



RUSSIAN MARITIME REGISTER OF SHIPPING

CIRCULAR LETTER

No. 315-23-1597c

dated 06.07.2021

Re:

amendments in the Rules for the Classification and Construction of Sea-Going Ships, 2021, ND No. 2-020101-138-E

Item(s) of supervision:

static sources of electrical power

Entry-into-force date:

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Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to part XI "Electrical Equipment"

Acting Director General

Sergey A. Kulikov

Text of CL:

We hereby inform that the Rules for the Classification and Construction of Sea-Going Ships shall be amended as specified in the Appendices to the Circular Letter.

It is necessary to do the following:

1. Bring the content of the Circular Letter to the notice of the RS surveyors, interested organizations and persons in the area of the RS Branch Offices' activity.
 2. Apply the provisions of the Circular Letter during review of technical documentation on ships contracted for construction or conversion on or after 01.08.2021, in the absence of a contract, on ships the keel of which is laid or which are at a similar stage of construction on or after 01.08.2021, as well as during review and approval of technical documentation on ships, the delivery of which is date on or after 01.08.2021, as well as during review and approval of the technical documentation for products requested for review on or after 01.08.2021, as well as when performing technical supervision during manufacture of products.
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List of amended and/or added paras/chapters/sections:

Part XI: Section 25

Person in charge:

Mikhail A. Iukhnev

315

+7 (812) 605-05-17

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**Information on amendments introduced by the Circular Letter
(for inclusion in the Revision History to the RS Publication)**

No.	Amended paras/chapters/sections	Information on amendments	No. and date of the Circular Letter introducing the amendments	Entry-into-force date
1	Section 25	A new Section with special requirements for static sources of electrical power has been introduced	315-23-1597c of 06.07.2021	01.08.2021

**RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS, 2021,
ND No. 2-020101-138-E**

PART XI. ELECTRICAL EQUIPMENT

New Section 25 is introduced reading as follows:

"25 SPECIAL REQUIREMENTS FOR STATIC SOURCES OF ELECTRICAL POWER

25.1 DEFINITIONS, ABBREVIATIONS AND EXPLANATIONS

25.1.1 For the purpose of this section the following definitions, abbreviations and explanations have been adopted.

Auxiliary source of electrical power is a source of electrical power intended for provision of output reserve of shipboard electrical power system.

Static source of electrical power (SPS) is a source of electrical power with no moving parts intended for production and storage of electrical power being a part of ship power system and used as main, emergency, emergency transient or auxiliary power source.

Valve-type static source of electrical power is a static source of electrical power consisting of a semiconductor converter for implementation of its functions and regulation (maintenance) of output power parameters.

Lithium-ion battery (LIB) is a static source of electrical power consisting of one or more lithium-ion batteries connected with each other and used as a power source.

Lithium-ion battery system (LIBS) is a static source of electrical power consisting of one or more lithium-ion batteries with charging-discharging units, control, management, protection and alarm system connected with each other and used as a power source.

Supercapacitor (SC) is a static source of electrical power that is charged and stores energy by forming of electrical field in the double electrical layer at the interface between n-type conductor and ionic conductivity conductor (electrolyte).

Supercapacitor system (SCS) is a static source of electrical power consisting of two or more supercapacitors, with charging-discharging units, control, management, protection and alarm system connected with each other and used as a power source.

Fuel cell (FC) is a static source of electrical power that is an electrochemical device in which the chemical energy of a fuel and oxidizing agent is converted into electrical (direct current) energy, thermal energy and other chemical reaction products.

Solar-cell (photovoltaic) array (SA) is a static source of electrical power that is a device, comprised of electrically connected photovoltaic modules, circuits or groups, generating flow of direct current initiated from electromagnetic radiation and comprising all components enabling electrical and mechanical connections both in the battery and with external devices and structures.

25.2 GENERAL

25.2.1 The requirements of this Section apply to static sources of electrical power (SPS) and their components:

- Li-Ion battery systems (LIBS);
- supercapacitor systems (SCS);
- fuel cells (FC);
- solar arrays (SA).

25.2.2 In respect of all the parameters not specified in this Section, SPS shall meet the requirements of this Part and Part XV "Automation".

25.3 MODES OF OPERATION

25.3.1 In accordance with 3.1.1, Li-Ion battery systems (LIBS) may be used as main power source on board the ships. LIBS may be used as an emergency and emergency transient power source. LIBS, SCS, FC and SA may be used as an auxiliary power source.

25.3.2 Where LIBS is a main power source, at least two LIBS shall be provided that shall be arranged in separate spaces and shall meet the requirements of 3.1.6.

25.4 CHARGING AND DISCHARGING MODES

25.4.1 Static source of electrical power (SPS) shall be so designed that the temperature build-up shall not exceed the specified maximum value. SPS shall be operated within the limits of voltage, current and temperature rated by the manufacturer. Technical documentation containing the requirements to charging modes shall be provided for SPS; the appropriate charging units shall be designed to maintain the charging mode within the specified limits of voltage, current and temperature.

25.4.2 Charging-discharging units shall be so designed that voltage, current rate and temperature during charging and discharging shall be maintained within the limits specified by the manufacturer.

25.4.3 Charging-discharging units shall be controlled by a local control, management, protection and alarm system.

25.5 PROTECTION, CONTROL AND ALARM ARRANGEMENTS

25.5.1 LIBS shall be fitted with a local control, management, protection and alarm system (LCS).

The following protection functions shall be provided by the system:
charging and discharging current limitation;
overcurrent protection;
overvoltage and under-voltage protection;
overheating protection.

The following parameters shall be measured:
cell voltage;
cell or module voltage;
output current.

The following parameters shall be displayed at local control stations:
output voltage;
maximum, minimum and average cell voltage;
maximum, minimum and average temperature of cells or modules;
output current.

The following signals shall be given to the ship alarm system:
high temperature of a cell or module;
overvoltage or undervoltage;
battery disconnection;
circuit breaker activation;
data transmission failure;
coolant leakage.

LCS shall be permanently in operation. In case of LCS power interruption, alarm signal shall be activated.

25.5.2 Supercapacitor systems shall be fitted with LCS.

The following parameters shall be measured:
cell voltage;
cell temperature;

module current;
module voltage.

LCS shall be permanently in operation. In case of power interruption, alarm signal shall be activated.

The following parameters shall be displayed at local control stations:

cell overvoltage;
cell overheating;
charging current of reverse polarity;

The following signals shall be given to the ship alarm system:

cell overvoltage;
high ambient temperature;
voltage unbalance of components;
cell overheating;
short circuit to earth;
data transmission failure;
SCS failure or failure of a particular module;
charging current of reverse polarity;
state of charge below the prescribed limit;
coolant temperature above the prescribed upper limit;
cooling system failure;
internal short-circuit of supercapacitor.

25.5.3 Fuel cells (FS) shall be fitted with LCS. The appropriate instrumentation shall apply for measuring the critical parameters enabling safe control of fuel and gas system including bunkering.

The following parameters shall be displayed at local control stations:

cell voltage;
deviations of cell voltage;
exhaust gas temperature;
fuel oil temperature;
current rate.

The following signals shall be given to the ship alarm system:

fuel oil tank level;
overflow;
bunkering;
fuel pump operation;
operation parameters of fuel cells (cell voltage, deviation of cell voltage, exhaust gas temperature, fuel oil temperature and current rate);
ventilation system functioning;
availability of hazardous gases;
availability of vapors;
availability of fluid leakages;
emergency shutdowns;
fire outbreak.

25.5.4 Solar arrays (SA) shall be fitted with LCS.

The following parameters shall be measured:

voltage;
current;
temperature.

25.6 SAFETY

25.6.1 Li-Ion battery system (LIBS) room shall be considered as a machinery space differ from category A, as specified in Part VII "Machinery Installations". LIBS room shall be equipped with the appropriate fixed fire-extinguishing system recommended by the battery manufacturer.

25.6.2 Supercapacitor system (SCS) room shall be considered as a machinery space other than category A, as specified in Part VII "Machinery Installations". SCS room shall be equipped with the appropriate fixed fire-extinguishing system recommended by the

supercapacitor manufacturer and complying with the chemical composition of supercapacitor cell electrolyte.

25.6.3 Fuel cells (FC) room shall be equipped with a fixed fire-extinguishing system. Fire-extinguishing system shall comply with the proposed particular FC technology. For minimizing gas explosion probability in FC room, it shall be so designed that to minimize the danger under any operational conditions. Due to the risk of explosive gas leakage, FC room shall be classified as hazardous location referred to zone 1. Thus, equipment and components located in this room shall be of safe type.

25.6.4 During SA choice and installation, the safety of technical maintenance shall be provided taking into account the availability of direct current voltage on SA even in case of deenergizing at a.c. side.

25.7 DESIGN

25.7.1 Mechanical protection of batteries, their connections and control circuits inside the battery shall be provided to avoid damage. Mechanical protection may be provided by a battery case or housing of equipment for batteries intended for installation in the final housing of equipment.

LIB case shall be so designed as to allow changing of battery dimensions during charging and discharging, as recommended by the battery manufacturer.

25.8 SERVICEABILITY

25.8.1 Static source of electrical power (SPS) shall be so designed that to provide easy access to replaceable components and units for repair and technical maintenance.

During repair, ship transport and hoisting equipment and machinery may be used where necessary. SPS shall be arranged taking into consideration the service zones as specified in technical documentation.

25.9 SHIPBOARD OPERATIONAL CONDITIONS

25.9.1 SPS shall be resistant to operational conditions onboard the ships specified in 2.1.

25.10 ARRANGEMENT ONBOARD

25.10.1 No heat sources or flammable materials shall be available in LIBS room.

To avoid loss of way or steering in case of possible SPS failure, no essential devices shall be located in LIBS room, including piping and cables servicing such devices.

Ventilation system shall be provided in LIBS room. LIBS ventilation system, as well as the capacity thereof, shall meet the requirements of 12.10, Part VIII "Systems and Piping".

Ventilation duct walls shall be tight and withstand the temperature of discharged gas.

The following parameters shall be displayed at the local and remote control stations of the ventilation system:

- ambient temperature in the room;
- alarm signal of ventilation system operation.

Ventilation system shall be supplied by two separate feeders from the main switchboard in accordance with 4.3.1.16.

Where the room temperature exceeds the maximum permissible value, at the failure of ventilation system or fan power interruption, the alarm shall be activated.

In case of failure of ventilation system remote control, there shall be a possibility of control from local station located immediately at the entrance to LIBS room. Failures or faults of ventilation system shall not result in LIBS failures or faults.

LIBS room shall be provided with gas detection system that shall activate the alarm signal upon detection of gas concentrations above the alarm setpoint.

Gas detectors shall be so located that to be capable of gas emission detection as early as possible. Taking into consideration that the evolved gases may be lighter or heavier than air, at least two detectors shall be provided in each room, one detector shall be located in the upper part of LIBS room, and the other one in its lower part. Where LIBS is the main power source, duplication of detectors shall be provided both in the upper and lower parts of the room.

The setpoint of gas detection system activation shall not exceed 30 % LEL, where LEL is the lower explosive limit of gas. With the setpoint exceeded, the following shall be performed automatically:

LIBS shall be disconnected (where LIBS is the main power source, it shall be disconnected only in case of activation of both detectors duplicating each other);

alarm signal shall be given at the navigation bridge;

ventilation in LIBS room shall start to operate;

The following parameters shall be displayed on alarm control panels located in accordance with 7.11.3:

current gas concentration in LIBS room;

setpoint of gas detection system activation;

alarm signal of gas detection system operation.

Gas detection systems shall be supplied by two separate feeders (from the main switchboard and from emergency switchboard).

Failures or faults of gas detection system shall not result in LIBS failures or faults.

25.10.2 No heat sources or flammable materials shall be available in SCS room.

To avoid loss of way or steering in case of possible SCS failure, no equipment of other systems intended for safe navigation, including piping and cables servicing such systems shall be located in SCS rooms.

SCS room shall fitted with the appropriate ventilation system.

The requirements to ventilation systems of SCS rooms are similar to those of LIBS rooms.

SCS room shall be fitted with gas detection system that shall activate alarm signal on the gas detection alarm control panels located in accordance with 7.11.3, upon detection of gas concentrations above the alarm setpoint. The requirements to gas detection systems of SCS rooms are similar to those of LIBS rooms.

25.10.3 FC room shall be considered as a machinery space of category A, in accordance with the provisions of Part VII "Machinery Installations". In addition, it shall be separated by class A-60 structures around the perimeter from all sides adjacent to control stations, escape routes, accommodations, stairs, corridors and other machinery spaces.

FC room shall be fitted with gas detection system that shall activate alarm signal on the gas detection alarm control panels located in accordance with 7.11.3 upon detection of gas concentrations above the alarm setpoint.

25.10.4 In compliance with the recommendations of manufacturer, solar array (SA) installation shall allow for the maximum expansion/contraction of photovoltaic modules within the expected working temperature.

All SA structures shall be made of corrosion-resistant materials.

When calculating SA supporting structures, wind loads and snow loads shall be considered.

25.11 STORAGE

25.11.1 During the storage of SPS spare parts in shipboard condition the requirements specified in the appropriate technical documentation of the manufacturers shall be complied with.

25.12 DISPOSAL

25.12.1 Instructions for disposal shall be marked on SPS or indicated in the operational documentation.

25.13 ACCIDENT CONTAINMENT ONBOARD THE SHIP

25.13.1 A list of organizational and technical measures for SPS accident containment onboard the ship shall be developed by the ship's designer taking into account their structure, characteristics of physical processes, arrangement and other factors."