RUSSIAN MARITIME REGISTER OF SHIPPING

Version: 01.07.2024

RULES

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

PART I

CLASSIFICATION

ND No. 2-020101-176-E

St. Petersburg

RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SHIPS CARRYING LIQUEFIED GASES IN BULK (PART I)

The present version of Part I "Classification" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk of Russian Maritime Register of Shipping (RS, the Register) has been approved in accordance with the established approval procedure and comes into force on 1 July 2024.

The present version is based on the version dated 1 January 2023 and Rule Change Notice No. 24-87473 taking into account the amendments and additions developed immediately before publication (refer to the Revision History).

.

REVISION HISTORY[1]

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

[1] With the exception of amendments and additions introduced by Rule Change Notices (RCN), as well as of misprints and omissions.

1 GENERAL

1.1 Application.

1.1.1 Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk[1] apply to specially built or converted ships, regardless of their gross tonnage and power plant output, intended for the carriage of liquefied gases in bulk having a vapour pressure exceeding 280 kPa absolute at a temperature of 37,8 °C, and other substances listed in the Table of Technical Requirements (refer to Annex 1).

Ships carrying liquefied gases in bulk[2] are in full measure covered by the requirements of the Rules for the Equipment of Sea-Going Ships, Rules for the Cargo Handling Gear of Sea-Going Ships, Load Line Rules for Sea-Going Ships, Rules for the Classification and Construction of Sea-Going Ships[3] apply to LG carriers to the extent stipulated in the text of the LG Rules.

1.2 Definitions and explanations.

1.2.1 The following definitions are used in the LG Rules.

Upper flammable limit means the concentration of a hydrocarbon gas in air above which there is insufficient air to support and propagate combustion.

Secondary barrier is the liquid-resisting outer element of a cargo containment system designed to afford temporary containment of any envisaged leakage of liquid cargo through the primary barrier and to prevent the lowering of the temperature of the ship's structure to an unsafe level.

Gas-safe space is a space other than a gas-dangerous space.

LG carrier is a ship designed for the carriage of liquefied gases and other products in bulk listed in the Table of Technical Requirements (refer to Annex 1).

LG-dangerous space (including hazardous space) is:

a space in the cargo area which is not arranged or equipped in an approved manner to ensure that its atmosphere is at all times maintained in a gas-safe condition;

an enclosed space outside the cargo area through which any piping containing liquid or gaseous product passes, or within which such piping terminates, unless approved arrangements are installed to prevent any escape of product vapour into the atmosphere of that space;

a cargo containment system and cargo piping;

a hold space where cargo is carried in a cargo containment system not requiring a secondary barrier;

a space separated from a hold space, in which a cargo containment system requiring a secondary barrier is arranged, by a single gastight steel boundary;

a cargo pump room and cargo compressor room;

a zone on the open deck, or semi-enclosed space on the open deck, within 3 m of any cargo tank outlet, gas or vapour outlet, cargo pipe flange or cargo valve or of entrances and ventilation openings to cargo pump rooms and cargo compressor rooms;

the open deck over the cargo area and 3 m forward and aft of the cargo area on the open deck up to a height of 2,4 m above the weather deck;

a zone within 2,4 m of the outer surface of a cargo containment system where such surface is exposed to the weather;

---

1 Hereinafter referred to as "the LG Rules".
2 Hereinafter referred to as "the LG carriers".
3 Hereinafter referred to as "the Rules for the Classification".

an enclosed or semi-enclosed space in which pipes containing products are located. (A space which contains gas detection equipment specified in 6.3, Part VIII "Instrumentation and Automation Systems" and a space utilizing boil-off gas as fuel and complying with the requirements of Part VI "Systems and Piping" are not considered as gas-dangerous spaces);

a compartment for cargo hoses;

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

Cargo tank is the liquid-tight shell designed to be the primary container of the cargo and includes all such containers whether or not associated with insulation or secondary barriers or both.

Cargo area is that part of the ship which contains the cargo containment system and cargo pump and compressor rooms and includes deck areas over the full length and breadth of the part of the ship over the above-mentioned spaces. Where fitted, the cofferdams, ballast or void spaces at the after end of the aftermost hold space or at the forward end of the forward most hold space are excluded from the cargo area.

Loading arm is an articulated transfer system used for loading and/or unloading liquefied gas to or from LG carrier and capable of withstanding various external aspects of cargo handling operations such as ship's motions, ship's freeboard, changes in water depth (tides).

Loading hose is a part of cargo system used for loading and/or unloading liquefied gas to or from LG carrier and composed of flexible pipes and relevant fitting.

Cargo machinery spaces are the spaces where cargo compressors or pumps, cargo processing units, are located, including those supplying gas fuel to the engine-room.

Cargo service spaces are spaces within the cargo area used for workshops, lockers and store-rooms of more that 2 m^2 in area.

Cargo containment system is the arrangement for containment of cargo including, where fitted, a primary and secondary barrier, associated insulation and any intervening spaces, and adjacent structure if necessary for the support of these elements.

Cargoes are products listed in the Table of Technical Requirements (Annex 1) and carried in bulk by ships, which meet the LG Rules requirements.

Vapour pressure is the equilibrium pressure of the saturated vapour above the liquid expressed in kilopascals absolute at a specified temperature.

Accommodation spaces — refer to 1.5.2 of Part VI "Fire Protection" of the Rules for the Classification.

Tank cover is the protective structure intended to protect the cargo containment system against damage where it protrudes through the weather deck or to ensure the continuity and integrity of the deck structure.

Closed loop sampling is a cargo sampling system that minimizes the escape of cargo vapour to the atmosphere by returning product to the cargo tank during sampling.

Insulation space is the space, which may or may not be an interbarrier space, occupied wholly or in part by insulation.

Separate systems are those cargo piping and vent systems that are not permanently connected to each other.

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

Tank dome is the upward extension of a portion of a cargo tank protruding through the weather deck or a tank cover.

MARVS is the maximum allowable relief valve setting of a cargo tank.

Interbarrier space is the space between a primary and a secondary barrier, whether or not completely or partially occupied by insulation or other material.

Thermal oxidation method is a system where the boil-off vapours are utilized as fuel for shipboard use or as a waste heat system subject to the provisions of Chapter 16 or a system not using the gas as fuel complying with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk[1].

Lower flammable limit means the concentration of a hydrocarbon gas in air below when it is impossible to support and propagate combustion.

Primary barrier is the inner element designed to contain cargo when the cargo containment system includes two boundaries.

Vapour density is the relative weight of vapour compared with the weight of an equivalent volume air at the same pressure and temperature.

Cargo control room is a space used in the control of cargo handling operations and complying with the requirements of Section 10 of Part VI "Systems and Piping".

Control stations — refer to 1.5.1 of Part VI "Fire Protection" of the Rules for the Classification.

Gas consumer is any unit within the ship using cargo vapour as a fuel.

Void space is an enclosed space in the cargo area external to a cargo containment system, other than a hold space, ballast space, fuel oil tank, cargo pump or compressor room, or any space in normal use by personnel.

Reliquefaction plant means equipment used for cooling of cargo and reliquefaction of cargo vapours, which includes refrigeration system, reliquefaction unit and associated piping.

Regasification plant means equipment used for regasification operation, which includes supply pump, suction drum, regasification unit, regasification system for heat transfer agent, collecting drum, export manifold and associated piping.

Regasification system for heat transfer agent means piping system for heat energy supply to obtain the set parameters of gas offloading.

Service space — refer to 1.5.3 of Part VI "Fire Protection" of the Rules for the Classification.

LNG is a liquefied natural gas primarily consisting of methane.

LPG is a liquefied petroleum gas, primarily consisting of hydrocarbons (mixtures of propane and butane in any combination), whose composition may include small amounts of other components like hydrogen sulphide or lead alkyls.

Boiling point is the temperature in Celsius degrees at which a product exhibits a vapour pressure equal to the atmospheric pressure.

Hold space is the space enclosed by the ship's structure in which a cargo containment system is situated. Where the secondary barrier is the part of the hull structure, it may be the boundary of the hold space.

Turret compartments are those spaces and trunks that contain equipment and machinery for retrieval and release of the disconnectable turret mooring system, high-pressure hydraulic operating systems, fire protection arrangements and cargo transfer valves.

Gas combustion unit (GCU) is a means of disposing excess cargo vapour by thermal oxidation.

Reliquefaction unit is a process unit of equipment consisting of a separator, a compressor, a heat exchanger, a condenser, piping, electrical and automation equipment serving them.

Regasification unit is a process unit of equipment consisting of a booster pump, a vaporizer, piping, electrical and automation equipment serving them.

---

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

2 CLASS NOTATION

2.1 Class notation of a ship.

2.1.1 The character of classification and additional distinguishing marks are assigned in accordance with the requirements of 2.2 of Part I "Classification" of the Rules for the Classification.

2.2 Descriptive notation in the class notation.

2.2.1 The ships meeting the requirements of the Rules for the Classification and the LG Rules are assigned the descriptive notation: **gas carrier** added to the character of classification (refer to Section 2 of Part I "Classification" of the Rules for the Classification).

2.2.2 The descriptive notation is supplemented with the words: **type 1G, type 2G, type 2PG and type 3G**, depending on the extent, to which a ship meets the requirements of Part III "Stability. Subdivision. Freeboard", as well as on the location of cargo tanks relative to the ship's shell plating and on the extent to which ship's survival capability is ensured taking into account the biological hazard of cargoes permitted for carriage.

2.2.3 If LG carrier is intended for the carriage of one specific cargo only, the name of cargo, its design temperature, in °C, and design density, in kg/m^3, may be additionally indicated in brackets after the descriptive notation **Gas carrier**, for example: **Gas carrier type 2G (ethylene, –104 °C, 560 kg/m^3)**. In this case, the requirements imposed on the ship shall consider the specific hazards associated with the carriage of that cargo.

For LG carrier intended for the carriage of liquefied natural gas (LNG), an entry **(methane)** shall be additionally added to the descriptive notation **Gas carrier**, for example: **Gas carrier type 2G (methane)**.

2.2.4 If a LG carrier is intended for the carriage of several specific cargoes, the requirements are specified proceeding from the combination of properties of the most dangerous cargoes carried.

2.2.5 When cargo tanks contain products, for which a **type 1G** ship is required, neither flammable liquids having a flashpoint of 60 °C or less, nor flammable products listed in Annex 1, shall be carried in tanks located within the protective zones described in 2.4.1 of Part II "Ship Arrangement".

2.2.6 When cargo tanks contain products, for which a **type 2G/2PG** ship is required, the flammable liquids as described in 2.2.5 of this Part, shall not be carried in tanks located within the protective zones described in 2.4.2 of Part II "Ship Arrangement".

2.2.7 In each case, for cargo tanks loaded with products, for which a **type 1G** or **2G/2PG** ship is required, the restriction applies to the protective zones within the longitudinal extent of the hold spaces for those tanks.

2.2.8 The flammable liquids and products described in 2.2.5 may be carried within these protective zones when the quantity of products retained in the cargo tanks, for which a **type 1G** or **2G/2PG** ship is required, is solely used for cooling, circulation or fuelling purposes.

2.2.9 Where a ship is fitted with a regasification unit for cargo export to shore and provided the requirements of 3.24 of Part VI "Systems and Piping" are met, the distinguishing mark **RGU (Regasification unit)** shall be added to the ship's class notation. In addition, the requirements of 2.2.5.5 of Part VII "Electrical Equipment" and Part V "Fire Protection" shall be met.

2.2.10 Where a ship is fitted with a reliquefaction unit for cargo vapours complying with 4.2 of Part VI "Systems and Piping", the distinguishing mark **RLU** (**Reliquefaction unit**) shall be added to the ship's class notation. The documentation specified in 4.5 of this Part shall be submitted to confirm the fulfillment of the requirements applying to ships with the distinguishing mark **RLU**.

2.2.11 Where a ship is fitted with a gas combustion unit complying with 4.3 of Part VI "Systems and Piping", the distinguishing mark **GCU (Gas combustion unit)** shall be added to the ship's class notation.

2.2.12 If membrane LNG cargo tanks of LG carrier are capable to withstand vapour pressure exceeding 25 kPa but not more than 70 kPa, the distinguishing mark **highPRESS(pressure)** shall be added to the ship's class notation where a maximum allowable vapour pressure in kPa is indicated in brackets, for example, **highPRESS(50)**. In order to assign **highPRESS(pressure)** mark to the ship, the documentation shall be submitted in accordance with 4.1 of this Part confirming fulfillment of the requirements specified in 24.1.4 and 24.4 of Part IV "Cargo Containment", 3.16.6 of Part VI "Systems and Piping" and 4.1 of Part VIII "Instrumentation and Automation Systems".

3 CLASSIFICATION SURVEYS

3.1 Initial and/or periodical surveys of gas carriers to assign and/or confirm the class are carried out in accordance with Section 8 of Part III "Additional Surveys of Ships Depending on their Purpose and Hull Material" of the Rules for Classification Surveys of Ships in Service.

3.2 The survey of a ship to issue the Certificate is carried out during the initial or periodical survey of the ship.

3.3 Ship's annual surveys are carried out within 3 months before or after every anniversary date since the day of issue of the Certificate, and are intended to ascertain that equipment, fittings, arrangements and materials of the ship meet the relevant requirements of the LG Rules.

An appropriate entry on the surveys carried out is made in the Certificate.

4 TECHNICAL DOCUMENTATION

4.1 GENERAL

4.1.1 In addition to the design documentation specified in Section 3 of Part I "Classification" of the Rules for the Classification, the following technical documentation confirming fulfillment of the LG Rules shall be submitted to the Register at least in the scope specified in tables of Chapter 4.2.

The requirements of 4.2 cover the scope of documentation submitted according to the options given in 3.1.2 of Part I "Classification" of the Rules for the Classification: in the set of the plan approval documentation (PAD) or in the set of the technical design documentation (TD) with further approval of detailed (design) documentation (DD).

4.1.2 At the early stages of design, on the customer's request, the Register may review the documentation as part of the service rendering:

Approval in Principle (AIP) of LNG containment systems;

General Approval for Ship Application (GASA) of LNG containment system with membrane tank.

The set of documentation submitted for AIP and GASA service rendering is subject to agreement between the customer and the Register in each particular case taking into account provisions of 4.3.

4.2 DESIGN DOCUMENTATION

Letter identification and abbreviations:
A — Approved;
AG — Agreed;
FI — For information;
TD — Technical design;
PAD — Plan approval documentation;
DD — Detailed (design) documentation.

4.2.1 Ship's general documentation.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	General arrangement plan, showing location of:	FI/A	●		●	Information given in 4.2.1.1 may be submitted on separate drawings. If all necessary information concerning escape routes is stated in the plan, the general arrangement plan shall be approved
.1.1	cargo tanks with their distances from side plating and the bottom specified, fuel oil tanks, ballast tanks and other tanks					
.1.2	tank domes and openings in tanks					
.1.3	void spaces					
.1.4	doors, hatches and any other openings into gas-dangerous spaces or zones (refer to 2.1 of Part VII "Electrical Equipment")					
.1.5	vent pipes and air inlet and outlet locations of a ventilation system					
.1.6	doors, scuttles, companions, ventilating duct outlets locations and other openings in spaces of the superstructure and spaces adjacent to the cargo area					
.1.7	hazardous areas					
.1.8	airlocks between hazardous and non-hazardous areas					
.2	List of cargoes to be carried onboard a ship specifying their basic chemical and physical properties, as well as hazards related to their carriage and storage	FI	●		●	
.3	Justification of fitness of insulating materials used in the cargo area	AG	●		●	

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.4	Cargo system operation manual in accordance with the requirements of Chapter 18 of the IGC Code (preliminary)	AG	●		●	
.5	Gas testing program (preliminary)	AG	●		●	
.6	Calculation of maximum filling limit of cargo tanks	AG	●		●	

4.2.2 Hull documentation.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Drawings of hull structures in way of cargo tanks, including supporting arrangements, anti-flotation arrangements, deck sealing arrangements, etc.	A	●		●	
.2	Hull structures plan according to distribution of steel grades based on the hull temperature calculation in accordance with 4.2.3.3	AG	●		●	

4.2.3 Documentation on cargo containment system.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Cargo containment system arrangement plans including a primary and, where fitted, a secondary barrier (with indication of material and scantlings of the system elements), thermal insulation	A	●		●	
.2	Strength calculation of cargo containment system elements including fatigue analysis and crack propagation analysis (if applicable for the tank type) as well as including calculation of dynamic loads due to ship motion	AG	●		●	
.3	Temperature calculation of hull structures adjacent to the cargo containment system made in accordance with 19.2.1 of Part IV "Cargo Containment" including description of applied calculation procedures	AG	●		●	
.4	Tank domes drawings (with indication of position and scantlings of supports and seals of hull structures)	A	●		●	
.5	Calculation of boil-off rate	AG	●		●	
.6	Drawings of ladders, fittings, pump towers and other elements of cargo containment and treatment system located inside tanks (with indication of material and scantlings of system elements)	A	●		●	
.7	Strength calculation of pump towers and other elements of cargo containment and treatment system located inside the tank	AG	●		●	
.8	Inspection/survey plan for the cargo containment system	A	●	●	●	
.9	Techniques for mechanical relief of stresses in independent cargo tanks	AG	●		●	

4.2.4 Documentation on fire protection.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Justification of fitness of fire extinguishing media, fire detection and extinction systems apparatus for cargoes carried	AG	●		●	
.2	Documents confirming the design time of fire extinction, application rate of fire extinguishing media and the amount of fire extinguishing media on board	AG	●		●	

4.2.5 Documentation on systems and piping.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Drawings and diagrams of systems and piping for cargo and cargo vapours specifying such assemblies as compensators, flange joints, stop and regulating valves and fittings	A	●	●	●	
.2	Drawings of quick-closing arrangements of the cargo containment system	A	●		●	
.3	Stress analysis in cargo and other piping containing cargo at a temperature – 110°C or lower	AG	●		●	
.4	Diagrams of cargo heating and refrigeration systems	A	●		●	
.5	Heat transfer calculation in cargo heating and refrigeration systems	AG	●		●	
.6	Drawings of relief valves and vacuum relief valves of cargo tanks	A	●		●	
.7	Diagrams of cargo pressure and temperature control systems	A	●		●	
.8	Diagrams of the vent system with indication of all relief valve settings and relevant alarm in case the tanks are equipped with the system with variable setting pressure	A	●		●	
.9	Calculations of the vent system	AG	●		●	
.10	Drawings and descriptions of the inert gas system	A	●		●	
.11	Diagrams of bilge and ballast systems in the cargo area, pump rooms, cofferdams, pipe tunnels, spaces for independent cargo tanks, etc.	A	●		●	
.12	Calculations of bilge and ballast systems in the cargo area, pump rooms, cofferdams, pipe tunnels, spaces for independent cargo tanks, etc.	AG	●		●	
.13	Diagrams of the ventilation system of spaces in the cargo area and of other spaces to be accessible for cargo operations performance	A	●		●	The diagrams shall contain data on fitness of materials used for manufacture of fan impellers and air ducts
.14	Calculations of the ventilation system of spaces in the cargo area and of other spaces to be accessible for cargo operations performance	AG	●		●	
.15	Diagrams of piping relating to the use of cargo as fuel with indication of separate pipe joints assemblies, and of valves location and design	A	●		●	
.16	Diagrams of heating systems for hull structures (if applicable)	A	●		●	
.17	Drawings of process pressure vessels	A	●		●	
.18	Drawings of cargo pumps and compressors	A	●		●	

4.2.6 Documentation on electrical equipment, instrumentation and automation systems.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Failure mode and effects analysis (FMEA) for electrical generation and distribution systems, and associated control systems	AG	●		●	Refer to 2.1.4 of Part VII "Electrical Equipment"
.2	Drawings of cable laying in dangerous spaces	A	●	●	●	
.3	Drawings of earthing for electrical equipment, cables, piping located in gas-dangerous spaces	A	●	●	●	
.4	Block diagram for all intrinsically safe circuits, including data for verification of the compatibility between the barrier and the field components	A	●		●	
.5	Diagrams of electric drives for a reliquefaction unit for cargo vapours, liquefied gas refrigeration units, cargo pumps and compressors, an inert gas generation plant, fans of dangerous spaces and air locks	A	●		●	
.6	Functional diagrams of control systems for units specified in 4.2.6.5	A	●		●	
.7	Functional diagrams of electric measurement and alarm systems including cargo temperature control system	A	●		●	
.8	Functional diagrams of automatic and remote shutdown systems for electrical equipment, remote control systems of hull structure heater valves	A	●		●	
.9	Drawings and descriptions of all systems and devices for measurement of cargo amount and characteristics, and for gas detection	A	●		●	
.10	Calculation of maximum filling level of cargo tanks considering all values of relief valve setting if cargo tanks are equipped with the system with variable setting pressure	AG	●		●	

4.2.7 Documentation on loading arms.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Arrangement plan of loading arms including their operating envelope scheme	A	●		●	
.2	Structural drawings including platforms, foundations and reinforcements	A	●	●	●	
.3	Drawing and diagram of piping with fittings including the drawing of cargo swivel	A	●		●	
.4	Drawing of quick connect/disconnect coupler (QCDC)	A	●		●	
.5	Drawing of emergency release coupling (ERC)	A	●		●	
.6	Drawings of swivel joints, ropes, blocks and counterweights	A	●		●	
.7	Diagram of purge and drain system	A	●		●	
.8	Plan of arrangement and connection diagrams of electrical equipment (components of arm constant position monitoring system, components of automation, alarm and protection systems including local control panels, earthing, etc.)	A	●		●	
.9	Pattern of insulating coating application	A	●		●	
.10	Justification of material selection for structures and piping with loading arm fitting	AG	●		●	
.11	Strength calculation for structures and piping with loading arm fitting	AG	●		●	
.12	Bollard pull calculation when choosing the rope	AG	●		●	

4.2.8 Documentation on reliquefaction unit for cargo vapours.

No.	Description of documentation	Stamp	TD	DD	PAD	Remarks
.1	Technical specification of reliquefaction unit for cargo vapours	AG	●		●	
.2	Calculation of required capacity for reliquefaction unit for cargo vapours taking into account thermal flows for each cargo tank	AG	●		●	
.3	Arrangement plans of reliquefaction unit for cargo vapours and associated equipment (compressors, heat exchangers, pumps, pressure vessels, separators) on board with indication of escape routes from the compartment, where the unit is installed, and arrangement of fixed gas detection system	A	●		●	
.4	Arrangement plans for refrigerant, cooling medium and cooling water pipelines with indication of sections passing through the bulkheads, decks and platforms	A	●	●	●	
.5	Arrangement plans for electrical and automation equipment of reliquefaction unit for cargo vapours	A	●		●	
.6	Circuit diagrams of ventilation systems for spaces, where the equipment for reliquefaction unit for cargo vapours is fitted, with indication of watertight, gastight and fire-fighting bulkheads, as well as the rate of air changes	A	●		●	
.7	Circuit diagrams of refrigerant, cooling medium and cooling water systems with indication of heat-transfer properties	A	●		●	
.8	Functional diagram and description of emergency shutdown system for reliquefaction unit for cargo vapours and its interaction with the emergency shutdown system for ship's cargo system	A	●		●	
.9	List of mechanisms and equipment for reliquefaction unit for cargo vapours with indication of their technical characteristics	AG	●		●	
.10	List of electrical and automation equipment for reliquefaction unit for cargo vapours with indication of type of explosion protection and equipment specification summary	AG	●		●	
.11	Failure mode and effects analysis (FMEA) for reliquefaction unit for cargo vapours (in accordance with IEC 60812 standard) performed against the level confirming intended operation of the unit after a single failure	AG	●		●	
.12	Test program of reliquefaction unit for cargo vapours	A	●		●	

4.3 APPROVAL IN PRINCIPLE (AIP) AND GENERAL APPROVAL FOR SHIP APPLICATION (GASA)

4.3.1 "Approval in Principle" of LNG containment system.

4.3.1.1 The service "Approval in Principle" of LNG containment system (hereinafter referred to as "the containment system") is rendered in accordance with 3.6 of Part II "Technical Documentation" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

4.3.1.2 For AIP service to be rendered, the following information shall be submitted to the Register for review:

.1 information on tank type in accordance with the types specified in Part IV "Cargo Containment" with indication of design temperature of cargo and design pressure of cargo vapours;

.2 general arrangement plans of containment system elements specifying location and extension of barriers and thermal insulation, location of containment system elements in relation to cargo hold with indication of access areas into the tank for survey and testing;

.3 drawings specifying the methods and fastening/mating devices of containment system elements between each other and with adjacent hull structures;

.4 drawings specifying quantity and location of cargo temperature indicating devices;

.5 information confirming the possibility of inert gas system functioning, i.e. possibility of inerting interbarrier spaces and hold spaces of a ship depending on the type of containment system;

.6 information on materials used for manufacture of elements of containment systems confirming fitness of applied materials with regard to their insulating, physical and mechanical properties as well as description of technology for material manufacture;

.7 information on the process of manufacture and installation of containment system elements confirming principal possibility to manufacture elements and install tank elements on board;

.8 general information on restrictions that may be imposed to the ship and/or special requirements for ship's design for which the containment system has been developed, if any.

4.3.2 General approval for ship application of LNG containment system with membrane tank.

4.3.2.1 For GASA service to be rendered, the following technical documentation shall be submitted to the Register for review:

.1 general information on ship in the scope necessary to evaluate compliance of LNG containment system with membrane tank (hereinafter referred to as "the system") with applicable requirements;

.2 general information on system elements geometrical dimensions and location in the ship's hull;

.3 drawings of system structures in way of flat and corner regions, in way of attachments of system elements to adjacent hull structures and in way of cargo tank dome;

.4 drawings of pump tower including relevant equipment (pumps, pipelines, ladders, etc.) as well as its connection to ship's hull;

.5 drawings of pump tower base support;

.6 description of joining processes to connect system elements to each other as well as connections with adjacent hull structures;

.7 list of materials and components used in system structures and their test results;

.8 temperature calculations of system elements and adjacent hull structures including description of applied calculation procedures;

.9 strength calculations of system elements including description of applied calculation procedures;

.10 calculation of ship's rolling and loads on the system elements with description of applied calculation procedures and results of laboratory tests;

.11 information on previously rendered AIP service by the Register, if any.

4.3.2.2 The Register may require additional information necessary to render GASA service.

4.3.2.3 The results of rendered GASA service are finalized by drawing up a conclusion letter (expert opinion) according to 8.5 of Part II "Technical Documentation" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

Russian Maritime Register of Shipping

Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk
Part I
Classification

FAI "Russian Maritime Register of Shipping"
8, Dvortsovaya Naberezhnaya,
191181, St. Petersburg,
Russian Federation
www.rs-class.org/en/