RUSSIAN MARITIME REGISTER OF SHIPPING

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RULES

FOR THE CLASSIFICATION AND CONSTRUCTION OF FIXED OFFSHORE PLATFORMS

PART VI

FIRE PROTECTION

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RULES FOR THE CLASSIFICATION AND CONSTRUCTION OF FIXED OFFSHORE PLATFORMS

Rules for the Classification and Construction of Fixed Offshore Platforms (the FOP Rules) 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 September 2023.

The present Rules are based on the latest version of the Rules for the Classification, Construction and Equipment of Mobile Offshore Drilling Units and Fixed Offshore Platforms, 2022, taking into account the amendments and additions developed immediately before publication.

The Rules set down specific requirements for FOP and supplement the Rules for the Classification and Construction of Sea-Going Ships and the Rules for the Equipment of Sea-Going Ships.

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 Protection";
Part VII "Machinery Installations and Machinery";
Part VIII "Systems and Piping";
Part IX "Boilers, Heat Exchangers and Pressure Vessels";
Part X "Electrical Equipment";
Part XI "Refrigerating Plants";
Part XII "Materials";
Part XIII "Welding";
Part XIV "Automation";
Part XV "Safety Assessment";
Part XVI "Signal Means";
Part XVII "Life-Saving Appliances";
Part XVIII "Radio Equipment";
Part XIX "Navigational Equipment";
Part XX "Equipment for Prevention of Pollution".

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 APPLICATION

1.1.1 The requirements of this Part of the Rules for the Classification and Construction of Fixed Offshore Platforms[1] apply to structural fire protection of FOP, fire extinguishing systems and fire detection and alarm systems, as well as to fire-fighting equipment and outfit. In addition to the requirements of this Part, the relevant requirements of Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships[2] shall be met to the extent that they are applicable and appropriate, considering requirements of this Part.

1.1.2 The fire safety design or arrangements may deviate from prescriptive provisions of this Part, provided that the design and arrangements meet the fire protection objectives and functional requirements. When the fire safety design or arrangements deviate from the prescriptive provisions of this Part, the engineering analysis, evaluation and approval of the alternative design and arrangements shall be carried out in accordance with 1.7, Part VI "Fire Protection" of the RS Rules/C.

1.1.3 Fire protection requirements relating to the structural members of the FOP hull, machinery and parts thereof, electrical equipment, pumping and piping, arrangements, fuel and lubricating oil tanks, construction and location of boilers, refrigerating plants, spaces, etc. are set out in the relevant parts of the FOP Rules.

1.1.4 Special equipment and outfit (fire extinguishing systems and fire detection and alarm systems, fire extinguishing installations, portable fire fighting outfit items, etc.) intended for fire preventing and fighting in the drilling and process area and not covered by this Part, shall meet their requirements to the extent agreed with the Register in each particular case.

The necessity of installing such equipment and outfit and characteristics thereof shall be determined by the customer having regard to the presence and number of special salvage teams on board the FOP and the presence of ships assigned the mark **FF** added to their class notation in the FOP water area.

The scope of the Register technical supervision of the said equipment and outfit is determined by the customer and agreed with the Register.

1.1.5 Layout of the drilling and process equipment, as well as technical solutions to ensure safe drilling and well operation, collection, storage, treatment and transportation of the well products shall comply with the requirements of the competent State bodies exercising supervision of the safety in oil and gas industry.

[1] Hereinafter referred to as "the FOP Rules".
[2] Hereinafter referred to as "the RS Rules/C".

1.2 DEFINITIONS AND EXPLANATIONS

1.2.1 The definitions and explanations relating to the general terminology of the FOP Rules are given in the General Regulations for the Classification and Other Activity and in Part I "Classification" of the FOP Rules. Definitions and explanations concerning fire protection are stated in 1.2, Part VI "Fire Protection" of the RS Rules/C.

1.2.2 Unless otherwise provided, the following definitions have been adopted in this Part.

Emergency shutdown (ESD) are control actions undertaken to shut down equipment or processes in response to a hazardous situation.

Emergency response is an action taken by the personnel on or outside FOP to control or mitigate the effects of a hazardous event or initiate and execute evacuation from FOP.

Emergency station is a place where emergency response personnel go to undertake their emergency duties.

Emergency depressurization is controlled disposal of pressurized fluids to a flare or ventilation system when required to avoid or minimize a hazardous situation.

A self-contained breathing apparatus of PDR type (pressure-demand respirator) is a device where the pressure reducer and exhalation valve maintain gage pressure in the mask except at high frequency of breathing. In case the apparatus of PDR type has any leakage, the pressure reducer provides fresh air supply into the mask, preventing ingress of the outside polluted air.

A self-contained breathing apparatus of PPR type (positive-pressure respirator) is a device to support gage pressure in the face mask while breathing (inhalation and exhalation).

Hazardous zones and areas, refer to 2.9, Part X "Electrical Equipment".

Accommodation spaces are those used for public spaces, cabins, offices, hospitals, corridors, lavatories, cinemas, games and hobbies rooms, pantries containing no cooking appliances and similar spaces.

Structural fire protection is a complex of structural means of structural fire protection intended:

for prevention of fire;

for containment of flame and smoke spreading throughout FOP;

for creation of conditions for safe evacuation of personnel;

for effective fire extinction.

Zone (area classification) is a distance in any direction from the source of emission to the point where the flammable atmosphere has been diluted by air to a sufficiently low level.

ICAO is the International Civil Aviation Organization.

Source of ignition is any source with sufficient energy to initiate combustion.

Source of release is a point from which the products can be released into the atmosphere.

Class of fire (type of fire) characterizes fire intensity and extent.

FTP Code is the International Code for Application of Fire Test Procedures, 2010 adopted by IMO resolution MSC.307(88), as amended by IMO resolution MSC.437(99).

Integrated installation is an offshore structure which contains accommodation spaces and auxiliary systems with process and/or wellhead equipment.

Critical temperature is the maximum temperature that the equipment, assembly or structure to be protected may be allowed to reach.

H class divisions are those divisions, which are formed by bulkheads and decks complying with the following requirements:

they shall be constructed of steel or equivalent material;

they shall be suitably stiffened;

they shall be so constructed as to be capable of precluding the passage of smoke and flame during 120 min of the standard fire test;

they shall be so insulated with non-combustible material or equivalent fire-protective means that the average or maximum (at any point) temperature at the unexposed side will not rise more than 140 °C and 180 °C, respectively, above the original temperature.

Depending on the time, during which the above indicated temperature rise is ensured in the course of the standard fire test, the following symbols are given to divisions: H-120 — during 120 min, H-60 — during 60 min, H-0 — during 0 min.

Fire integrity of divisions is tested according to the method stated in Part 3 of Appendix 1 to the International Code for Application of Fire Test Procedures, 2010 (FTP Code), considering that the furnace heating temperature shall be changed in compliance with time-dependent temperature curve during hydrocarbon burning specified in the national or international standards (such as BS EN 1363-2:1999; ASTM 1529-14a; ISO/DIS 20902-1).

Passive fire protection material is coating or cladding that, in the event of a fire, will provide thermal protection to restrict the rate at which heat is transmitted to the object or area being protected.

Machinery spaces of Category A and other machinery spaces, refer to 1.2, Part VII "Machinery Installations" of the RS Rules/C.

IMDG Code is the International Maritime Dangerous Goods (IMDG) Code adopted by IMO resolution MSC.122(75), as amended by IMO resolutions MSC.157(78), MSC.205(81), MSC.262(84), MSC.294(87), MSC.328(90), MSC.372(93), MSC.406(96), MSC.442(99).

Lower explosive limit (LEL) is the lowest concentration of combustible vapors or gases, by volume in mixture with air at which flame propagation through the mixture is possible at any distance from the ignition source.

Manned installation is a FPU that is designed to be operated by the personnel normally present on board.

Attending personnel are persons who, for the purpose of this Part, permanently or temporarily stay on board FOP in connection with the unit’s mission or because of special work being performed on FOP.

Public spaces are those portions of the accommodation which are used for halls, dining rooms, lounges and permanently enclosed spaces.

Flammable atmosphere is a mixture of flammable gas or vapour in the air which burns when ignited.

Hazardous event is an incident which occurs when a hazard is realized.

Hazard is a potential for human injury, damage to the environment, material damage or their combination.

Dangerous goods are substances, materials and products covered by the IMDG Code.

Hazardous areas are all those areas of FOP where, due to possible presence of a flammable atmosphere arising from the drilling operations, the use without proper consideration of machinery or electrical equipment may lead to fire hazard or explosion.

Hazard assessment is a process of hazard or hazardous event analysis in relation to standards or criteria which have been developed as a basis for decision-making.

Passive fire protection (PFP) is coating or cladding arrangement or free-standing system which, in the event of fire, will provide thermal protection to restrict the rate at which heat is transmitted to the object or area being protected.

Pool fire is turbulent diffusion combustion of vaporizing hydrocarbon fuel spilled and retained on a surface above a horizontal body of the fuel that has zero or low initial momentum.

Process equipment spaces are spaces containing equipment intended for collection, storage, treatment and transportation of the well products.

Control stations are those spaces in which the unit's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment or the dynamic positioning control system is centralized or where a fire-extinguishing system serving various locations is situated.

Fire barrier is a separating element that resists the passage of flame and/or heat and/or effluents for a period of time under specified conditions.

Risk is a combination of probabilities suggesting that an undesirable event will occur and lead to serious consequences.

Passive fire protection system is a removable jacket or inspection panel, cable transit system, pipe penetration seal or other such system that, in the event of a fire, will provide thermal protection to restrict the rate at which heat is transmitted to the object or area being protected.

Service spaces are galleys, bakeries, pantries containing cooking appliances, storerooms, workshops other than those forming part of machinery spaces and similar spaces.

Grade of release is a measure of potential frequency and duration of a release (independent of release rate, quantity of substances released, ventilation rate and fluid properties).

Fire and explosion strategy (FES) is result of the process involving fire assessment data to define measures required to control these hazardous events and importance thereof.

Jet fire is turbulent diffusion flame resulting from the combustion of a fuel continuously released (with some significant momentum) in a particular direction.

Process area is a part of FOP which contains equipment intended for well operation and associated processes of collection, storage, treatment and transportation of the FOP well products.

Physical explosion is a result of a sudden release of stored energy, e.g. pressure vessel rupture, gas fittings failure or high voltage electrical discharge.

Functional requirements are minimum criteria which shall be satisfied to meet the stated health, safety and environmental objectives.

Chemical explosion is a violent combustion of a flammable gas or mist which generates pressure effects due to confinement of the combustion-induced flow and/or the acceleration of the flame front by obstacles in the flame path.

Cellulosic fire is fire involving combustible material such as wood, paper, furniture, etc.

1.3 ABBREVIATIONS

1.3.1 In this Part the following abbreviations have been adopted:

AB — accommodation block;
BOP — blowout preventer;
CCR — central control room;
CF — cellulosic fire;
CS — control station;
EDP — emergency depressurization;
ESD — emergency shutdown;
FES — fire and explosion strategy;
HC — hydrocarbon;
ICAO — International Civil Aviation Organization;
JF — jet fire;
LEL — lower explosive limit;
PA — process areas;
PFP — passive fire protection;
TR — temporary refuge;
WH — wellhead area.

1.4 SCOPE OF SURVEYS

1.4.1 The scope of surveys shall comply with the requirements of 1.3.1 and 1.3.2, Part VI "Fire Protection" of the RS Rules/C.

1.4.2 To obtain the approval of the Register for the newly applied active fire-fighting means and passive means of structural fire protection, the materials specified in 1.3.3, Part VI "Fire Protection" of the RS Rules/C shall be submitted to the Register.

1.4.3 For approval of the structural fire protection, the Register shall be provided with the results of the fire tests carried out according to procedure in Part 3 "Test for "A", "B" and "F" Class Divisions" of the FTP Code.

For "H" class divisions, fire tests shall meet the requirements given in the definition "H" class divisions" in this Part VI.

The following features shall be taken into account:

jet fire possible on FOP with high impulse and efficient burning;

actual fire may have characteristics different from those which can be reproduced in a fire test;

testing critical equipment (refer to 2.6.2).

It shall be noted that many important parameters concerning the serviceability of materials or systems are not taken into account in the standard tests and test reports, e.g. different environmental conditions, ageing and mechanical effect.

1.4.4 Structural fire protection materials shall be of the type approved by the Register. When selecting materials, consideration shall be given to the duration of environment, fire type and size, smoke generation in fire situations and duration of protection.

Fire integrity and other material characteristics shall be documented by test reports from the testing laboratory recognized by the Register. Interpolation of test results to optimize the quantity of material to be applied shall be documented by the Register.

1.5 FIRE PLANS

1.5.1 At the central control station or in conspicuous positions in corridors and lobbies of FOP, there shall be exhibited general arrangement plans clearly showing the following for each deck:

.1 location of control stations;

.2 arrangement of fire-resisting and fire-retarding divisions;

.3 spaces protected by automatic fire detectors and manual fire alarm stations of fire detection and fire alarm system;

.4 spaces protected by automatic gas detectors of the combustible gas detection and alarm system (hydrocarbon gases, hydrocarbon fluid vapours);

.5 spaces protected by automatic hydrogen sulphide gas detectors of hydrogen sulphide detection and alarm system;

.6 location of respiratory protection equipment for hydrogen sulphide;

.7 general alarm actuating positions;

.8 arrangement of fire extinction stations, fixed fire extinguishing appliances, fire pumps, hydrants, section valves of fire extinguishing system, nozzles of pressure water-spraying systems and sprinklers of sprinkler system (if installed), valve remote controls of fire extinguishing systems, fire pumps, as well as remote controls of fire extinguishing system activation; spaces protected by fixed fire extinguishing systems;

.9 locations of fighter's outfits;

.10 location of helicopter crash kit;

.11 location of other fire-fighting outfits;

.12 location of ESD (engine shutdown, pump shutdown, oil fuel source shutdown, etc.) stations;

.13 ventilating system, including position of closing appliances for ventilation inlets and outlets, fire dampers, fire damper and ventilating controls of fire dampers with indication of identification numbers of ventilating fans serving the groups of spaces enclosed by fire structures;

.14 arrangement of fire/watertight doors and their remote controls;

.15 location of blowout preventer control stations;

.16 escape route and means of access to different compartments, decks, etc.;

.17 locations of emergency escape breathing devices (EEBD);

.18 arrangement of emergency muster stations and life-saving appliances; and

.19 location of documents referred to in 1.5.6.

1.5.2 A stitched set of plans with information specified in 1.5.1 shall be supplied to each officer, and one copy shall be available at all times on board in a readily accessible position.

1.5.3 A set of the plans protected against marine environment shall be permanently stowed outside the superstructure in a weathertight enclosure painted red and marked as indicated in Fig. 1.5.3-1.

Fig. 1.5.3-1

The enclosure shall be capable of being easily opened, be readily available to the salvage teams, be located in a conspicuous well-illuminated position, if possible, including illumination from an emergency source.

The enclosure shall not be located in a hazardous zone and on exterior bulkheads of superstructures which face hazardous zone and on side bulkheads abutting thereon.

If the enclosure is not adjacent to place of boarding of the salvage teams, there shall be guide signs as indicated in Fig. 1.5.3-2 showing the way thereto.

The dimensions of the signs shall be not less than 300 × 400 mm.

The signs shall be arranged at the same level and the spacing between them shall not exceed 50 m.

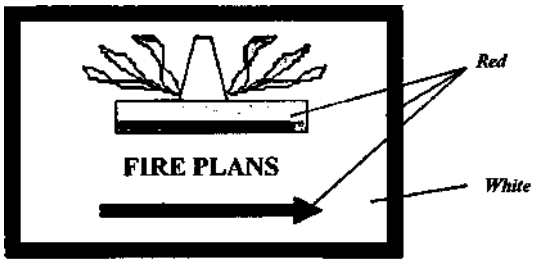


Fig. 1.5.3-2

1.5.4 Plans and booklets shall be made in the state language and shall contain translation into English, thus the symbols for items listed in 1.5.1 shall be in agreement with IMO resolution A.952(23) "Graphical Symbols for Shipboard Fire Control Plans" as amended by IMO resolution A.1116(30) for items, which signs are not indicated in IMO resolution A.952(23).

For FOP engaged in operations on the Russian continental shelf, translation into English is not required.

Graphical symbols shall be coloured.

1.5.5 Plans and booklets shall be continuously updated and any alterations in the fire protection shall be entered therein at the earliest possible date.

1.5.6 To be kept in a separate file in a readily accessible position are instructions for maintenance, repair, inspections and use of all systems, means to extinguish and confine a fire, fire-fighting outfit in accordance with the requirements of IMO resolution A.1023(26). The maintenance program may be computer-based. Maintenance and inspections shall be carried out in accordance with the requirements of MSC/Circ.850.

1.6 CATEGORIES OF SPACES

1.6.1 Categories of the FOP spaces shall meet the requirements of 1.5, Part VI "Fire Protection" of the RS Rules/C and 2.1.6.8.2 of this Part.

1.7 SUBDIVISION OF MATERIALS AND PRODUCTS

1.7.1 Subdivision of materials and products shall meet the requirements of 1.6.3, Part VI "Fire Protection" of the RS Rules/C and their tests shall be conducted in accordance with the procedures given in the FTP Code.

2 STRUCTURAL FIRE PROTECTION

2.1 GENERAL

2.1.1 Structural or passive fire protection (PFP) shall be provided in accordance with the following requirements:

.1 prevent spread of fire by provision of fire barriers to separate different fire areas;

.2 protect critical equipment and their supports to prevent further release of hydrocarbons, such as from separators, risers, piping, etc.;

.3 protect critical safety systems where they need to perform their functions under fire conditions and they might be exposed to the fire either directly or to their enclosures (e.g. fire water pumps, ESD valves and their actuators, piping supports of fire water systems and critical cables);

.4 protect critical structural members and, in particular, those members essential to the support of the TR and other critical equipment;

.5 avoid collapse of topside, TR equipment and evacuation facilities;

.6 protect the TR personnel until safe evacuation can take place;

.7 protect escape routes to the TR to allow for safe escape from the area and allow for emergency response activities;

.8 protect any sections of the evacuation routes from the TR to muster stations and survival craft embarkation stations.

Where structural fire protection is required to provide protection following an explosion, it shall be designed and installed such that deformation of the substrate caused by an explosion will not adversely affect its performance as specified in the performance standard.

Selection of the structural fire protection system shall take into account the duration of protection required, type of fire which can be experienced, and the limiting temperature for the structures and critical equipment to be protected.

2.1.2 Screening evaluations of credible fire scenarios can be sufficient to determine the structural fire protection requirements without more detailed calculations. These evaluations can show that certain fire scenarios are beyond the capability of critical safety systems.

It can then be necessary to undertake risk evaluation to evaluate whether it is reasonably practicable to provide additional structural fire protection for these cases or to use some other approach to prevent, control, or mitigate the identified fire hazardous events.

2.1.3 Materials shall meet the requirements of 2.1.1, Part VI "Fire Protection" of the RS Rules/C.

2.1.4 Fire-resisting and fire-retarding divisions shall meet at least the requirements of 2.1.2, Part VI "Fire Protection" of the RS Rules/C.

2.1.5 The fire-fighting divisions located in the vicinity of potential sources of jet fires shall be additionally "J" class rated and subject to fire test procedure specified in ISO 22899-1 "Determination of the resistance to jet fires of passive fire protection materials — Part 1: General requirements".

These fire-fighting divisions shall have combined fire integrity that may be defined as fire integrity to resist two-phase fire — initial jet fire followed by a hydrocarbon pool fire. Potential sources of jet fires are considered to be valves, flange and other detachable joints, etc. in the process system that are maintained under pressure during fuel extraction and could release a jet of flammable liquid or gas.

The combined fire integrity (H/J) shall only apply for "H" class divisions.

For example, "H-60/J-30" class division" means:

"H" class fire integrity defined according to the requirements specified in the definition "H class divisions";

additional "J-30" class fire integrity defined according to the requirements of ISO 22899-1; thus, the maximum temperature (at any point) of the unexposed side shall not rise more than 180 °C above the initial temperature identified in Part 3, Annex 1 of the FTP Code.

Thickness of the "J" class bulkhead or deck specimen subject to jet fire test according to 6.6 of ISO 22899-1 shall correspond to the thickness of the "H" class bulkhead or deck specimen tested.

Additional "J" class fire integrity is characterized by the additional PFP thickness to withstand the effects of the jet fire added to the thickness calculated during the "H" class division testing. The additional thickness shall be indicated in H/J Type Approval Certificate.

2.1.6 Requirements for structural fire protection of FOP.

2.1.6.1 Structural fire protection shall meet all relevant requirements of 2.1, Part VI "Fire Protection" of the RS Rules/C.

The hull, superstructures, structural bulkheads and decks shall be constructed of steel or equivalent material.

Structural fire protection details, materials and products of FOP shall be in accordance with the FTP Code, evaluated and approved by the Register

2.1.6.2 Superstructure on FOP, if its length exceeds 50 m and the number of attending personnel exceeds 100 persons, in way of accommodation and service spaces shall be divided into main vertical zones by "A-60" class divisions. Steps and recesses shall be kept to a minimum, but where they are necessary they shall be also of "A-60" class divisions. Where a space of categories (*8*), (*9*) indicated in 2.1.6.8.2 is on one side of the division the class may be reduced to "A-0".

Bulkheads forming the boundaries of main vertical zones shall extend from deck to deck and to the exterior boundaries of superstructure or other boundaries.

Where the main vertical zone is divided by horizontal "A" class divisions into horizontal zones for the purpose of providing an appropriate barrier between sprinklered and non-sprinklered zones of the FOP, the divisions shall extend between adjacent main vertical zone bulkheads and to exterior boundaries of the FOP and shall be insulated in accordance with the fire insulation and fire integrity values given in Table 2.1.6.8-2.

2.1.6.3 All bulkheads in accommodation and service spaces which are not required to be of "A" class divisions shall be at least of "B" class and "C" class divisions as specified in Table 2.1.6.8-1.

2.1.6.4 All corridor bulkheads which are not required to be of "A" class divisions shall be of "B" class divisions which shall extend from deck to deck except:

.1 when continuous "B" class ceilings or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceiling or lining shall be of material which, in thickness and composition, is acceptable in the construction of "B" class divisions but which shall be required to meet "B" class fire integrity standards only in so far as is reasonable and practicable;

.2 in case of a FOP protected by an automatic sprinkler system the corridor bulkheads of "B" class materials may terminate at ceiling in the corridor provided such a ceiling is of material which, in thickness and composition, is acceptable in the construction of "B" class divisions. Such bulkheads and ceilings shall be required to meet "B" class fire integrity standards only in so far as is reasonable and practicable.

All doors and frames in such bulkheads shall be of non-combustible materials and shall be fitted in such a way as to provide sufficient fire resistance.

In corridor bulkheads, ventilation openings may be permitted only in and under the doors of cabins, public spaces, offices and sanitary spaces. The openings shall be provided only in the lower half of the door. Where such an opening is in or under a door, the total net area of any such opening or openings shall not exceed 0,05 m².

If such an opening is cut in a door, it shall be fitted with a grille made of non-combustible material. Such openings shall not be provided in a door in a division forming a stairway enclosure.

2.1.6.5 All bulkheads that shall be "A" class divisions shall extend from deck to deck and to deckhouse side or other boundaries.

2.1.6.6 All bulkheads required to be of "B" class divisions, except corridor bulkheads required by 2.1.6.4, shall extend from deck to deck and to the exterior boundaries of superstructure or other boundaries unless the continuous "B" class ceilings or linings, having at least the same fire integrity as the bulkhead, are fitted on both sides of it, in which case the bulkhead may terminate at the continuous ceiling or lining.

2.1.6.7 Continuous "B" class ceilings or linings in association with the relevant decks or bulkheads may be accepted as contributing wholly or in part to the required insulation and integrity of a division.

2.1.6.8 On FOP, the minimum fire integrity of bulkheads and decks separating adjacent spaces shall be as prescribed in Tables 2.1.6.8-1 and 2.1.6.8-2.

The following requirements shall govern application of the tables:

.1 tables apply respectively to the bulkheads and decks separating adjacent spaces;

.2 for determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in 12 categories below. The title of each category is intended to be typical rather than restrictive.

(1) Control stations (CS):

spaces in which the emergency sources of power and lighting are located;

spaces containing radio equipment;

fire extinction stations, fire control stations and stations where the indicating unit of fire detection and fire alarm system is located;

main machinery control station (CCR), provided it is located outside the machinery space containing main machinery;

main process control station;

spaces containing centralized fire announcing system;

spaces, in which the central station and emergency loudspeaking communication equipment are situated.

(2) Corridors:

corridors and lobbies.

(3) Accommodation spaces:

spaces as defined in 1.2.2, excluding corridors.

(4) Stairways and lifts:

interior stairways, lifts and enclosures thereto (a stairway or lift, which is enclosed only at one level shall be considered as part of the space from which it is not separated by a fire door).

(5) Service spaces (low fire risk):

lockers and storerooms not having provisions for the storage of flammable liquids;

drying rooms;

workshops, which are not part of machinery spaces.

(6) Machinery spaces of Category A:

spaces as defined in 1.2.2.

(7) Other machinery spaces:

spaces as defined in 1.2.2 other than machinery spaces of Category A;

tanks for fuel oil and other oil products (if installed in a separate space containing no machinery);

fuel oil and industrial pipe tunnels;

closed passages and trunks serving the spaces listed above.

Table 2.1.6.8-1

Bulkheads not bounding either main vertical zones or main horizontal zones

Spaces		*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
CS, including process CS	*(1)*	A-0[1]	A-0	A-60	A-0	A-15	A-60	A-15	H-60[2, 3, 4]	A-60	*	A-0	A-60
Corridors	*(2)*		C[5]	B-0[5]	B-0 A-0[6]	B-0[5]	A-60	A-0	H-60[2, 3, 4]	A-0	*	B-0[5]	A-0
Accommodation spaces and TR	*(3)*			C[5]	B-0 A-0[6]	B-0[5]	A-60	A-0	H-60[2, 3, 4]	A-0	*	C[5]	A-0
Stairways and lifts	*(4)*				B-0 A-0[6]	B-0 A-0[6]	A-60	A-0	H-60[2, 3, 4]	A-0 *	*	B-0 A-0[6, 7]	A-0
Service spaces (low fire risk)	*(5)*					C[5]	A-60	A-0	H-60[2, 3, 4]	A-0	*	B-0	A-0
Machinery spaces of Category A	*(6)*						*	A-0	H-60[3]	A-60	*	A-0	A-60
Other machinery spaces	*(7)*							A-0[1]	H-0[3]	A-0	*	A-0	A-0
PA, oil storage tanks, wellhead area, manifold area	*(8)*								–	H-60[2, 3, 4]	*	H-60[2, 3, 4]	H-60[3]
Service spaces (high fire risk)	*(9)*									A-0[1]	*	A-0	A-0
Open decks	*(10)*										–	*	*
Sanitary and similar spaces	*(11)*											C[5]	A-0
Hazardous areas	*(12)*												–

[1] Where the spaces are used for the same purpose, no divisions may be fitted between them.
[2] Refer to 2.2.1 — 2.2.3.
[3] If the results of a Risk Analysis or Fire Load Analysis reviewed and accepted by RS justify such, an "A-60" division may be used in lieu of an “H-60” division (bulkhead, deck). An "A-0" division used in conjunction with the pressure water-spraying system and/or water-screen system may be used as an equivalent means of meeting the "A-60" class division. Regarding protection of windows and scuttles in fire-resistant bulkheads, refer to 2.5.1.
[4] Divisions facing potential sources of jet fires (refer to 2.1.5) and located within 15 m and less shall be additionally "J" class rated according to the requirements in 2.2.2.1 and 2.2.3.1.
[5] Where the divisions are the main vertical zone divisions required by 2.1.6.2, they shall be of "A-60" class standard.
[6] Refer to 2.4.2.
[7] Where toilets are installed completely within stairway enclosure, fire integrity of the toilet bulkhead within the stairway enclosure may be of "B" class.

N o t e s : 1. Where the contents and use of a space are such that there is a doubt as to its classification, it shall be considered as space within the relevant category having the most stringent boundary requirements.
2. Where a dash appears in the Table, it means that there are no special requirements for material or fire integrity of boundaries.
3. Letters N.A. mean that the adjacent space arrangement is not applicable.
4.Where an asterisk “*” appears in the Table, the division shall be of steel or equivalent material, but need not be of "A" class. However, where the division is penetrated for the passage of electric cables, pipes, etc., such penetrations shall be fitted with sealings of approved type.

Table 2.1.6.8-2

Decks not forming steps in main vertical zones nor bounding horizontal zones

Spaces		*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Control stations, including process control stations	*(1)*	A-0	A-0	A-0	A-0	A-60	A-60	A-0	H-60[1, 2, 3]	A-0	*	A-0	A-0
Corridors	*(2)*	A-0	*	*	A-0	*	A-60	A-0	H-60[1, 2, 3]	A-0	*	*	A-0
Accommodation spaces and TR	*(3)*	A-60	A-0	*	A-0	*	A-60	A-0	N.A.	A-0	*	*	
Stairways and lifts	*(4)*	A-0	A-0	A-0	*	A-0	A-60	A-0	H-60[1, 2, 3]	A-0	*	A-0	A-0
Service spaces (low fire risk)	*(5)*	A-15	A-0	A-0	A-0	*	A-60	A-0	H-60[1, 2, 3]	A-0	*		A-0
Machinery spaces of Category A	*(6)*	A-60	A-60	A-60	A-60	A-60	*	A-60	H-60[2, 3]	A-60	*	A-0	A-60
Other machinery spaces	*(7)*	A-15	A-0	A-0	A-0	A-0	A-0	*	H-0[2, 3]	A-0	*	A-0	A-0
Process area, oil storage tanks, wellhead area, manifold area	*(8)*	H-60[1, 2, 3]	H-60[1, 2, 3]	N.A.	H-60[1, 2, 3]	H-60[1, 2, 3]	H-60[2, 3]	H-60[2, 3]	–	H-60[1, 2, 3]	–	H-60[1, 2, 3]	–
Service spaces (high fire risk)	*(9)*	A-60	A-0	A-0	A-0	A-0	A-0	A-0	H-60[1, 2, 3]	A-0[4]	*	A-0	A-0
Open decks	*(10)*	*	*	*	*	*	*	*	–	*	–	*	–
Sanitary and similar spaces	*(11)*	A-0	A-0	*	A-0	*	A-0	A-0	H-60[1, 2, 3]	*	*	*	A-0
Hazardous areas	*(12)*	A-60	A-0	A-0	A-0	A-0	A-60	A-0	–	A-0	–	A-0	–

[1] Refer to Footnote 2 to Table 2.1.6.8-1.
[2] Refer to Footnote 3 to Table 2.1.6.8-1.
[3] Refer to Footnote 4 to Table 2.1.6.8-1.
[4] Refer to Footnote 1 to Table 2.1.6.8-1.

N o t e . Refer to the Notes to Table 2.1.6.8-1.

(8) Process area (PA):
area as defined in 1.2.2;
drill floor (wellhead area);
oil storage: tanks and other reservoirs intended for storage of oil, including slop tanks;
manifold area.
(9) Service spaces (high fire risk):
galleys, pantries containing cooking appliances;
storerooms containing flammable liquids (including paints, medicines, etc.);
laboratories, in which flammable liquids are stored.
(10) Open decks:
open deck spaces (spaces outside the superstructures), excluding drilling and process areas, which are not adjacent to these areas.
(11) Sanitary and similar spaces: communal sanitary spaces, laundries, shower rooms, water closets, etc.
(12) Hazardous areas:
areas as defined in 1.2.2.

2.2 PROTECTION OF ACCOMMODATION SPACES, SERVICE SPACES AND CONTROL STATIONS

2.2.1 In general, accommodation spaces, service spaces, control stations and spaces containing vital machinery and equipment shall be located outside hazardous areas and shall not be located above or below oil storage tanks or PA.

However, where this is not practicable, an engineering evaluation shall be performed in accordance with the national or international standards (refer to standards such as ISO 13702:2015 or API RP 2 FB) to ensure that the level of fire protection and explosion resistance of the bulkheads and decks separating these spaces from the hazardous areas are adequate for the likely hazard. Where it is shown that these spaces may be exposed to a radiant heat flux in excess of 100 kW/m^2, divisions (bulkhead or decks) shall be constructed to at least an "H-60" standard.

2.2.2 The exterior boundaries of superstructures and deckhouses enclosing accommodation spaces, service spaces and control stations, including any overhanging decks supporting such spaces, which face and are within 30 m of the centre of the rotary table (PA), shall be constructed to:

.1 "H-60" standard for the whole of the portions that could be exposed directly to the radiant heat from a fire in PA and, besides, such portions located within 15 m of potential sources of jet fires (refer to 2.1.5) shall be additionally "J-60" class rated;

.2 "A-60" standard for all the rest areas.

2.2.3 The exterior boundaries of superstructures and deckhouses enclosing TR, which face and are within 30 m of the centre of the rotary table (PA), shall be constructed to:

.1 "H-120" standard for the whole of the portions that could be exposed directly to the radiant heat from a fire in PA and, besides, such portions located up to 15 m inclusive of potential sources of jet fires (refer to 2.1.5) shall be additionally "J-120" class rated;

.2 "A-60" standard for all the rest areas.

2.2.4 Fire protection of the accommodation load-bearing structures related to the PA structures shall be provided according to Table 2.6.1.

2.2.5 Spaces containing the equipment intended for well drilling, collection, storage, treatment and transportation of well products shall not be adjacent to accommodation spaces and control stations (CS) and shall be enclosed by "A-0" class divisions.

2.3 ARRANGEMENT OF SPACES AND EQUIPMENT

2.3.1 General arrangement of spaces and equipment on FOP shall meet the following objectives:

to minimize the possibility of hazardous accumulations of flammable liquid and gases, and to provide for the rapid removal of any accumulations which do occur;

to minimize the probability of ignition;

to minimize the spread of flammable liquids and gases which may result in a hazardous event;

to segregate areas required to be non-hazardous from those designated as being hazardous;

to minimize the consequences of fire and explosions;

to provide for safe evacuation of the personnel from FOP.

2.3.2 General arrangement of spaces and equipment on FOP shall meet the following functional requirements:

to minimize fire and explosion risks;

to maximize, as far as reasonable, the separation by distance of TR, accommodation spaces and evacuation, escape and rescue (EER) facilities from areas containing equipment handling products (hydrocarbons);

to use fire resistance barriers in the deck or bulkhead plane for preventing the escalation of fire or explosion to another area (it shall be considered that provision of such barriers influences ventilation, access/escape routes, ESD/EDP system design, explosion resistance and firewater demands). The interdependency of safety systems shall be considered during the FOP design. Any penetration of a barrier provided to prevent escalation of a fire or explosion shall not jeopardize the barrier integrity;

critical safety systems, such as control stations, TR, muster areas, fire pumps and local control panels shall be located where they are least likely to be affected by fires and explosions; in some situations, such systems shall be designed to withstand fire and explosions and be protected from the ingress of smoke, at least until the personnel on board have been safely evacuated or the emergency situation has been brought under control;

blowout preventer (BOP) shall be able to perform its functions under emergency conditions that shall include the ability to initiate and operate this equipment during these conditions. Considerations shall also be given to location and operation of well-killing equipment in order to allow it to be used under emergency conditions;

to protect critical items of process equipment, especially where failure can result in a major loss of inventory; it shall be determined whether the equipment will be at risk of impact from falling objects or collisions and whether impact protection is required.

2.3.3 FOP shall be divided into different areas according to the type of activities that will be carried out and the associated hazard potential. Areas of high-risk potential shall be segregated from areas of low risk potential, and from areas containing important safety functions.

2.3.4 Location of non-hazardous areas surrounded or partly surrounded by hazardous ones is not normally accepted.

2.3.5 Accommodation spaces, service spaces, control stations and spaces containing vital machinery and equipment shall be located be located as far as possible from hazardous areas (vital machinery and equipment are those that are essential to the safety of FOP and all personnel on board; they include (but are not limited to) fire pumps, emergency sources of power, remote blowout preventer activation controls, and other operational or safety systems the sudden failure of which may result in hazardous situations; this does not include spaces located on the drill floor, e.g. the driller's cabin).

Use of fire-resisting bulkheads or fire barriers, blast bulkheads, cofferdams, etc. shall be considered in cases where segregation by physical distance is not sufficient.

2.3.6 Cofferdams shall be of sufficient size for easy access (minimum distance between bulkheads shall be 600 mm). Pump rooms and ballast tanks may serve as cofferdams.

2.3.7 Each area shall be arranged so that to minimize the consequences of fire and explosion, in particular:

.1 TR, as a rule, shall not be adjacent to PA and shall be protected from heat effect in case of fire by the superstructure or deckhouses;

.2 exterior boundaries of TR protected according to 2.3.7.1 may be insulated as "A-60" class (refer to 2.2.3.2).

2.3.8 Stores for hazardous substances shall be segregated and located at a safe distance from accommodation spaces and control stations. Indoor storage areas shall have access from open deck and have efficient ventilation.

2.3.9 The cuts in the barriers between zones shall be reduced to the minimum and any cut for a pipeline, cables, etc. shall be effectively isolated and have the same fire integrity as the barrier through which it passes.

2.3.10 Oil storage shall be isolated from machinery spaces, accommodation and service spaces, control stations, drinking and fresh water tanks by cofferdams.

2.3.11 Oil storage shall be arranged in such a way as to allow efficient external fire fighting assistance.

2.3.12 Where arrangement of accommodation spaces is provided in the same superstructure with the process equipment, consideration shall be given to the appropriate location of the accommodation spaces to minimize impairment from fire and explosion.

2.3.13 Accommodation spaces, control stations and service and machinery spaces connected therewith, in so far as is reasonable and practicable, shall be located collectively in the superstructure separated from the drilling and PA.

2.3.14 No fuel oil and lubricating oil tanks shall be located adjacent to the accommodation spaces, service spaces and control stations located in the superstructure.

2.4 STAIRWAYS, LIFT TRUNKS AND ESCAPE ROUTES

2.4.1 Stairways shall be constructed of steel or equivalent material. Stairways situated within superstructures shall be protected by divisions with self-closing doors.

2.4.2 Stairways, which penetrate only a single deck, shall be protected at least at one level by "A" or "B" class divisions and self-closing doors so as to limit the rapid spread of fire from one deck to another.

Personnel lift trunks shall be protected by "A" class divisions.

Stairways and lift trunks which penetrate more than a single deck shall be surrounded by "A" class divisions and protected by self-closing doors at all levels.

2.4.3 Stairway enclosures shall have direct communication with the corridors and be provided with landings as required by 8.5.4.2, Part III "Equipment, Arrangements and Outfit" of the RS Rules/C. Within the perimeter of such stairway enclosures, only public toilets, lockers for storage of salvage and fire fighting outfit are permitted. Only public spaces, corridors, public toilets, open decks and other stairways required by 8.5, Part III "Equipment, Arrangements and Outfit" of the RS Rules/C are permitted to have direct access to these stairway enclosures.

2.4.4 Furniture shall not be permitted in corridors forming escape routes in accommodation areas.

2.4.5 Consideration shall be given to the siting of superstructures, deckhouses and equipment such that in the event of fire at the drill floor or in PA at least one escape route to the embarkation position and survival craft is protected against radiation effects of that fire exceeding 2,5 kW/m^2, as far as practicable.

2.5 CLOSURES OF OPENINGS IN FIRE-RESISTING AND FIRE-RETARDING DIVISIONS

2.5.1 Where the exterior boundaries of superstructures and deckhouses facing the drilling or process area, as well as the adjoining outward sides for a distance of 3 m are required to be fitted with windows and side scuttles, the latter shall be of non-opening type to meet the requirements of 7.2, Part III "Equipment, Arrangements and Outfit" of the RS Rules/C.

Installation of windows and side scuttles of opening type providing their rapid closure.is permitted outside hazardous areas (refer to definition in 1.2).

Windows and side scuttles in "A-60" and "H-60" class divisions or divisions with combined fire integrity (H/J) facing the drilling or process area shall be of fire class complying with these structures or shall be protected by water-screen or pressure water-spraying system with the rate of water discharge 10 l/min per 1 m² or shall be fitted with permanently hinged inside deadlights of steel or equivalent material (on FOP with attending personnel only).

2.5.2 No doors to accommodation spaces, control stations and service, machinery spaces connected therewith and other spaces directly communicating with such spaces shall be fitted in the exterior boundaries of superstructures and deckhouses facing the drilling or process area and also on adjoining outward sides for a distance of 3 m.

2.5.3 No doors, windows and other openings shall be generally arranged on hull structures with a center situated at a distance of 3 m from the point of the drilling mud diversion.

2.5.4 The fire resistance of doors shall, as far as practicable, be equivalent to that of the division in which they are fitted. External doors in superstructures and deckhouses shall be self-closing and constructed to at least "A-0" class standard.

2.5.5 Self-closing doors in fire rated bulkheads shall not be fitted with hold-back hooks. However, hold-back arrangements incorporating remote release fittings may be utilized.

2.6 ADDITIONAL REQUIREMENTS FOR FIRE INTEGRITY

2.6.1 Fire integrity of the FOP load-bearing structures shall meet the requirements of Table 2.6.1.

Table 2.6.1

Fire area	Fire integrity of load-bearing structures				
	Accommodation block/ Temporary refuge (AB/TR)	Non-hazardous service areas (SA)	Wellhead areas (WH)	Process areas (PA), including gas compression areas	Control stations (CS)
AB/TR	1/CF/400	1/CF/400	N/A	N/A	1/CF/400
SA	1/CF/400	1/CF/400	1/ЦП/400	1/CF/400	1/CF/400
WH	1/JF[1]/400	1/JF[1]/400	1/СП[1]/400	1/JF[1]/400	1/JF[1]/400
PA	1/JF[1]/400	1/JF[1]/400	1/СП[1]/400	1/JF[1]/400	1/JF[1]/400
CS	1/CF/400	1/CF/400	N/A	N/A	1/CF/400

[1] "PF" type of fire may be considered as appropriate if the evaluation of fires in the area proves that "JF" is not a credible basis for the calculation of structural fire protection.
Notes: 1. Rating is specified as: period of resistance (hours)/type of fire/critical temperature, °C.
2. Type of fire: PF — pool fire, CF — cellulosic fire, JF — jet fire.

Temperature 400 °C stated in Table 2.6.1 is the critical temperature for load-bearing steel structures. The corresponding value for load-bearing aluminium structures is 200 °C. For other materials the critical temperature is the temperature, at which the yield strength is reduced to the minimum allowable strength level for operational loading cases.

The values given in Table 2.6.1 shall be read as follows:

where load-bearing structures for accommodation spaces are connected with structures in PA, then the load-bearing structures shall be protected against jet fire for 1 h at the ultimate temperature of the steel structure equal to 400 °C;

where several different fires are possible in the area, the type of fire, for which the strictest requirements for structural fire protection are established, shall be selected, unless this case is proven to be unrealistic for use as a design basis.

2.6.2 Table 2.6.2 prescribes standard fire integrity requirements for critical equipment which shall perform its emergency functions.

Structural fire protection of the spaces shall prevent the temperature rise to the level specified in Table 2.6.2.

Table 2.6.2

Type of equipment	Protection criteria	
	Surface temperature, °C	Protection period, min
Riser sections	< 200[1]	60[2]
Riser supports	< 400	60[2]
Topside riser ESD valve	< 200	60[2]
Fire pumps	< 200	60
Emergency generators	< 200	60
UPS systems	40[3]	30
Control panels for sub-surface isolation valve (SSIV)/ sub-surface safety valve (SSSV)/BOP	40[3]	15

[1] In the absence of any knowledge with regards to the relative location of the fire on the riser, the ESD valves, and the contents of the riser, it has been assumed that the fire is near the ESD valves and the riser is filled with liquid hydrocarbon. As a result, 200 °C has been used as the default surface temperature for the riser sections to ensure the integrity of the ESD valves.
[2] Minimum time period considered sufficient for a complete evacuation of FOP.
[3] PFP can be provided to prevent temperature in the enclosure containing this equipment rising to these levels when subjected to an external fire.

2.7 EXPLOSION MITIGATION AND PROTECTION SYSTEMS

2.7.1 Explosion mitigation and protection system (EMPS) aim is to reduce explosion probability up to acceptable level.

2.7.2 EMPS shall meet at least one of the following requirements:

reduction of the probability for explosion occurrence;

monitoring of an explosion by mitigation techniques that reduce explosion loads to acceptable levels;

mitigation of the consequences from an explosion and reduction of the accident progression as a result of explosion loads;

determination of pressure/loadings time histories, which are generated either from experimental/test data or computer models;

provision of the explosion mitigation measures to limit explosion overpressure and/or to ensure adequate strength.

2.7.3 Evaluation of explosion loads and relevant probabilities of exceedance of those loads shall be performed, as well as evaluation of probabilities of critical structures and equipment response to those explosion loads.

Evaluation for the development of EMPS shall:

determine the systems required to preserve the integrity of the structure, most of the equipment and piping systems;

evaluate the possibility of using water deluge system for explosion control;

determine the potential for accident progression resulting from blast damage which might impair the essential safety systems operation, and from the effect of any fire which may occur after an explosion.

2.7.4 When developing fire and explosion strategy (FES), the following effects of explosions shall be considered:

projectiles as a result of pressure vessels and pipework failures in a fire;

blast overpressure, which is a function of among other parameters type and amount of flammable material, overall dimensions and geometry, obstacle-generated turbulence, and confinement of the area;

drag forces, which are developed ahead of or behind the flame front and which might impose significant loads on equipment, pipework, or structure and which might escalate the damage created by the explosion.

2.7.5 The severity and consequences of an explosion can be minimized by the use of blast divisions, relief panels, equipment installation layout, use of active explosion suppression systems, or sufficient equipment strength to prevent escalation.

However, the preferred method of protection shall be by the avoidance of features which will cause high overpressures and by providing adequate venting to allow unburned gas and combustion products to flow out of the compartment before dangerously high pressures develop.

Blast overpressures can be effectively reduced by adopting the approach of inherent safety by design. This requires that the layout and location of equipment is such as to minimize equipment and pipework congestion, limit the use of confining walls, limit module volumes, and provide adequate venting. For these reasons, open-type installations are generally preferred. It shall be noted that this often conflicts with requirements for weather protection. Special attention is needed to develop solutions accounting for both explosion safety and weather protection.

2.7.6 The following explosion-suppression measures shall be taken:

locating product handling equipment in areas which are well ventilated where the consequences of an explosion are limited or where the structure can be designed to withstand the forces generated by an explosion;

limiting the number of bulkheads to separate areas or modules;

using grated flooring;

avoiding long and narrow modules;

locating process equipment in the open areas, if environmental conditions allow, as explosion pressure is dependent on the level of congestion and confinement;

avoiding significant obstructions, if this cannot be achieved, ventilation outlets in the bulkheads with frequent obstructions shall be provided.

2.7.7 Where explosion pressure relief valves are provided, they shall be so placed as to minimize the distance between any potential source of ignition and the valve. Such valves shall have the maximum possible free area, as the arrangement of equipment near them, can have major influence on the maximum overpressures expected in the area.

Main escape routes, essential safety systems and vulnerable process equipment shall not be located in the path of the pressure relief valves, due to possible damage by blast effects and projectiles. Besides, such equipment shall not be placed close to barriers, which may be displaced in the event of an explosion.

Cable trays, junction boxes, pipelines and miscellaneous equipment shall not be allowed to block the explosion pressure relief valves and reduce the free area near them, nor shall they be located in the areas where they will increase turbulence and thus explosion overpressures.

2.7.8 In addition to the above, the following explosion-mitigation measures are recommended:

locating equipment in hydrocarbon service in areas which are well ventilated where the consequences of an explosion are limited or where the structure can be designed to withstand the forces generated by an explosion;

avoiding accumulation of flammables by provision of walls to separate areas or modules, avoiding perimeter cladding or using grated flooring;

minimizing number of the ignition sources;

mitigating by venting, water sprays, chemicals, and dilution;

designing collapse in a cascade fashion such that failure occurs first in less critical directions;

during design making critical equipment/structures/barriers, including supports for equipment, pressure vessels and pipelines, as strong as reasonably practicable with regard to the uncertainty of any predictions of explosion overpressures (protection level);

optimizing the layout of equipment and piping within a module/area and location of walls and blast relief panels in accordance with the following:

orientate horizontal vessels so that the longest dimension is in the direction of main vent flow;

avoid long narrow modules;

do not obstruct the openings in the module boundaries;

maximize openings in decks (floors, ceilings) by using, in particular, grated flooring;

recognize that the accuracy of any predictions of explosion overpressures is not fully known, and in particular, depends on the predictive tool being used;

minimize flame path.

The hazard posed by projectiles shall be assessed by considering the likelihood of impact and damage caused by the projectile.

The recommended variants of module layout are shown in Fig. 2.7.8.

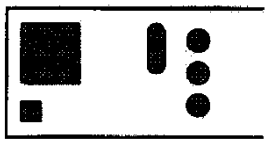
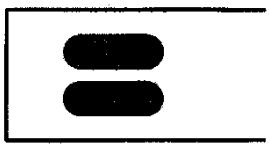
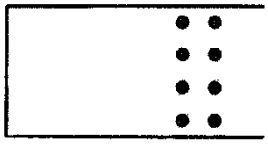
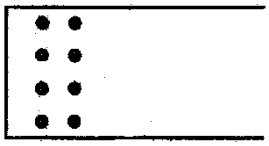
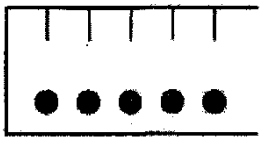
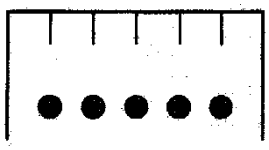
Poor layout	*Effect*	*Good layout*
	*Volume reduction*	
	*Reduction of blocking factor and the number of obstructions*	
	*Moving of obstructions inside the module*	
	*Lateral ventilation*	

Fig. 2.7.8
Effect of layout on explosion severity

2.7.9 The combined effect of venting and layout modifications is complex and shall be validated by blast calculations or experimental scaling. However, these effects can only be assessed quantitatively for specific situations.

Models used to calculate explosion loading shall be validated as far as possible and allowance shall be made for the uncertainty in the model.

A decision to use design overpressure less than predicted maximum shall be based on the assessment of importance of such pressure for personnel safety.

2.7.10 Explosion-protection requirements for structures, equipment, piping and supporting structures shall normally be documented, with structural calculations, which take into account the dynamic behavior related to the short duration of explosion loading.

In special cases, results of the simulated tests conducted according to recognized standards or procedures, or an engineering judgement may be accepted.

Guidance regarding the design of structural members for explosion loading is provided in GOST R 54483-2021 (ISO 19900:2013) and ISO 19902:2020.

2.8 HELICOPTER FACILITIES

2.8.1 Helicopter facilities (a complex of technical means, including a helideck, helicopter refueling facilities and compressed gas or special liquid filling facilities (if any), as well as spaces (if any) where helicopter maintenance facilities are located and hangars) shall be so arranged as to ensure protection of FOP against fire hazard associated with the use of helicopters:

.1 the helicopter facilities shall be arranged away from the drilling and process area, as well as from the areas containing sources of ignitions and spaces where large amounts of heat are produced;

.2 the helicopter facilities shall not be adjacent to accommodation spaces;

.3 the helicopter facilities shall be so located that in the event of fire in the drilling or process area they are protected by the superstructures against direct effects of the flame.

2.8.2 The helicopter facilities shall meet the requirements of Section 6, Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the RS Rules/C.

2.9 SPACES FOR WELDING OPERATIONS. FIXED OXYGEN AND ACETYLENE SYSTEM

2.9.1 Spaces for electric welding operations and storerooms for storage of oxygen and acetylene cylinders shall comply with the requirements of 2.1.5.6, Part VI "Fire Protection" of the RS Rules/C.

2.9.2 Areas for the storage of oxygen and acetylene cylinders shall not be located in the vicinity of the drilling and process area. Provision shall be made for the expeditious removal of oxygen and acetylene cylinders from the storage rooms in the event of fire.

2.9.2.1 Where cylinders are stowed on open deck, means shall be provided to:

.1 protect cylinders and associated piping from likely damages and heating;

.2 ensure suitable drainage from the deck areas where the cylinders are stowed.

2.9.3 Fixed piping system for oxygen and acetylene shall comply with the following requirements:

.1 pipes shall be made of steel or equivalent material and approved joints shall be fitted;

.2 material containing more than 70 % of copper shall not be used in the fittings, except for welding and cutting tips;

.3 allowance shall be made for expansion of piping;

.4 pipes shall be as short as possible and protected from physical damage.

2.9.4 Fire-extinguishing arrangements for the protection of spaces for electric welding operations shall comply with the requirements of item 4.13 of Table 5.1.2, Part VI "Fire Protection" of the RS Rules/C. Fire-extinguishing arrangements for the protection of areas or spaces on open deck where such cylinders are stored shall be agreed with the Register.

3 FIRE-FIGHTING EQUIPMENT AND SYSTEMS

3.1 GENERAL

3.1.1 The requirements of this Section are applicable to all fire-fighting equipment and systems fitted on FOP.

Where provision is made on a FOP for extra fire-fighting equipment and/or fire extinguishing systems in addition to those prescribed by this Section, such equipment and/or systems shall also comply with the requirements set out below, to the extent agreed with the Register in each case.

The fire extinguishing systems shall also comply with the requirements of Sections 2, 4, 5, Part VIII "Systems and Piping" of the RS Rules/C.

3.1.2 In addition to the water fire main system and in accordance with the purpose for which they are intended, spaces of FOP, considering performance of fired work therein, shall be protected by one of the fixed fire extinguishing systems according to Table 3.1.2, unless expressly provided otherwise.

Fixed fire-extinguishing systems shall comply with the applicable requirements of Section 3, Part VI "Fire Protection" of the RS Rules/C.

3.1.3 In well-grounded cases, instead of water-screen and pressure water-spraying systems, fire-resisting and fire-retarding divisions may be used.

3.1.4 Decks in way of oil storage tanks and the tanks themselves shall be protected by a fixed deck foam fire extinguishing system and fixed inert gas system, except that instead of the above systems, the Register, considering the arrangement and equipment of FOP, may accept other combinations of the fixed systems, provided they ensure equivalent protection.

To be reckoned as equivalent, the system proposed instead of the deck foam fire extinguishing system shall:

extinguish oil spillage fire and prevent ignition of oil spillages which are not on fire yet;

extinguish fire in all opened oil storage tanks.

3.1.5 Arrangement of fire-fighting equipment and installation of fire extinguishing system pipes in the areas of zones to be specified shall be carried out, as far as practicable, in such a way as to avoid damage risk in the event of emergency and to retain their operability.

3.1.6 Automatic release of fire extinguishing medium is not permitted, except the cases indicated in 3.3, 3.6.3 and 3.11.2.7, Part VI "Fire Protection" of the RS Rules/C.

Table 3.1.2

No.	Description of spaces	Fixed fire extinguishing systems						
		Sprinkler	Pressure water-spraying	Water screen	Foam fire extinguishing	Carbon dioxide smothering	Dry powder	Aerosol
1	Accommodation spaces excluding sanitary spaces (shower-rooms, bathrooms, toilets, indoor swimming pools, small laundries, etc.)	+[1]						
2	Service spaces: storerooms for combustible materials	+[1]						+
3	Service spaces: paint stores	+	+			+	+[2]	+[3]
4	Storerooms for flammable liquids, flammable liquefied and compressed gases[4]	+[5]	+[5]		+[6]	+	+[2]	+[3]
5	Spaces for process equipment		+		+[6]	+		+[3]
6	Degasser room		+		+[6]			
7	Open decks in way of hazardous zones		+		+[7]			
8	Drill floor, collectors		+		+[7]		+	
9	Pumps/compressors		+		+[7]			
10	Gas treatment area		+		+[8]		+	
11	Methanol area, including service pumps		+	+	+[9]			
12	Blowout preventer (BOP) area		+		+[7]			
13	Machinery spaces of Category A. Hangars for helicopters and fuel distribution stations		+[10]		+[10, 11]	+[10]		+
14	Silencers of internal combustion engines, exhaust gas boilers, exhaust ventilation ducts of galley					+		
15	Means of escape (refer to 2.4.5)			+				
16	Exits from machinery spaces and process equipment spaces enclosed in trunks			+[13]				
17	Helideck				+[7]			
18	Oil collecting tanks				+[7]			
19	Special electrical rooms (refer to 1.2.1, Part X "Electrical Equipment")					+		

[1] With attending personnel not over 100 in number — on agreement with the customer; with attending personnel over 100 in number — the system is compulsory.
[2] Dry powder fire extinguishing system shall ensure the delivery of not less than 0,5 kg powder/m^2.
[3] Explosion-proof aerosol generators shall be installed.
[4] Storerooms for flammable liquids, liquefied and compressed gases, paint stores need not be fitted with a fixed fire extinguishing system, if the volume of each storage space is not more than 4 m^2.
[5] Water-mist fire extinguishing systems shall be used.
[6] A system using medium expansion foam shall be used.
[7] A system using low expansion foam with the use of monitors shall be provided.
[8] If area contains significant flammable liquids.
[9] Alcohol-resistant foam shall be used. In lieu of the foam fire extinguishing system a portable foam unit may be used if the methanol area is small.

No.	Description of spaces	Fixed fire extinguishing systems						
		Sprinkler	Pressure water-spraying	Water screen	Foam fire extinguishing	Carbon dioxide smothering	Dry powder	Aerosol
[10] Where the machinery space of Category A and spaces containing fired processes are not entirely separate, or if fuel oil can drain from the latter spaces into the machinery space, the combined machinery space and fired process space shall be considered as one compartment. [11] A system using high expansion foam shall be used. [12] The silencers of medium- and high-speed engines need not to be fitted with the fixed fire extinguishing system, when there are spark arresters in the exhausts. [13] Required if the trunk is constructed of "A-0" class division. To be fitted outside the trunk.								

3.2 WATER FIRE MAIN SYSTEM

3.2.1 The water fire main system shall meet the applicable requirements of 3.2.3.4, 3.2.3.5, 3.2.3.7, 3.2.5.2, 3.2.5.3, 3.2.6.1, 3.2.6.3, 3.2.6.4, 3.2.6.6 and 3.2.6.8 of Part VI "Fire Protection" of the RS Rules/C.

The system shall be designed considering structural features of FOP as a multi-level structure. The fire main on FOP shall be arranged as a ring one with shut-off valves fitted to keep the system operable when certain sections of the ring main are disconnected, and other levels and compartments shall be fitted with pipes branching from the inner fire main with the necessary number of fire hydrants and monitors.

3.2.2 At least two independently driven fire pumps shall be provided, each arranged to draw water from the its own sea valve and discharge into a fixed fire main.

The fire pumps, together with their source of power, piping and valves, shall be located such that a fire in any one compartment will not render both fire pumps inoperable.

At least one of the pumps shall be diesel engine driven, unless the emergency power supply can supply the load for an electric motor driven pump.

3.2.3 The fire pumps diesel engines shall be fitted with independent fuel tanks. Reserves of fuel shall provide continuous pump operation for at least 6 h. Fuel tanks, piping and power cables shall be protected against fire and mechanical damage.

3.2.4 Two water supply sources (sea chests, valves, strainers and pipes) shall be provided and so arranged that one water supply source failure shall not put the other supply source out of action.

3.2.5 On FOP with high suction lifts, booster pumps may be installed, provided such arrangements satisfy the requirements of 3.2.6 — 3.2.14.

3.2.6 One of the two fire pumps shall be designated as the primary fire pump, and the other as the standby fire pump.

3.2.7 The total capacity and head of the fire pumps shall be sufficient to ensure simultaneous operation of the water fire main system and other fire extinguishing systems using water and required for fighting a fire in one of the spaces or areas on open deck of FOP for which the maximum quantity of water is required.

3.2.8 The capacity and head of each fire pump shall be sufficient to ensure simultaneous operation of the water or foam fire extinguishing systems and two nozzles with diameter of 19 mm while maintaining the minimum pressure of 0,35 MPa at hydrants and shall be determined by calculation.

The pumps shall be capable of maintaining a minimum pressure of 0,7 MPa at the foam installation.

If the water consumption for other fire extinguishing systems exceeds the rate of the water fire main system, this consumption shall be the determining factor in calculating the required capacity of the fire pumps.

3.2.9 Fire pumps providing water to the pressure water-spraying system shall be started automatically.

3.2.10 Where the fire pumps are located in spaces not normally manned, suitable provision shall be made for remote start-up of those pumps and remote operation of associated valves to be effected either from the manned spaces, e.g. the central control room (CCR) or fire station, or from the helideck (if any) according to 6.4.1.4, Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the RS Rules/C.

3.2.11 Every centrifugal pump, which is connected to the fire main, shall be provided with a non-return valve fitted on the delivery pipe.

3.2.12 Relief valves shall be provided in conjunction with all pumps connected to the fire main if the pumps are capable of developing a pressure exceeding the design pressure of the fire main, hydrants and hoses. Such valves shall be so placed and adjusted as to prevent excessive pressure in the fire main system.

3.2.13 Sea water storage tanks shall comply with the requirements of 3.3.2.2, Part VIII "Systems and Piping".

The capacity of the tanks shall be such that minimum permissible amount of water therein permits the operation of two fire hose nozzles during 15 min, but in any case, the capacity shall be not less than 10 m³.

Where fixed foam fire extinguishing system is provided, the capacity of the tanks shall be such that minimum permissible amount of water therein permits the operation of at least one fire hose nozzle within 15 min and at least one foam unit within 30 min, but in any case the capacity shall not be less than 20 m^3.

3.2.14 On FOP with attending personnel over 100 in number, the water fire main system shall be kept under pressure at all times. The indicators of the fire main water pressure drop shall be provided at the CCR.

3.2.15 The fire main shall where practicable, be routed clear of hazardous areas and be arranged in such a manner as to make maximum use of physical protection afforded by the FOP structure.

3.2.16 The fire main shall be provided with isolating valves located so as to permit optimum utilization of the main in the event of physical damage to any part thereof.

3.2.17 The fire main shall not have connections other than those necessary for fire-fighting purposes.

3.2.18 Additionally, a fixed fire main shall meet the requirements of 3.2.18.1 — 3.2.18.6.

3.2.18.1 The diameter of the fire main and water service pipes shall be sufficient for the effective distribution of the maximum required discharge from the required fire pumps operating simultaneously.

3.2.18.2 With the required fire pumps operating simultaneously, the pressure maintained in the fire mains shall meet the requirements of this Part and be adequate for the efficient operation of all equipment supplied therefrom.

3.2.18.3 All practical precautions shall be taken to protect the fire main under pressure against freezing on its pipelines located on the open decks and in the non-heated spaces.

3.2.18.4 In constructing of fire mains, the requirements of 3.1.4.2, Part VI "Fire Protection" of the RS Rules/C shall be met.

3.2.18.5 The number and position of the hydrants shall be such that at least two jets of water, not emanating from the same hydrant, one of which shall be from a single length of fire hose, may reach any part of FOP normally accessible to the personnel or crew on board. Fire hose shall be provided for every hydrant.

3.2.18.6 FOP shall be provided with at least one international shore connection complying with the requirements of 5.1.8, Part VI "Fire Protection" of the RS Rules/C. Facilities shall be available on the main line enabling such a connection to be used on two opposite sides of FOP.

3.3 PRESSURE WATER-SPRAYING SYSTEM

3.3.1 The pressure water-spraying system is provided to protect the areas and spaces as specified in Table 3.1.2, including protection of areas with the pipelines and equipment directly related to production, critical equipment such as pressure vessels, well heads, specific structural members. The system shall provide cooling of the process equipment and reduce the fire spread probability.

3.3.2 Each area shall be protected by a section (sections) forming part of the pressure water-spraying system. Between each section and distribution pipework the stop valve shall be installed that is clearly and permanently indicated and readily accessible in a location outside the areas and spaces to be protected.

3.3.3 Distribution pipework shall have self-draining capability.

3.3.4 Means for testing the operation of each section and system section valves shall be provided by purging with compressed air (without water supply to the nozzles).

3.3.5 Water pressure available at the inlet to an individual section shall be sufficient for the efficient operation of all nozzles in that section under design water rate (when designing the pressure water-spraying system, the approved technique for hydraulic calculation shall be used).

A gauge indicating the pressure in the system shall be provided at each section stop valve and at the CS.

3.3.6 Selected nozzle type, location, position and orientation shall be so that to ensure the supply of the required quantity of water on the protected surfaces. Outlets of the nozzles and cross-section of the associated pipeline of the section shall be selected to prevent them from becoming clogged by corrosion products.

3.3.7 The design capacity of the pumps supplying the pressure water-spraying system shall be sufficient to provide the rate of water discharge not less than 10 l/min per 1 m^2 of the deck of the protected area or space, unless otherwise specified below.

3.3.8 The following areas and process equipment located on open deck shall be protected by the pressure water-spraying system with the water discharge rate not less than 20,4 l/min per 1 m^2:

drilling area with the relevant equipment, including ESD equipment, critical structural components and enclosure fire barriers;

oil and gas collectors;

pumps and compressors;

mud circulation and treatment equipment;

piping containing oil and gases;

compressed gas cylinders (oxygen, acetylene, etc.).

3.3.9 Instead of the pressure water-spraying system the multiple fixed monitors discharging at a minimum flow rate and pressure 1900 l/min at 1 MPa may be provided. They shall be arranged such that all areas and equipment can be reached by at least two monitors, which are widely separated.

Each monitor shall have sufficient movement horizontally and vertically in order to permit the monitor to cover the FOP complete area of protection.

When the oscillating monitors are used, they shall be provided with means of disengaging the oscillating mechanism to allow rapid conversion to manual operation. The monitors shall be also provided with fixing devices.

The monitors may be operated either remotely or locally.

Remotely operated monitors shall be arranged so that they cannot cause injury or block escape routes when operated.

Locally operated monitor shall be available in a readily accessible position and provided with an access far removed from the FOP protected area. The platform of the manually operated monitor shall be protected from the effects of heat radiated by the fire by the water screen system (not required for remotely operated monitors).

3.3.10 The main fire pumps may be used to supply the fixed pressure water-spraying system if they have sufficient capacity to simultaneously supply the water-spraying and fire main systems at the required flow and pressure.

3.3.11 A lockable non-return shut-off valve shall be fitted at the connection pipeline.

3.3.12 The pipelines shall be protected against mechanical damage as well as against fire and explosion.

3.3.13 Nozzles, piping, fittings and related components shall be designed to withstand exposure to temperatures up to 925 °C.

3.3.14 Release of the pressure water-spraying system shall be provided automatically upon receiving the fire detection signal, shall be possible both manually at the fire risk area and remotely at the control station (fire station) outside the protected area where the operating status of the system (e.g. "valve is open/closed") is monitored.

3.3.15 Automatic fire detection and fire alarm system shall be installed in the areas protected by the water-spraying system.

3.4 WATER-SCREEN SYSTEM

3.4.1 The water-screen system is provided to protect escape routes and survival craft embarkation stations against heat radiation from possible fires as specified in Table 3.1.2, as well as to protect the areas where the critical equipment (refer to 2.6.2) is installed against the areas where other process equipment, for example, tanks with methanol, including the service pumps, is installed.

3.4.2 The release of the water screen system shall be performed manually from the place of possible fire and remotely from positions outside the areas and spaces to be protected.

3.4.3 The water-screen system shall be generally fed from the water fire main. The design capacity of the pumps supplying the system shall be sufficient to provide 70 l/min per linear metre of the screen length. Water discharge of the water-screen nozzles, internal diameters of supply and distribution pipelines, pipeline pressure at the nozzles shall be confirmed by the hydraulic calculation.

3.4.4 Length of the screen protecting escape routes shall be not less than the length of the escape route. In areas where the escape routes are protected (screened) against heat radiation from possible fires in PA by superstructures or deckhouses, the water screens shall be extended along their bulkheads for not less than 3 m.

3.5 FOAM FIRE EXTINGUISHING SYSTEM

3.5.1 The foam fire extinguishing system is provided to protect decks in way of the fuel oil tanks and the tanks themselves, as well as the spaces and areas specified in Table 3.1.2.

3.5.2 The foam fire extinguishing system shall meet the applicable requirements of 3.7, Part VI "Fire Protection" of the RS Rules/C.

3.5.3 Sufficient foam concentrate shall be supplied to ensure 20 min of foam generation when the oil storage tanks are provided with an inert gas system and 30 min when the oil storage tanks are not provided with an inert gas system.

3.5.4 The installation of foam fire extinguishing system is not obligatory if FOP is designed to prevent product penetration onto the upper deck and if the FOP hull is not intended for product storage.

3.5.5 Provisions may be made for the installation in the FOP PA of fixed foam generators connected to the foam solution distribution pipeline which provides foam supply sufficient to cover the whole area but not less than 500 m^2.

3.5.6 The system shall be capable of delivering foam solution at a rate of not less than 6 l/min per 1 m^2.

3.5.7 Foam extinguishing system shall be provided for operation in drilling mud treatment area. The system shall be capable of delivering foam solution at a rate of not less than 6,5 l/min per 1 m^2 (4,1 l/min per 1 m^2 for aqueous film-forming foam concentrate (AFF) or film-forming fluoroprotein foam concentrate (FFFP)) for 15 min. Alternatively, a fixed gas fire extinguishing system may be used for enclosed mud treatment spaces.

3.5.8 The number of portable foam generators and foam applicators shall be determined by calculation in accordance with Tables 3.7.1.3 and 3.7.2.3, Part VI "Fire Protection" of the RS Rules/C.

3.5.9 Provisions shall be made for the installation on the fire main in each PA of the fire hydrants or valve chests the number of which shall be such as to ensure foam supply from at least two portable foam generators or air-foam nozzles connected to different fire hydrants.

3.5.10 On FOP the piping of the foam fire extinguishing system shall be connected to the fire main to use the foam for fire-fighting in accommodation and service spaces.

3.5.11 Helideck fixed foam fire extinguishing system on FOP shall meet the requirements of 6.4.1, Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the RS Rules/C.

3.6 SPRINKLER SYSTEM

3.6.1 Automatic sprinkler system is provided to protect the spaces indicated in Table 3.1.2 where cellulosic fires are expected.

3.6.2 The system shall meet the applicable requirements of 3.3, Part VI "Fire Protection" of the RS Rules/C.

3.7 DRY POWDER SYSTEM

3.7.1 The dry powder system is provided to protect the areas and spaces specified in Table 3.1.2 (to protect the spaces with the equipment not containing liquid hydrocarbons, as well as the process equipment with a limited content of hydrocarbon liquids).

3.7.2 The dry powder system shall meet the applicable requirements of 3.10, Part VI "Fire Protection" of the RS Rules/C. The nature of potential fires shall be considered in selecting the type of dry powder and equipment.

3.7.3 Dry powder may be discharged through the hand hose lines or fixed monitors aimed at the fire point. Several powder fire extinction stations may be provided.

3.7.4 When powder and foam concentrate are expected to be used at the same location, their compatibility shall be confirmed.

3.7.5 Release of the dry powder system shall be provided automatically upon receiving the fire detection signal, shall be possible both manually at the fire risk area and remotely at the control station (fire station) outside the protected area.

4 FIRE DETECTION AND ALARM SYSTEMS

4.1 FIRE DETECTION AND FIRE ALARM SYSTEM

4.1.1 FOP shall be provided with an automatic fire detection and fire alarm system.

4.1.2 In addition to the spaces referred to in 4.2.1, Part VI "Fire Protection" of the RS Rules/C, automatic fire detectors shall be fitted in the spaces within hazardous zones and areas 1 and 2 specified in 2.9, Part X "Electrical Equipment" of the FOP Rules.

4.1.2.1 An automatic fire detection and fire alarm system shall be provided and arranged in such a way as to ensure smoke detection in accommodation spaces.

4.1.2.2 The fire detection main indicator board shall be placed at a permanently manned control station to indicate where fire has been detected:

.1 fire detectors shall be fitted in normally unattended machinery spaces, in this case fire detection systems using only thermal detectors shall not be permitted;

.2 automatic fire detection and alarm system shall be provided in accommodation and service spaces, and accommodation spaces shall be fitted with smoke detectors. Thermal detectors shall be fitted in galleys;

.3 smoke detectors shall be provided at control stations and in electrical rooms;

.4 thermal or flame detectors shall be installed in drilling and mud treatment areas. Smoke detectors may be used in enclosed mud treatment areas.

4.2 MANUAL FIRE ALARMS

4.2.1 FOP shall be provided with manual fire alarms.

4.2.2 In addition to the spaces referred to in 4.2.1, Part VI "Fire Protection" of the RS Rules/C, manual fire alarms shall be fitted in the spaces within hazardous zones and areas 1 and 2 specified in 2.9, Part X "Electrical Equipment" of the FOP Rules.

4.3 GAS DETECTION AND ALARM SYSTEMS AND EQUIPMENT

4.3.1 Fixed combustible gas (oil gases and vapours) and hydrogen sulphide detection and alarm systems shall be provided.

4.3.1.1 Fixed combustible gas detection and alarm systems shall be provided to protect the following areas:

.1 cellar deck;

.2 drill floor;

.3 ventilation intake of positive pressure driller's cabin;

.4 mud pit area;

.5 shale shaker area;

.6 enclosed spaces containing the open components of mud circulation system from the bell nipple to the mud pits;

.7 ventilation intakes of accommodation spaces;

.8 ventilation intakes of enclosed machinery spaces contiguous to hazardous areas and containing internal combustion engines, boilers, or non-explosion proof electrical equipment;

.9 air intakes to all combustion engines or machinery, including internal combustion engines, boilers, compressors or turbines, located outside of an enclosed machinery space;

.10 at each access (door) to accommodation spaces except for access doors forming part of an air-lock which is provided with a gas detection and alarm system;

.11 near other openings, including emergency egress, of accommodation spaces, regardless if these openings are fitted with self-closing and gastight closing appliances except for emergency egress doors which are fitted with a mechanism to prevent use other than in an emergency (e.g. doors fitted with security seals acting as a deterrent but easily breakable in a real emergency) as well as except for openings which are designed for maintenance and provided with closing appliances of non-opening type, e.g. bolted closed maintenance ways, etc.

4.3.1.2 Fixed hydrogen sulphide detection and alarm system shall be provided to protect the following areas:

drilling floor;

drilling mud treatment area;

well area.

Hydrogen sulphide detectors shall be connected to an audible and visual alarm system with indicators at the central control station. The system shall indicate where gas has been detected. Low level alarm set at 3 mg/m³ and high-level alarm set not higher than 10 mg/m³ shall be designed. The high-level alarm shall activate an evacuation alarm. If the alarm at the central control station is unanswered within 2 min, hydrogen sulfide alarm and evacuation alarm shall be automatically activated.

4.3.1.2.1 The need for fixed automatic hydrogen sulphide detection and alarm system to be provided on FOP shall be determined on the basis of the results of hydrogen sulphide detection in the well fluid of the first exploration well.

4.3.2 A gas detection and alarm system shall function continuously and shall ensure:

.1 giving visual and audible signals at the appropriate local control station, drill master’s cabin, industrial and at the central control station when the concentration of oil gases and vapours is not more than 20 % and 50 % of LEL;

.2 starting the ventilation system for operation with maximum air changes per hour in the space;

.3 cutting off the sampling devices or oil gas or vapour detectors operating on thermochemical principle when hydrogen sulphide concentration reaches 10 mg/m³ with a signal being given to the central control station;

.4 giving alarm signal at the central control station to indicate failure in the system itself.

4.3.3 Visual signals to indicate oil gas and vapour concentration shall be distinct from the signals to indicate hydrogen sulphide concentration.

4.3.4 The components of the system shall meet the requirements of Part XI "Electrical Equipment" of the RS Rules/C.

4.3.5 The design of detectors and instruments fitted in hazardous zones and areas shall meet the requirements of 2.11, Part X "Electrical Equipment".

4.3.6 Sampling devices shall be made of materials resistant to the attack of oil gases and hydrogen sulphide vapours. The diameter and length of the piping shall be based on the supply time of gas sample to the detector to be not in excess of 60 s.

4.3.7 Use of change-over devices, which provide successive gas monitoring in several points is permitted. The fixed position shall be maintained during the time period sufficient for a gas sample to pass to the detector.

4.3.8 Positions of the oil gas or vapour concentration sampling devices or detectors (hydrogen sulphide concentration detectors) are dictated by the field facilities construction project with due regard for the density of gases, technical data and location of the equipment used.

4.3.9 On drilling units, gas sampling devices or detectors of the oil gas/vapour monitoring system shall be fitted:

.1 in spaces:

in way of delivery side of each drilling mud and cement pump at a height of not more than 0,5 m above the deck or above the continuous plating;

above the drilling mud tanks at a height of 0,2 m above their upper edge and at a height of 0,5 m above the deck where they are fitted;

near the shale shaker at a distance of not more than 1 m, horizontally, at a height of not more than 0,5 m above it;

.2 on open decks — near the drilling mud diverter, at least in four points at a distance of not more than 1 m therefrom. Where the diverter is located in semi-enclosed spaces, not less than in two points.

4.3.10 On drilling units, gas sampling devices or detectors of hydrogen sulphide monitoring system shall be fitted:

.1 in spaces containing drilling mud tanks, drilling mud pumps and mud circulating system:

in the working area at a height of not more than 1 m above the deck or above the continuous plating;

near the shale shaker at a distance of not more than 1 m therefrom at a height of 1 m above the deck (floor);

.2 in open and semi-enclosed areas — near the drilling mud diverter.

4.3.11 A unit shall be provided with:

.1 two portable gas monitoring devices capable of measuring a concentration of oil gases and vapours;

.2 two portable gas monitoring devices capable of measuring a concentration of hydrogen sulphide.

5 FIRE-FIGHTING OUTFIT, SPARE PARTS AND TOOLS

5.1 GENERAL

5.1.1 As a minimum, the fire-fighting outfit, spare parts and tools shall comply with Section 5, Part VI "Fire Protection" of the RS Rules/C as applied to oil tankers and as far as the helicopter facilities are concerned they shall comply with 6.4, Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the RS Rules/C.

5.1.2 Fireman's outfit shall be supplied to the units, as a minimum, in compliance with the requirements of Section 5, Part VI "Fire Protection" of the RS Rules/C as applied to oil tankers, with due account of 5.1.2.1 — 5.1.2.3.

5.1.2.1 Use of a smoke helmet or a smoke mask complete with an air hose and an air pump is not permitted in the fireman's outfit.

5.1.2.2 Each fireman's outfit shall include a portable instrument for measuring oxygen and flammable vapour concentrations.

5.1.2.3 For FOP having superstructure divided into main vertical fire zones, provision shall be made for two additional fireman's outfits.

5.1.3 The number and distribution of portable fire extinguishers in spaces of FOP, except for the helicopter facilities, shall be adopted in accordance with Section 5, Part VI "Fire Protection" of the RS Rules/C, as applied to oil tankers. Where the requirements of Section 5, Part VI Part VI "Fire Protection" of the RS Rules/C differ from the requirements of Table 5.1.3 it will be necessary to be guided by the latter, considering the fire hazard characteristic of the space concerned.

5.1.4 Recharging of air cylinders.

The apparatus for recharging air cylinders, if provided on FOP, shall have its power supplied from the emergency supply or be independently diesel-powered, or be so constructed or equipped that the air cylinders may be used immediately after recharging:

.1 the apparatus shall be suitably located in a sheltered space above main deck level on FOP. Intakes for air compressors shall draw from a source of clean air. The air shall be filtered after compression to eliminate compressor oil contamination;

.2 the apparatus for recharging shall be: breathing air compressors with a minimum capacity of 60 l/min but not more than 420 l/min, or self-contained air storage systems of suitable pressure to recharge the breathing apparatus used in FOP, with a capacity of at least 1200 l per required breathing apparatus, but not to exceed 50000 l of free air.

5.1.5 Breathing equipment to protect the personnel against hydrogen sulphide:

.1 self-contained breathing apparatuses of PPR/PDR types with full-face piece rated for a minimum of 30 min, shall be provided for each person in working areas where hydrogen sulphide may be encountered. Each person in other areas shall be provided with self-contained breathing apparatus of PPR/PDR types rated for a minimum of 15 min; or

.2 breathing air line coupled with a self-contained breathing apparatus of PPR/PDR types equipped with low pressure warning alarm installed and rated for a minimum of 15 min, shall be provided for each person on board FOP.

Breathing air supply line shall be provided at least in the following areas:

living quarters;

muster/evacuation areas;

drilling floor;

mud treatment area;

other working areas.

Table 5.1.3

Nos.	Items of outfit	Number of items of outfit to be available in FOP
1	Portable foam fire extinguishers, dry powder fire extinguishers and carbon dioxide fire extinguishers. The use of dry powder fire extinguishers is permitted in all spaces instead of foam and carbon dioxide fire extinguishers except for the spaces where the energized electrical and radio equipment is installed of over 1000 V	**1.** Machinery spaces: 1 foam fire extinguisher and 1 carbon dioxide fire extinguisher to extinguish fire on electrical equipment and main control panels when the main control panels are installed in space containing the main power sources; 2 carbon dioxide fire extinguishers in the immediate vicinity of the main control panel. **2.** Machinery spaces of category A: 1 foam fire extinguisher nearby each furnace front in spaces containing oil-fired boilers provided that the total capacity of additional fire extinguishers for any one space does not exceed 45 l; 2 foam fire extinguishers or equivalent thereto in each space containing fuel-oil units; 1 foam fire extinguisher for each 750 kW, or part thereof, of the machinery power. The total number of portable fire extinguishers so provided shall be not less than two, however, there is no need for more than six portable fire extinguishers. **3.** Machinery spaces of category A which are periodically unattended: 1 foam fire extinguisher at each entrance to the space. **4.** Cranes driven by internal combustion engines: 1 dry powder fire extinguisher at the crane control location (in cabin) and 1 foam fire extinguisher at exterior to the crane machinery compartment **5.** Drill floor: 1 dry powder fire extinguisher at each exit to drill floor but not less than 2. **6.** Mud pits and mud processing area: 1 foam fire extinguisher for each enclosed space. Travel distance to the fire extinguisher shall not to exceed 10 m for open space. **7.** Spaces wherein fired work is performed: 2 foam fire extinguishers or equivalent thereto in each such space
2	Foam fire extinguishers of at least 45 l capacity	1 fire extinguisher or equivalent thereto in each machinery space of category A

6 DANGEROUS GOODS

6.1 Dangerous goods carried on FOP shall be stored and secured safely according to class/subclass of the goods with due account of the provisions of 6.2 — 6.6 as well as all applicable requirements of the IMDG Code.

6.2 Incompatible goods shall be segregated from one another.

6.3 Explosives shall be stored in a suitable magazine which shall be kept securely closed to prevent unauthorized access. Such explosives shall be segregated from detonators.

6.4 Flammable liquids which give off dangerous vapours and flammable gases shall be stored in well-ventilated spaces (requirements of 2.1.5.3, Part VI "Fire Protection" of the RS Rules/C shall be fulfilled as well) or on open deck.

6.5 Substances, which are liable to spontaneous heating or combustion, shall not be carried on board the FOP unless adequate precautions have been taken to prevent the outbreak of fire.

6.6 Radioactive substances shall be stored and handled in a safe manner.

Russian Maritime Register of Shipping

Rules for the Classification and Construction of Fixed Offshore Platforms
Part VI
Fire Protection

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