

# **RULES**

## **FOR THE CLASSIFICATION AND CONSTRUCTION OF FLOATING OFFSHORE OIL-AND-GAS PRODUCT UNITS**

### **PART XVI**

#### **GENERAL REQUIREMENTS AND SAFETY PRINCIPLES**

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# **RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF FLOATING OFFSHORE OIL-AND-GAS PRODUCT UNITS**

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Rules for the Classification and Construction of Floating Offshore Oil-and-Gas Product Units (FPU) 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 2023.

The Rules are published in the following parts:

Part I "Classification";

Part II "Hull";

Part III "Equipment, Arrangements and Outfit";

Part IV "Stability";

Part V "Subdivision";

Part VI "Fire and Explosion Protection";

Part VII "Machinery Installations";

Part VIII "Systems and Piping";

Part IX "Machinery";

Part X "Boilers, Heat Exchangers and Pressure Vessels";

Part XI "Electrical Equipment";

Part XII "Refrigerating Plants";

Part XIII "Materials";

Part XIV "Welding";

Part XV "Automation";

Part XVI "General Requirements and Safety Principles".

The Rules supplement the Rules for the Classification and Construction of Sea-Going Ships and the Rules for the Classification, Construction and Equipment of Mobile Offshore Drilling Units and Fixed Offshore Platforms.

**REVISION HISTORY**

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

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

## 1 GENERAL

**1.1** FPU safety shall comply with the requirements of Part XV "MODU and FOP Safety Assessment" of the Rules for the Classification, Construction and Equipment of Mobile Offshore Drilling Units and Fixed Offshore Platforms<sup>1</sup>, as well as with the requirements set forth below.

**1.2** Safety and location of equipment, machinery and arrangements providing FPU operation shall meet the requirements of the Rules for the Classification and Construction of Sea-Going Ships<sup>2</sup> to the extent that they are practicable and reasonable, unless otherwise specified.

**1.3** Structural, technical and organizational measures shall be taken to ensure the FPU safety.

**1.4** The basic principle for the FPU safety is the separation of functional areas (zones) of the unit (accommodation, storage, processing areas etc.) in accordance with their explosion hazard potential. Zones of high risk potential (hazardous zones) shall be separated from the others.

Hazardous zones are enclosed spaces, semi-enclosed and out-door locations and spaces in which, due to presence of explosive gas or explosive gas/air mixture, explosion hazard exists continuously or periodically.

Other zones and areas are considered to be non-hazardous.

**1.5** Classification of the FPU hazardous zones shall comply with the requirements of 19.2.3, Part XI "Electrical Equipment" of the Rules for the Classification.

**1.6** Electrical equipment installed in FPU hazardous zones shall comply with the requirements of 2.9, Part XI "Electrical Equipment" of the Rules for the Classification.

The equipment in zones 0 to 2 shall be of explosion-proof and safe type.

**1.7** During installation of the equipment it shall be isolated from or located at a safe distance from hazardous zones, accommodation spaces and provided with effective ventilation. Adequate structural measures shall be also taken to protect process and accommodation areas from the effect of explosions and fires.

**1.8** The locations within zone 2, as well as non-hazardous processing machinery spaces shall generally not be adjacent to hazardous spaces and areas. Where passageways are available, they shall be fitted with air-lock(s), where pressurization is provided by mechanical supply ventilation.

**1.9** Electric power plants shall be segregated from hazardous zones with fire walls and divisions having fire resistance limit of 1 h (A-60 class) facing potential effect of fire.

**1.10** Fixed heating appliances, boilers and internal combustion engines shall normally be located at a safe distance from hazardous areas. In areas where they may cause ignition as a result of accidental gas or liquid discharge special measures shall be taken (gas-tight closures, gas detection systems, insulation and cooling of hot surfaces, using fire-resisting bulkheads, etc).

**1.11** The equipment shall be located to provide:

- safe escape from working areas;
- effective ventilation of working areas;
- minimum excessive pressure in case of hot gas release;
- access for fighting fires and combating accidents;
- prevention of serious consequences from dropping objects;
- minimum possibility of propagation of fires, damage and accidents;

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

<sup>2</sup> Hereinafter referred to as "the Rules for the Classification".

safe suppression of hazardous liquid accidental blowout;  
simultaneous performance of operations.

**1.12** Safety systems shall be located so that in accident situations they can remain operable.

Safety systems control devices shall be located in such places where they are easily accessible and ready for use in the event of an accident.

**1.13** Accommodation and public spaces shall be located as far as practically away from hazardous zones taking into account prevailing winds.

Outer protective walls of accommodation spaces shall be capable of withstanding the effects of fire for at least 1 h (A-60 class).

**1.14** Product filling and transfer system shall be located as far as practically away, but at least 10 m from accommodation and service spaces.

**1.15** Control stations of automated fire extinguishing installations and fire alarm system are located in the central control station (CCS), while duplicate control and means of communication shall be located in the temporary refuge.

## **2 ESCAPE ROUTES**

**2.1** The recommendations of the present Section aim to ensure timely and unobstructed evacuation of FPU personnel in the event of fire and to provide continuous fire shelter from the effects of hazards along escape routes.

**2.2** Escape routes shall provide safe escape of the personnel from the FPU spaces.

**2.3** The evacuation shall be provided to the temporary refuge, muster and survival craft embarkation station, landing area, as well as to other the FPU areas where there are no fire hazards.

**2.4** Escape routes protection from outside of the spaces shall be provided taking into account the following factors:

fire hazard category of the spaces from which the escape is performed;

number of personnel to be evacuated;

fire resistance of structures;

number of escape routes from the FPU decks, platforms and spaces.

**2.5** The number of escape routes from each deck, platform and tier of process and accommodation area shall be assumed in compliance with the design but shall in no case be less than two.

**2.6** Dead-end corridors in the FPU spaces shall not exceed 7 m in length.

**2.7** Width in the clear of escape routes and doors shall be at least 1,2 m and 0,8 m, respectively, height of passageways along the escape routes shall be at least 2,2 m, and height in the clear of doors shall be at least 1,8 m.

**2.8** Non-hazardous enclosed spaces with processing equipment and facilities, if possible, shall not be connected with the hazardous areas and spaces. If necessary, the passages between them shall meet the requirements of 2.10, Part X "Electrical Equipment" of the MODU/FOP Rules.

**2.9** In some justified cases sliding doors may be fitted in the spaces which can accommodate simultaneously not more than 5 persons. All escape route doors shall be readily operable in the direction of escape, except for the sliding doors leading outside.

**2.10** Escape routes, muster and survival craft embarkation stations shall be so located that various structures might protect them from direct heat effects in the event of fire in the most hazardous area of the processing.

**2.11** Emergency lighting shall be provided along the escape route as well as signs of exits and escape routes which shall be applied in fluorescent paint or shall be of photoluminescent material.

### **3 TEMPORARY REFUGE**

**3.1** All FPU attended by the personnel shall be provided with temporary refuge intended for protection of the personnel from the effect of fire and other accidents during the time necessary for accident elimination or safe escape in compliance with the approved escape plans.

**3.2** The temporary refuge shall be located in the FPU accommodation area and be adequately equipped so as to provide life support and communications of the personnel for at least two hours in the event of an accident.

**3.3** Escape routes shall ensure evacuation of all people on board FPU to reach the temporary refuge in the shortest possible time but not exceeding 10 min.

**3.4** The capacity of the temporary refuge shall be sufficient to shelter 100 % of the crew members and provide some reserve places for transient persons on board FPU.

**3.5** Bulkheads, deck, ceiling, as well as doors, hatches, hatchways of the temporary refuge facing the drilling and process units shall have a fire resistance limit not less than H-120/J-120.

**3.6** No scuttles (windows) shall be permitted in the temporary refuge.

**3.7** The FPU temporary refuge shall be provided with:  
self-contained filter unit maintaining, where necessary, excessive pressure in relation to the adjacent spaces;  
self-contained drenching system for protection of external surfaces of shelter bulkheads, decks and ceiling;  
duplicating control means for fire extinguishing systems;  
fire and gas detection systems;  
emergency GMDSS communication with self-contained source of power;  
monitor and control system for FPU main processing equipment;  
self-contained ventilating and air conditioning system.

**3.8** In the temporary refuge area it is recommended to arrange the following:  
inlet for water pumped from salvage ships into the fire-fighting system;  
external supply switchboard to provide the fire pump operation.

**3.9** Temporary refuge shall be provided with emergency outfit, medicines, emergency supply of water and provisions and other items in accordance with the list approved by the Register.

## **4 BASIC PRINCIPLES OF SAFETY CONTROL**

**4.1** The FPU safety assessment shall be carried out throughout the unit life cycle: design, construction, operation, utilization.

**4.2** The FPU safety assessment shall be performed at the stage of the field facilities design concept. The meaning of this assessment shall make sure at the early design stage that the selected FPU concept does not result in necessity to introduce principal alterations in the design and construction due to safety requirements. The objective of the FPU safety assessment shall ensure acceptable safety in accordance with the set criteria.

**4.3** The FPU safety assessment shall be included in the plan of design development and FPU construction.

**4.4** As a basis for safety assessment, the following information shall be submitted:

- description of the FPU environment;
- description of the FPU functioning and operational details;
- layout drawings showing machinery, arrangements and systems performing the most essential functions. Particular emphasis shall be placed on the location wherein works are performed and the equipment having a significant destructive potential, is installed, as well as on the fire safety, accommodation complexes, escape routes, protective zones and evacuation systems;
- key structural diagrams;
- description of the most impotent measures provided for accident probability reduction;
- description of measures provided for restriction of accident consequences;
- description of escape routes;
- description of the level of safety associated with new processes and technical innovations planned for use;
- accidents corresponding to the design accident effect on FPU;
- calculation showing that the consequences of accident effects meet adequate safety criteria specified.

**4.5** The safety assessments shall confirm the reasonably low probability of casualties evaluated by the use of annual individual risks, and also of societal risks, or large losses and unacceptable environment pollution that may happen as a result of the accident.

**4.6** For FPU safety assessment the analysis of accident situations shall be carried out. This analysis falls into two main trends. The first one deals with the analysis through conformity to the existing standards, specifications, etc., and the second one, with the analysis of accident situations for scenarios of a higher risk.

**4.7** Analysis of potential accident situations is defined as a number of measures aimed to minimize the accident probability and severe consequences for FPU.

The sequence of the measures is usually as follow:

- determination of potential accident situations;
- assessment of the risk level to be accepted;
- prevention or elimination of accident situations.

**4.8** The analysis of accident situations is used in design (since a design concept), construction and operation of FPU. In this case, all the design modes of operation shall be considered: transportation, marine operations, installation on site, operational mode, extreme loading, removal from location, etc.

The analysis of accident situations shall be also applied to existing FPU if they are subjected to major modifications.



**4.9** The analysis of potential accident situations shall be approved by the Register and shall include the following:

- description of conditions at the beginning of an accident situation, initial data for analysis;

- description of accident control measures, FPU equipment and systems specified for mitigating accident consequences;

- information on analysis techniques, physical and statistical models;

- description of the accident development process including its design presentation;

- protective measures for personnel and individuals present on board the FPU in the event of an accident.

**4.10** The risk evaluation is a part of the FPU safety control which lies in the systematic use of all available information for identification of hazards and risk evaluation of potential undesirable events.

Risk assessment for FPU shall be conducted in compliance with the requirements of Part XV "MODU and FOP Safety Assessment" of the MODU/FOP Rules.

## 5 SAFETY ZONES

**5.1** During operation FPU shall be surrounded with safety zones and functional zones by means of mark and ice buoys as well as spars.

**5.2** Safety and functional zones around FPU shall be determined when necessary:  
to provide the safety working environment for the personnel of FPU and interacting ships;  
to minimize probability of hazardous accidents and consequences due to their negative effects;

to protect the environment from emergency oil spillage.

The following safety measures shall be taken:

minimizing the number of ships;

conformity of ships to the conditions of the environment;

monitoring and efficient control of the interacting processes;

operative response to an accident individual safety of personnel.

**5.3** Safety zones specified around FPU shall not intersect.

**5.4** Federal executive bodies shall be notified about the FPU location, its safety zones around, positions and characteristics of warning and navigational aids, as well as about the FPU partial or complete removal (liquidation) indicating depths, geographical coordinates and dimensions so as to include this information into the sailing directions and other navigational publications.

**5.5** Safety circles (echelons) and functional zones with special regime of ship navigation and positioning around the FPU shall be established ([refer to Fig. 5.5](#)):

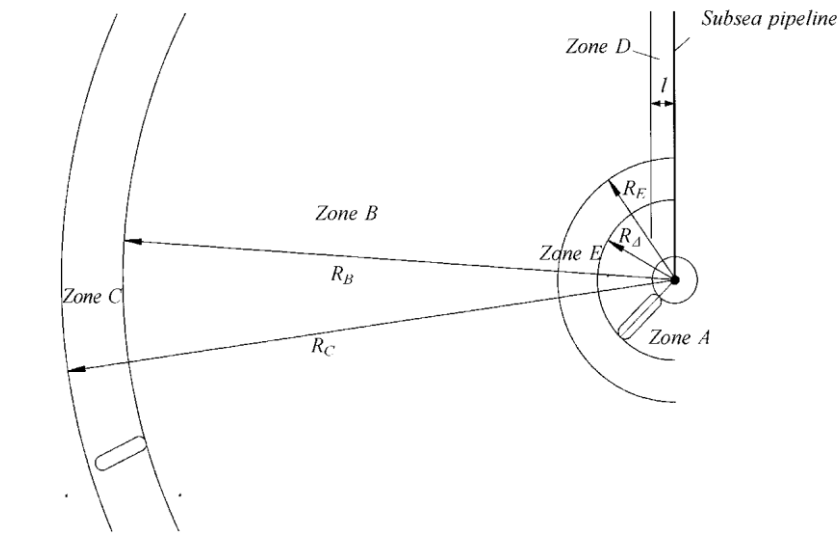


Fig. 5.5

Safety zones:

- zone A – high risk zone (offloading);
- zone B – hazardous zone (manoeuvring);
- zone C – estrangement zone (waiting);
- zone D – zone of subsea piping and cabling;
- zone E – forbidden zone

high risk zone (offloading zone *A*) in which a tanker is under loading. In these conditions no other ships shall enter this zone except support vessel called for by the FPU operator or master of the tanker for the purpose of rendering assistance and/or preventing accident situation;

hazardous zone (manoeuvring zone *B*) in which the tanker is manoeuvring so as to approach/depart the FPU. During these manoeuvring operations any other ships except a support vessel called for by the operator or master of the tanker are forbidden to enter this zone;

estrangement zone (waiting zone *C*) which is specified for anchorage of other ships waiting for the operator's permission to approach the FPU;

zone of subsea piping and cabling (zone *D*);

forbidden zone (zone *E*).

**5.6** Dimensions and navigation regimes of safety zones as well as the presence of ships therein shall be set forth for each particular FPU by special instructions and technical specifications which shall be agreed upon with the Register.

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