

**2.5** A suitable number of fire detectors including flame detectors, shall be fitted to cover the regasification units and export manifold.

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<sup>1</sup> Hereinafter referred to as "the Code".

### **3 FIRE FIGHTING EQUIPMENT AND SYSTEMS**

#### **3.1 General requirements.**

**3.1.1** Enclosed spaces meeting the criteria of cargo machinery spaces and the cargo motor room within the cargo area of any ship, shall be provided with a fixed fire-extinguishing system complying with the provisions of the International Code for Fire Safety Systems, as adopted by IMO resolution MSC.98(73)<sup>1</sup> and taking into account the necessary concentrations/application rate required for extinguishing gas fires.

**3.1.2** Enclosed spaces meeting the criteria of cargo machinery spaces and turret compartments within the cargo area of ships that are dedicated to the carriage of a restricted number of cargoes, shall be protected by an appropriate fire-extinguishing system for the cargo carried.

**3.1.3** Turret compartments of any ship shall be protected by internal water spray, with an application rate of not less than 10 l/m<sup>2</sup>/min of the largest projected horizontal surface. If the pressure of the gas flow through the turret exceeds 4 MPa, the application rate shall be increased to 20 l/m<sup>2</sup>/min.

The system shall be designed to protect all internal surfaces.

**3.1.4** The automatic sound alarms to warn of the fire extinguishing in the above spaces shall be safe for use in a flammable cargo vapour-air mixture.

#### **3.2 Water fire main system.**

**3.2.1** Water fire main system shall meet the requirements of 3.2, Part VI "Fire Protection" of the Rules for the Classification, having regard to the following:

**.1** when a fire pump is used to supply the water-spray system ([refer to 3.3.5](#)), limitations in 3.2.1.5.2 and 3.2.5.1, Part VI "Fire Protection" of the Rules for the Classification are not applied. The capacity of fire pumps shall be such that the areas mentioned in [3.3.1](#) can be protected when simultaneously supplying two jets of water from fire hoses with 19 mm nozzles at a pressure of at least 0,5 MPa;

**.2** the arrangements shall be such that at least two jets of water can reach any part of the deck in the cargo area and those portions of the cargo containment system and tank covers that are above the deck;

**.3** the necessary number of fire hydrants shall be located to satisfy the above arrangements and to comply with the requirements of 3.2.6.2 and 5.1.5, Part VI "Fire Protection" of the Rules for the Classification with hose lengths as specified in 5.1.4, Part VI "Fire Protection" of the Rules for the Classification;

**.4** the requirements of Table 3.2.1.1, Part VI "Fire Protection" of the Rules for the Classification shall be met at a pressure of at least 0,5 MPa gauge;

**.5** stop valves shall be fitted in any crossover provided and in the fire main or mains in a protected location, before entering the cargo area and at intervals ensuring isolation of any damaged single section of the fire main, so that requirements in [3.2.1.2](#) and [3.2.1.3](#) can be complied with using not more than two lengths of hoses from the nearest fire hydrant;

**.6** the water supply to the fire main serving the cargo area shall be a ring main supplied by the main fire pumps or a single main supplied by fire pumps positioned fore and aft of the cargo area, one of which shall be independently driven;

**.7** after installation, the pipes, valves, fittings and assembled system shall be subject to a tightness and function test.

**3.2.2** When the ship is fitted with a total flooding high expansion foam system protecting the category A engine-room and the emergency fire pump is intended to supply sea water to this system, then, the emergency fire pump shall also be sized up to cover the foam system for dealing with an engine-room fire when the main fire pumps are disabled.

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<sup>1</sup> Hereinafter referred to as "the FSS Code".

**3.2.3** On the basis of the principle of dealing with one single incident at a time, the emergency pump does not need to be sized to cover fire hydrants, foam system in accordance with the requirements of [3.2.2](#) and water-spray system in accordance with the requirements of [3.3.6](#) at the same time.

At that, it shall be sized to simultaneously cover the foam system and two hydrants in accordance with the requirements of [3.2.2](#) or the water-spray system and two hydrants in accordance with the requirements of [3.3.6](#), whichever is greater.

**3.3 Water-spray system.**

**3.3.1** On ships carrying flammable and/or toxic products, a water-spray system, for cooling, fire prevention and crew protection shall be installed to cover:

**.1** exposed cargo tank domes, any exposed parts of cargo tanks and any part of cargo tank covers that may be exposed to heat from fires in adjacent equipment containing cargo such as exposed booster pumps/heaters/re-gasification or re-liquefaction plants, hereafter addressed as gas process units, positioned on weather decks;

**.2** exposed on-deck storage vessels for flammable or toxic products;

**.3** gas process units positioned on deck;

**.4** cargo liquid and vapour discharge and loading connections, including the presentation flange and the area where their control valves are situated, which shall be at least equal to the area of the drip trays provided;

**.5** all exposed emergency shut-down (ESD) valves in the cargo liquid and vapour pipes, including the master valve for supply to gas consumers;

**.6** exposed boundaries facing the cargo area, such as bulkheads of superstructures and deckhouses normally manned, cargo machinery spaces, store-rooms containing high fire-risk items and cargo control rooms. Exposed horizontal boundaries of these areas do not require protection unless detachable cargo piping connections are arranged above or below. Boundaries of unmanned forecastle structures not containing high fire-risk items or equipment do not require water-spray protection;

**.7** exposed lifeboats, liferafts and muster stations facing the cargo area, regardless of distance to cargo area, except for the exposed muster stations and exposed launching routes from the life rafts storage location to the ship side where rafts are located and ready for launching at both sides (remote liferafts located in areas covered by water-spray protection as required in [3.3.1.6](#), are considered as adequately protected); and

**.8** any semi-enclosed cargo machinery spaces and semi-enclosed cargo motor room.

Water-spray system of ships intended for periodical operation at a fixed location in regasification and offloading mode or in the receiving, processing, liquefying and storage modes shall be designed in compliance with the requirements of 1.1.10 of the Code.

**3.3.2** The system shall be capable of covering all areas mentioned in [3.3.1](#) with a uniformly distributed water application rate of at least 10 l/m<sup>2</sup>/min for the largest projected horizontal surfaces and 4 l/m<sup>2</sup>/min for vertical surfaces.

On vertical surfaces, spacing of nozzles protecting lower areas may take account of anticipated rundown from higher areas.

For structures having no clearly defined horizontal or vertical surface, the capacity of the water-spray system shall not be less than the projected horizontal surface multiplied by 10 l/m<sup>2</sup>/min.

For the purposes of firefighting, any weather deck areas above cofferdams or fuel oil tanks installed instead of cofferdams in accordance with [2.3](#), ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forwardmost hold space shall be included in the cargo area mentioned in [3.3.1.6](#) and [3.3.1.7](#). The weather deck area above the above-mentioned fuel oil tanks shall be regarded as a cargo area for the purpose of applying [3.3.8](#).

**3.3.3** Stop valves shall be fitted in the main supply line(s) in the water-spray system, at intervals not exceeding 40 m, for the purpose of isolating damaged sections.

Alternatively, the system may be divided into two or more sections that may be operated independently, provided the necessary controls are located together in a readily accessible position outside the cargo area.

**3.3.4** A section protecting any area included in [3.3.1.1](#) and [3.3.1.2](#) shall cover at least the entire athwartship tank grouping in that area.

Any gas process unit(s) included in [3.3.1.3](#) may be served by an independent section.

**3.3.5** In addition to surfaces specified in [3.3.1.4 — 3.3.1.8](#), the capacity of the water-spray pumps shall be capable of simultaneous protection of the greater of the following:

**.1** any two complete athwartship tank groupings including any gas process units within these areas, where one group is defined as tanks located in transverse direction from ship side to ship side; where there is only one cargo tank occupying a hold space from ship side to ship side, it is considered as a "grouping"; the area of any two complete tank groupings shall be equal to the combined area of the two largest tank groupings including any gas process units within these areas;

**.2** for ships intended for operation as stipulated in 1.1.10 of the Code — of any added fire hazard and the adjacent athwartship tank grouping.

Alternatively, the main fire pumps may be used for this service, provided that their total capacity is increased by the amount needed for the water-spray system.

In either case, a connection, through a stop valve, shall be made between the fire main and water-spray system main supply line outside the cargo area.

**3.3.6** The boundaries of superstructures and deckhouses normally manned, and lifeboats, liferafts and muster areas facing the cargo area, shall also be capable of being served by one of the fire pumps specified in 3.2.1.1, Part VI "Fire Protection" of the Rules for the Classification and installed outside the spaces where spray pumps are located or emergency fire pump, in case fire in one compartment (meaning a compartment provided with A-class boundaries in which fire pump(s) is(are) located or the source of power of the fire pump(s), serving the water-spray system in accordance with [3.3.2](#)) could disable both fire pumps. Emergency fire pump capacity shall be capable of maintaining two jets of water in accordance with 3.2.4.7, Part VI "Fire Protection" of the Rules for the Classification and spray application rates stated in [3.3.2](#), but limiting coverage to boundaries of normally manned superstructures and deckhouses, survival crafts and their muster areas.

**3.3.7** Water pumps normally used for other services may be arranged to supply the water-spray system main supply line.

**3.3.8** All pipes, valves, nozzles and other fittings in the water-spray system shall be resistant to corrosion by seawater. Piping, fittings and related components within the cargo area (except gaskets) shall be designed to withstand 925 °C.

**3.3.9** The water-spray system shall be arranged with in-line filters to prevent blockage of pipes and nozzles. In addition, means shall be provided to back-flush the system with fresh water.

**3.3.10** Remote starting of pumps supplying the water-spray system and remote operation of any normally closed valves in the system shall be arranged in suitable locations outside the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the protected areas.

**3.3.11** After installation, the pipes, valves, fittings and assembled system shall be subject to a tightness and function test.



**3.3.12** For ships fitted with the regasification plant, the water spray system shall meet the additional requirements:

**.1** the fire water main shall be designed and equipped with isolation valves such that no single accidental event disrupt firewater supply to the spray water system;

**.2** a water-spray system with an application rate according to [3.3.2](#) shall be arranged to protect:

the regasification units;

metering station;

suction drum;

export manifold;

internal surfaces of the turret compartment;

storage tanks for any flammable fluids or gases, if fitted on the weather deck;

**.3** the arrangements and capacities of the water spray system shall be such that with one spray pump system out of operation the remaining pump system shall have capacity to supply the water spray system;

**.4** if the fire water pumps and spray pumps are combined, the capacity shall be sufficient to supply water spray to the largest fire section as well as two fire hoses;

**.5** release of the water spray systems shall be possible both locally and remotely at the control station where the operating status of the systems is monitored;

**.6** the regasification plants shall be covered by a dry chemical powder fire-extinguishing system complying with the requirements in [3.4](#).

**3.4 Dry chemical powder fire extinguishing system.**

**3.4.1** Ships in which the carriage of flammable products is intended shall be fitted with fixed dry chemical powder fire-extinguishing systems, approved by MSC.1/Circ.1315 "Guidelines for the approval of fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk" for the purpose of firefighting on the deck in the cargo area, including any cargo liquid and vapour discharge and loading connections on deck and bow or stern cargo handling areas.

**3.4.2** The system shall be capable of delivering powder from at least two hand hose lines, or a combination of monitor/hand hose lines, to any part of the exposed cargo liquid and vapour piping, load/ unload connection and exposed gas process units.

**3.4.3** The dry chemical powder fire-extinguishing system shall be designed with not less than two independent units. Any part required to be protected by [3.4.2](#) shall be capable of being reached from not less than two independent units with associated controls, pressurizing medium fixed piping, monitors or hand hose lines. For ships with a cargo capacity of less than 1000 m<sup>3</sup>, only one such unit need be fitted.

**3.4.4** A monitor shall be arranged to protect any load/unload connection area and be capable of actuation and discharge both locally and remotely. The monitor is not required to be remotely aimed, if it can deliver the necessary powder to all required areas of coverage from a single position.

**3.4.5** One hose line shall be provided at both port- and starboard side at the end of the cargo area facing the accommodation and readily available from the accommodation.

**3.4.6** The capacity of a monitor shall be not less than 10 kg/s.

Hand hose lines shall be non-kinkable and be fitted with a nozzle capable of on/off operation and discharge at a rate not less than 3,5 kg/s. The maximum discharge rate shall allow operation by one man. The length of a hand hose line shall not exceed 33 m.

Hand hose lines and nozzles shall be of weather-resistant construction or stored in weather resistant housing or covers and be readily accessible.

**3.4.7** Where fixed piping is provided between the powder container and a hand hose line or monitor, the length of piping shall not exceed that length which is capable of maintaining the powder in a fluidized state during sustained or intermittent use, and which can be purged of powder when the system is shut down.

**3.4.8** Hand hose lines shall be considered to have a maximum effective distance of coverage equal to the length of hose.

**3.4.9** Ships fitted with bow/stern load/unload connections shall be provided with independent dry powder unit protecting the cargo liquid and vapour piping, aft or forward of the cargo area, by hose lines and a monitor covering the bow/stern load/unload complying with the requirements of [3.4.1 — 3.4.8](#).

**3.4.10** The dry chemical powder fire-extinguishing system of ships intended for periodical operation at a fixed location in regasification and offloading mode or in the receiving, processing, liquefying and storage modes shall be designed in compliance with the requirements of 1.1.10 of the Code.

**3.4.11** After installation, the pipes, valves, fittings and assembled systems shall be subjected to a tightness test and functional testing of the remote and local release stations. The initial testing shall also include a discharge of sufficient amounts of dry chemical powder to verify that the system is in proper working order. Testing arrangements shall involve the discharge from all monitors and hand hose lines on board, but it is not required that there is a full discharge of the installed quantity of dry powder.

After the completion of this testing, the system, including all monitors and hand hose lines, shall be blown through with dry air for the purpose of the system subsequently being clear from any residues of dry chemical powder.

## 4 PERSONNEL PROTECTION

**4.1** Every ship carrying flammable products shall carry firefighter's outfits complying with the requirements of 5.1.15, Part VI "Fire Protection" of the Rules for the Classification in the numbers specified in [Table 4.1](#).

Table 4.1

| Total cargo capacity          | Number of outfits |
|-------------------------------|-------------------|
| 5000 m <sup>3</sup> and below | 4                 |
| Above 5000 m <sup>3</sup>     | 5                 |

**4.2** Any breathing apparatus required as part of a firefighter's outfit shall be a self-contained compressed air-operated breathing apparatus having a capacity of at least 1200 l of free air.

**4.3** Suitable protective equipment, including eye protection to a recognized national or international standard, shall be provided to protect crew members involved in normal loading and discharging operations, with due regard for the characteristics of the products being carried.

**4.4** The personal protective equipment shall be kept in clearly marked lockers located in readily accessible places.

**4.5** Sufficient, but not less than three complete sets of safety equipment in addition to the fireman's outfit required by [4.1](#) each permitting personnel to enter and work in gas-filled spaces, shall be provided.

**4.6** One complete set of safety equipment required by [4.5](#) shall consist of:

**.1** one self-contained positive pressure air-breathing apparatus incorporating full face mask, not using stored oxygen and having a capacity of at least 1,200 l of free air. Each set shall be compatible with that required by [4.1](#);

**.2** protective clothing, boots and gloves to a recognized standard;

**.3** steel-cored rescue line with belt; and

**.4** explosion-proof lamp.

**4.7** An adequate supply of compressed air for the air-breathing apparatus required in [4.2](#) and [4.6](#) shall be provided and shall consist of:

**.1** at least one fully charged spare air bottle for each breathing apparatus;

**.2** an air compressor of adequate capacity capable of continuous operation, suitable for the supply of high-pressure air of breathable quality; and

**.3** a charging manifold capable of dealing with sufficient spare breathing apparatus air bottles for the breathing apparatus.

**4.8** Safety equipment required in [4.5](#), [4.6](#) and [4.7](#) shall be kept in special clearly marked lockers located in readily accessible places.

**4.9** The protective clothing required in [4.6.2](#) shall be gastight.

**4.10 First-aid equipment.**

**4.10.1** A stretcher that is suitable for hoisting an injured person from spaces below deck shall be kept in a readily accessible location.

**4.10.2** The ship shall have onboard medical first-aid equipment, including oxygen resuscitation equipment, based on the requirements of the Medical First Aid Guide (MFAG) on rendering first-aid in accidents associated with dangerous cargoes as well as considering the characteristics of the cargoes being carried.

Russian Maritime Register of Shipping

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