RUSSIAN MARITIME REGISTER OF SHIPPING

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GUIDELINES

ON TECHNICAL SUPERVISION DURING MANUFACTURE OF SHIP AND OFFSHORE SERVICE MODULES

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GUIDELINES ON TECHNICAL SUPERVISION DURING MANUFACTURE OF SHIP AND OFFSHORE SERVICE MODULES

Guidelines on Technical Supervision During Manufacture of Ship and Offshore Service Modules 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 October 2023.

The Guidelines supplement the Rules for the Classification and Construction of Sea-Going Ships, the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships, the Rules for the Classification and Construction of Mobile Offshore Drilling Units, the Rules for the Classification and Construction of Fixed Offshore Platforms and other RS rules in so much as applicable to the ship and offshore service modules.

The Guidelines are published in Russian and English in electronic format.

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 SCOPE OF APPLICATION

1.1.1 The requirements of the Guidelines on Technical Supervision During Manufacture of Ship and Offshore Service Modules[1] apply to the ship and offshore service modules[2] designed to perform special service tasks on sea-going ships and offshore installations and capable of being handled in open seas, to, from, and between fixed or floating facilities and ships.

1.1.2 During installation and operation of the modules on sea-going ships and floating facilities, the same regulatory documents apply to the modules as to sea-going ships and floating facilities (e.g., the Code for the Construction and Equipment of Mobile Offshore Drilling Units, 2009, as adopted by IMO resolution A.1023(26), as amended[3], International Convention for the Safety of Life at Sea, 1974, as modified by the Protocols of 1978 and 1988 and amended by subsequent resolutions[4], Flag State regulations, government regulations, etc.).

Where the modules are installed and used on MODU and FOP, the requirements of the Rules for the Classification and Construction of Mobile Drilling Units[5] and the Rules for the Classification and Construction of Fixed Offshore Platforms[6] shall be applied.

1.1.3 The purpose of these Guidelines is to provide solutions to ensure an adequate level of safety in accordance with the codes, regulations and standards specified in these Guidelines.

1.1.4 The requirements of SOLAS-74 apply to the modules used on ships and some floating facilities. The requirements of the 2009 MODU Code apply to the modules used on mobile offshore drilling units (MODU), including self-elevating MODU. This applies regardless of when such modules are installed and used.

These Guidelines contain the basic safety requirements that comply with the requirements of SOLAS-74 and the 2009 MODU Code regarding provision of requirements for evacuation, fire detection and fire protection.

1.1.5 The equipment subject to the RS approval, as defined in the RS rules for ships/MODU/FOP, shall be approved in accordance with the applicable RS rules/standards prior to its commissioning and use in the module approved in compliance with these Guidelines.

1.1.6 These Guidelines do not contain any requirements for commissioning of the modules. Installation of the modules on the items of the RS technical supervision (ships and offshore installations) shall be carried out under technical supervision.

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[1] Hereinafter referred to as "these Guidelines".
[2] Hereinafter referred to as "the modules".
[3] Hereinafter referred to as "the 2009 MODU Code".
[4] Hereinafter referred to as "SOLAS-74".
[5] Hereinafter referred to as "the MODU Rules".
[6] Hereinafter referred to as "the FOP Rules".

1.2 DEFINITIONS

1.2.1 Definitions and abbreviations related to the general terminology of these Guidelines are given in Section 1 "General" of the General Regulations for the Technical Supervision of Containers. For the purpose of these Guidelines, the following definitions and explanations have been adopted.

Gas tightness means doors, walls or dampers which shall maintain a pressure differential between adjacent areas. The allowable leakage rate shall not exceed 0,5 m^3/ m^2h at +50 Pa.

Source of release means a point or location from which a flammable substance may be released into the room or building such that an explosive gas atmosphere could be formed.

Manning means manned for more than 2 h in a 24-hour period. If manning is provided and located externally, requirements for emergency lighting and ventilation are not considered mandatory. If ventilation provides explosion protection, the requirements for ventilation are considered mandatory.

Extreme location means an area which is out with the range of location defined for mid-point location.

Maximum operational weight means the maximum weight of the module during operation on deck, including materials, fluids (e.g. diesel, water or hydraulic fluid) or process materials (e.g. mud, cuttings) contained in the unit during operation. The maximum operational weight may be different to the maximum rating defined for the purposes of transportation and lifting.

Machinery spaces mean all machinery spaces of category A and all other spaces containing main machinery, shafting, boilers, fuel oil units, steam and internal combustion engines, generators and other major electrical machinery, fuel oil filling stations, ventilation and air-conditioning units, refrigerating plants, steering engines, stabilizing equipment and similar spaces, and trunks to such spaces.

Low flame spread means a surface, which in accordance with the International Code for Application of Fire Test Procedures, 2010 adopted by IMO resolution MSC.307(88), as amended[1], shall adequately restrict the spread of flame.

Offshore installation means a structure that may be a fixed/floating facility or a ship on which the module may be located.

Non-combustible material means material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750 °C, this being determined in accordance with the FTP Code.

In this context, the products made only from glass, concrete, ceramic products, natural stone, stone or brick sections, structural metals and metal alloys are considered non-combustible and may be installed without testing.

Short circuit proof means installation following one of the following methods:

bare conductors mounted on isolating supports;

single core cables (i.e. conductors with both insulation and overall jacket) without metallic screen or armour or braid, or with the braid fully insulated by heat shrink sleeves at both ends;

insulated conductors from different phases kept separated from each other and from earth by supports of insulating materials, or by the use of outer extra sleeves;

double insulated conductors.

Essential safety systems mean module integrated systems including required utilities, which are provided to prevent, detect or warn of an accidental event and/or mitigate its effect. The systems may include:

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

fire/gas detection and alarm system;
shutdown system;
public address/general alarm (PA/GA) systems;
supplies from emergency sources or uninterruptible power supplies (UPS);
fire protection and fire extinguishing systems.

Offshore accommodation modules mean modules used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, hairdressing salons, pantries containing no cooking appliances, laundries, storage spaces and similar spaces.

Note. The term "cabins" relates to sleeping areas. "Offices" are considered as spaces for paperwork/administrative tasks only. Facilities for office work incorporated into the same space as low voltage (up to 1 kV) control/monitoring equipment or laboratories, without an internal source of release, would not be considered accommodation spaces.

Offshore container means transport equipment having sufficient strength, with the maximum gross mass not exceeding 25000 kg, designed for repeated use in the transport of goods and/or equipment, handled in open seas to, from or between fixed and/or offshore installations. More detailed information is given in Part VII "Offshore Containers" of the Rules for the Manufacture of Containers[1].

Offshore important service modules mean modules for offshore installation which are critical to the safety of the offshore installation or modules that prevent, protect or mitigate from the effects of an accidental event. Examples may include accommodation units, emergency generators, well intervention equipment.

Offshore modules with category A machinery space mean modules containing:
internal combustion engines (ICE) used for main propulsion; or
ICE used for other purposes if their total power is not less than 375 kW; or
any oil-fired boilers or oil fuel units, or equipment operating on fuel oil other than boilers, such as inert gas generators, incinerators, etc.

Offshore service module means frame equipment with facilities manufactured and designed for special service tasks (mainly as temporary installations/structures) on offshore installations that may be handled in open seas to fixed/offshore installations.

Offshore service modules include: offshore accommodation modules, offshore important service modules, offshore modules with category A machinery spaces, etc., and may also include offshore frames with equipment.

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

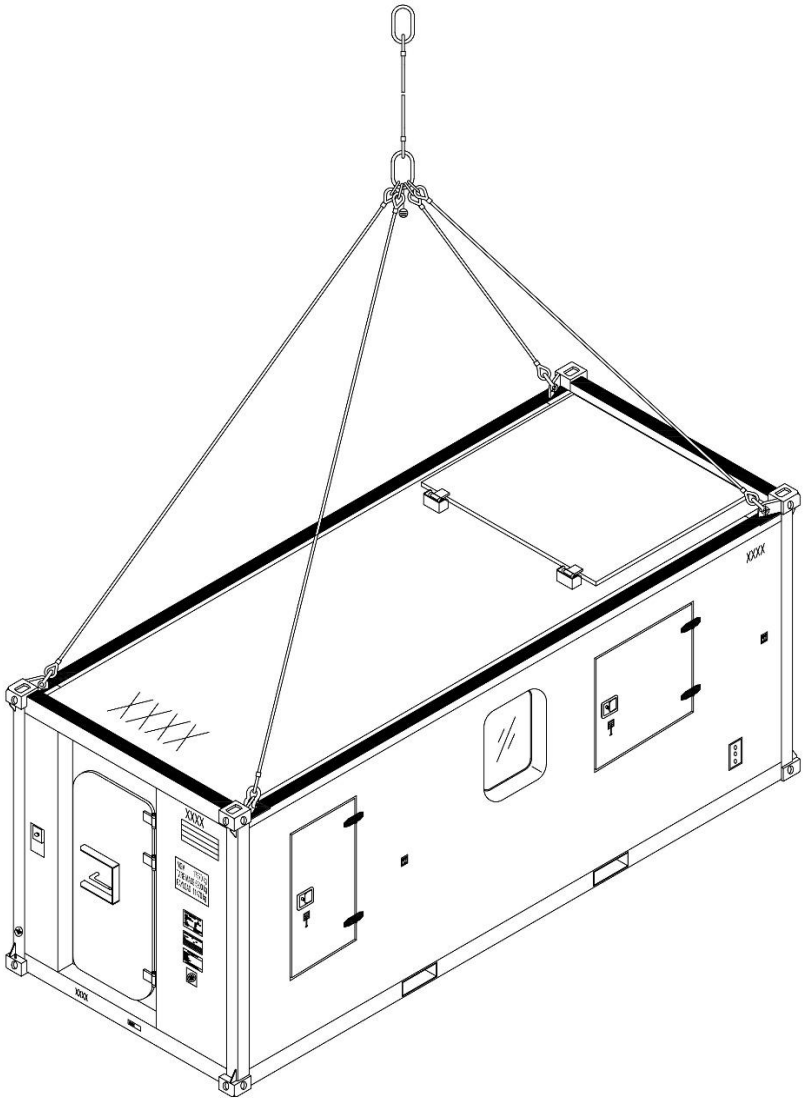

Fig. 1.2.1 Offshore service module with lifting set

Primary deck covering means the first layer of a floor construction, which is applied directly on top of the deck plating and is inclusive of any primary covering, corrosion-resistant compound or adhesive, which is necessary to provide protection or adhesion to the deck plating. Other layers of a floor construction, which are applied directly on top of the deck plating, constitute floor coverings.

Portable offshore unit (POU) means a unit or a package of units intended for repeated or single offshore transportation and installation/lifting of the equipment. POU may also be designed for subsea lifting.

Operation in automatic mode means, for the purposes of these Guidelines, unmanned operation of the equipment.

Certified safe equipment means equipment certified by an independent competent body to be in accordance with a recognized standard for electrical apparatus in hazardous areas.

Mid-point location means an area between 0,2 and 0,7 times the offshore installation length, measured from the aft.

Standard fire tests mean tests in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature curve in accordance with the test method specified in the FTP Code.

Ship service module means fitted frame equipment manufactured and designed to perform special service tasks on ships and not intended for handling in open seas.

1.3 ABBREVIATIONS

1.3.1 Abbreviations related to the general terminology of these Guidelines are given in Section 1 "General" of the General Regulations for the Technical Supervision of Containers. For the purpose of these Guidelines, the following abbreviations have been adopted:

CCR — cargo control room;

EMC — electromagnetic compatibility;

EN — European standard;

ESD — emergency shutdown;

EU/EEA — European Union/European Economic Area;

FSS Code — International Code for Fire Safety Systems, adopted by IMO resolution MSC.98(73), as amended;

FTP Code — International Code for Application of Fire Test Procedures, 2010, adopted by IMO resolution MSC.307(88), as amended;

IEC — International Electrotechnical Commission;

IP — degree of protection;

LEL — lower explosive limit;

LL-66/88 — International Convention on Load Lines, 1966, as modified by the Protocol of 1988, as amended;

MARPOL 73/78 — International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978, and the Protocol of 1997 relating thereto, as amended by subsequent resolutions;

2009 MODU Code — Code for the Construction and Equipment of Mobile Offshore Drilling Units, 2009, adopted by IMO resolution A.1023(26), as amended;

module — ship or offshore service module;

ODP — ozone depletion potential;

PA/GA — public address/general alarm;

POU — portable offshore unit;

OGE Rules — Rules for the Oil-and-Gas Equipment of Floating Offshore Oil-and-Gas Production Units, Mobile Offshore Drilling Units and Fixed Offshore Platforms;

SOLAS-74 — International Convention for the Safety of Life at Sea, 1974, as modified by the Protocols of 1978 and 1988 and amended by subsequent resolutions;

UPS — uninterruptible power supply.

1.4 TECHNICAL DOCUMENTATION

1.4.1 General:

.1 design or technical specification (for firms for which, the module design specification is not provided according to the applied normative documents) (*);

.2 operating manual (**);

.3 test programme and procedure for prototype modules and modules of a series (*);

.4 strength calculations of the main and secondary bearing structures by finite element analysis (**);

.5 strength calculations of pad eyes and fork lift pockets (where applicable) (**);

.6 drawings of parts, assemblies, general view drawings, general arrangement plans of module, drawings of marking and plates indicating materials and thickness, welding procedures and types of welded joints (*);

.7 weld examination diagram (*).

1.4.2 Documentation on electrical equipment (where applicable):

.1 electrical connection diagrams for equipment (*);

.2 connection diagram for intrinsically-safe circuits (*);

.3 calculation of intrinsically safe circuits (**);

.4 list of safe-type electrical equipment indicating explosion protection level (**);

.5 ESD diagram with detailed description of all functions (*);

.6 ESD procedure for important service modules (**);

.7 electrical connection and cable run diagram, as well as the cable penetrations through watertight and gastight structures (*).

1.4.3 Documentation on fire protection:

.1 insulation plan, deck coverings plan, scheme of linings of bulkheads and ceilings indicating fire integrity of divisions, information on type approval of insulating materials and fire-fighting divisions, as well as finishing materials (where required);

.2 installation diagram of closures indicating the types of closures (door, hatch, porthole, etc.) and their fire integrity, as well as information on type approval (*);

.3 installation diagram of penetrations (of pipelines, cables, ventilation ducts) in the divisions indicating their fire integrity and type approval (where required by 2.1.3, Part VI "Fire Protection" of the RS Rules/C) (*);

.4 diagram of fire extinguishing systems with calculations (where required);

.5 installation diagram of fire detectors (manual and automatic) of the fire detection and fire alarm system and automatic fire detectors of the flammable gas (hydrocarbon gases, hydrocarbon liquid vapours) detection and alarm system with connection diagrams, detailed description of signalling technique and information on type approval of components (*);

.6 additional information in the operating manual: fire risk category of the module; information on restrictions on storage of materials and/or types of works performed in the module; instructions on use of fire extinguishing systems and other fire extinguishing means (if any) in case of fire in the module; arrangement plan of portable/mobile fire extinguishers indicating their type and quantity;

.7 additional information in the operating manual on escape routes, including their dimensions and lighting;

.8 calculation of the total mass of combustible materials in accommodation and service spaces in accordance with 2.1.1.4, Part VI "Fire Protection" of the RS Rules/C (**).

1.4.4 System documentation (where applicable):

.1 gas detection alarm system:

.1.1 general arrangement plan of the system, component connection diagrams indicating the type, detector arrangement plan with description of signalling technique (*);

.2 public address system:

.2.1 general arrangement plan of the system (*);

.2.2 operating manual describing operational characteristics of the system and guidance (*);

.2.3 description of the systems' operation (**);

.2.4 drawings with information on connection to offshore installation (*);

.3 ventilation/overpressure system:

.3.1 diagram of ventilation ducts and instrumentation for the ventilation system (*);

.3.2 information describing the operational characteristics of the ventilation/overpressure system (where applicable) shall be added to the operating manual (**);

.3.3 calculation of purging time for the ventilation/overpressure system (**);

.3.4 calculation of ventilation, heating and cooling performance (**).

N o t e . The volume of technical documentation is minimal.

In paras 1.4.1 — 1.4.4, documentation marked with (*) is the documentation, which review results are documented by stamping in accordance with Figs. 8.2-1 or 8.2-2, Part II "Technical Documentation" of the Rules TSDCS, and documentation marked with (**) is the documentation, which review results are documented by stamping in accordance with Figs. 8.2-3 or 8.2-4, Part II "Technical Documentation" of the Rules TSDCS.

2 MODULE TYPES

2.1 GENERAL

2.1.1 Table 2.1.1 indicates the types of modules, the requirements for which are specified in these Guidelines. Modules shall be one of types 1 — 9 given in the Table. When the functions/equipment of groups A — G are used, the requirements of the applicable group shall be met. Applicable module groups shall be specified in the RS documents issued for the module.

Other types of modules other than those listed in the Table may be considered and included in these Guidelines after special approval/agreement.

Table 2.1.1

Module types and functional groups

		Description
Module type	1	Accommodation module
	2	Pressurized module — no internal source of release
	3	Non-pressurized module/frame
	4	Pressurized module with internal source of release
	5	Workshop for hotwork
	6	Flammable material/paint store
	7	Thermal modules
	8	Local equipment room (electrical equipment)
	9	Novel/special case equipment module
Functional group	A	Internal combustion engines (ICE)
	B	Air compressors
	C	Steam generators
	D	Well intervention equipment
	E	Diving systems
	F	Hydrocarbon gathering, treatment, storage and transportation equipment
	G	Well drilling and service equipment

3 STRUCTURAL TECHNICAL REQUIREMENTS

3.1 GENERAL

3.1.1 The modules will be subject to various static or dynamic loads during transportation, handling and operation on offshore installations. In addition to principal loads such as the module weight and the effects of lifting, miscellaneous loads associated with the module proposed location and mode of operation shall also be considered where applicable.

In addition to relevant lifting or transportation related loads (refer to 3.2), modules for use on floating facilities will be subject to additional forces during operation. Applicable loads based upon offshore installation type are specified in 3.3 and 3.4. Fig. 3.1.1 summarizes the main structural requirements to be defined by the designer and satisfied where relevant, depending on operational requirements for the module.

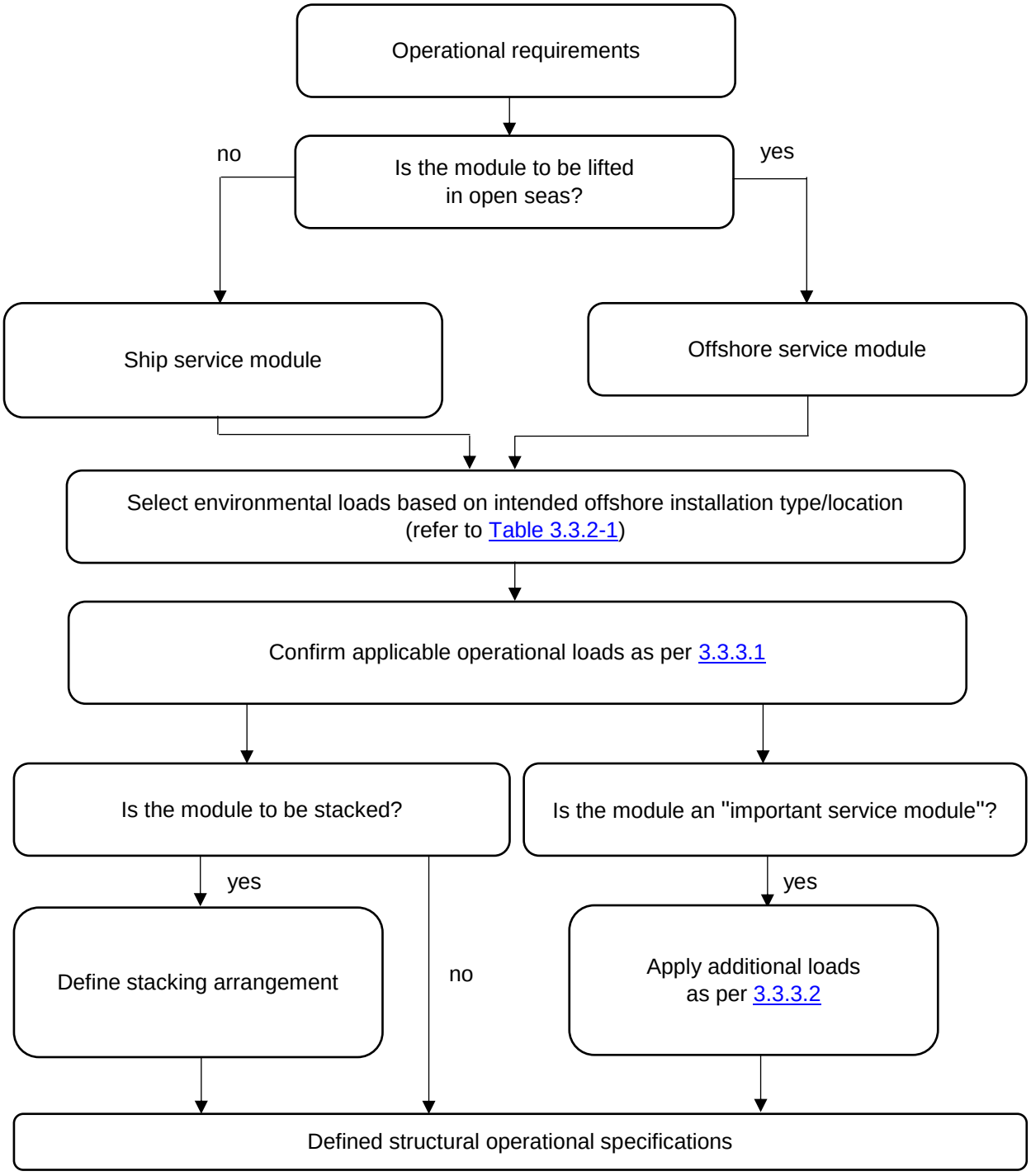
Operational requirements
Is the module to be lifted in open seas?
no
yes
Ship service module
Offshore service module
Select environmental loads based on intended offshore installation type/location (refer to Table 3.3.2-1)
Confirm applicable operational loads as per 3.3.3.1
Is the module to be stacked?
Is the module an "important service module"?
yes
yes
Define stacking arrangement
no
Apply additional loads as per 3.3.3.2
Defined structural operational specifications

Fig. 3.1.1

3.2 LIFTING

3.2.1 The modules approved in compliance with the requirements of these Guidelines shall also meet the requirements of Part VII "Offshore Containers" of the RMC (including IMO Circular MSC/Circ. 860).

N o t e . If sea-transportation as a freight container is required, the modules shall be approved as ISO/CSC containers.

To facilitate international transport by sea, the modules shall be manufactured as ISO/CSC containers, since such modules can be carried as standardized cargo units on container carriers and other dry cargo ships. Modules that are not ISO/CSC containers will normally be transported as special cargo.

Modules manufactured according to ISO 1496 shall be approved in accordance with CSC. The structural requirements specified in ISO 1496 and CSC and related to transport and handling are not generally relevant for modules when installed on ships and offshore installations and as such will be subject to the additional requirements given in this Section.

3.2.2 Additional fittings for lifting.

In addition to the pad eyes and slings used for offshore handling, some modules and POU may be provided with extra sets of fittings for lifting and handling. These may include pad eyes, tugger points, etc. used for handing the module on an offshore installation only.

These additional fittings shall not be used to lift and transfer a module from/to a supply vessel. Such information shall be stated in the RS documents for module and shall be clearly marked on the module.

3.3 OFFSHORE INSTALLATION INDUCED LOADS

3.3.1 General information.

Installation induced and other miscellaneous loads shall be defined and documented by the designer and/or customer; realistic values may be specified for generic operational conditions. Additional loads shall be applicable for important service modules (refer to 3.3.3.2). Operational limitations used as the basis for approval are specified in the RS documents for module.

It is recommended that the thickness of the module outer walls be a minimum of 4 mm however shall be demonstrated as sufficient to withstand the loads specified in this Chapter. Special attention shall be paid to buckling control of thin-plated structures subject to compressive stresses.

Allowable bending and shear stresses shall be taken as $160/\eta$ and $90/\eta$ N/mm^2, respectively, where η is the application factor of mechanical properties of steel (refer to 1.1.4.3, Part II "Hull" of the RS Rules/C).

N o t e . The plate flanges of corrugated/stiffened plates shall be checked for buckling. The compression stresses σ_c in the plate flange, induced by lateral pressure and local bending shall not exceed the critical buckling stress times utilization factor $\sigma_c \times \eta$. For loads applied on normal load level $\eta = 0,8$.

3.3.2 External environmental loads.

For floating facilities and ships, the ship motions will be applicable as might direct sea pressure, the nature and severity of which will depend on the nature of the floating facility and the proposed location of the module on deck. Table 3.3.2-1 defines minimum loads which shall be considered.

Table 3.3.2-1

Environmental parameters

Ship's type	Sea pressure		Acceleration				Other applicable loads[1]	
			Mid-point location		Extreme location			
	Mid-point location, kPa	Extreme location, kPa	Horizontal	Vertical	Horizontal	Vertical	Wind, kPa	Securing[2]
Floating offshore oil-and-gas product unit, drilling ship[3]	Refer to Fig. 3.3.2-1	Refer to Fig. 3.3.2-2	0,75g	0,6g	0,75g	1,0g	Refer to Fig. 3.3.2-1 or 3.3.2-2	Yes
Service vessel, supply vessel			0,5g	0,3g	0,5g	0,5g		
Semi-submersible unit			0,35g	0,3g	0,35g	0,3g		
Self-elevated MODU, FOP	—		---				Yes	No

[1] Applicable loads defined for reference, however all applicable loads, including those specified in 3.3.3.1 and 3.3.3.2 shall be considered and applied as relevant to the module/application.
[2] Where securing may not be considered applicable, stacking shall be assessed if modules are required to be stacked.
[3] Grouping includes all types of ships which will be required to stay on station during all weather conditions.

N o t e s : 1. Height above sea level h_0 specified in Figs. 3.3.2-1 and 3.3.2-2 is based upon the minimum freeboard as specified in LL-66/88 and Table 3.3.2-2 of these Guidelines. Where the actual freeboard is in excess of this value, the difference between the minimum and actual freeboard values shall be subtracted from the deck height above sea level h_0. h is considered to be the height to the bottom of the lowest offshore service module. Horizontal acceleration shall be considered to act in any direction, unless clearly specified in technical documentation. Vertical acceleration shall be considered to act in a positive or negative direction in addition to normal gravity. Offshore installations/ships in excess of 300 m in length shall utilize the values for 300 m.
Where the design parameters are given based on Figs. 3.3.2-1 and 3.3.2-2, the boundary line for 30 kPa a special case assessment shall be provided following the requirements of 1.3, Part II "Hull" of the RS Rules/C.
2. Sea pressure shall be applied to external surfaces of the module as a linear triangular distribution, with zero pressure at the top of the module and the maximum sea pressure at the base, with the average sea pressure at the half height. The same distribution is considered applicable for up to two modules stacked, with zero pressure at the top of the highest module. When stacking more than two modules in height, sea pressure need only be considered on the lower two modules.

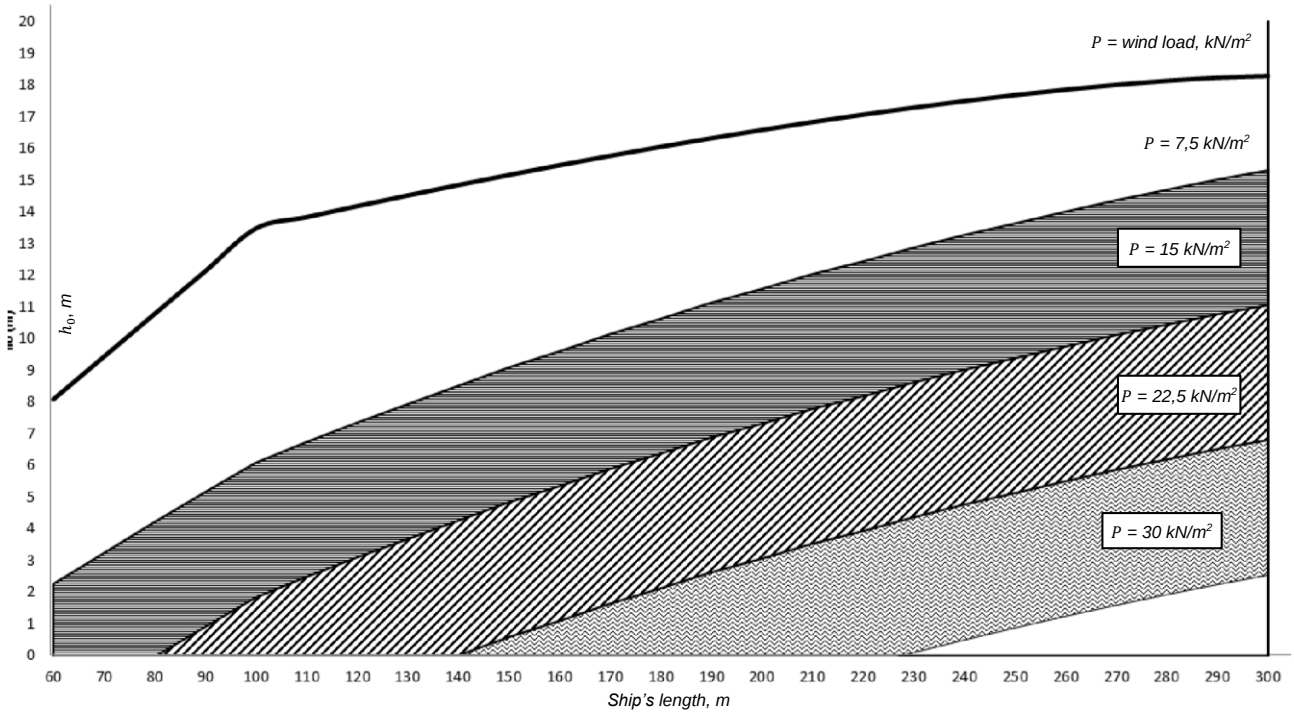

Fig. 3.3.2-1 Sea pressure (mid-point location)

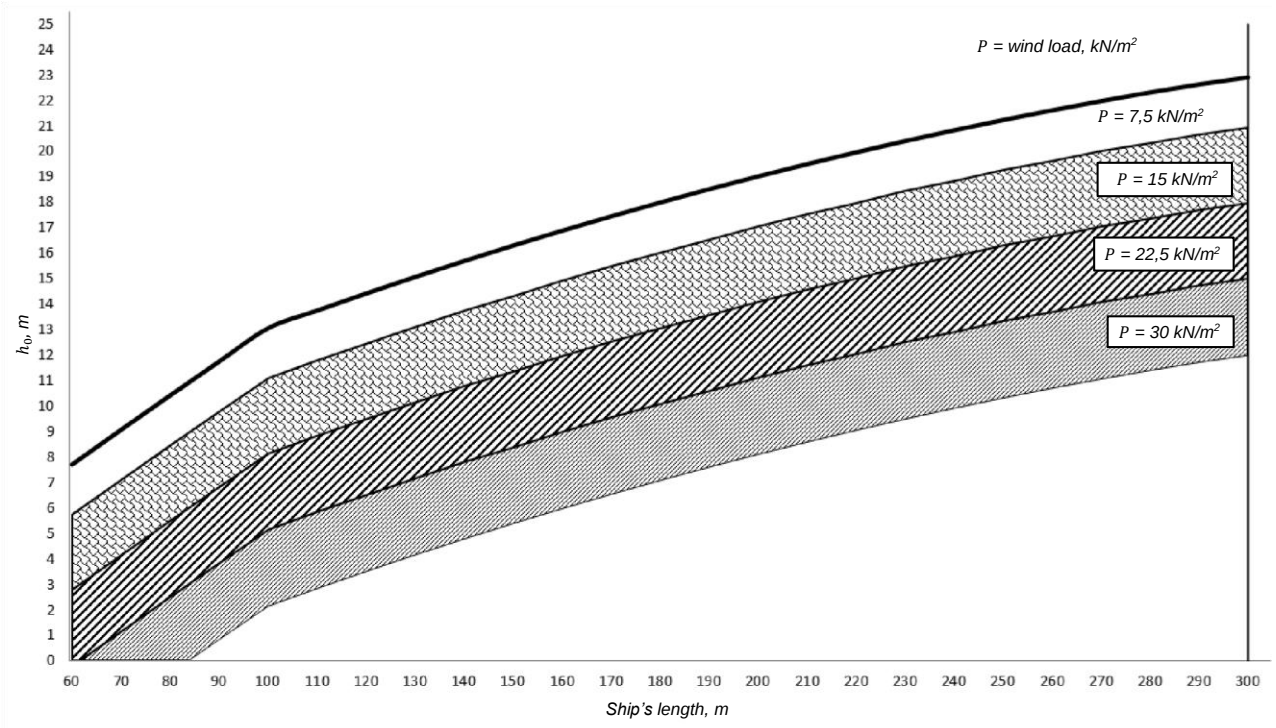

Fig. 3.3.2-2 Sea pressure (extreme location)

Table 3.3.2-2

Ship's length and relative minimum freeboard

Length, m	60	80	100	120	140	160	180	200	220	240	260	280	300
Freeboard, m	0,57	0,89	1,27	1,69	2,11	2,52	2,92	3,26	3,59	3,88	4,15	4,39	4,63

3.3.3 Other in-service and accidental loads.

3.3.3.1 General service modules.

Modules may be subject to other action effects/loads and relevant combinations thereof as follows:

other operational loads acting on the unit from equipment/apparatus installed (e.g. winch loads, lifting beams, etc.) shall be considered, where relevant, to the module type and specific configuration;

wind loads acting on the module structure shall not be taken less than 2,5 kPa, unless otherwise documented;

snow and ice loads — ice accumulation from sea spray, snow, rain and air humidity shall be considered, where relevant. Snow and ice loads may be reduced or neglected if snow and ice removal procedures are established.

3.3.3.2 Important service modules.

Important service modules shall be subject to an assessment taking into account additional loads: accidental collision, grounding or similar events — to verify the provision of sufficient securing arrangements. Modules installed on ships, which are covered by classification requirements, shall be evaluated for a minimum longitudinal acceleration of 0,5g in the forward direction and 0,25g in the aft direction.

3.4 SECURING TO OFFSHORE INSTALLATION

3.4.1 Modules shall be provided with means of securing safely to the ship/offshore installation. It may be either appropriate marine fittings or structural parts suitable for bolting or welding to the deck (to foundations).

Securing devices and bolts shall be safe against unwanted opening or release. Securing devices such as container twistlocks may be used, but shall be mechanically secured in the locked position. Only manually operated twistlocks may be used, not semi-automatic or fully automatic twistlocks. Securing devices shall be approved by RS. The main pad eyes on offshore modules or POU shall not be utilized as securing points.

Some modules may be stacked on offshore installations. Securing and support loads based on the loads described in 3.3 shall be taken into account in the stacked condition. Securing arrangement and strength of supporting modules shall be demonstrated under the defined stacking and environmental conditions. Unless defined in the RS documents for the product, modules shall not be stacked.

4 SAFETY RELATED TECHNICAL REQUIREMENTS

4.1 GENERAL

4.1.1 This Chapter provides general technical requirements, which apply to the modules. Special requirements for modules are contained in the appropriate chapters of Section 4.

4.1.2 Any equipment, which remains electrically energized or has the potential to have surface temperatures in excess of 200 °C following shutdown on gas detection, shall be designed and installed to meet the requirements of minimum zone 2 and in some cases zone 1 hazardous areas.

Equipment, which remains energized during gas detection or produces a hot surface, shall meet a minimum of requirements for gas group IIA and temperature class T3.

4.1.3 Modules shall be suitable for defined environmental conditions. Table 4.1.3-1 gives the information for all modules. Table 4.1.3-2 shall be considered for important service modules as defined in 1.2.

Table 4.1.3-1

Environmental conditions — all modules

Outside ambient temperature range	-20 °C to +45 °C
Humidity	Up to 96 % without condensation when heating is provided (mounted indoors) or 100 % with condensation when mounted outdoors
Electromagnetic compatibility (EMC)	All electrical equipment shall be selected and installed so as to avoid EMC problems according to the standards: IEC 61000-6-2 — Electromagnetic compatibility (EMC). Part 6-2. Generic standards. Immunity for industrial environments; IEC 61000-6-4 — Electromagnetic compatibility (EMC). Part 6-4. Generic standards. Emission standard for industrial environments
Inclination	The maximum operational inclination for the module shall be specified. This maximum shall be defined at the point where continued operation of the equipment changes to a level where it presents a risk to the operator/offshore installation. Should no inclination values be specified, the module shall be marked in the RS documents for module as suitable for use on fixed offshore installations only
Note. Alternative temperature range shall be considered on a case-by-case basis and noted in the RS documents for module.	

Table 4.1.3-2

Environmental conditions — important service modules

Vibration level	Category of equipment V2 From 2 to 25 Hz: 1,6 mm displacement amplitude (peak value) From 25 to 100 Hz: 4g acceleration		
Inclination	Equipment and components on floating facilities shall be designed to operate satisfactorily under the following inclinations of the floating facility:		
	Ships		
	All conditions	List 22,5°	Trim 10°
	Column-stabilized and self-elevating units		
	Static condition	List 15°	Trim 15°
	Dynamic condition	List 22.5°	Trim 22,5°
	Emergency condition	List 25°	Trim 25°
	Other values may be accepted if justified by calculations for the particular offshore installation. Should the inclination requirements stated above not be achieved, the manufacturer shall supply details of inclination that can be achieved with limitations detailed in the technical documentation, which will be reflected in the RS documents for module.		

4.1.4 Where applicable, modules shall be provided with a noise assessment to determine the working environment around or in the module. The noise level shall detail the maximum sound pressure level at 1 m from the module and the maximum point internal to the module.

The need for hearing protection shall be marked on the module where noise levels are in excess of 85 dB. Also audible alarms provided for the module shall be supplemented with a flashing or rotating beacon when the noise level is above 85 dB.

4.1.5 No asbestos-containing materials shall be used in the manufacture of the modules designed for installation on the RS-classed ship or offshore installation. An asbestos-free declaration shall be issued by the manufacturer.

4.2 ELECTRICAL EQUIPMENT

4.2.1 The requirements of this Chapter apply to electrical equipment installed inside and outside of the ship and offshore service modules subject to the Register technical supervision, as well as to individual types of electrical equipment as per 1.3, Part XI "Electrical Equipment" of the RS Rules/C.

4.2.2 Components and equipment.

4.2.2.1 Electrical components and equipment shall be suitable for use offshore and shall be designed, manufactured and tested in compliance with the requirements of Part XI "Electrical Equipment" of the RS Rules/C and Section 10, Part IV "Technical Supervision during Manufacture of Products" of the Rules TSDCS.

4.2.3 Technical documentation.

4.2.3.1 The scope of technical documentation for electrical equipment intended for installation inside and outside the module shall comply with the applicable requirements of 1.4, Part XI "Electrical Equipment" of the RS Rules/C.

Additionally, technical documentation shall be submitted as specified in 1.4.2.

4.3 GENERAL REQUIREMENTS

4.3.1 Influence of climatic conditions.

4.3.1.1 Electrical equipment installed inside and outside offshore service modules shall be capable of reliable performance under climatic conditions that meet the requirements of 2.1.1, Part XI "Electrical Equipment" of the RS Rules/C.

4.3.2 Mechanical effects.

4.3.2.1 Electrical equipment installed inside and outside offshore service modules shall be capable of reliable performance at mechanical effects that meet the requirements of 2.1.2, Part XI "Electrical Equipment" of the RS Rules/C.

4.3.3 Permissible variations of supply parameters.

4.3.3.1 Electrical equipment installed inside and outside offshore service modules shall be capable of reliable performance at the variations from the supply voltage and frequency as specified in Tables 2.1.3.1, 3.1.2.2, 16.8.3.3, Part XI "Electrical Equipment" of the RS Rules/C.

4.3.4 Electromagnetic compatibility (EMC).

4.3.4.1 All electrical equipment shall be selected and installed with allowance for EMC. Standards IEC 61000-6-2, IEC 610006-4, IEC 61000-4-4 may be used for the declaration of electrical equipment conformity to EMC directive.

4.3.5 Earthing.

4.3.5.1 Earthing of the module structure:

.1 a minimum of two earth bolts mounted diagonally, suitably recessed and opposite each other, shall be welded to the main steel structure on the outside at the module's lower part. Bolts for fixing the module to the deck shall not be regarded as an earthing connection. Main structural earth bolt shall be minimum M12. Protected/power earth and instrument earth shall be connected to structure via separate earth bolts not less than 1 m apart;

.2 welding the module to the deck is considered an alternative method of earthing.

4.3.5.2 Earthing of electrical enclosures and terminal boxes:

.1 equipment made of conductive material shall be earthed either via the copper braid of the cable, a separate earth core within the cable, or via a separate earth conductor. Where copper braid is used, this shall have a cross sectional area as defined in Table 4.3.5.2.1. Where non-copper earth connections are used, the cross section shall be increased dependent upon the increased resistance of the material compared to copper;

.2 hinged or bolted connections are not considered to be an earth, therefore a separate earth connection shall be provided, where required;

.3 all earth bars shall be located at the front of enclosures and terminal boxes.

Note. Earth bars may be accepted, on a case-by-case basis, at the rear of enclosures and terminal boxes, providing they are easily accessible and unobstructed by cabling or other equipment.

Table 4.3.5.2.1

Earth/bonding conductor cross sectional area

Condition	Cross sectional area
Internal panel wiring	Same size as current carrying conductors but not less than 1,5 mm^2
Internal static bonding	Minimum 4 mm^2
External static bonding	Minimum 6 mm^2
Earth conductor for equipment (excludes internal panel wiring)	Same cross section as the current carrying conductor up to and including 16 mm^2 or 50 % of the current carrying conductors' cross section above 16 mm^2
Structural earth connection	Not less than 16 mm^2 or the same size as the earth in the supply cable

4.3.5.3 Earth conductors:

.1 earth conductors shall be coloured yellow/green and shall not be used for any other purposes than earthing;

.2 only one earth conductor shall be connected to a single terminal/earthing point. Multiple connections can be made utilizing an earth bar. An exception to this arrangement may be granted for components located inside the same enclosure when utilizing the terminal or crimped connections, which are designed to accept multiple cable entries;

.3 external earth connections shall be secured by a minimum of M10 bolts and indoor earth connections shall be secured by a minimum of M8. All connections shall be assembled with star washers to prevent loosening due to vibration.

4.3.5.4 Insulation resistance monitoring and earth leakage protection:

.1 all insulated electrical and control systems within the module shall have continuous insulation resistance monitoring. Leakage current shall not be above 30 mA. In the event of an earth fault, either automatic tripping of the affected circuits shall occur or an alarm shall be generated. If automatic tripping is not implemented, alarm signal shall be provided at the control station of the offshore installation. If there are several circuits, one common alarm will normally be sufficient. Local galvanic isolated systems may be earthed at one point;

.2 residual current devices shall be provided in the final sub-circuits containing socket outlets of 16 A or less.

4.3.6 Materials.

4.3.6.1 No asbestos-containing materials shall be used in the manufacture of the modules designed for installation on the RS-classed vessel or offshore installation. An asbestos-free declaration shall be issued by the manufacturer.

4.3.6.2 Electrical equipment installed inside and outside offshore service modules shall be made of materials that meet the requirements of 2.3, Part XI "Electrical Equipment" of the RS Rules/C.

4.3.7 Structural requirements and protection of electrical equipment.

4.3.7.1 The structure and protection of electrical equipment installed inside and outside offshore service modules shall meet the requirements of 2.4, Part XI "Electrical Equipment" of the RS Rules/C.

4.3.8 Arrangement and location of equipment.

4.3.8.1 Modules are exposed to rough handling and environmental conditions during transportation and storage. In order to ensure safety and fitness for use of electrical equipment, the following requirements shall be met:

.1 equipment shall be provided with mechanical protection to prevent damage during transportation and use;

.2 external electrical enclosures shall be located in a suitable recess, within the outer structural frame of the module. Equipment in the recess shall be adequately protected from damage (e.g. use of removable or hinged cover plates). Where equipment is located on a base frame arrangement and not enclosed properly, suitable protection covers/bars shall be provided to avoid damage to the equipment during transportation;

.3 electrical equipment shall be protected against corrosion;

.4 where excess humidity or condensation is expected, a system of space heating shall be required if the normal module heating system is ineffective. Electrical enclosures exposed to the outside atmosphere and also enclosures that are sensitive to moisture shall be equipped with individual space heaters. Such heaters are not required for simple junction boxes. The space heating system shall be activated whenever practical both onshore and offshore;

.5 portable electrical equipment shall be securely fixed. The installation and fixing of all equipment shall result in the module being able to withstand the likely stresses imposed on it when the module is transported or lifted;

.6 internal power outlets and sockets shall be located a minimum of 300 mm above the internal floor level unless provided with protection or in a protected location which would prevent accidental damage to outlet/socket;

.7 socket outlets for a rated current in excess of 16 A shall be interlocked with a switch so that no connection can be made to the socket outlet when the switch is in the "on" position;

.8 hook-up connections shall be protected to minimize the effects of splashing water. These shall be easily accessible for hook-up and maintenance purposes, and located between 600 mm and 1500 mm above the base of the module;

.9 panels and/or control stations (internal or external) operated by personnel shall be located approximately 1500 mm above the base of the module or floor level panels. Consideration shall be given to the location of control panels and control stations within the module, to ensure ease of access for personnel operating the equipment.

4.3.8.2 To facilitate connection to offshore installation systems, modules shall be prepared according to the following:

.1 suitable hook up points (e.g. junction boxes) shall be arranged in recesses on the outside wall. This arrangement may also be suitable for flexible cable types provided strain relief devices are fitted;

.2 where an "A" fire integrity is not required, the module may be fitted with cable glands for connection into junction boxes inside the module. Cable glands shall be installed as to resist smoke or fire for 60 min. Connections for power supplies shall be mounted external to the module regardless of fire integrity.

4.3.8.3 Modules shall have their in-take circuits and components rated for defined values of nominal voltage, frequency, current, short circuit level and type of system in compliance with the requirements of GOST 30331.1 (IEC 60364-1). These parameters shall be clearly marked at the connection point.

4.3.8.4 Enclosures for termination of external cables shall be arranged such that the cables can be conveniently connected, i.e. without excessive bending of the conductor ends and without having to unscrew terminals or other parts.

N o t e . The offshore installations shall have pre-installed junction boxes or socket outlets within a reasonable vicinity such that the modules can be conveniently connected.

4.3.8.5 A load switch shall be mounted at the main power intake. The switch may be a suitable circuit breaker, a manual switch, isolator or similar. If there is a hazardous area, the switch shall be certified as safe-type equipment rated for use in the hazardous area in which it is located. If the module has several power sources, a separate switch for each power source shall be installed. Switches shall be readily accessible, external to the module and marked in a suitable manner, providing means for manual emergency shutdown. Each switch shall be housed in a separate enclosure or shall otherwise be arranged to enable work without accidental touching of live parts.

N o t e . The load switch would be considered acceptable as the external hook-up point without the need for an additional hook-up junction box for the electrical supply.

4.3.8.6 Electrical equipment shall be installed in such a manner as to provide convenient access to controls and to all parts that require maintenance, inspection and replacement.

4.3.8.7 The electrical equipment placed in locations subject to vibration and shocks (heavier than those specified in 2.1.2.1, Part XI "Electrical Equipment" of the RS Rules/C), which are impossible to eliminate, shall be so designed as to ensure its normal operation under these conditions or to mounted on relevant shock absorbers.

4.3.8.8 Electrical equipment shall be fixed in position in such a manner that the strength of decks, bulkheads and skin is not impaired as a result of this.

4.3.8.9 No electrical equipment shall be located in spaces wherein explosives are stored. Lighting of such spaces shall be provided with lighting fixtures fitted in adjacent flameproof spaces. If this is impracticable, the electrical equipment shall be of the design and type which prevent potential ignition and explosion.

4.3.8.10 When the enclosures of electrical equipment are made from different material than the structures on which they are installed, care shall be taken, if necessary, to prevent electrolytic corrosion.

4.3.8.11 Electrical components located in panels, consoles and enclosures which may need to be opened for inspection or maintenance while the circuits are live shall have covers with interlocking devices or otherwise be arranged such that touching or short circuiting of live parts is not possible.

4.3.9 Equipment located external to module.

4.3.9.1 The external location of components (junction boxes, control panels, pipe connections, fans, etc.) shall be avoided. Components that have to be located externally shall be installed within the equipment's outer frame to avoid damage of components due to lifting and handling of the module. Equipment located in a module not fully enclosed in a protective metal housing shall be considered as being external.

4.3.9.2 If located external to the module, electrical and control equipment shall be suitable for use in the applicable hazardous area zone and in environmental conditions specified in 4.1.3. Gland entries into electrical equipment shall be made from the underside. Side entry may be accepted providing the cable is routed in such a manner that running water is directed away from the gland. Where top entry cannot be avoided (e.g. due to design limitations), the recess area shall be fully enclosed with permanent protective covers to prevent water ingress. Protective covers shall remain in place during operation.

4.3.9.3 Electrical components mounted external to the module shall be protected against direct exposure to sun radiation.

4.3.9.4 Rotating machines exposed to the outdoor atmosphere shall be suitably protected against icing. Motors shall not have an external cooling fan unless the fan has been assessed as not being an ignition source and the overall equipment, including the fan, meets the ingress protection requirements.

4.3.10 Safe-type electrical equipment.

4.3.10.1 Certification of equipment.

Electrical equipment for hazardous areas shall be designed and certified by an independent competent body according to IEC 60079 series or equivalent standards.

Notes: 1. The following may be accepted as the documents confirming the safe-type design of electrical equipment:

documents issued within the framework of explosion protection certification systems having no restrictions in relation to ships, MODU and the equipment used thereon, e.g. IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEx);

certificates of compliance with the Technical Regulations of the Customs Union TR CU 012/2011 "On the safety of equipment for working in explosive environments", provided that the certificates or appendices thereto contain the references to compliance with the requirements of explosion protection standards having no restrictions in relation to sea-going ships, MODU and equipment used thereon, such as GOST R 30852, IEC 60079, etc.;

documents issued in other certification systems that do not apply to sea-going ships and MODU, e.g. for compliance with the requirements of ATEX Directive 2014/34/EU, if such documents contain the references to compliance with the explosion protection standards having no restrictions in relation to sea-going ships, MODU and equipment used thereon;

if included as part of the marking of safe-type equipment, the letter "X" denotes that special conditions have been defined for the safe use of the equipment. Special conditions that are applicable to offshore installation shall be listed in the RS documents for module.

2. Certificates issued for the safe-type equipment may be invalidated by unqualified repairs or modification.

Optical sources are considered as electrical equipment and shall be certified in accordance with IEC 60079-28.

4.3.10.2 Non-electrical equipment in hazardous areas.

In addition to ignition risk from electrical equipment, assessment is required to ensure equipment does not present an ignition risk from mechanical (i.e. surface temperature, impact or friction), static discharge or lightening. Assessment for non-electrical ignition risk shall follow the requirements of Parts 36 and 37 of IEC 80079 or equivalent.

4.3.10.3 Inspection and installation.

Selection/installation of equipment for hazardous areas shall be in accordance with IEC 60079-14. An inspection plan shall be provided in accordance with IEC 60079-17. Records shall be retained to demonstrate that the requirements of this inspection plan have been met during the life of the module. Operating manual shall be included for need to conduct detailed inspection to IEC 60079-17 of any hook-up connections during installation.

The competence of the person carrying out the installation and inspections shall be demonstrated upon request to the satisfaction of RS.

4.3.11 Cables.

4.3.11.1 All cables installed inside and outside offshore service modules shall meet the requirements of Section 16, Part XI "Electrical Equipment" of the RS Rules/C.

4.3.11.2 Cables shall be secured according to Section 16, Part XI "Electrical Equipment" of the RS Rules/C.

Additional recommendations:

cables shall be securely fixed and connected;

cables shall be secured close to the gland to provide support and prevent damage to the integrity of the cable or gland. Securing shall be as close as possible to the cable entry without applying additional mechanical forces to the connection, and shall not be greater than 10 cable diameters from the cable entry point;

metallic ties shall be used for the first securing point from the gland at each end. The routing of cabling shall be such as to ensure that it is possible to verify the required dust-and-moisture-proof degree for the enclosure and that the glands are properly maintained;

to prevent collapse of cabling in the event of fire, metallic ties shall be used. On enclosed modules, which are not subject to mechanical forces, photo-stable non-metallic ties may be used internal to the module providing every third securing point utilizes a metallic tie. Use of flame retardant conduit systems shall also be acceptable in place of metallic ties.

N o t e. Data cables down to 0,22 mm^2 may be accepted in internal areas, assuming that they are not associated with safety systems or control/monitoring functions which could lead to or cause escalation of an incident, and that the integrity of them is tested following transportation and offshore lifting.

4.3.11.3 Cables shall be terminated and connected according to Section 16, Part XI "Electrical Equipment" of the RS Rules/C.

Additional recommendations:

all cable conductors shall be terminated at the termination location with only one conductor per terminal. An exception to this arrangement may be granted when utilizing a terminal or crimped connections, which are designed to accept multiple conductors;

spare cable cores shall be terminated at both ends in the same way as earth conductors. Such spare cable cores may be coloured yellow/green and if so shall be marked "spare";

termination methods shall be such that the cross section of conductors and braiding and their integrity are not reduced;

cables shall be permanently marked at each end with the identifier, which is traceable to the approved drawings.

4.3.11.4 Termination and connection of armour and screens.

Cables, which are external or exposed on the module, shall be with braid or armour. Full enclosing the cable in metallic cable pipe may be considered when braid/armour cannot be installed.

Cable braiding, armour and screens shall be carried through the gland and be connected to the earth bar at both ends. However, when found necessary for function or safety reasons, connection to earth at the supply end only may be used. Plastic junction boxes used for loop through of circuits may be equipped with an earth bar which is not connected to the structure, but shall otherwise be marked and used for connection of the braiding as an ordinary earth bars.

When braiding, armours and screens are earthed at one end only, the other end shall be carried through the gland and connected to an insulated terminal.

N o t e . For cables rated at 3,6/6 (7,2) kV and above, employ flexible conductor stranding (Class 5) and braid insulation shields indicating a minimum bend radius of $6D$ for unarmoured cables and $8D$ for armoured cables, in concurrence with the approval of the cable manufacturer.

4.3.12 Accumulator batteries.

Accumulator batteries shall meet the requirements of Section 13, Part XI "Electrical Equipment" of the RS Rules/C.

Additional recommendations:

all circuits to/from the batteries shall be provided with adequate circuit protection devices. Short circuit proof cables indicated in 1.2.1 shall be applied between the accumulator batteries and the circuit protection device;

accumulator batteries located in modules shall be located in protective boxes or cabinets certified for at least zone 2 hazardous areas;

accumulator batteries supporting essential/safety systems shall be housed in protective boxes or cabinets certified for zone 1 hazardous areas. However, the non-certified safe equipment may be connected to the accumulator battery via a short-circuit isolator (Exd);

accumulator batteries of a valve regulated type with the charge capacity not exceeding 0,2 kW may be internal to equipment. Accumulator batteries of a valve regulated type with the charge capacity not exceeding 5 kW may be located in separate cabinets. Charge capacities exceeding 5 kW or other battery chemistries shall be considered on a case-by-case basis, with due consideration of the applicable requirements of the International Maritime Dangerous Goods Code, adopted by IMO resolution MSC.122(75), as amended[1].

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

4.4 FIRE AND GAS DETECTION

4.4.1 Atmosphere monitoring system and equipment.

4.4.1.1 General information.

Ventilation ducts at air intakes shall be fitted with gas detectors upstream of the fire or gastight damper unless all installations are of certified safe equipment and the use of tools or equipment in the area will not create any ignition potential. As a minimum, gas detection equipment shall be suitable for detection of methane (CH_4). If other flammable or toxic gases are considered likely, additional gas detectors suitable for detection of these gases shall be provided at the intake and (if present) in the airlock (if installed).

In certain cases it may be necessary to interface the atmosphere monitoring system in the module with the offshore installation. Details shall be provided within the operating manual on required hook-up, operation and testing.

Non-enclosed or partially enclosed modules with equipment containing a source of hydrocarbon release shall be fitted with a minimum of one gas detector. Where this is not possible, special requirements shall be noted in the RS documents detailing need for suitable gas detection to be provided by the offshore installation.

4.4.1.2 Gas detection inside the module.

Gas detectors shall be required inside the module if the following situations exist:

at all ventilation outlets, if an internal source of release is present;

inside module, if a source of release is present (e.g. paint stores, gas turbine enclosures, laboratory) or if the module contains equipment which develops a hot surface;

inside module, if disconnection of non-safe-type equipment is delayed on loss of pressurization.

Atmosphere monitoring inside the module does not replace the need for gas detection at the ventilation outlets.

4.4.1.3 Explosive gas detection and alarm system.

4.4.1.3.1 The explosive gas detection and alarm system shall be capable of automatically initiating the following actions (refer to Table 4.4.1.3.1), either through an integrated control system or in conjunction with the offshore installation.

The explosive gas detection and alarm system shall alarm or shutdown within 10 s of detecting of gas at the appropriate level. A set of volt-free contacts for each of the low- and high-level signals to the offshore installation CCR shall be provided.

When the gas detectors have been activated, resetting of the explosive gas detection and alarm system shall only be possible following manual intervention.

The setting of the low and high levels of explosive gas concentration may be adjustable within the above ranges.

N o t e . Shelf states may stipulate other standards, e.g. EN 50381 that requires high level gas concentration to shutdown at 20 % LEL.

T a b l e 4.4.1.3.1

Gas detection and alarming required actions

Cause	Effect
Low level gas at the air inlet, range 10 — 30 % LEL	Audible and visible signals in the module. Signal to the offshore installation CCR shall be provided
High level gas at the air inlet, range 30 — 80 % LEL	Audible and visible signals shall be given in the area of highest occupation in/around the module. Fans shall be stopped. Non-safe equipment inside the module shall be isolated. Signal to the offshore installation CCR shall be provided. Fire dampers/louvers shall close

.2 point detectors shall not be used for air velocities above 12 m/s unless specified as suitable from the detector manufacturer.

The explosive gas detection and alarm system shall be active at all times including during periods when power sources within the module are shut down. The local gas alarm station shall be connected to the same source used to supply the offshore installation fire extinguishing system and explosive gas detection and alarm system or have a battery backed supply sufficient for 24-h operation.

Note. Should the explosive gas detection and alarm system be powered from the offshore installation emergency switchboard, the requirement for supply from the battery backed supply may be reduced to 2 h. However, the battery supply (transitional power) run time shall be confirmed by as being of the same discharge duration as the offshore installation main fire detection system (when running on accumulator battery/uninterruptible power source (UPS) supply).

.3 where facilities are provided for the by-pass of explosive gas detection and alarm system, these shall only be used for maintenance purposes onshore and shall not be utilized when on an offshore installation.

4.4.2 Fire detection and fire alarm system.

The fire detection and fire alarm system shall be designed and installed with certified safe equipment suitable for operation in zone 1 hazardous areas regardless of intended location on the offshore installation.

4.4.2.1 Fire detectors.

At least one automatic fire detector shall be located in each area of the module which presents a fire risk. This may be omitted in small airlocks which contain only minimal certified safe equipment or no combustible materials.

The type of fire detector shall be selected as the best suitable for early and reliable detection of fire hazard according to the actual fire risk.

Table 4.4.2.1

Fire detection and alarming required actions

Fire detection installation type	Cause	Effect
Module with integral fire detection and fire alarm system	Activated fire alarm by automatic or manual fire detector	Audible and visible alarms shall be given in the area of highest occupation in/around the module. Mechanical ventilation shall be stopped. Fire dampers/louvers shall close. Non-safe equipment inside the module shall be isolated. Signal to the offshore installation CCR
Module without integral fire detection and fire alarm system	Activated fire detection alarm by detector or pushbutton	Mechanical ventilation shall be stopped. Audible and visible alarms shall be given in the area of highest occupation in/around the module. Non-safe equipment inside the module shall be isolated. Module fire dampers shall close (on loss of power)

4.4.2.2 Module fitted with integral fire detection and fire alarm system.

Manual fire detectors connected to the integral fire detection and fire alarm system shall be mounted at a suitable place on a manned module and shall be marked "Fire alarm".

The fire detection and fire alarm system shall automatically initiate actions as defined in Table 4.4.2.1.

The fire detection and fire alarm system shall be active at all times including during periods when power sources within the module are shut down. The local fire detection and fire alarm system shall be connected to the same source used to supply the offshore installation fire system and explosive gas detection and alarm system or have a battery backed supply sufficient for 24-h operation. Suggested alternative solutions are indicated in 4.4.1.3.

Where facilities are provided for the by-pass of fire detection and fire alarm system, these shall only be used for maintenance purposes onshore and shall not be utilized when on the offshore installation.

4.4.2.3 Modules not equipped with an integral fire detection and fire alarm system.

The fire detectors may be connected directly to the offshore installation main fire detection and fire alarm system. In such cases, the module shall be arranged with suitable junction boxes for hook-up to the offshore installation system.

Mounting of appropriate types of detectors may be carried out as part of the installation on board.

Manual fire detectors of the fire detection and fire alarm system shall be mounted at a suitable place on a manned module and shall be marked "Fire alarm". The manual fire detectors shall be wired to a suitable junction box for connection to the offshore installation.

The fire detection and fire alarm system of the offshore installation shall automatically initiate actions as defined in Table 4.4.2.1.

4.4.3 Emergency shutdown (ESD) initiated from offshore installation.

The module shall be provided with means to receive the ESD signals from the offshore installation to isolate all ignition sources. This may be conducted by tripping of supply to the module.

Equipment intended to stay energized after the offshore installation ESD signal shall be certified as safe equipment for zone 1 hazardous areas.

4.5 MEANS OF COMMUNICATION

4.5.1 Public address and general alarm system (PA/GA).

4.5.1.1 Modules that are planned to be manned by service personnel shall be fitted with loudspeaker(s) that can be connected to the offshore installation PA/GA system.

N o t e . Unless stated otherwise in these Guidelines, a minimum of one PA/GA speaker shall be provided per module. However, consideration shall be given to offshore installations/ships, which have a dual PA/GA system, and flexibility for inclusion of the second PA/GA speaker is recommended.

4.5.1.2 Any PA/GA equipment shall be certified safe equipment suitable for operation in zone 1 hazardous areas.

In modules with noise levels are above 85 dB, the audible alarm shall be supplemented by light signals as per the offshore installation's requirements.

N o t e . The provision of additional PA/GA systems shall be considered in unmanned modules containing equipment with noise levels exceeding 85 dB, i.e. where the effectiveness of the offshore installations systems may be reduced.

4.5.2 Telephone/two-way communication.

All manned modules shall have equipment suitable for effective two-way communication with the offshore installation CCR.

Telephone systems, if installed, shall be connected via the module ESD system. Certified safe equipment circuits shall be used for those parts not being shut down. The PA/GA loudspeakers and telephones shall not share the same cable. Use of suitable rated portable radios shall also be considered acceptable for communication with control station of the offshore installation.

4.6 FIRE FIGHTING

4.6.1 Categorization of risks.

Modules containing equipment considered to be a category A machinery space or accommodation space shall be fitted with a fixed fire extinguishing system.

These Guidelines have considered the typical fire risks for each of the defined module groups and defines the minimum requirements for fire-fighting equipment in each case (refer to 5.3). When considering fire risks, the categories detailed in Table 4.6.1 shall be utilized.

Table 4.6.1

Categorization of risks

Categorization	Fire risk of module
No fire risk	Modules containing no energy sources (i.e. electrical, chemical or mechanical)
Low fire risk	Module for storage of non-flammable equipment such as tools, mechanical parts and electrical equipment not connected to power sources. The module itself contains only a minimum of necessary electrical equipment for lighting, heating, etc. A fire is not likely to be supported
Medium fire risk	Modules containing electrical panels, testing equipment, work space for paper work. Modules which are normally manned (not accommodation modules)
High fire risk	Modules containing category A machinery spaces, accommodation modules and stores for flammable liquids. Also high power electrical machinery

4.6.2 Portable fire extinguishers.

At least one portable fire extinguisher shall be located inside of the module in an easily accessible position. For modules required to have several exits, one portable fire extinguisher shall be available near each exit (normally not required for emergency exits).

The type and quantity of portable fire extinguishers shall be in accordance with the requirements of IMO circular MSC.1/Circ.1275 and Table 9.3 of the 2009 MODU Code.

Minimum capacities for each fire extinguisher shall be:

5 kg for CO_2 or dry powder;

9 l for foam or water-based extinguishers.

4.6.3 Fixed fire extinguishing systems.

4.6.3.1 All fixed fire extinguishing systems shall comply with the provisions of the International Code for Fire Safety Systems, adopted by IMO resolution MSC.98(73), as amended[1].

4.6.3.2 Manual release facilities shall be located at an easily accessible position outside the module. They shall have suitable protection against unintentional operation and shall be clearly marked.

4.6.3.3 Automatic release is recommended for modules containing high fire risk equipment. The automatic release mechanism may be, e.g., a direct temperature sensitive device or may be operated by a signal from the fire detection and fire alarm system. Fire extinguishing systems, which have a gaseous fire extinguishing medium, shall be manually activated only.

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

4.6.3.4 Fixed gas fire extinguishing system shall meet the requirements of the FSS Code. An equivalent gas fire extinguishing system may be used providing the requirements of IMO circular MSC/Circ.848 (as amended by Item 11 of IMO circular MSC/Circ.1267) are satisfied.

4.6.3.5 Water-based systems may have automatic activation by a signal from the fire detection and fire alarm system.

N o t e . In order to make the system more resistant to false alarms, it is recommended that two or more fire detectors be used, and that activation of one detector only will not release the system, but will give an alarm only.

4.6.3.6 Control circuits for the fire extinguishing system release and corresponding alarms shall be active continuously, including periods when other power sources within the module are shut down. The system shall utilize certified safe equipment for operation in zone 1 hazardous areas regardless of intended location on the offshore installation and shall be connected to the power source used to supply the offshore installation fire/gas detection and alarm systems or have a battery backed supply sufficient for 24-h operation. Refer to 4.4.1.3 for suggested alternative solution.

4.6.3.7 When a fixed fire extinguishing system has been released, actions as detailed in Table 4.6.3.7 shall occur.

T a b l e 4.6.3.7

Required actions following release of fixed fire extinguishing system

Cause	Effect
Activated fixed fire extinguishing system: automatically or manually	Audible and light release alarm activated inside module, signals shall be different and distinguishable from other signals. Mechanical ventilation shall be stopped. Fire dampers/louvers/closing device shall close. Confirmed release alarm to the main machinery control room of offshore installation. Non-certified safe equipment inside the module shall be isolated

4.7 PASSIVE FIRE PROTECTION

4.7.1 General information.

4.7.1.1 Passive fire protection shall provide:
prevention of fire;
prevention of escalation of fire and smoke to adjacent areas and spaces;
conditions of safe evacuation of people from the module and offshore installation;
protection of systems or equipment of essential importance for safety;
successful fire extinguishing.

4.7.1.2 Materials to be used for the purpose of passive fire protection shall be supplied with an approval certificate documenting compliance with the RS rules (e.g. fire tests according to the requirements of the FTP Code). Detailed information on construction methods and limitations shall also be available.

Danger of heat transmissions at intersections and termination points of thermal barriers in fire-fighting divisions shall be specially considered.

N o t e . Any such heat bridge shall be insulated to the same rating as the thermal barrier for a distance of not less than 900 mm, typically 450 mm on each side.

4.7.1.3 Openings and penetrations in fire-fighting divisions shall be arranged so as to maintain the fire integrity of the divisions where they are installed. Penetrations shall have the fire integrity equivalent to the fire integrity of the divisions where they are installed. Louvers/dampers shall be operable from outside the module and configured for automatic closure on fire detection as well as manual closure. Louvers/dampers for external ventilation openings shall be provided through external bulkheads. The Type Approval Certificate for Fire-Proof Division is not required for the louvers/fire dampers installed on an external "A" class bulkhead. Conductive materials in contact with external bulkheads are considered part of the bulkheads and shall meet the requirements of this category. The extent of the insulation shall be sufficient to cover all exposed thermally conductive surfaces fitted to the bulkhead for a distance of at least 900 mm; however, ducting does not require to be 900 mm if not required by the design of the module or contains non-thermally conductive materials. The insulation design shall meet the technical parameters stated in the Type Approval Certificate for Fire Proof Division for the "A" class fire-fighting division.

N o t e . Details on internal ducting and cable/pipe penetrations through fire-fighting bulkheads are given in regulation II-2/9 SOLAS-74.

4.7.1.4 For equipment located on open deck a continuous steel construction is required to satisfy the requirements of the RS Rules/C, SOLAS-74, 2009 MODU Code (whichever is applicable). For certain applications (e.g. winches, lifting equipment) it may not be possible or practical to enclose the module. The use of modules, which do not satisfy continuous steel construction, may be permitted, however to meet the intent of the requirements of the RS Rules/C, SOLAS-74 and 2009 MODU Code (whichever is applicable) the end user shall be responsible for detecting and reacting to a fire event on the module prior to it spreading to deck, which shall be clearly defined in the RS documents for module.

N o t e . Modules not meeting the requirements for fire-fighting divisions as specified in SOLAS-74/the 2009 MODU Code may be used when the function of the equipment necessitates the need for an opening in the fire-fighting area. Where it is possible to enclose the module to meet the fire integrity and to perform its intended function, the minimum fire integrity shall be achieved. Modules which contain equipment defined under Table 4.6.1 as high fire risk shall always meet the minimum fire integrity.

4.7.2 Restricted use of combustible materials.

4.7.2.1 Exposed surfaces in ceilings or any surfaces in concealed or inaccessible spaces for accommodation, service spaces and control stations shall meet the requirements of 2.1.1.8, Part VI "Fire Protection" of the RS Rules/C.

4.7.2.2 Primary deck coverings shall not readily ignite or give rise to toxic or explosive hazards at elevated temperatures in accordance with Part 5, Appendix 1 to the FTP Code.

4.7.2.3 Paint/surface coatings applied internally or externally shall meet the requirements for primary deck coverings.

4.8 ESCAPE

4.8.1 Doors.

4.8.1.1 The personnel doors shall be fitted where users are expected to enter the equipment including for planned maintenance. All personnel access doors shall be self-closing. Module doors are not considered personnel doors unless they are fitted with a self-closing device and are capable of latching into a closed position.

4.8.1.2 Modules with mechanical ventilation containing ignition sources shall have self-closing doors. All other hatches and doors shall be closed when the module is energized.

4.8.1.3 All external doors shall open outwards.

4.8.1.4 The self-closing mechanism shall be capable of closing the door with an over-pressure ventilation system in operation. This requirement does not apply to transport doors or emergency exits. Doors fitted with self-closing mechanisms shall not be fitted with latching mechanisms to hold the door open.

N o t e . This requirement replaces and supersedes the requirements of 2.1.8, Part VII "Offshore Containers" of the RMC for doors to be able to be latched in the open position.

4.8.1.5 Where necessary to prevent unauthorized access, doors may be fitted with a lock. In such cases provision shall be made for safe egress from inside without a key.

4.8.1.6 Modules which present additional danger if locked in, e.g. air tight modules or refrigeration/freezer modules, an alarm shall be provided to raise attention of personnel trapped within the module. Alarm shall be supplied from an emergency source of power from the offshore installation or provided with a battery backup should main power be lost. Alarm shall provide a visual and audible warning external to the module when activated.

4.8.1.7 Category A machinery spaces shall have the ladder width in escape routes and the door width at exits of at least 600 mm.

4.8.2 Emergency exits and escape routes.

4.8.2.1 Modules that are manned, and either have an internal area exceeding 20 m^2 or the escape route length to the external exit door exceeds 5 m, shall have a separate emergency exit. Any separate emergency exit shall be located in an easily accessible position and as widely spaced from the main exit as possible. Escape hatches shall have a minimum size of 800 mm x 800 mm and be possible to open from inside and outside by one person. Clearance shall be provided within the module to allow for manoeuvre and exit of a stretcher through the emergency exit. Consideration shall be given to the arrangement and position of the emergency escape with regard to ease of access and distance to deck when egressing though the exit. All information for personnel shall be specified in the operating manual and, where necessary, marked on the emergency exit.

4.8.2.2 An unobstructed route (minimum 650 mm wide) shall be provided between areas where personnel access may be possible and emergency exits. The module design shall consider sufficient height for ease of egress to the escape exits/hatches.

4.8.2.3 Escape exits shall be marked with photo luminescent material on both sides with the words: "Emergency exit" and "Not to be obstructed".

4.8.3 Emergency lighting.

4.8.3.1 Manned modules shall be fitted with emergency lighting system which shall be certified safe equipment for zone 1 hazardous areas and fitting with integral battery sufficient for at least 60 min operation.

4.8.3.2 At least one emergency light shall be installed in each room of the module where persons may be present.

4.8.3.3 Battery backed emergency lighting fixtures shall be fitted above main and emergency exits. Where an airlock or two entry doors are utilized, the emergency lighting

fixture may be positioned either in the airlock or in space between the doors, or above the internal door within the main room, providing the internal door is provided with a vision panel.

4.8.3.4 Emergency lighting fixtures may be omitted in secondary rooms if there is no closable door and no part of the floor is more than 2 m higher than the main room floor.

N o t e . Appropriate procedures or some automatic means shall be implemented to ensure that the emergency lighting battery is readily available and fully charged when the module is taken into operation.

4.9 HEATING, VENTILATION AND AIR CONDITIONING

4.9.1 Air inlets/outlets.

4.9.1.1 All ventilation openings shall be fitted with gas detectors before the fire or gastight damper unless all equipment installed in the module is certified safe equipment and the use of tools or equipment in the area will not create any ignition sources.

4.9.1.2 Closure mechanisms shall be fail-safe, i.e. de-energize to close. Simultaneous stop of all ventilation fans shall be possible by manual activation of one handle, push button or similar control.

This manual facility may also activate and/or de-activate other functions, e.g. module shutdown/electrical isolation.

4.9.1.3 The position of dampers/louvers shall be visible locally at the damper and to the offshore installation ventilation control system/CCR.

4.9.1.4 The inlet and outlet openings shall be arranged for connection of ducts which shall be routed for a fresh air supply/exhaust from/to a non-hazardous area. Modules incorporating overpressure ventilation systems shall be arranged to allow location of the fan at the inlet end of the duct in the non-hazardous area, thus keeping the duct at an overpressure relative to the surroundings.

4.9.1.5 If a fire risk exists inside the module, all ventilation openings, including louvers, shall have facilities to be closed from outside the module.

4.9.2 Natural ventilation.

4.9.2.1 Natural ventilation may be applied for modules intended only for storage of non-hazardous/non-flammable materials and which are not manned.

4.9.2.2 The module shall be provided with suitable ventilation openings located at the top and bottom of the bulkheads.

4.9.2.3 If the module is designed as an open skid or frame, a ventilation system is not necessary, however consideration shall be made of 4.7.1.

4.9.3 Mechanical ventilation.

The requirements for heating and ventilation systems for offshore modules are based on the following:

personnel shall have sufficient fresh air and comfortable working temperature;

ventilation may be used to keep the atmosphere free from explosive gasses and vapours. If the source of hazard is outside the module, the applicable means of ensuring this shall apply internal overpressure with respect to the external environment.

N o t e . The statutory regulations may require a ventilation rate of minimum 12 l/s of fresh air per person.

The following modules require mechanical ventilation:

modules, in which ignition sources are present;

modules that are manned on a permanent basis (requirements for fresh air are given in 4.9.3.1);

modules, in which equipment emits large amounts of heat;

modules with an internal source of release.

The flow of ventilation air shall be continuously monitored. During operation upon the detection of inadequate ventilation, a local alarm shall be initiated within a safe period of time unless the supply is automatically restored from alternative fans or any alternative power supply. It is recommended that this safe period shall be less than 15 min, however maximum time shall not exceed the value based on the following calculation:

$$\text{Time, min} = \frac{\text{free volume of module, m}^3}{0{,}72 \times \text{number of persons inside module}}.$$

Where arrangements are provided for the by-pass of ventilation/pressurization facilities, they shall only be used for onshore maintenance purposes and shall not be utilized on offshore installations.

4.9.3.1 Modules that are manned on a permanent basis:

.1 in modules, which are manned on a permanent basis, sufficient air heating and/or air cooling shall be provided to ensure comfort. The system shall be designed such that the inlet air is not distributed to the work places unless it is conditioned (to provide comfort temperature and humidity);

.2 the minimum required ventilation rate for working areas is 12 l/s of fresh air per person. The module shall be marked with the maximum occupancy.

4.9.3.2 Cooling of equipment.

Outside air intended for cooling of non-certified equipment shall not be fed directly onto the equipment being cooled. The air shall instead be fed into the module in order to allow for the response time of gas detection and alarm systems.

4.9.3.3 Heating elements and air fans:

.1 heating elements (including heating elements within space heaters, water heaters and ovens) and air fans located in the inlet ventilation duct shall be of certified safe type. This also applies to space heaters for modules intended for location in zone 1 hazardous areas. The fan blades shall be non-sparking and have suitable protection against mechanical damage.

N o t e . Exhaust fans may be accepted that are not of a certified safe type when located in a non-hazardous areas and gas detection is provided locally on the fan assembly. Demonstration of no residual ignition risks (e.g. dissimilar metals in fan blades or gap between blades and housing to prevent sparks when fan is slowing) shall be required;

.2 in modules intended for location in zone 2 hazardous areas and non-hazardous areas, non-certified safe space heaters may be used, provided the exposed temperatures have been tested and confirmed to be below 200 °C and suitable assessment of ignition risk has been demonstrated;

.3 heaters shall be interlocked with the ventilation fan switch or a flow switch such that they cannot be energized unless the fan is running;

.4 in addition to the normal service working temperature regulating devices, heaters shall have at least one temperature sensor connected to the heating element to accurately determine the temperature of the surface.

N o t e s : 1. For testing of the maximum temperature, the test voltage shall be 110 %. Where relevant, the temperature rise shall be included after a built-in fan has stopped. The temperature shall be measured directly on the heating elements. If the elements are encapsulated in metal pipes or similar, which are gastight also at the ends, the temperature may be measured on the pipes.

2. The following combinations of materials and clearances between impeller and air duct are considered to be non-sparking:

impeller and/or housing of non-metallic material, due regard being paid to the elimination of static electricity;

impellers and housings of non-ferrous metals;

impellers of aluminium alloys or magnesium alloys and a ferrous (including austenitic stainless steel) housing on which a ring of suitable thickness of non-ferrous materials is fitted, due regard being paid to static electricity and corrosion between ring and housing;

impellers and housing of austenitic stainless steel;

any combination of ferrous (including austenitic stainless steel) impellers and housings with not less than a 13 mm tip design clearance.

3. Any combination of an aluminium or magnesium alloy fixed or rotating component, and a ferrous fixed or rotating component, regardless of tip clearance, is considered a spark hazard and shall not to be used.

4.9.4 Over-pressurized ventilation systems.

Modules with ignition sources (e.g., non-certified hazardous area equipment) located in hazardous areas shall have overpressure with monitoring. The value of the overpressure inside a module shall be kept above 50 Pa but shall not exceed 200 Pa.

N o t e . It shall be noted that for pressurized modules built within EU/EEA countries these Guidelines have not been fully aligned with the essential health and safety requirements of EN 50381. Where requirements differ between EN 50381 and these Guidelines, notes have been inserted. When pressurized equipment is intended for use in an EU/EEA member country, it is recommended for the customer to specify additional publications of EN 50381 allowing them to be incorporated within the RS documents for the module.

Boundary doors shall be self-closing and gastight.

Modules, which enclosed spaces (e.g., panels, cupboards, cable ducting) do not exceed 10 % of the volume of the module, shall be provided with additional means of ventilation, e.g. louvers. If an internal source of release exists in these enclosed spaces, they shall be provided with additional ventilation regardless of volume.

An automatic system for control of the purging shall be implemented. The necessary time for purging shall be established based on tests and measurements of air flow on the built module.

A pressure drop for a limited period of 30 s during the purge phase may be acceptable. If the pressure drops for more than 30 s, the purge cycle shall be automatically restarted.

Regardless of zone hazard class, a purge cycle of minimum 6 air changes shall be performed before non-hazardous area certified equipment inside the module is energized. Calculation of purge time shall be based upon set point of minimum air flow during purge and not nominal air flow.

N o t e . Shelf states may stipulate other requirements, e.g., EN 50381 which requires a minimum of 10 or 5 volumetric air changes per hour for zone 1 and zone 2 hazardous areas, respectively, and that such air changes shall be doubled unless representative gas testing is conducted.

Failure of overpressure ventilation shall be alarmed at a manned location (local and remote). A pre-set time delay of up to 30 s may be applied to minimize EAS spurious action when doors are intentionally opened.

N o t e . Shelf states may stipulate other requirements, e.g., EN 50381, which requires instantaneous shutdown of modules for use in zone 1 hazardous areas or modules with an internal source of release unless an external door switch is fitted indicating the door has been left open.

An allowable delay time of 30 s before opening the module door has proved to be a practical compromise and has been commonly used.

On loss of overpressure, isolation of the batteries may be delayed for up to 10 min. This requires an internal gas detector to be fitted for immediate isolation of batteries on gas detection.

Ignition sources shall be isolated where ventilation cannot be restored within a short time, typically within 30 s and at a maximum 90 s, or if gas is detected within the area during ventilation failure. The following automatic actions shall then be initiated:

all electrical equipment inside the module, which is not certified safe equipment for the corresponding outside hazardous area, shall be isolated;

essential safety systems (refer to 1.2) shall not be shut down;

a loss of pressurization alarm is initiated to the main machinery control room of offshore installation.

N o t e . Shelf states may stipulate other requirements, e.g., EN 50381, which requires shutdown of inlet and extract dampers upon the occurrence of ventilation failure and/or loss of pressurization.

The switch for isolating non-certified equipment for the above shall be certified as safe equipment for use in a hazardous area.

An indicating instrument showing the actual differential pressure relative to atmosphere shall be installed within the module.

4.9.4.1 Air locks:

.1 modules for use in zone 1 hazardous areas which contain ignition sources shall have overpressure ventilation and an air lock. In an air lock, the inner door shall open into the module (i.e. both doors open away from the airlock).

N o t e . Arrangements where the inner door of the airlock opens into the airlock shall also be considered providing there is sufficient space for the internal door to be closed prior to the external door being opened;

.2 air lock shall consist of gastight bulkheads and gastight self-closing doors. The air lock shall be mechanically ventilated at a positive pressure against the adjacent hazardous area or outside atmosphere, and the air lock shall at a minimum be classified as for zone 2 hazardous areas;

.3 where the airlock is gastight, use of a gas detector within the airlock in place of mechanical ventilation shall also be accepted. Gas detector shall be set to shutdown module at 25 % LEL;

.4 there are no requirements for an air lock in modules placed in non-hazardous areas or in zone 2 hazardous areas. However, where an inner door is installed, suitable purging of the space between the external door and the internal door shall be demonstrated in order to ensure that the accumulation of hazardous atmospheres cannot occur.

N o t e s : 1. For modules with internal and external doors with the space between not fitted with mechanical ventilation a control procedure shall be implemented to ensure that the internal door is open prior to purging commencing.

2. For modules intended for use in hazardous areas classified as zone 2, additional requirements may be applicable when also complying with requirements of IEC 60079-13 with regard to maintaining minimum pressure/air flow with external door open.

4.9.4.2 Non-certified safe equipment in pressurized modules:

.1 to ensure full isolation of ignition sources within the module, the following shall be applied:

no battery-operated devices (e.g. laptops, data recorders etc.) unless batteries are removed and adequately stored to prevent short circuit.

No fibre optic equipment other than that specified in the RS-approved documentation shall be present.

No signal (including data) or power connection shall be brought directly into the module unless they are intrinsically safe, as this will cause an ignition source to be present in a hazardous area following any shutdown of the pressurization system with the exception of signals specified within the hook-up requirements in the approved design/RS certificate.

Exposed surface temperatures on equipment shall be measured and confirmed to be below 200 °C (e.g. ovens, heaters, display monitors, computers, etc.). For application in zone 1 hazardous areas, two levels of the ESD devices, in addition to normal operational controls/thermostat, shall be provided;

.2 the above requirements shall be included in the module operating manual to highlight the need for the end user to comply with the above when adding or using equipment within an approved module.

5 SUMMARY OF REQUIREMENTS

5.1 GENERAL INFORMATION

5.1.1 This Chapter contains the information clarifying the application of the requirements of these Guidelines. The manufacturer is responsible to ensure that all requirements applicable for the module type/functions are met.

5.1.2 The module types are specified in Section 2.

5.2 SUMMARY OF REQUIREMENTS BASED ON MODULE TYPE

Table 5.2.1

Summary of requirements based on module type

Section of Guidelines		Module type								
		1	2	3	4	5	6	7	8	9
		Accommodation module	Pressurized module — no internal source of release	Non-pressurized module/frame	Pressurized module with internal source of release	Workshop for hotwork	Flammable material/paint store	Thermal modules	Local equipment room (electrical equipment)	Novel/special case equipment module
3	Structural	Structural assessments shall always be applicable on floating facilities								
4.1 — 4.2		Requirements for these sections shall always be considered								
4.3	Ignition prevention	1	X	2	X	2	3	1	X	2
4.4	Fire and gas detection	X	X	X	X	X	X	4	X	X
4.5	Means of communication	5	X	6	X	6	6	6	6	6
4.6	Fire fighting	7	8	8	9	8	10	8	8 and 11	8
4.7	Passive fire protection	12	13	13	13	13	13	—	13	13
4.8	Escape	X	X	X	X	X	14	15	14	X
4.9	Heating, ventilation and air conditioning	X	6	6	6	6 and 16	6	6 and 17	6	6
4.9.4	Overpressure	18	X	—	X	18	—	—	X	—

For module types 1 — 8, a basic fire risk assessment has been made in order to determine the above requirements, for module type 9 or variations on types 1 — 8 an individual fire risk assessment shall be made by the manufacturer using Table 4.6.1 for reference.

X — Denotes requirements shall always be applicable.

1 — Not permitted in hazardous areas.

2 — Refer to 4.1.2.

3 — The internal areas of the module are classified as hazardous areas. Zone category and extents of external zone around ventilation openings shall be determined based on the product's emissions of flammable and explosive gases, and the exposure time if emissions occur. Certified safe equipment shall be for a minimum of group IIB and temperature rating T3. Materials with lower categories of explosive mixture or auto ignition temperature below 200 °C shall not be stored within the module unless electrical equipment installed is suitability rated.

4 — Gas detection equipment shall be capable of detecting a release of refrigeration gas which may be harmful to personnel.

5 — Minimum of two speaker loops shall be supplied with separate hook-up points to the offshore installation to provide redundancy (i.e. one from each redundant PA system on the offshore installation).

6 — Applicable if module is manned.

7 — Fixed sprinkler system is required. Portable fire extinguishers according to SOLAS-74 are required.

8 — Portable fire extinguishers according to SOLAS-74 are required. Fixed fire extinguishing system based on documented fire risk.

9 — Assessment of the quantities and type of flammable materials within the module shall be provided. This shall consider the situation following loss of ventilation. Based on this assessment a fixed fire extinguishing system sufficient to extinguish the most prevalent fire risk shall be provided. Portable fire extinguishers shall be provided if the selected fixed fire extinguishing system is not suitable for extinguishing fires from all type of materials stored within the module.

10 — Fixed fire extinguishing system is required. Details of the materials types permitted to be stored within the module shall be defined; this will determine the suitable type of fixed fire-fighting equipment.

11 — Important service modules shall be fitted with a suitable fixed fire extinguishing system.

Section of Guidelines		Module type								
		1	2	3	4	5	6	7	8	9
		Accommodation module	Pressurized module — no internal source of release	Non-pressurized module/frame	Pressurized module with internal source of release	Workshop for hotwork	Flammable material/paint store	Thermal modules	Local equipment room (electrical equipment)	Novel/special case equipment module
12 — The surfaces of modules intended for location within 30 m of the centre of a rotary table shall meet the requirements of an "A-60" fire integrity, in accordance with para 9.2.4 of the 2009 MODU Code. When out with this distance or not intended for utilization on offshore installation which applied the 2009 MODU Code, the requirements of item 12 above shall be considered. 13 — Modules intended for location on deck shall be of a minimum of continuous steel construction. Where the module contains separate spaces with different function or fire risk internally, the ratings as defined in Table 9.3 and 9.4, regulation II-2/9 of SOLAS-74 shall be applied. Definition of spaces is provided in regulation II-2/9 of SOLAS-74. 14 — Modules shall be fitted with lockable doors (refer to 4.8.1). 15 — Provision for alarm and escape if occupants are locked within module (refer to 4.8.1). 16 — If the module contains ignition sources, it shall be located in non-hazardous areas or meet the requirements in 4.9.4. 17 — No refrigeration agents with ozone-depleting potential (ODP) > 0 shall be used. 18 — Optional depending upon the customer request.										

5.3 SUMMARY OF REQUIREMENTS BASED ON MODULE FUNCTIONAL GROUP

5.3.1 Internal combustion engines (ICE).

Table 5.3.1

General	ICE designed for location in non-hazardous or hazardous areas shall be constructed to ensure that no ignition sources are present following shutdown of the equipment. This requires confirmation that the temperature of the exhaust gas is less than 300 °C and surface temperature is less than 200 °C. Should the exhaust gas temperature be in excess of 300 °C, the manufacturer may provide details of heat dissipation on the exhaust surface once the engine has been shutdown
	It shall be defined whether ICE supports an important service
	If marine specification engines are required, nitrogen oxide (NO_x) emissions shall be considered and documented in accordance with Annex VI to MARPOL 73/78. Engines, which are utilized in the exploration, production or support of hydrocarbon activities, are exempt from these requirements
Ignition prevention	Starting battery shall be connected via an Exd isolator, which will disconnect the batteries on confirmation of gas within the area. Battery terminals shall be constructed as to prevent accidental short circuit. Cabling between batteries and isolator shall be double insulated and in single cores. Cables shall be mechanically protected to prevent accidental short circuit
	Engines for use in hazardous areas shall meet the requirements of EN 1834-1. Spark arrester shall be fitted in the exhaust system and shall be certified in accordance with requirements of EN 1834-1
Ignition prevention — fuel supply	Drip tray/bunding shall be installed around the floor perimeter of the module to collect any diesel leaks. This shall be sufficient for 100 % of all fluids within the module or be provided with an audible and visual alarm, which will alarm at the local control station
	Excess diesel shall be routed back to the diesel fuel tank and not to the pump feed chamber. The return area in the tank shall be separated and ventilated to avoid continuous agitation of diesel and pressure build-up in the diesel tank
	Diesel and lubricant hoses shall be made of hydrocarbon-resistant materials. Joints in proximity to the engine shall be taped to prevent splash of diesel onto engine. High-pressure fuel pipe (0,18 MPa and greater) between the fuel pumps and the injectors shall be double skinned
	Diesel fuel tanks shall meet the requirements of the IMDG Code and transported with a maximum of 5 l of fuel within the diesel system
	Diesel tanks shall be fitted with a manual shut-off valve, which can be closed from outside the module. Diesel supply to the engine shall be gravity fed or arranged such that the inclinations declared in 4.1.3 do not cause loss of suction
	Diesel tanks shall be fitted with a gauge for manual determination of fuel level. Gauge shall be supplied via a manual valve, which cannot be secured open. Gauge materials shall be fire-resistant
	The cap and dipstick for lubrication oils shall be secured against coming loose due to vibration during shipment

Fire and gas/shutdown	All safety-relief devices valves shall be certified and records shall be available for current maintenance/calibration
	Gas detector shall be installed in air inlet
	Suitable fire detectors shall be located within the module
	The following ESD functions shall, as a minimum, be provided: local emergency stop accessible externally; remote stop from offshore installation control room; remote closure of diesel supply valve (outside space); overspeed; low oil pressure; high cooling water temperature; automatic rapid closing valve in combustion air inlet
Fire protection	Exhaust pipes shall have fireproof seals between flanged joints
	Continuous steel construction module required. All openings shall be closable from outside the module and all penetrations and seals shall resist fire and smoke for 60 min. Personnel doors shall be automatically closing and module end doors shall remain closed while operational
Module with ICE of 375 kW or greater	Fixed fire extinguishing system with automatic release and manual release external to the module shall be installed suitable for extinguishing of diesel/fuel type fire. Refer to 4.6.3
Module with ICE less than 375 kW	A fire-fighting monitor with a weight of 45 kg shall be provided inside the module. This shall be removable to allow for location in proximity to the main entry to the module
	Double skinned high-pressure fuel pipe between the fuel pumps and the injectors is not mandatory

5.3.2 Air compressors.

Table 5.3.2

General requirements	It shall be defined whether the air compressor will support an important service
Ignition prevention	All mechanical ignition risks shall be assessed in accordance with EN 13463. Fan belts shall be antistatic
Fire and gas/shutdown	Gas detector shall be provided in the air intake to the compressor room or the compressor itself. Air compressors that are attached equipment for diesel engines are exempt from the gas detector requirement
	The following ESD functions shall be provided: local emergency stop; remote ESD from the main machinery control room; automatic shut down on gas detection
Fire protection	There are no specific requirements for fire protection, provided no surface temperature in excess of 200 °C is present and that no ignition sources are present following shutdown on gas detection
Ventilation — breathing air	Where breathing air is required, the supply air shall be taken from a non-hazardous area. Air duct from non-hazardous area shall be designed and installed as to protect against leakage
	The quality of the breathing air shall be in accordance confirmed on an annual basis by an external laboratory

5.3.3 Steam generators.

Table 5.3.3

Ignition prevention — general	Diesel fuel steam generators designed for location in non-hazardous or hazardous areas shall be constructed to ensure that no ignition sources are present following shutdown of the equipment. This includes requiring the surface temperature of the exhaust to be below 300 °C or below 200 °C for all other surfaces. Should the exhaust gas temperature be in excess of 300 °C, the manufacturer can provide details of heat dissipation on the exhaust surface once the boiler has been shutdown
	Spark arrester shall be fitted in the exhaust system and shall be certified in accordance with requirements of EN 1834-1
Ignition prevention — fuel supply	Excess diesel shall be routed back to the diesel fuel tank and not to the pump feed chamber. The return area in the tank shall be separated and ventilated to avoid continuous agitation of diesel and pressure build-up in the diesel tank
	Diesel hoses shall be made of hydrocarbon-resistant materials. Joints in proximity to the boiler shall be taped to prevent splash of diesel onto boiler
	Drip tray/bunding shall be installed around the floor perimeter of the module to collect any diesel leaks. This shall be sufficient for 100 % of all fluids within the module or shall be provided with an alarm (audible and visual) which will alarm at the local control station
	Diesel fuel tanks shall meet the requirements of the IMDG Code and transported with a maximum of 5 l of fuel within the diesel system
	Diesel tanks shall be fitted with a manual shut-off valve, which can be closed from outside the module. Diesel supply to the engine shall be gravity fed
	Diesel tanks shall be fitted with a gauge for manual determination of fuel level. Gauge shall be supplied via a manual valve, which cannot be secured open. Gauge materials shall be fire-resistant

Fire and gas/shutdown	Gas detector shall be installed in air inlet
	Suitable fire detectors shall be located within the module
	All pressure-relief devices/valves shall be certified and records shall be available for current maintenance/calibration
	The following emergency alarms and ESD functions shall, as a minimum, be provided: local emergency stop; low water level in the boiler (alarm/shutdown); high steam pressure alarm/shutdown; remote ESD from the main machinery control room of offshore installation; closure of diesel supply valve; boiler flame extinguished
	Automatic or manual shutdown systems shall be implemented in a safety system that is mutually independent of the control and alarm system, or be provided with a documented failure analysis to ensure that the boiler will fail to a safe condition under all control, alarm or shutdown conditions
Fire fighting	Fixed fire extinguishing system with automatic release and manual release external to the module shall be installed suitable for extinguishing of diesel fire
Fire protection	Continuous steel construction module required. All openings shall be closable from outside the module and all penetrations and seals shall resist fire and smoke for 60 min. Personnel doors shall be automatically closing and module end doors shall remain closed while operational
	Exhaust pipes shall have fireproof seals between flanged joints

5.3.4 Well intervention equipment.

Table 5.3.4

General requirements	This is a composite functional group, each component of the well intervention package needs to be assessed individually based on its module group and function. Consideration shall also be given to whether the equipment is intended for use in an important service module
	Elements, which interact with isolation of the well, shall meet the requirements of the relevant American Petroleum Institute (API) standard
	Winches and lifting equipment with a lifting capacity greater than 1 t shall be certified according to the Rules for Cargo Handling Gear of Sea-Going Ships[1]

[1] Hereinafter referred to as "the RS Rules/CHG".

5.3.5 Diving systems.

Table 5.3.5

General requirements	Requirements for diving systems are defined in the Rules for the Classification and Construction of Manned Submersibles and Ship's Diving Systems[1]
	The equipment installed in diving systems shall be certified according to the procedures given in the MS and SDS Rules
	Piping systems and electrical systems interconnecting modules used for diving systems shall meet the requirements given in the MS and SDS Rules
Fire and gas	All enclosed spaces in the diving systems shall be provided with low oxygen alarms
	Any spaces where oxygen is present (stored, used or piped) shall be provided with a high O_2 alarm.
	Any oxygen sensors shall be demonstrated as suitable for use in a helium environment
Fire fighting	Modules, which are located on the open deck, shall be provided with a fixed fire extinguishing system
Fire protection	Modules, which are manned, used for control of operations or essential for recovery of divers, shall have "A-60" fire integrity
Ventilation	Modules where accidental release of gasses may be a hazard shall be provided with a suitable ventilation system

5.3.6 Hydrocarbon gathering, treatment, storage and transportation equipment.

Table 5.3.6

General requirements	Compliance of equipment with Part III "Systems for Production, Treatment, Gathering and Transportation of Well Fluids" and with the other applicable requirements of the OGE Rules
	Well test package installations require additional case-by-case review based upon the specific configuration and application. Aspects relating to fire fighting, fire protection, ventilation and escape shall be assessed during this review. The manufacturer shall state the limitations of their equipment with regard to these requirements to support this review. The general requirements applicable to the equipment specified in Section 3 shall be applied

5.3.7 Well drilling and service equipment.

Table 5.3.7

General requirements	Compliance of equipment with Part II "Drilling Rig Systems and Equipment" and with the other applicable requirements of the OGE Rules

[1] Hereinafter referred to as "the MS and SDS Rules".

5.4 OFFSHORE INSTALLATIONS NOT INTENDED FOR HYDROCARBON RELATED ACTIVITIES

5.4.1 Equipment intended for use on offshore installations where hydrocarbon liquids or gasses will never be present are permitted to replace certain requirements in these Guidelines with the alternatives listed in 5.4.2 — 5.4.5.

Where alternatives are applied according to this para, such limitations shall be noted in the RS documents.

N o t e . Proximity to hydrocarbons where accidental release may reach the offshore installation (i.e. work relating to subsea wells or platform support ships) shall be considered as areas where hydrocarbons may occur.

5.4.2 Inclination on service equipment.

Inclination angles do not impact the safe operation of the equipment under the following conditions:

equipment is not used for an important service; and

hydrocarbon gasses or liquids are not present.

Under these conditions the requirements for inclination given in Table 4.1.3-1 are not applicable.

5.4.3 Accumulator batteries.

For zone 2 hazardous areas, accumulator batteries are not required to be in certified safe equipment enclosures when hydrocarbons do not occur. Accumulator batteries shall be located in a battery compartment or locker.

5.4.4 Gas detection.

Gas detection by alarm systems on the equipment or at ventilation openings is not required where hydrocarbon gasses do not occur.

5.4.5 ICE and steam generator.

When hydrocarbon gasses or liquids do not occur, the maximum surface temperature of an ICE or steam generator shall be 220 °C and spark arrestors are not required.

6 INSTALLATION AND HOOK-UP

6.1 GENERAL

6.1.1 Before the module is taken into service, it shall be safely secured to the deck or supporting structure (refer to Section 3).

Cables for power supply, cabling and other hook-ups shall be suitably protected against mechanical damage or short circuit and shall not cause a hazard to the offshore installation.

6.2 INTERFACES BETWEEN MODULE AND OFFSHORE INSTALLATION

6.2.1 To ensure correct and suitable connections to the module, the RS documents shall specify any relevant interfaces between the module and the offshore installation. These interfaces may include hook-up of:

electric power supplies;

telephones and PA/GA systems;

signals to and from CCR;

utility systems, e.g., air, nitrogen, steam, hydraulics, water, drains, diesel.

The specification of interfaces shall be sufficiently detailed and unambiguous that the equipment can be safely and correctly hooked up to the permanent utilities on the offshore installation.

6.2.2 Signal from module or equipment to CCR.

Depending on the configuration of the module, the following signals shall be transmittable:

gas detection;

fire detection/manual fire detector of fire alarm system;

fire extinguishing medium released;

loss of pressurization;

fire damper position indication (if fire damper used);

status of control systems on the module. These signals may be connected to a common alarm signal;

condition monitoring alarms/status of monitoring.

N o t e . This includes alarms from monitoring systems for machinery, processes and other similar alarms. Equipment, which has this local monitoring system, may have a device to send an alarm signal to the main machinery control room if the equipment operates unmanned.

The RS-approved termination facilities shall be provided at a convenient location to allow hook-up to the offshore installation cables. Signals from modules to the main machinery control room shall be sent via voltage-free contacts. Regardless of location, such termination facilities shall be suitably certified as safe equipment rated for the area in which it is located but minimum of zone 2 hazardous areas.

Where voltages remain on internal components following shutdown, such equipment shall be marked: "Warning! Internal voltages may remain after module shutdown: ensure that atmosphere is non-hazardous before opening".

6.2.3 Signals from CCR to module or equipment.

Depending on the configuration of the module or equipment, the following signals shall be transmittable:

emergency stop (e.g., rotating/moving machinery);

ESD, e.g., non-certified equipment and/or safety/battery systems;

information via the offshore installations alarm system (PA/GA system/telephone).

6.3 INSTRUCTIONS FOR HOOK-UP/INSTALLATION

6.3.1 Instructions for hook-up/installation of the module shall always accompany the module detailing, at a minimum, the following:

instructions on hook-up of equipment incorporating input voltages and required protection settings from the offshore installation;

description of the conditions/functions the module shall perform and any safety precautions required to operate within prescribed condition;

maintenance requirements and periodic checks;

valid certificate of lifting equipment.

6.3.2 Copies of the design assessment documentation and referenced drawings shall be submitted to the Register for each module to allow confirmation of "as built" condition at time of certification.

7 MARKING AND INSTRUCTIONS

7.1 INFORMATION PLATE

7.1.1 Modules shall be fitted with markings provided in accordance with the applicable codes/standards. Each module shall be fitted with an information plate. For the requirements for the material and positioning of the information plate, refer to 7.5.1, Part VII "Offshore Containers" of the RMC.

The information plate shall contain the following information:

.1 name of firm (manufacturer);
.2 firm (manufacturer) contact details;
.3 number and date of technical documentation approval;
.4 module functional group;
.5 serial number;
.6 module type;
.7 hazardous area rating;
.8 module operation temperature range;
.9 minimum purge time;
.10 manned/unmanned;
.11 maximum authorized number of personnel within module;
.12 maximum fitted out mass;
.13 maximum operational weight;
.14 user must refer to the RS certificate for limitation of use.

Recommended appearance of information plate is shown in Fig. 7.1.1.

OFFSHORE MODULE	
Name of manufacturer:	…
Manufacturer contact details:	…
Approval letter number and date:	
Functional group:	…
Manufacturer's serial number:	…
Type:	
Hazardous area rating:	…
Operation temperature range:	…
Minimum purge time:	…
Manned use:	…
Max. No. of personnel within module:	…
Maximum fitted out mass:	…
Maximum operational weight:	…
USER MUST REFER TO RS CERTIFICATE FOR LIMITATION OF USE	

Fig. 7.1.1 Information plate for offshore service modules

N o t e . If the module meets the requirements of Part VII "Offshore Containers" of the RMC, the name of the information plate shall be changed to "OFFSHORE SERVICE MODULE RS". The names of the information and inspection plates in 7.5.2 and 7.5.3, Part VII "Offshore Containers" of the RMC shall be changed to "OFFSHORE SERVICE MODULE DATE PLATE RS" and "OFFSHORE SERVICE MODULE INSPECTON PLATE RS", respectively.

7.2 MARKING OF EQUIPMENT

7.2.1 Components and cable connections shall be clearly marked to enable tracing to the approved drawings.

7.2.2 All marking plates and signboards shall be of permanent and durable construction. Lettering shall be of sufficient size and colour as to be easily readable from ground/deck level. Signage and designation for shutdown or fire protection systems shall be marked in red with white lettering. Marking shall be secured in place by suitable means, i.e. stainless steel screws, rivets or metal bands. Use of plastic cable ties or glue for securing of marking shall only be accepted on the basis of documented evidence that exposure to environmental condition (refer to 4.1.3) shall not cause a deterioration or detachment of the marking.

7.2.3 The following specific markings shall be applied, where applicable:

fuse holders shall be marked with Ampère value (A) and circuit designation;

adjustable thermal protection devices shall be marked with the appropriate setting;

terminal rails shall be marked with the appropriate voltage;

electrical equipment enclosures shall be marked with voltage on the outside;

battery backed emergency lighting shall be easily identifiable on the external of the lighting fixture;

all operator control devices/buttons and emergency stop buttons shall be clearly marked with their function;

junction boxes provided for hook-up shall be marked with the required function/type, i.e. "Main Power" or "Emergency Power";

main isolating switches shall be marked to identify function and supply, i.e. "Main Power Isolator";

enclosures containing intrinsically safe circuits shall be suitably marked;

warning for internal voltages shall be marked;

portable fire extinguisher holders shall be marked with the fire extinguisher type and size.

7.2.4 Modules intended for connection to the offshore installation/ship power supply systems shall have the following data clearly marked at the connection point:

system voltage(s);

maximum supply protection value;

frequency;

short circuit current;

rated short circuit breaking capacity;

type of distribution system as per requirements of GOST 30331.1 (IEC 60364-1).

Russian Maritime Register of Shipping

Guidelines on Technical Supervision During Manufacture of Ship and Offshore Service Modules

FAI "Russian Maritime Register of Shipping"
8, Dvortsovaya Naberezhnaya,191186, St. Petersburg
www.rs-class.org/eng/