RUSSIAN MARITIME REGISTER OF SHIPPING

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RULES

FOR THE CLASSIFICATION, CONSTRUCTION AND EQUIPMENT OF MOBILE OFFSHORE DRILLING UNITS AND FIXED OFFSHORE PLATFORMS

PART V

SUBDIVISION

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RULES FOR THE CLASSIFICATION, CONSTRUCTION AND EQUIPMENT OF MOBILE OFFSHORE DRILLING UNITS AND FIXED OFFSHORE PLATFORMS

Rules for the Classification, Construction and Equipment of Mobile Offshore Drilling Units (MODU) and Fixed Offshore Platforms of (FOP) 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 July 2022.

The present edition of the Rules is based on the 2018 edition taking into account the amendments and additions developed before publication.

The Rules set down specific requirements for MODU and FOP, consider the recommendations of the Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU Code), as adopted by the IMO Assembly on 2 December 2009 (IMO resolution A.1023(26)).

The procedural requirements, unified requirements, unified interpretations and recommendations of the International Association of Classification Societies (IACS) and the relevant resolutions of the International Maritime Organization (IMO) have been taken into consideration.

The Rules are published in the following parts:

Part I "Classification";
Part II "Hull";
Part III "Equipment, Arrangements and Outfit of MODU/FOP";
Part IV "Stability";
Part V "Subdivision";
Part VI "Fire Protection";
Part VII "Machinery Installations and Machinery";
Part VIII "Systems and Piping";
Part IX "Boilers, Heat Exchangers and Pressure Vessels";
Part X "Electrical Equipment"
Part XI "Refrigerating Plants";
Part XII "Materials";
Part XIII "Welding";
Part XIV "Automation";
Part XV "MODU and FOP Safety Assessment";
Part XVI "Signal Means";
Part XVII "Life-Saving Appliances";
Part XVIII "Radio Equipment";
Part XIX "Navigational Equipment";
Part XX "Equipment for Prevention of Pollution".

These Rules supplement the Rules for the Classification and Construction of Sea-Going Ships and the Rules for the Equipment of Sea-Going Ships.

REVISION HISTORY

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

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

1 GENERAL

1.1 APPLICATION

1.1.1 The requirements of this Part of the Rules for the Classification, Construction and Equipment of Mobile Offshore Drilling Units (MODU) and Fixed Offshore Platforms (FOP)[1] apply to:

all types of self-elevating and submersible MODU and FOP while being afloat in transit;

MODU with column-stabilized units in transit and in operation;

floating units with a ship- or barge-type displacement hull of single or multiple hull construction intended for drilling of seabed and operating in the floating condition;

FOP modules afloat in transit with more than 12 persons on board.

The above floating structures are subsequently referred to as "units".

1.1.2 Drilling ships shall meet the requirements specified in 3.4.7 of Part V "Subdivision" of the Rules for the Classification and Construction of Sea-Going Ships[2], when any single compartment is flooded (with due account of the extent and location of damage as specified in 3.2 of Part V "Subdivision" of the Rules for the Classification) unless the shipowner imposes more stringent requirements.

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

2 Hereinafter referred to as "the Rules for the Classification".

1.2 DEFINITIONS AND EXPLANATIONS

1.2.1 The definitions and explanations relating to the general terminology are specified in Part I "Classification".

For the purpose of this Part the following definitions have been adopted.

Damage waterline is the waterline of a damaged unit after flooding of one or several adjacent compartments.

Watertightness is the capability of a structure to prevent water penetration in any direction under the water head the structure is designed for.

Draught d is a vertical distance measured at the midpoint of the appropriate length from the top of the plate keel or from the point where the inner surface of the shell (outer surface for units with a non-metal shell) abuts upon the bar keel, up to the relevant waterline of the unit.

Compartment is the part of the internal hull space bounded by shell plating, watertight bulkheads, decks, platforms, stringers and floors. As applied to stability columns, compartment means the part of the internal column space bounded by shell plating, watertight vertical bulkheads and horizontal platforms along its perimeter.

Permeability of space μ is the ratio of the volume that may be filled with water in full flooding of the space to the total theoretical volume of the space.

Weathertightness is that in any sea conditions water will not penetrate into the unit.

Floating unit is a unit with a ship-or barge- type displacement hull of single or multiple hull construction intended for drilling of seabed and operating in the floating condition.

Downflooding is any flooding of any intact buoyant part of the unit's hull through the openings located below the damage waterline and which cannot be closed watertight, or which are required for operational reasons to be kept open.

Equalization of unit is the process of eliminating or reducing heel and/or trim.

Angle of inclination is the angle between the vertical and the line of intersection of the unit's center and midstation planes.

The tangent of the angle of inclination φ is determined by the formula

$$tg(\varphi) = (tg^2\theta + tg^2\psi)^{1/2}$$

where θ = angle of heel;
ψ = angle of trim.

In all design flooding conditions only one damage is assumed and only one free surface of the outside water that penetrates the compartment after an accident is taken into account. The damage therewith is assumed to be shaped as a rectangular parallelepiped.

1.3 SCOPE OF TECHNICAL SUPERVISION

1.3.1 The general provisions pertaining to the procedure of classification, technical supervision during construction, classification surveys, as well as the requirements for technical documentation to be submitted for review and approval by the Register are specified in Part I "Classification".

1.3.2 For every unit covered by the requirements of this Part, the Register carries out:

.1 review and approval of the Damage Stability Booklet;

.2 review and approval of the relevant software if provision is made for use of a shipboard computer to evaluate damage stability.

1.4 GENERAL TECHNICAL REQUIREMENTS

1.4.1 When checking the damage trim and stability in accordance with the requirements of this Part the unit is assumed to be a free-floating body. However, it is necessary to evaluate the possible detrimental effects of the position-keeping system on the damage trim and stability, especially in case where mooring line fairleads are lower than the centre of lateral resistance of the damaged unit.

1.4.2 Calculating the initial metacentric height and plotting static stability curves for a damaged unit, the free surface corrections for liquids in intact tanks shall be regarded in a way similar to stability calculations of the intact unit in accordance with Part IV "Stability".

1.4.3 Plotting static stability curves for a damaged unit, enclosed superstructures, deckhouses, as well as angles of flooding through the openings assumed as open shall be taken into account in the same manner as in the case of plotting the curves for an intact unit in accordance with Part IV "Stability".

Damaged superstructures and deckhouses may be regarded only with the permeability specified in 2.3 or not regarded at all. The openings inside the above spaces used for access to non-flooded spaces are assumed open for ingress of water at appropriate angles of inclination unless they are provided with standard closing weathertight devices.

1.4.4 All units shall be provided with the Damage Stability Booklet approved by the Register. The Booklet shall allow the master of a unit to take into account the requirements associated with subdivision and to assess the condition of the damaged unit prior to taking appropriate measures for survival of the damaged unit.

The Damage Stability Booklet shall include the following data:

.1 data on the unit, schematic diagrams of its inboard profile and sectional view, of deck and platform plans, of typical cross-sections of hulls and stability columns with indication of watertight bulkheads, enclosures, platforms with openings therein, the type of closure of these openings. The openings that are open during drilling and shall be closed watertight in transit shall be expressly specified. The diagrams of systems used in damage control of the unit shall be also presented;

.2 data essential for maintaining stability, trim of an intact unit, and sufficient for withstanding, in accordance with the requirements of this Part, the most dangerous design damage;

.3 the summary of the results of damaged unit condition calculations which includes parameters of an initial and damage draught, heel and trim, a metacentric height and stability curves prior to and after taking measures for equalization, as well as recommended measures and the time of equalization;

.4 other data on structural provision of subdivision, on the use of cross-flooding arrangements and emergency means, as well as potential consequences of flooding due to particular features of a given unit, recommended and prohibited actions for the crew in service and in accidents with the unit associated with compartments flooding.

1.4.5 The Damage Stability Booklet shall be compiled on the basis of unit’s inclining test results and the data contained in Stability Booklet.

The procedure for extending the validity of the Damage Stability Booklet from one unit to another of the same series of construction is similar to that applied for Stability Booklet specified in Part IV "Stability".

1.4.6 The Damage Stability Booklet may be complied as a separate document or as a constituent part of the unit’s Operating Manual.

1.4.7 The Damage Stability Booklet of a column-stabilized unit shall be either confirmed or updated with due regard for the change of the light displacement and/or the results of the unit’s in-service inclining test conducted, based on the results of survey for class renewal and/or MODU Safety Certificate validation.

1.4.8 The diagrams showing the boundaries of watertight compartments, arrangement of openings leading to these compartments and their means of closing with indication of control stations of these means, as well as arrangements for equalizing heel and trim due to compartments flooding shall be exhibited in every unit.

1.4.9 The shipboard computer is recommended for use to estimate damage trim and stability. In this case, the relevant software shall have the Register approval.

Availability of the onboard software approved by the Register on board to check the damage stability and trim of the unit does not justify exclusion of any section of the Damage Stability Booklet.

1.5 GENERAL REQUIREMENTS FOR SUBDIVISION

1.5.1 Subdivision of units listed in 1.1.1 is considered to be satisfactory if damage trim and stability meet the requirements of Section 2.

2 DAMAGE TRIM AND STABILITY

2.1 GENERAL

2.1.1 Trim and stability of an intact unit in all operational loading conditions corresponding to the unit's intended purpose (without regard for icing) shall be sufficient to ensure fulfillment of the requirements for damage trim and stability of a damaged unit.

2.1.2 The requirements for unit's damage trim and stability are considered to have been fulfilled if, under damages specified in 2.2 with the number of flooded compartments mentioned in 2.4, at the permeability determined according to 2.3, the calculations made in compliance with the conditions in 2.1.3 — 2.1.7 indicate that the proper requirements specified in 2.5 — 2.7 are complied with.

2.1.3 The calculations confirming fulfillment of the requirements of 2.5 — 2.7 for damage trim and stability of a damaged unit shall be made for such a number of the worst, with reference to trim and stability, loading conditions, such location and extent of a damage determined in accordance with 2.2 that proceeding from these calculations, one could be assured that in all other cases the damaged unit parameters as regards damage trim and stability, will be more favourable.

2.1.4 Where the distance between two adjacent watertight transverse bulkheads is less than the design damage extent lengthwise, an appropriate compartment, at the designer's discretion, shall be added to one of the adjacent compartments when checking damage trim and stability.

2.1.5 Where the step of a bulkhead is located within the damage zone assumed, the stepped bulkhead shall be considered as covered by the damage when dealing with compartment flooding.

2.1.6 If any damage of a lesser extent than specified in 2.2 may result in a more severe condition as regards damage trim and stability, such a damage shall be considered when making stability of a damaged unit calculations of the damage trim and stability.

2.1.7 All piping, ventilation ducts, trunks, etc. within the extent of damage shall be assumed to be damaged, and construction of means of closure provided on watertight boundaries to preclude the progressive flooding of spaces which are intended to be intact.

2.1.8 When making calculations confirming compliance with the requirements of 2.5 — 2.7 for damage trim and stability of a damaged unit the ability to reduce angles of inclination by pumping out, compartments ballasting or position-keeping system use, etc shall not be considered as arguments in relaxation of these provisions.

2.2 EXTENT AND ZONES OF DESIGN DAMAGES

2.2.1 For self-elevating, floating and surface units, the following design damages of outboard sides and transoms shall be assumed:

.1 longitudinal extent: 3 m;

.2 tranverse extent: 1,5 m;

.3 vertical extent: from the baseline upwards without limit.

At unusually large draughts and elevations of the bulkhead deck above the waterline in transit, the vertical extent may be assumed from the line located 10 m below the waterline (with due regard for trim) upwards up to the line located 7 m above the waterline (with due regard for trim as well).

2.2.2 In calculations of damage trim and stability confirming compliance with the requirements of 2.5 and 2.6 for column-stabilized units, the following damage extent for columns and bracings located along the perimeter of the unit is assumed:

.1 longitudinal extent: 1/8 of the stabilized column perimeter at the level of an actual waterline or 2,5 m (whichever is greater);

.2 transverse extent: 1,5 m;

.3 vertical extent: 3 m at any level between 5 m above and 3 m below an actual waterline with due regard for the trim. The above-mentioned zones may be reduced if it is proved to the Register that damage in this or that zone is impossible due to structural arrangements performed which are provided for by the particular design. However, in any case the damage area shall extend at least by 1,5 m above and 1,5 m below the actual waterline.

2.2.3 Watertight horizontal platforms and vertical bulkheads, trunks, piping, etc. shall be taken as destroyed ones that may be covered by damages specified in 2.2.2 in any place of the zone bounded by:

two outer quadrants (180^{o}) at middle columns;

three outer quadrants (270^{o}) at corner columns.

2.2.4 In transit condition of the column-stabilized unit, the underwater hull or footings shall be assumed to be damaged in the same manner as indicated in 2.2.2 and 2.2.3 (depending on the shape of the underwater hull or footings, 2.2.1.1 may be applied instead of 2.2.2.1).

2.3 PERMEABILITY INDICES

2.3.1 In the calculations of damage trim and stability the permeability index of flooded space shall be assumed equal to:

.1 0,85 for spaces occupied by machinery, electric generating sets and process equipment;

.2 0,95 for accommodation spaces and empty spaces including empty tanks;

.3 0,6 for the spaces intended for dry stores.

2.3.2 Permeability of flooded tanks with liquid cargo or liquid stores or water ballast is determined based on the assumption that all the cargo is discharged from the tank and sea water is ingressed taking into consideration the permeability index being equal to 0,95.

2.3.3 The permeability index of spaces may be assumed lower than specified above only in case a special calculation is performed which is approved by the Register.

2.3.4 Where the arrangement of spaces or the operating conditions of the unit are such that the expediency of the application of other permeability indices resulting in more severe requirements is evident, the Register is entitled to require the application of those permeability indices.

2.4 NUMBER OF COMPARTMENTS TO BE FLOODED

2.4.1 The requirements for damage trim and stability shall be met at flooding of any compartment or combination of compartments with the damages specified in 2.2.

The exception may concern the number of flooded compartments for stability columns of MODU with the design damage whose extent and location are specified in 2.2.2 — 2.2.4.

2.4.2 The necessity to ensure damage trim and stability at flooding of any two or three adjacent compartments over the whole length and breadth of the hull or part thereof is shall be determined by the shipowner.

2.5 GENERAL REQUIREMENTS FOR DAMAGE TRIM AND STABILITY CHARACTERISTICS OF DAMAGED UNITS

2.5.1 The damage waterline prior to taking measures on equalization and after it shall run below the bulkhead deck outside the damage area. This requirement may be ignored when the damage waterline prior to the equalization process and after it runs at least 0,3 m below openings in bulkheads, decks and sides through which progressive flooding is possible.

By openings through which progressive flooding of a unit is possible, the outlets of air and vent pipes, as well as cutouts closed by weathertight doors and covers are meant.

The following may be excluded from the above:

side and deck scuttles of the non-opening type;

manholes closed by covers with closely fitted bolts;

2.5.2 The initial metacentric height corresponding to an inclination in relation to any possible axis in the final stage of flooding, as calculated by the constant displacement method, prior to taking measures on equalization and/or improving stability shall be at least 0,3 m.

2.5.3 The angle of inclination determined with due regard for heel and trim angles shall not exceed 7° in the final stage of flooding after taking measures on equalization. The allowable angle of inclination prior to equalization is specified in 2.6 and 2.7.

2.5.4 The static stability curve of a damaged unit shall have the sufficient area of positive arm sections. In the final stage of flooding therewith, as well as after equalization the maximum statical arm shall be at least 0,3 m.

2.5.5 Openings, such as air and vent pipes, cutouts, hatches, doors, etc. submerged when a unit is inclined to the range from the first to the second intercept of the right moment curve and the wind heeling moment curve or to the downflooding angle (whichever is less) shall be weathertight.

2.6 ADDITIONAL REQUIREMENTS FOR DAMAGE TRIM AND STABILITY

2.6.1 Floating and self-elevating units.

2.6.1.1 In any operating or transit condition the unit shall withstand flooding of any single compartment when damaged as specified in 2.2.1.

2.6.1.2 For self-elevating unit, when any single compartment is flooded the following requirement shall be met:

$$R_0S \geq 7° + (1{,}50\varphi_s) \qquad (2.6.1.2)$$

where $R_0S \geq 100$;

R_0S = range of damage stability from the static angle of inclination φ_s in degrees, to the angle of vanishing stability φ_v, in degrees, without reference to the angle of downflooding.

Calculation of the damage stability shall be made with the unit being inclined about the critical axis.

2.6.1.3 The unit shall have sufficient reserve stability in a damaged condition to withstand the statically applied heeling moment based on a wind velocity of 25,8 m/s superimposed from any direction.

The reserve of stability is considered as sufficient if the area under the damage righting moment curve from the static angle of inclination without regard for the wind action to the angle of the second intercept with the wind heeling moment curve (or to the angle of downflooding through an opening considered to be open, if it is less than the angle of the second intercept) regardless the motions is greater than the area under the wind heeling moment curve limited by the same angles.

In this condition, the waterline of the damaged unit shall be below the lower edge of any opening through which progressive flooding may take place.

2.6.2 Column-stabilized units.

2.6.2.1 In any operating and transit conditions, the unit damaged as specified in 2.2.2 — 2.2.4 shall have sufficient reserve buoyancy and stability to withstand the statically applied heeling moment based on a wind velocity of 25,8 m/s superimposed from any direction. In this case, the following requirements shall be met:

.1 the angle of inclination shall not be greater than 17°;

.2 any opening below the final waterline shall be made watertight and any opening within 4 m above the damage waterline shall be made weathertight;

.3 the range of positive part of the damage righting moment curve from the angle of inclination, with due regard for a wind action, to the angle of downflooding or the second intercept of the wind moment and righting moment curves (whichever is less) shall be at least 7°. The angle at which water enters the openings not having watertight or weathertight closures through which water can penetrate intact compartments shall be assumed to be the angle of downflooding;

.4 within the righting moment curve range specified in 2.6.2.1.3, the righting moment curve shall reach a value of at least twice the wind heeling moment curve, both being measured at the same angle of inclination (refer to Fig. 2.6.2.1.4).

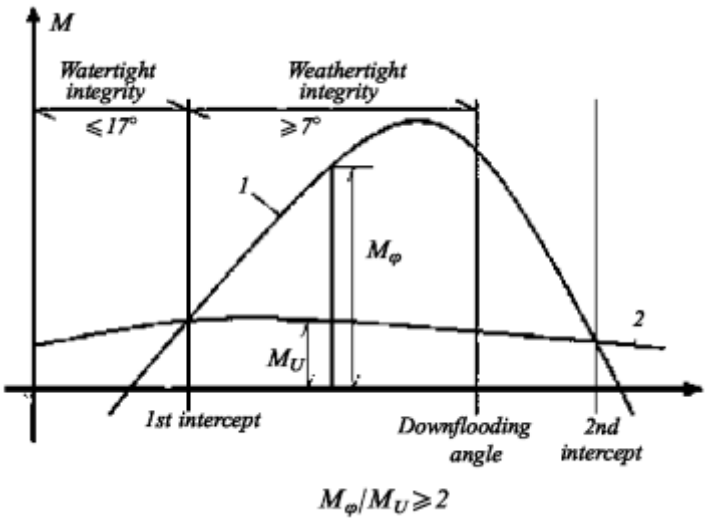

Fig. 2.6.2.1.4
Righting moment (1) and wind heeling moment (2) curves

2.6.2.2 In any operating or transit condition, the unit shall withstand the flooding of any watertight compartment (one, irrespective of the size thereof) wholly or partially situated below the waterline in question, which is a room containing ballast pumps, a room containing machinery with a sea water cooling system or a compartment adjacent to sea, taking the following considerations into account:

.1 the angle of inclination after flooding shall not be greater than 25°;

.2 any opening below the final waterline shall be made watertight;

.3 a range of positive stability after damage shall be provided, with due regard for the angle of downflooding, of at least 7°.

2.6.2.3 In transit or operating conditions, the requirement of 2.6.2.2 may not apply to spaces containing ballast pumps or machinery with a sea water cooling system in case when these pumps and machinery shall not function in one of the two conditions and if these spaces are not adjacent to sea.

2.6.2.4 As an alternative to the requirements of 2.6.2.1.3, 2.6.2.1.4 and 2.6.2.2.3, in order to assess the damage stability of a column-stabilized units which have buoyant volumes contained in watertight upper- deck structure the following criteria may apply:

.1 the righting lever curve after damage or flooding as specified in 2.2.2 and 2.6.2.2 shall, before the second intercept angle, reach a value of at least 2,5 m (refer to Fig. 2.6.2.4.1). In calculating the righting lever curve, the enclosed watertight volumes above the watertight platforms positioned at, or above, the lowest continuous deck shall arise at least 1,0 m to this value;

.2 the righting moment curve after damage shall have a range not less than 10° between the first and the second angles of intercept of the righting and wind heeling moments;

.3 for the purpose of calculating the righting lever curve of a damaged unit, buoyancy may be assumed from all spaces which comply with 2.6.2.4.4 and 2.6.2.4.5. Where the lower edge of any opening the closure of which does not comply with 2.6.2.4.4 and 2.6.2.4.5, is submerged, then the corresponding space shall be excluded from the reserve of buoyancy, starting from a level corresponding to the angle where this opening is submerged. Loss of buoyancy in this case shall not cause the righting lever to fall below 1,0 m above the wind lever curve within the range specified in 2.6.2.4.2;

.4 any opening submerged before the angle of inclination at which the righting lever meets the requirement of 2.6.2.4.1 shall be fitted with a remotely operated watertight means of closure. Means of closure of self-activating type may be used;

.5 any opening submerged after the angle of inclination at which the righting lever meets the requirement of 2.6.2.4.1 within a range specified in 2.6.2.4.2, shall be fitted with a means of closure as required in 2.6.2.4.4 or with easily operable weathertight means of closure.

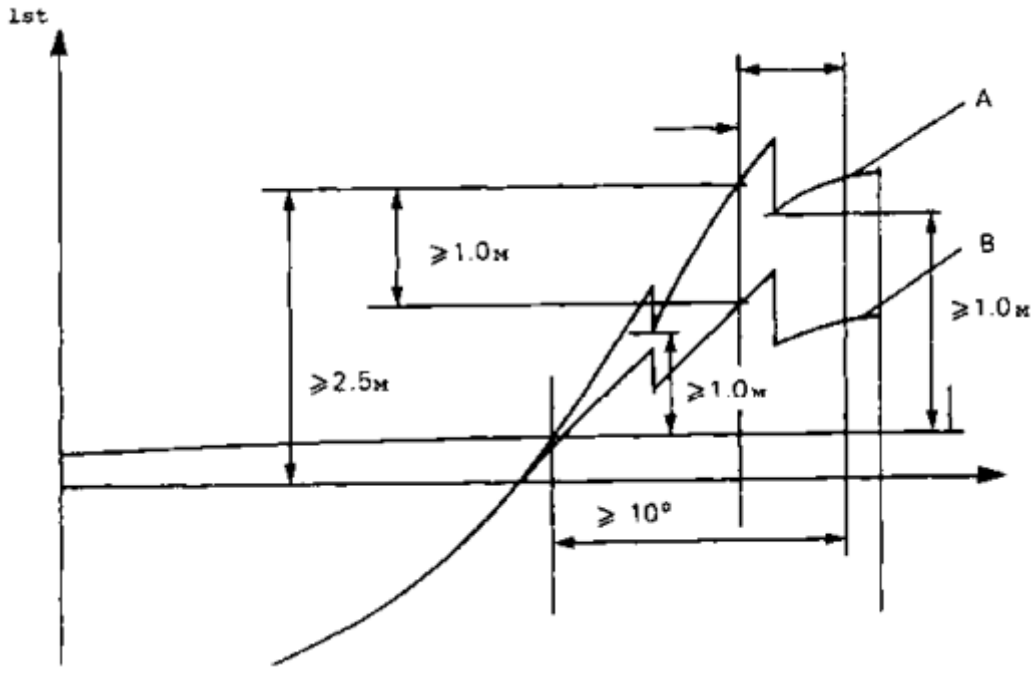

Fig. 2.6.2.4.1
Righting moment curves with or without regard for the topside buoyancy:

A — *GZ*-curve including the watertight volumes with watertight bottom, situated on or above the lowest continuous deck;
B — *GZ*-curve excluding the watertight volumes with watertight bottom, situated on or above the lowest continuous deck

2.7 CONDITIONS OF SUFFICIENT BUOYANCY AND STABILITY FOR FOP DAMAGED MODULES

2.7.1 Damage trim, stability and buoyancy of a modulus with a flooded compartment or compartments are considered satisfactory if:

.1 the initial metacentric height of the modulus in the final stage of flooding for non-inclined condition as determined by the constant displacement method, prior to taking measures on its increase, is at least 0,05 m;

.2 the angle of inclination does not exceed 25°;

.3 the extent φ_+ of a static stability curve having positive arms with due regard for the angle of flooding is at least 20°. This value may be reduced down to $\varphi_+ = 10°$ provided the curve section area with positive arms is at least (20°/φ_+) 0,0175 m·rad;

.4 the damage waterline prior to, in the course of and after equalization runs at lest 0,3 m below the openings in bulkheads, decks and sides through which progressive flooding is possible;

.5 the bulkhead deck and even the open deck may be immersed in water.

2.7.2 The value of the maximum arm of a static stability curve shall be at least 0,1 m within the range specified.

In the intermediate stages of flooding the above value shall be at least 0,05 m, and the extent of the positive part of the static stability curve shall be at least 7°.

Russian Maritime Register of Shipping

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Part V
Subdivision

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