



# RUSSIAN MARITIME REGISTER OF SHIPPING

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**CIRCULAR LETTER**

**No. 311-05-1966c**

dated 08.08.2023

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Re:

amendments to the Rules for the Classification and Construction of Sea-Going Ships, 2023, ND No. 2-020101-174-E

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Item(s) of supervision:

ships under construction and in service, technical documentation

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Entry-into-force date:

**01.09.2023**

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~~Cancels / amends / adds Circular Letter No.~~

~~dated~~

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Number of pages:

1 + 12

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Appendices:

Appendix 1: information on amendments introduced by the Circular Letter

Appendix 2: text of amendments to Parts I "Classification" and XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships"

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Director General

Sergey A. Kulikov

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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.

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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 and approval of the technical documentation on ships (or equipment installed on board the ships, or products/machinery installed on board the ships) contracted for construction or conversion on or after 01.09.2023, in the absence of a contract, during review and approval of the technical documentation on ships requested for review on or after 01.09.2023.
  3. Apply the provisions of the Circular Letter during review of the technical documentation on ships under construction and in service by request of the interested parties.
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List of the amended and/or introduced paras/chapters/sections:

Part I: para 2.2.59 and Table 2.5

Part XVII: Section 32

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

Nos.	Amended paras/chapters/ sections	Information on amendments	Number and date of the Circular Letter	Entry-into-force date
1	Part I, para 2.2.59	New para has been introduced containing description and conditions for assignment of distinguishing marks <b>WSV1</b> and <b>WSV2</b>	311-05-1966c of 08.08.2023	01.09.2023
2	Part I, Table 2.5	New item 2.35 has been introduced containing description and conditions for assignment of distinguishing marks <b>WSV1</b> and <b>WSV2</b>	311-05-1966c of 08.08.2023	01.09.2023
3	Part XVII, Section 32	New Section has been introduced containing requirements for offshore support vessels with special equipment for well stimulation in oil and gas fields installed on board or specially prepared for installation of such equipment	311-05-1966c of 08.08.2023	01.09.2023

## RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF SEA-GOING SHIPS, 2023,

ND No. 2-020101-174-E

### PART I. CLASSIFICATION

#### 2 CLASS OF A SHIP

1 **New para 2.2.59** is introduced reading as follows:

**"2.2.59 Distinguishing marks WSV1 and WSV2 for offshore support vessels with special equipment for well stimulation in oil and gas fields installed on board or specially prepared for installation of such equipment.**

The distinguishing mark **WSV1** (well stimulation vessel type 1) may be added to the character of classification of the offshore support vessels fitted with well stimulation equipment and complying with the requirements of Section 32 of Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships"; the distinguishing mark **WSV2** (well stimulation vessel type 2) may be added to the character of classification of the offshore support vessels that are prepared for installation of well stimulation equipment, but the equipment itself is not installed or dismantled.

The offshore support vessels carry and use the following substances for well stimulation:  
acids;  
liquid nitrogen;  
additives;  
gel fluids;  
proppants, etc."

2 **Table 2.5. New item 2.35** is introduced reading as follows:

**"2.35 WSV1 and WSV2 — distinguishing marks for offshore support vessels with special equipment for well stimulation in oil and gas fields installed on board or specially prepared for installation of such equipment**

Distinguishing mark	Brief description	Reference to additional RS requirements for the distinguishing mark
<b>WSV1</b> (well stimulation vessel type 1) <b>WSV2</b> (well stimulation vessel type 2)	The mark is assigned to offshore support vessels with special equipment for well stimulation in oil and gas fields installed on board or specially prepared for installation of such equipment	<b>Rules for the Classification and Construction of Sea-Going Ships</b> Part I "Classification", 2.2.59 Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships", Section 32

## PART XVII. DISTINGUISHING MARKS AND DESCRIPTIVE NOTATIONS IN THE CLASS NOTATION SPECIFYING STRUCTURAL AND OPERATIONAL PARTICULARS OF SHIPS

3      **New Section 32** is introduced reading as follows:

### **"32 REQUIREMENTS FOR OFFSHORE SUPPORT VESSELS WITH SPECIAL EQUIPMENT FOR WELL STIMULATION IN OIL AND GAS FIELDS INSTALLED ON BOARD OR SPECIALLY PREPARED FOR INSTALLATION OF SUCH EQUIPMENT**

#### **32.1 GENERAL**

##### **32.1.1 Application.**

**32.1.1.1** The requirements of this Section apply to the design, construction and operation of offshore supply vessels with permanently installed special equipment for stimulation of wells in oil and gas fields in order to improve their productivity or prepared for installation of such equipment.

**32.1.1.2** This Section is applicable to offshore support vessels to perform well stimulation operations including transporting well stimulation substances and well fluids between onshore and offshore facilities. The requirements of this Section are not applicable to well stimulation processing equipment.

**32.1.1.3** Processing equipment (pumps, blenders, pressure vessels, hydraulic stations, coiled tubing unit, fracturing equipment, special purpose hoisting equipment, etc.) shall comply with the requirements of national supervisory bodies in the oil and gas industry and may be voluntarily taken under the technical supervision of the Register in accordance with the requirements of the Rules for the Oil-and-Gas Equipment of Floating Offshore Oil-and-Gas Product Units, Mobile Offshore Drilling Units and Fixed Offshore Platforms.

**32.1.1.4** The offshore support vessels carry and use the following substances for well stimulation:

- acids;
- liquid nitrogen;
- additives;
- gel fluids;
- proppants, etc.

**32.1.1.5** The distinguishing mark **WSV1** (well stimulation vessel type 1) may be added to the character of classification of the ships fitted with well stimulation equipment and complying with the requirements of this Section; the distinguishing mark **WSV2** (well stimulation vessel type 2) may be added to the character of classification of the ships that are prepared for installation of well stimulation equipment, but the equipment itself is not installed or dismantled.

##### **32.1.2 Definitions.**

Well stimulation is a type of well intervention performed on an oil or gas well to increase production by improving the flow of hydrocarbons from the drainage area into the wellbore.

Well stimulation systems are the facilities intended for operating stimulation substances, i.e. well stimulation installations, equipment and operation system. Well stimulation systems may include acidizing equipment, fracturing blenders, pumping units, hydration and chemical additive systems, supporting equipment, lifting appliances, well control equipment, pressure vessels, piping and electrical components, control systems, etc.

Well stimulation vessels are the offshore support vessels designed for carrying and/or operating well stimulation substances. Well stimulation vessels may operate stimulation substance systems installed on board or operate stimulation substances carried by other vessels as to inject the substances into wells.

Proppants are propping agents; a proppant is a solid material, typically sand, treated sand or man-made ceramic materials, designed to keep an induced hydraulic fracture open, during or following a fracturing treatment. It is added to a fracking fluid which may vary in composition depending on the type of fracturing used.

Blending additives are small amounts of liquid substances used during blending of products or production processes of cargoes for use in the search for and exploitation of seabed mineral resources used to facilitate such operations.

Dangerous chemicals are any liquid chemicals designated as presenting a safety hazard and assigned to chapter 17 of the IBC Code<sup>1</sup>.

Semi-enclosed spaces are those spaces that either:  
are open at two ends; or

have an opening at one end and are provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side walls or from above, the openings having a total area of at least 10 % of the total area of the space sides.

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<sup>1</sup> International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk adopted by IMO resolution MEPC.119(52).

### 32.2 TECHNICAL DOCUMENTATION

For the project of a well stimulation vessel with the distinguishing mark **WSV1** or **WSV2** in the class notation, in addition to those specified in Section 3 of Part I "Classification", the documentation below shall be submitted.

The letter identification (A — approved, AG — agreed, FI — for information) denotes the results of documentation review documented by stamping in accordance with 8.2 of Part II "Technical Documentation" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

No.	Description of documentation	Stamp	TD <sup>1</sup>	DD <sup>2</sup>	PAD <sup>3</sup>	Remarks
1.	General arrangement of the vessel	FI	•	•	•	
2.	General arrangement plan of well stimulation equipment including hazardous area/zone classification and chemical storage area definition, as well as decontamination and eye-washing facilities, and personnel protective equipment location	A	•	•	•	
3.	Structural fire protection	A	•	•	•	
4.	Tank Plan or Capacity plan, or table with centers of gravity and tank free surface corrections	AG	•	•	•	
5.	Body Lines plan or Offset Table	AG	•	•	•	
6.	Hydrostatic curves or table	AG	•	•	•	
7.	Cross curves of stability	AG	•	•	•	
8.	Arrangement of all integral and independent tanks, including support and stays of independent tanks	A	•	•	•	
9.	Structural drawings of acid tanks including vent arrangements, information on non-destructive testing of welds, strength and tightness testing, and specification of protective linings	A	•	•	•	
10.	Documentation for liquid nitrogen tanks	A	•	•	•	
11.	Pumping arrangement including diagrams of piping for acid, nitrogen and liquid additives, details of flange connections and pipe clamping/securing as well as specification and data on high pressure flexible hoses with end connections	A	•	•	•	
12.	Arrangement of mechanical ventilation of closed and semi-closed spaces containing acid tanks, pipes, pumps, mixers and blenders	A	•	•	•	
13.	Drawings showing location of all electrical equipment in areas containing installations for uninhibited acid	A	•	•	•	
14.	Electrical diagrams of well stimulation systems including single line diagram for intrinsically safe circuits, control and monitoring systems for cargo tank level gauging, overflow protection and emergency shutdown, as well as indication equipment for hydrogen, hydrogen chloride and oxygen	A	•	•	•	
15.	List of explosion protected equipment together with certificates and references to specific diagrams and/or plans	AG	•	•	•	

No.	Description of documentation	Stamp	TD <sup>1</sup>	DD <sup>2</sup>	PAD <sup>3</sup>	Remarks
16.	Calculations demonstrating the adequacy of the vessel's stability	AG	•	•	•	
17.	Calculations demonstrating adequacy of propulsion power required for the vessel to maintain station during well stimulation operations	AG	•	•	•	
18.	Stress analysis of supporting structure in way of flexible hose storage reel(s)	AG	•	•	•	
19.	Stress analysis of liquid nitrogen piping and heat exchangers	AG	•	•	•	
20.	Personnel protective equipment scope and types	AG	•	•	•	
<sup>1</sup> TD — Technical design. <sup>2</sup> DD — Detailed (design) documentation. <sup>3</sup> PAD — Plan approval documentation.						

## 32.3 TECHNICAL REQUIREMENTS

### 32.3.1 Hull.

**32.3.1.1** The structure and strength of the hull of well stimulation vessels shall comply with the requirements under 3.8 of Part II "Hull".

### 32.3.2 Positioning arrangements.

**32.3.2.1** Well stimulation vessels shall keep their position during well stimulation operations.

Position mooring or dynamic positioning systems may be a means of maintaining position.

**32.3.2.2** Position-keeping systems and components thereof shall comply with the requirements in Section 4 of Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Mobile Offshore Drilling Units.

Characteristics of environmental conditions shall be assumed in compliance with the Reference Data on Wind and Wave Regime of the Barents Sea, the Sea of Okhotsk and the Caspian Sea; the Baltic, North, Black, Azov and Mediterranean Seas; the Sea of Japan and the Kara Sea; the Bering and White Seas; the Barents and Kara Sea Shelf for recurrence period of once in 10 years with averaging interval of 10 min, depending on the area of the ship's operation.

**32.3.2.3** Electric and electronic equipment of the dynamic positioning systems, automated control systems for thruster units as well as ship systems affecting dynamic positioning system operation shall comply with the requirements in Section 8 of Part XV "Automation".

**32.3.2.4** Automated control systems of power equipment of position mooring systems shall comply with the requirements in Section 9 of Part XV "Automation".

### 32.3.3 Stability, unsinkability and subdivision.

**32.3.3.1** Under all loading conditions to be encountered in service and which are in agreement with the purpose of the vessel (icing disregarded), the trim and stability of an intact well stimulation vessel shall be sufficient for satisfying damage trim and stability requirements.

**32.3.3.2** The trim and stability of an intact well stimulation vessel shall comply with the requirements in 3.11 of Part IV "Stability".

**32.3.3.3** Requirements for the ship damage trim and stability shall be considered satisfied if, in case of damage mentioned in 3.2 and 3.4.9 of Part V "Subdivision", with the permeability determined in accordance with 1.6 of Part V "Subdivision", calculations made in conformity with 3.1.3 — 3.1.7 of Part V "Subdivision", indicate that the requirements of 3.3 and 3.4 of Part V "Subdivision", are satisfied.

### 32.3.4 Tanks, cargo and process piping.

**32.3.4.1** Cargo tanks containing acids and liquefied nitrogen shall be located at least 760 mm measured inboard from the side of the vessel perpendicular to the centreline at the level of the summer load waterline, taking into account the following. Solid ballast shall not normally be used in double-bottom spaces in the cargo area. Where, however, because of stability considerations, the fitting of solid ballast in such spaces becomes unavoidable, then its disposition shall be governed by the need to ensure that the impact loads resulting from bottom damage are not directly transmitted to the cargo tank structure.

**32.3.4.2** Tanks and pumping arrangements for the well stimulation processing plants shall be segregated from machinery spaces, propeller shaft tunnels, dry cargo spaces, accommodation and service spaces, as well as from drinking water and stores for human consumption by means of cofferdam, void space, cargo pump room, empty tank, oil fuel tank or similar arrangement.

**32.3.4.3** Tanks for cargoes that react in hazardous manner with other cargoes shall be segregated from them by means of cofferdam, void space, cargo pump room, empty tank or fuel oil tank. Tanks for other purposes, except of those for fresh water and lubricating oils, may be accepted as cofferdams for these tanks. The spacing between all cargo tank boundaries and adjacent ship's structure shall be minimum 600 mm.

**32.3.4.4** Tanks and piping systems for the well stimulation processing plant shall be separated from the vessel's marine machinery and piping systems.

**32.3.4.5** Generally, piping conveying well stimulation substances shall be joined by welding except for:

- .1 approved connections to shut-off valves and expansion joints;
- .2 other exceptional cases approved by Administration.



**32.3.4.6** Tanks, pumps, valves, gaskets and piping for uninhibited acids shall be of corrosion resistant material or shall have internal lining of corrosion resistant material.

**32.3.4.7** Ship's cargo hoses for dangerous chemical cargoes shall meet the requirements in 1.8 of Part VI "Systems and Piping" of the Rules for the Classification and Construction of Chemical Tankers (the Chem Rules).

**32.3.5 Accommodation, service spaces and control stations.**

**32.3.5.1** Piping systems for the well stimulation processing plant shall not pass through any accommodation, service or machinery spaces other than pump-rooms. The area designated for well stimulation processing plants shall be arranged as far away as practical from accommodation, service spaces, machinery spaces or control stations.

**32.3.5.2** Unless accommodation, service and machinery spaces are spaced at least 7 m away from the cargo area containing flammable products, entrances, air inlets and openings to accommodation, service and machinery spaces and control stations shall not face the cargo area. Doors to spaces not having access to accommodation, service and machinery spaces and control stations, such as cargo control stations and store-rooms, may be permitted within the 7 m zone specified above, provided the boundaries of the spaces are insulated to "A-60" standard. When arranged within the 7 m zone specified above, windows and side scuttles facing the cargo area shall be of a fixed type.

Such side scuttles in the first tier on the main deck shall be fitted with inside covers of steel or equivalent material.

**32.3.5.3** For substances with pollution hazard only and having a flashpoint exceeding 60 °C, the requirements of 32.3.5.2 may be waived.

**32.3.5.4** Remote control of the well stimulation processing plant shall be arranged at a position outside the area where the well stimulation systems are located.

**32.3.6 Liquids having flashpoint < 60 °C.**

**32.3.6.1** Tanks and pumping arrangements for liquid additives having flashpoint below 60 °C shall comply with relevant requirements in Section 31.

**32.3.7 Special requirements.**

**32.3.7.1 Nitrogen.**

**32.3.7.1.1** Materials of construction and ancillary components such as insulation shall be resistant to the effects of high oxygen concentrations caused by condensation and enrichment at the low temperatures attained in parts of the cargo system. Due consideration shall be given to areas where condensation might occur, to avoid the stratification of oxygen-enriched atmosphere.

**32.3.7.1.2** Tanks, pumps and piping and associated instruments shall be made of materials which are suitable to the pressure and cryogenic temperature of the liquid nitrogen system, and comply with recognized standards. In general, they shall be made of steel.

**32.3.7.1.3** Liquid nitrogen tanks shall comply with the relevant requirements for the design, installation and testing of type C independent tanks (refer to Section 23 of Part IV "Cargo Containment" of the Rules for the Classification and Construction of Ships Carrying Liquefied Gases in Bulk (the LG Rules)).

**32.3.7.1.4** Materials and design of piping shall comply with the requirements in Section 2 of Part VI "Systems and Piping" of the LG Rules.

**32.3.7.1.5 Cargo hoses.**

**32.3.7.1.5.1** Hoses used for cargo transfer shall be compatible with the cargo and suitable for the cargo temperature, and also comply with the requirements in Section 6 of Part VIII "Systems and Piping".

**32.3.7.1.5.2** Hoses shall be designed for a bursting pressure not less than five times the maximum pressure the hose will be subjected to during cargo transfer.

**32.3.7.1.5.3** Cargo hoses for chemical cargoes and liquefied gases transfer shall be prototype-tested at a normal temperature, with 200 pressure cycles from zero to 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 upper and lower extreme service temperature. 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 two fifths of its bursting pressure. The hose shall be stenciled, or otherwise marked, with the date of testing, its specified maximum working pressure and, if used in services other than

ambient temperature services, its maximum and minimum service temperature, as applicable. The specified maximum working pressure shall not be less than 1 MPa gauge.

#### **32.3.7.2 Acids.**

**32.3.7.2.1** The ship's shell plating shall not form any boundaries of tanks containing mineral acids.

**32.3.7.2.2** Steel tanks and related piping systems may be lined with corrosion-resistant materials. The elasticity of the lining shall not be less than that of the supporting boundary plating.

**32.3.7.2.3** Unless constructed wholly of corrosion-resistant materials or fitted with an approved lining, the plating thickness shall take into account the corrosivity of the cargo.

**32.3.7.2.4** Flanges of the loading and discharge manifold connections shall be provided with shields, which may be portable, to guard against the danger of the cargo being sprayed; and in addition, drip trays shall also be provided to guard against leakage on to the deck.

**32.3.7.2.5** If there is the danger of evolution of hydrogen when these substances are being carried, the electrical arrangements shall comply with the requirements in Section 2 of Part VII "Electrical Equipment" of the LG Rules. The approved safe type equipment shall be suitable for use in hydrogen/air mixtures. Other sources of ignition shall not be permitted in such spaces.

**32.3.7.2.6** Substances subjected to the requirements of this Section shall be segregated from accommodation, service and machinery spaces as well as from drinking water and stores for human consumption, fuel oil tanks by means of cofferdam, void space, pump room, or similar arrangement.

**32.3.7.2.7** Provision shall be made for suitable apparatus to detect leakage of cargo into adjacent spaces.

**32.3.7.2.8** The cargo pump-room bilge pumping and drainage arrangements shall be of corrosion-resistant materials.

**32.3.7.2.9** Dimensions, manufacture, testing and location of piping shall meet the requirements in 1.2 — 1.5 of Part VI "Systems and Piping" of the Chem Rules.

#### **32.3.7.2.10 Cargo hoses.**

Cargo hoses shall comply with the requirements in 32.3.7.1.5.

### **32.3.8 Tanks venting.**

#### **32.3.8.1 Nitrogen tanks.**

Outlets from safety valves of nitrogen tanks shall be led to open deck. Outlet pipes shall be arranged and supported such, as to allow for thermal contraction/expansion during cold gas release. Penetrations of decks or bulkheads shall be such that their structures are thermally isolated from the cold pipes.

#### **32.3.8.2 Acid tanks.**

Vent outlets from acid tanks shall have pressure/vacuum valves fitted with flame arrestors and shall be led to open deck. The outlets shall have a minimum height of 4 m above deck and located at a minimum horizontal distance of 5 m from openings to accommodation and service spaces.

### **32.3.9 Requirements for process spaces for acid, liquid nitrogen and additives storage and handling.**

#### **32.3.9.1 Access openings.**

Enclosed spaces containing tanks, pumps, blenders and associated piping for uninhibited acid shall have entrances direct from open deck or through air lockers from other spaces. Minimum clear opening for horizontal access shall not be less than 600 mm × 600 mm and for vertical openings not less than 600 mm × 800 mm. The air lockers shall have independent mechanical ventilation.

#### **32.3.9.2 Ventilation of spaces for acid storage and handling.**

**32.3.9.2.1** It is recommended that exhaust ventilation shall be provided. Explosion proof electrical equipment shall be used for ventilating spaces containing acetic acid.

**32.3.9.2.2** The spaces containing uninhibited acid shall have independent mechanical ventilation with a capacity of minimum 30 air changes per hour, while those containing inhibited acid a minimum of 20 air changes per hour. The intakes shall be located both, at floor and ceiling levels of the space concerned.

#### **32.3.9.3 Ventilation of spaces for liquid nitrogen.**

Spaces containing installations for liquid nitrogen shall have independent mechanical ventilation with a capacity of minimum 20 air changes per hour.

#### **32.3.9.4 Ventilation of spaces for additives storage and handling.**

Ventilation of spaces for storage and handling of dry and liquid additives will be case by case considered based on flammability, toxicity and reactivity criteria of the additives concerned.

#### **32.3.9.5 Acid spill protection.**

##### **32.3.9.5.1 Protection of floors and decks.**

**32.3.9.5.1.1** Floors or decks under acid storage tanks, pumps and piping for uninhibited acid shall have a lining or coating of acid resistant material extending up to a minimum height of 500 mm in the bounding bulkheads or coamings.

**32.3.9.5.1.2** Hatches or similar openings on those decks where acid storage tanks, pumps and piping for acid, are routed shall have watertight coamings having a minimum height of 500 mm and the coamings shall be protected by a lining or an acid resistant coating. Height requirement for coamings may be waived where this height is not practicable.

**32.3.9.5.1.3** A permanent spill coaming of 150 mm in height shall be provided on deck to keep deck spills away from accommodation and service areas.

##### **32.3.9.5.2 Shields and drip trays.**

On acid installations spray shields shall be provided to cover flanges or other detachable pipe connections. Portable shield covers shall be provided for connecting the flanges of the loading manifold. Drip trays of acid resistant material shall be provided under loading manifolds.

##### **32.3.9.5.3 Drainage.**

**32.3.9.5.3.1** Spaces housing tanks, pumps and piping for acids or additives shall have a separate drainage system not connected to the draining of the other areas and this system shall be made of acid resistant materials.

**32.3.9.5.3.2** Drainage arrangements for pump rooms, void spaces, any slop tank, double bottom tanks and similar spaces shall be situated entirely within the well stimulation processing area except for void spaces, double bottom tanks and ballast tanks, where such spaces are separated from tanks containing well stimulation substances or residues of such substances by a double bulkhead.

##### **32.3.9.6 Liquid nitrogen drip protection.**

Drip trays resistant to cryogenic (ca.  $-200\text{ }^{\circ}\text{C}$ ) temperatures shall be provided at manifolds transferring liquefied gases and at other flanged connections in the liquid nitrogen system. When selecting materials for trays and hull structures in the area of a possible liquid nitrogen spill, the requirements in Section 2 of Part IX "Materials and Welding" of the LG Rules shall be met.

#### **32.3.10 Control and monitoring systems.**

**32.3.10.1** An automatic and manual control system shall be provided, with the possibility of stopping the whole process and individual work operations.

##### **32.3.10.2 Atmosphere monitoring.**

###### **32.3.10.2.1 Vapour detection.**

Enclosed and semi-enclosed spaces containing installations for acids shall be provided with fixed vapour detection and alarm systems capable of giving an audible and visual alarm. The vapour detection system shall be capable of detecting hydrogen and hydrogen chloride gases.

###### **32.3.10.2.2 Oxygen deficiency monitoring.**

Enclosed spaces containing tanks and piping for liquid nitrogen shall be equipped with a sensor continuously monitoring the oxygen content of the space; an alarm shall be provided in case of low oxygen concentration. For semi-enclosed spaces portable equipment may be accepted.

##### **32.3.10.3 Tank level gauging systems.**

###### **32.3.10.3.1 Nitrogen tanks.**

Tanks for liquefied nitrogen are to have gauging and level detection arrangements in accordance with the requirements in Part VIII "Instrumentation and Automation Systems" of the LG Rules.

###### **32.3.10.3.3 Tanks for acid.**

Tanks for hydrochloric acid shall have a closed gauging system. A high level alarm shall be provided to be activated by a level sensing device independent of the gauging system.

###### **32.3.10.4 Leakage alarm.**

Spaces housing equipment and storage tanks for the well stimulation system shall be provided with detection and alarm system for liquid leakages.

### **32.3.11 Emergency shutdown.**

#### **32.3.11.1 Pumps.**

Emergency stop of all pumps in the well stimulation system shall be arranged from a dedicated cargo operations control station and at least one position located outside the area for well stimulation operations.

#### **32.3.11.2 Valves.**

Emergency shut-off valves shall be provided in liquid nitrogen lines from each nitrogen tank. The shut-off valves shall be remotely controlled from one or more positions outside the area for well stimulation operations.

#### **32.3.11.3 Transfer hose.**

Emergency depressurizing and disconnection of the transfer hose shall be arranged from a dedicated cargo operations control station and another location outside the cargo area and at a safe distance from it.

### **32.3.12 Power supply.**

**32.3.12.1** A reliable power supply shall be provided for the operation of the emergency control and shutdown system.

**32.3.12.2** Electrical power supply shall be from a main power system and from an uninterrupted power supply (UPS) capable of continuously operating for at least 30 minutes upon loss of power from the main source. The UPS shall be powered from both the main and the emergency power systems.

**32.3.12.3** Where hydraulic or pneumatic power supply is used for actuation of emergency control and shutdown, duplication arrangements shall be made in accordance with the following requirements.

Where power supply is hydraulic, hydraulic pumps shall be fitted in duplicate. The reservoir shall be of sufficient capacity to contain all of the fluid when drained from the system, maintain the fluid level at an effective working level and allow air and foreign matter to separate out. The pump suction shall be sized and positioned to prevent cavitation or starvation of the pump. A duplex filter, which can be cleaned without interrupting the oil supply, shall be fitted on the discharge side of pumps. The hydraulic fluid shall be suitable for its intended operation. Hydraulic supplies to safety and control systems may be derived from the same source but shall be by means of separate lines.

Where power supply is pneumatic, compressed air for control and monitoring systems shall be supplied from at least two air compressors. The starting air system, where consisting of two air compressors, may be used for this purpose. The system shall be arranged such that a single failure will not result in the loss of air supply. The required air pressure shall be automatically maintained.

Air supplies to control and monitoring systems may be derived from the same source, but shall be by separate lines incorporating shut-off valves.

Where driving power for hydraulic and/or pneumatic pumps is electric, power supply circuits shall be connected to the main and emergency power sources separately.

### **32.3.13 Internal communication.**

A wired service communication shall be provided for voice communication between the control stations for well stimulation operations and the ship's control stations, meeting the requirements in 7.2 of Part XI "Electrical Equipment".

### **32.3.14 Fire protection.**

#### **32.3.14.1 Structural fire protection.**

**32.3.14.1.1** Well stimulation vessels carrying liquid cargo having a flashpoint exceeding 60 °C, other than oil and oil products, shall have structural fire protection meeting the requirements in 2.1 and 6.3 of Part VI "Fire Protection".

**32.3.14.1.2** Well stimulation vessels carrying liquid cargo having a flashpoint not exceeding 60 °C shall have structural fire protection meeting the requirements of Part V "Fire Protection" of the Chem Rules.

#### **32.3.14.2 Water fire main system.**

The water fire main system shall comply with the requirements in 3.2 of Part VI "Fire Protection".

**32.3.14.2.1** For cargo temperatures below -110 °C, a water distribution system shall be provided for hull sections below the shore connections to create, at low pressure, a water curtain for additional protection of the steel hull material and side structures, 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 and shall be used during the cargo transfer operation. The water curtain system shall comply with the requirements in 3.5 of Part VI "Fire Protection".

**32.3.14.3 Foam fire extinguishing system.**

The foam fire extinguishing system shall comply with the requirements in 3.7 of Part VI "Fire Protection".

**32.3.14.4 Carbon dioxide smothering system.**

The carbon dioxide smothering system shall comply with the requirements in 3.8 of Part VI "Fire Protection".

**32.3.14.5 Fire-fighting outfit.**

Well stimulation vessels shall have fire-fighting outfit in accordance with Section 5 of Part VI "Fire Protection".

**32.3.15 Personnel protection.**

Well stimulation vessels shall have on board protective equipment complying with the requirements in Part X "Personnel Protection" of the Chem Rules.

## **32.4 CONDITIONS FOR ASSIGNMENT OF DISTINGUISHING MARK WSV2**

**32.32.4.1** A ship may be assigned the distinguishing mark **WSV2** if the well stimulation equipment has been removed from the ship or has not been installed on the ship after construction or repair, conversion or modernisation, but the possibility of installing such equipment, including deck tanks for the carriage of well stimulation fluids, without altering the ship design or ship systems, is retained.

In this case, the requirements of this Section shall apply selectively, taking into account the functional purpose of the ship."