RULES
FOR THE CLASSIFICATION AND CONSTRUCTION OF MOBILE OFFSHORE DRILLING UNITS

PART II
CONSTRUCTION, STRENGTH AND MATERIALS

July
2024

GDAŃSK

2.5.3 The structure in way of components of the position mooring system such as fairleads and winches should be designed to withstand the stresses imposed when a mooring line is loaded to its breaking strength.

2.6 Special considerations for self-elevating units

2.6.1 The hull strength should be evaluated in the elevated position for the specified environmental conditions with maximum gravity loads aboard and with the unit supported by all legs. The distribution of these loads in the hull structure should be determined by a method of rational analysis. Scantlings should be calculated on the basis of this analysis, but should not be less than those required for other modes of operation.

2.6.2 The unit should be so designed as to enable the hull to clear the highest design wave including the combined effects of astronomical and storm tides. The minimum clearance may be the lesser of either 1.2 m or 10% of the combined storm tide, astronomical tide and height of the design wave above the mean low water level.

2.6.3 Legs should be designed to withstand the dynamic loads which may be encountered by their unsupported length while being lowered to the bottom, and also to withstand the shock of bottom contact due to wave action on the hull. The maximum design motions, sea state and bottom conditions for operations to raise or lower the hull should be clearly stated in the operating manual.

2.6.4 When evaluating leg stresses with the unit in the elevated position, the maximum overturning moment on the unit due to the most adverse combination of applicable environmental and gravity loadings should be considered.

2.6.5 Legs should be designed for the most severe environmental transit conditions anticipated including wind moments, gravity moments and accelerations resulting from unit motions. The Administration should be provided with calculations, an analysis based on model tests, or a combination of both. Acceptable transit conditions should be included in the operating manual. For some transit conditions, it may be necessary to reinforce or support the legs, or to remove sections to ensure their structural integrity.

2.6.6 Structural members which transmit loads between the legs and the hull should be designed for the maximum loads transmitted and so arranged as to diffuse the loads into the hull structure.

2.6.7 When a mat is utilized to transmit the bottom bearing loads, attention should be given to the attachment of the legs so that the loads are diffused into the mat.

2.6.8 Where tanks in the mat are not open to the sea, the scantlings should be based on a design head using the maximum water depth and tidal effects.

2.6.9 Mats should be designed to withstand the loads encountered during lowering including the shock of bottom contact due to wave action on the hull.

2.6.10 The effect of possible scouring action (loss of bottom support) should be considered. The effect of skirt plates, where provided, should be given special consideration.

2.6.11 Except for those units utilizing a bottom mat, the capability should be provided to pre-load each leg to the maximum applicable combined load after initial positioning at a site. The pre-loading procedures should be included in the operating manual.

The equivalent stress in plate elements clear of discontinuities shall generally not exceed 0.7 and 0.9 of the yield strength of the material, for the loading conditions given in D3.4.1(i) and (ii), respectively.

(b) Members of lattice type structures shall be designed in accordance with accepted practice for such members; for example, they may comply with the American Institute of Steel Construction's Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.

D3.4.4 Fatigue analysis

D3.4.4.1 The possibility of fatigue damage due to cyclic loading shall be considered in the design of self elevating and column stabilized units.

D3.4.4.2 The fatigue analysis will be dependent on the intended mode and area of operations to be considered in the unit's design.

D3.4.4.3 The fatigue life is to be based on a period of time equal to the specified design life of the structure. The period is normally not to be taken as less than 20 years.

D3.4.5 The effect of notches, stress raisers and local stress concentrations is to be taken into account in the design of load carrying elements.

D3.4.6 Critical joints depending upon transmission of tensile stresses through the thickness of the plating of one of the members (which may result in lamellar tearing) are to be avoided wherever possible. Where unavoidable, plate material with suitable through-thickness properties and inspection procedures may be required.

D3.5 Allowable stresses

D3.5.1 For cases involving individual stress components and, where applicable, direct additions of such stresses, the stress is not to exceed the allowable individual stress σ_i^* or τ_i^*,

where:

σ_i^* – $\eta\sigma_Y$ for axial bending stress,
τ_i^* – $\eta\sigma_Y$ for shear stress,
σ_Y – specified minimum tensile yield stress of the material,
η – usage factor,

- for static loadings (see D3.4.1.1)
  η – 0.6 for axial stress,
  0.6 for bending stress,
  0.40 for shear stress,
- for combined loadings (see D3.4.1.2)
  η – 0.8 for axial stress,
  0.8 for bending stress,
  0.53 for shear stress.

D3.5.2 In addition, the stress in structural elements, due to compression, ending, shear or any combination of the three, shall not exceed the allowable buckling stress σ_b^* or τ_b ~~b~~*,

where:

σ_b^* – $\eta\sigma_{cr}$ for compression or bending,
τ_b^* – $\eta\tau_{cr}$ for shear stress,
η – 0.6 for static loadings,

D4.3.2 Structure in way of jacking or other elevating arrangements

Load carrying members which transmit loads from the legs to the hull are to be designed for the maximum design loads and are to be so arranged that loads transmitted from the legs are properly diffused into the hull structure.

D4.3.3 Hull structure

The hull is to considered as a complete structure having sufficient strength to resist all induced stresses while in the elevated position and supported by all legs. All fixed and variable loads are to be distributed, by an accepted method of rational analysis, from the various points of application to the supporting legs. The scantlings of the hull are then to be determined consistent with this load distribution, but are not to be less than those required by D4.2. Scantlings of units having other than rectangular hull configurations will be subject to special consideration.

D4.3.4 Wave clearance

The unit is to be designed for a crest clearance of either 1.2 m (4 ft), or 10% of the combined storm tide, astronomical tide and height of the maximum wave crest above the mean low water level, whichever is less, between the underside of the unit in the elevated position and the crest of the design wave. This crest elevation is to be measured above the level of the combined astronomical and storm tides.

D4.3.5 Bottom mat

When the bottoms of the legs are attached to a mat, particular attention is to be given to the attachment and the framing and bracing of the mat, in order that the loads resulting from the legs are properly distributed. The envelope plating of tanks which are not vented freely to the sea is not to be less in thickness than would be required by the Rules for tanks, using a head to the design water level, taking into account the astronomical and storm tides. The effects of scouring on the bottom bearing surface should be considered. The effects of skirt plates, where provided, will be specially considered. Mats are to be designed to withstand the shock of touching bottom while the unit is afloat and subject to wave motions.

D4.3.6 Preload capability

For units without bottom mats, all legs are to have the capability of being preloaded to the maximum applicable combined gravity plus overturning load. The approved preload procedure should be included in the Operating Booklet.

D4.3.7 Sea bed conditions

Classification will be based upon the designer's assumptions regarding the sea bed conditions. These assumptions should be recorded in the Operating Booklet. It is the responsibility of the operator to ensure that actual conditions do not impose more severe loadings on the unit.

D4.3.8 Deckhouses

Deckhouses are to have sufficient strength for their size, function and location, and are to be constructed to approved plans. Their general scantlings are to be as indicated in the Rules. Where they are close to the side shell of the unit, their scantlings may be required to conform to the applicable requirements of the *Rules for the Classification and Construction of Sea-going Ships, Part II – Hull,* for bulkheads of unprotected house fronts.

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Annex to UR D4 as Recommendations on Operation of Legs:

(1) Legs while lowering to bottom: Legs are to be designed to withstand the dynamic loads which may be encountered by their unsupported length just prior to touching bottom, and also to withstand the shock of touching bottom while the unit is afloat and subject to wave motions.

(2) Instructions for lowering legs: The maximum design motions, bottom conditions and sea state while lowering legs should be clearly indicated in the Operating Booklet, and the legs are not to be permitted to touch bottom when the site conditions exceed the allowable.

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IACS UR D5/Rev.3 - Column-stabilized drilling units

D5.1 General

D5.1.1 This section applies to the unit type as defined in *Part I* of the Rules (in IACS UR D2.2.2).

D5.1.2 For units of this type, the highest stresses may be associated with less severe environmental conditions than the maxima specified by the owner (designer). Where considered necessary by PRS, account should be taken of the consequent increased possibility of encounter of significant stress levels, by either or both of the following:

(i) suitable reduction of the allowable stress levels for combined loadings given in IACS UR D3.
(ii) detailed investigation of the fatigue properties.

Particular attention should also be given to the details of structural design in critical areas such as bracing members, joint connections, etc.

D5.1.3 Local structures in way of fairleads, winches, etc., forming part of the position mooring system, should be designed to the breaking strength of the mooring line.

D5.2 Upper structure

D5.2.1 The scantlings of the upper structure are not to be less than those required by the *Rules* in association with the loadings indicated on the deck loading plan. (These loadings are not to be less than the minima specified in IACS UR D3.3.6). In addition, when the upper structure is considered to be an effective member of the overall structural frame of the unit, the scantlings are to be sufficient to withstand actual local loadings plus any additional loadings superimposed due to frame action, within the stress limitations of IACS UR D3.

D5.2.2 When the upper structure is designed to be waterborne in any mode of operation or damaged condition, or to meet stability requirements, it will be subject to special consideration.

D5.2.3 Deckhouses fitted to the upper structure are to be designed in accordance with the applicable requirements of the *Rules for the Classification and Construction of Sea-going Ships, Part II – Hull*, with due consideration given to their location and to the environmental conditions in which the unit will operate.

D5.3 Columns, lower hulls and footings

D5.3.1 Main stability columns, lower hulls or footings may be designed as either framed or unframed shells. In either case, framing, ring stiffeners, bulkheads or other suitable diaphragms which are used are to be sufficient to maintain shape and stiffness under all the anticipated loadings.

Portlights or windows including those of the non-opening type, or other similar openings, are not to be fitted in columns.

D5.3.2 Columns shall meet the following requirements:

(a) where columns, lower hulls or footings are designed with stiffened plating, the minimum scantlings of plating, framing, girders, etc., may be determined in accordance with the requirements for tanks as given in IACS UR D7. Where an internal space is a void compartment, the design head used in association with the above is not to be less than corresponding to the maximum allowable waterline of the unit in service. In general, the scantlings are not to less than required for watertight bulkheads in association with a head equivalent to the maximum damaged waterline, and for all areas subject to wave immersion, a minimum head of 6.0 m (20 ft) should be used.

(b) where columns, lower hulls or footings are designed as shells, either unstiffened or ring stiffened, the minimum scantlings of shell plating and ring stiffeners are to be determined on the basis of established shell analysis using the appropriate usage factors and the design heads as given in (a).

(c) scantlings of columns, lower hulls or footings as determined in (a) and (b) are minimum requirements for hydrostatic pressure loads. Where wave and current forces are superimposed, the local structure of the shell is to be increased in scantlings as necessary, to meet the strength requirements of IACS UR D3.4.1(ii).

(d) when the column, lower hull or footing is an effective member of the overall structural frame of the unit, the scantlings are to be sufficient to meet the requirements of D5.3 plus any additional stresses superimposed due to frame action, within the stress limitations of IACS UR D3.

(e) particular consideration is to be given to structural details, reinforcement, etc., in areas subject to high local loadings, or to such loadings that may cause shell distortion, for example:
.1 bottom bearing loads, where applicable;
.2 partially filled tanks;
.3 local strength against external damage;
.4 continuity through joints;
.5 wave impacts.

(f) for units designed to rest on the sea bed, the effect of scouring action (loss of bottom support) is to be considered. The effects of skirt plates, where provided, will be specially considered.

D5.3.3 Bracing members

(a) Stresses in bracing members due to all anticipated loadings are to be determined in accordance with the following requirements in conjunction with the relevant requirements of IACS UR D3.

(b) Bracing members are to be designed to transmit loadings and to make the structure effective against environmental forces and, when the unit is supported by the seabed, against the possibility of uneven bearing loads. Although designed primarily as brace members of the overall structure under the designated loadings, the bracing must also be investigated, if applicable, for superimposed local bending stresses due to buoyancy, wave and current forces.

(c) Where relevant, consideration is to be given to local stresses due to wave impact.

(d) When bracing members are of tubular section, ring frames may be required to maintain stiffness and roundness of shape.

(e) When bracings are watertight, they are to be suitably designed to prevent collapse from external hydrostatic pressure.

D5.4 Wave clearance

D5.4.1 Afloat condition

Unless deck structures are designed for wave impact, to the satisfaction of PRS, reasonable clearance between the deck structures and the wave crests is to be ensured for all afloat modes of operation, taking into account the predicted motion of the unit relative to the surface of the sea. Calculations, model test results, or prototype experiences are to be submitted for consideration.

D5.4.2 On-bottom condition

For on-bottom modes of operation, clearances are to be in accordance with those specified in IACS UR D4.3.4 for self-elevating units.

D5.5 Structural redundancy

D5.5.1 When assessing structural redundancy for column stabilized units, the following assumed damage conditions shall apply:

1. The unit's structure shall be able to withstand the loss of any slender bracing member without causing overall collapse of the unit's structure.
2. Structural redundancy will be based on the applicable requirements of IACS UR D3.3, D3.4, D3.5, and D3.6, except:
   a. maximum calculated stresses in the structure remaining after the loss of a slender bracing member are to be in accordance with IACS UR D3.5 in association with usage factors not exceeding 1.0. This criterion may be exceeded for local areas, provided redistribution of forces due to yielding or buckling is taken into consideration;
   b. when considering environmental factors, a one year return period may be assumed for intended areas of operations. (see IACS UR D3.3.1)

D5.5.2 The structural arrangement of the upper hull is to be considered with regard to the structural integrity of the unit after the failure of any primary girder.
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IACS UR D6/Rev.1 - Surface type drilling units

D6.1 General

D6.1.1 This section applies to the unit type, as defined in *Part I* of the Rules (in IACS UR D2.2.3).

D6.2 Ship type drilling units

D6.2.1 Scantlings of the hull structure are to meet the applicable requirements of the *Rules for the Classification and Construction of Sea-going Ships, Part II - Hull*. Special consideration is, however, to be given to items which may require some deviation or additions to the *Rules*, in particular the items indicated in D6.2.2 to D6.2.5.

D6.2.2 The required strength of the unit is to be maintained in way of the drilling well, and particular attention is to be paid to the transition of fore and aft members so as to maintain continuity of the longitudinal material. In addition, the plating of the well is to be suitably stiffened to prevent damage due to foreign objects which may become trapped in the well while the unit is under way.

D6.2.3 The deck area in way of large hatches is to be suitably compensated where necessary to maintain the strength of the unit.

D6.2.4 The structure in way of heavy concentrated loads resulting from the drilling derrick, pipe rack, set back, drilling mud storage, etc., is to be suitably reinforced.

D6.2.5 Local structure in way of fairleads, winches, etc., forming part of the position mooring system, should be designed to the breaking strength of the mooring line.

D6.3 Barge type drilling units

D6.3.1 Scantlings of the hull structure are to meet the applicable requirements of the *Rules for the Classification and Construction of Sea-going Ships, Part II - Hull*. Special consideration, where applicable, is to be given to items listed in D6.2.

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3 TOWING OF THE UNIT

3.1 Towing arrangements

3.1.1 The design and arrangement of towing fittings should have regard to both normal and emergency conditions. (MODU Code, 2.8.1)

3.1.2 Arrangements, equipment and fittings should meet the appropriate requirements of the Administration or an organization recognized by the Administration, under paragraph 1.6.5.1 of MODU Code.* (MODU Code, 2.8.2)

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* Refer to the *Guidelines for safe ocean towing* (MSC/Circ.884).

Towing arrangements shall meet the applicable requirements given in Chapter 5 of *Part III, Hull Equipment*, of the *Rules for the Classification and Construction of Sea-going Ships*.

3.1.3 Each fitting or item of equipment provided under this regulation should be clearly marked with any restrictions associated with its safe operation, taking into account the strength of its attachment to the unit's structure. (MODU Code, 2.8.3)

4 FATIGUE STRENGTH

4.1 Fatigue analysis

4.1.1 The possibility of fatigue damage due to cyclic loading should be considered in the design of self-elevating and column-stabilized units. (MODU Code, 2.9.1)

4.1.2 The fatigue analysis should be based on the intended mode and area of operations to be considered in the unit's design. (MODU Code, 2.9.2)

4.1.3 The fatigue analysis should take into account the intended design life of the unit and the accessibility of load-carrying members for inspection. (MODU Code, 2.9.3)

5 MATERIALS AND PROTECTIVE COATNINGS

5.1 Materials

5.1.1 Units should be constructed from steel or other suitable material having properties acceptable to the Administration taking into consideration the temperature extremes in the areas in which the unit is intended to operate. (MODU Code, 2.10.1)

5.1.2 Consideration should be given to the minimization of hazardous substances used in the design and construction of the unit, and should facilitate recycling and removal of hazardous materials*.(MODU Code, 2.10.2)

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* Refer to the *Guidelines on ship recycling*, adopted by IMO by resolution A.962(23), as amended (refer to A.980(24)).

5.1.3 For all MODUs, new installation of materials which contain asbestos should be prohibited*. (MODU Code, 2.10.3)

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* Refer to the *Unified interpretation on implementation of regulation 2.10.3 of the 2009 MODU Code, regulation 2.8.2 of the 1989 MODU Code and regulation 2.7.2 of the 1979 MODU Code* (MSC.1/Circ.1671).

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Refer to the *Guidelines for maintenance and monitoring of materials containing asbestos on board MODUs*. (MSC.1/Circ.1672)

5.1.4 Materials and protective coatings used for the construction of the unit shall meet the applicable requirements specified in *Part IX – Materials and Welding,* of the *Rules for the Classification and Construction of Sea-going Ships*.

5.2 Anti-fouling systems

If anti-fouling systems are installed, they should conform to the requirements of the *International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001*. (MODU Code, 2.11)

5.3 Protective coatings of dedicated seawater ballast tanks

5.3.1 All dedicated seawater ballast tanks should be coated during construction in accordance with the recommendations of the Organization*. For the purpose of this section, pre-load tanks on self-elevating units are to be considered dedicated seawater ballast tanks. Mat tanks and spud cans on such units are not to be considered dedicated seawater ballast tanks. (MODU Code, 2.12.1)

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* Refer to *Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers*, adopted by the Maritime Safety Committee by resolution MSC.215(82).

5.3.2 Maintenance of the protective coating system should be included in the overall unit's maintenance scheme. The effectiveness of the protective coating system should be verified during the life of a unit by the Administration or an organization recognized by the Administration, based on the guidelines developed by the Organization. *(MODU Code, 2.12.2)

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* Refer to the *Guidelines for maintenance and repair of protective coatings* (MSC.1/Circ.1330).

6 TECHNOLOGY OF PRODUCTION

6.1 Construction portfolio

A construction portfolio should be prepared and a copy placed on board the unit. It should include plans showing the location and extent of application of different grades and strengths of materials, together with a description of the materials and welding procedures employed, and any other relevant construction information. Restrictions or prohibitions regarding repairs or modifications should be included. (MODU Code, 2.13)

6.2 Welding

The welding procedures employed during construction should be to a recognized international standard. Welders should be qualified in the welding processes and procedures utilized. The selection of welds for testing and the methods utilized should meet the requirements of a recognized classification society. (MODU Code, 2.14)

Detailed requirements for welding and weld testing are given in *Part IX, Materials and Welding* of the *Rules for the Classification and Construction of Sea-going Ships.*

6.3 Testing

Upon completion, boundaries of tanks should be tested to the satisfaction of the Administration. (MODU Code, 2.15)

Tightness and strength tests shall be carried out in accordance with the applicable requirements specified in *Publication 21/P - Ship Hull Structure Tests*.

6.4 Drainage and sediment control*

* Refer to the *Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens*, adopted by IMO by resolution A.868(20).

All ballast and preload tanks and related piping systems should be designed to facilitate effective drainage and removal of sediments. Coatings which could entrain sediments and harmful aquatic organisms should be avoided. (MODU Code, 2.16)

7 POSITION KEEPING SYSTEMS OF THE UNIT

IACS UR D3/Rev.6 - General design parameters

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D3.11 Position keeping systems and components

D3.11.1 General

D3.11.1.1 Units provided with position keeping systems equipment in accordance with D3.11 will be eligible to have a special optional notation included in the classification designation in accordance with the policy of PRS.

D3.11.2 Anchoring Systems

D3.11.2.1 General

Plans showing the arrangement and complete details of the anchoring system, including anchors, shackles, anchor lines consisting of chain, wire or rope, together with details of fairleads, windlasses, winches, and any other components of the anchoring system and their foundations are to be submitted to PRS.

D3.11.2.2 Design

D3.11.2.2.1 An analysis of the anchoring arrangements expected to be utilized in the unit's operation is to be submitted to PRS. Among the items to be addressed are:

1. Design environmental conditions of waves, winds, currents, tides and ranges of water depth.
2. Air and sea temperature.

3. Ice conditions (if applicable).
4. Description of analysis methodology.

D3.11.2.2.2 The anchoring system should be designed so that a sudden failure of any single anchor line will not cause progressive failure of remaining lines in the anchoring arrangement.

D3.11.2.2.3 Anchoring system components should be designed utilizing adequate factors of safety (FOS) and a design methodology suitable to identify the most severe loading condition for each component. In particular, sufficient numbers of heading angles together with the most severe combination of wind, current and wave are to be considered, to determine the maximum tension in each mooring line. When a particular site is being considered, any applicable cross sea conditions are also to be considered in the event that they might induce higher mooring loads.

D3.11.2.2.3.1 When the Quasi Static Method is applied, the tension in each anchor line is to be calculated at the maximum excursion for each design condition defined in D3.11.2.2.3.2, combining the following steady state and dynamic responses of the Unit:

(a) steady mean offset due to the defined wind, current, and steady wave forces;
(b) most probable maximum wave induced motions of the moored unit due to wave excitation.

For relatively deep water, the effect from damping and inertia forces in the anchor lines is to be considered in the analysis. The effects of slowly varying motions are to be included for MODUs when the magnitudes of such motions are considered to be significant.

D3.11.2.2.3.2 When the Quasi Static Method outlined in D3.11.2.2.3.1 is applied, the following minimum factors of safety at the maximum excursion of the unit for a range of headings should be considered:

DESIGN CONDITION	FOS (factor of safety)
Operating	2.7
Severe storm	1.8
Operating – one line failed	1.8
Severe storm – one line failed	1.25

where:

FOS = PB/T_{max}

T_{max} = characteristic tension in the anchor line, equal to the maximum value obtained according to D3.11.2.2.3.1

PB = minimum rated breaking strength of the anchor line

Operating: the most severe design environmental condition for normal operations as defined by the owner or designer

Severe storm: the most severe design environmental condition for severe storm as defined by the owner or designer

Operating – one line failed: following the failure of any one mooring line in the operating condition

Severe storm – one line failed: following the failure of any one mooring line in the severe storm condition

When a dynamic analysis is employed, other safety factors may be considered to the satisfaction of PRS.

The defined Operating and Severe Storm are to be the same as those identified for the design of the unit, unless PRS is satisfied that lesser conditions may be applicable to specific sites.

D3.11.2.2.3.3 In general, the maximum wave induced motions of the moored unit about the steady mean offset should be obtained by means of model tests. PRS may accept analytical calculations provided that the proposed method is based on a sound methodology which has been validated by model tests.

In the consideration of column stabilized MODUs, the value of C_S and C_H, as indicated in IACS UR D3.8.2 (in stability requirements), may be introduced in the analysis for position keeping mooring systems. The intent of D3.8.3 – Wind tunnel tests, and of D3.8.4 – Other stability requirements, may also be considered by PRS.

D3.11.2.2.3.4 PRS may accept different analysis methodologies provided that it is satisfied that a level of safety equivalent to the one obtained by D3.11.2.2.3.1 and D3.11.2.2.3.2 is ensured.

D3.11.2.2.3.5 PRS may give special consideration to an arrangement where the anchoring systems are used in conjunction with thrusters to maintain the unit on station.

D3.11.3 Equipment

D3.11.3.1 Windlasse

D3.11.3.1.1 The design of the windlass is to provide for adequate dynamic braking capacity to control normal combinations of loads from the anchor, anchor line and anchor handling vessel during the deployment of the anchors at the maximum design payout speed of the windlass. The attachment of the windlass to the hull structure is to be designed to withstand the breaking strength of the anchor line.

D3.11.3.1.2 Each windlass is to be provided with two independent power operated brakes and each brake is to be capable of holding against a static load in the anchor lines of at least 50 percent of its breaking strength. Where PRS so allows, one of the brakes may be replaced by a manually operated brake.

D3.11.3.1.3 On loss of power to the windlasses, the power operated braking system should be automatically applied and be capable of holding against 50 percent of the total static braking capacity of the windlass.

D3.11.3.2 Fairleads and Sheaves

D3.11.3.2.1 Fairleads and sheaves should be designed to prevent excessive bending and wear of the anchor lines. The attachments to the hull or structure are to be such as to withstand the stresses imposed when an anchor line is loaded to its breaking strength.

D3.11.4 Anchor line

D3.11.4.1 PRS is to be ensured that the anchor lines are of a type that will satisfy the design conditions of the anchoring system.

D3.11.4.2 Means are to be provided to enable the anchor lines to be released from the unit after loss of main power.

D3.11.4.3 Means are to be provided for measuring anchor line tensions.

D3.11.4.4 Anchor lines are to be of adequate length to prevent uplift of the anchors under the maximum design condition for the anticipated area(s) of operation.

D3.11.5 Anchors

D3.11.5.1 Type and design of anchors are to be to the satisfaction of PRS.

D3.11.5.2 All anchors are to be stowed to prevent movement during transit.

D3.11.6 Quality Control

D3.11.6.1 Details of the quality control of the manufacturing process of the individual anchoring system components are to be submitted. Components should be designed, manufactured and tested in accordance with recognized standards insofar as possible and practical. Equipment so tested should, insofar as practical, be legibly and permanently marked with PRS stamp and delivered with documentation which records the results of the tests.

D3.11.7 Control Stations

D3.11.7.1 A manned control station is to be provided with means to indicate anchor line tensions at the individual windlass control positions and to indicate wind speed and direction.

D3.11.7.2 Reliable means are to be provided to communicate between locations critical to the anchoring operation.

D3.11.7.3 Means are to be provided at the individual windlass control positions to monitor anchor line tension, windlass power load and to indicate amount of anchor line payed out.

D3.11.8 Dynamic Positioning Systems

D3.11.8.1 Thrusters used as a sole means of position keeping should provide a level of safety equivalent to that provided for anchoring arrangements to the satisfaction of PRS.

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Units with a dynamic positioning system shall meet the requirements specified in *Publication 120/P Requirements for Vessels and Units with Dynamic Positioning (DP) Systems.*

Mooring chains should meet the requirements specified in *Publication 96/P - Offshore mooring chain*.

List of reference IMO documents in *Part II*

Resolutions

1. MSC.133(76): Adoption of technical provisions for means of access for inspections.
2. MSC.158(78): Adoption of amendments to the technical provisions for means of access for inspections.
3. MSC.215(82): Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers.
4. A.864(20): Recommendations for entering enclosed spaces aboard ships.
5. A.868(20): Guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens.
6. A.962(23): Guidelines on ship recycling.
7. A.980(24): Amendments to the IMO guidelines on ship recycling.
8. A.1050(27): Revised recommendations for entering enclosed spaces aboard ships.

MSC Circulars

1. MSC/Circ.884: Guidelines for safe ocean towing.
2. MSC/Circ.686/Rev.1: Guidelines on the means of access to structures for inspection and maintenance of oil tankers and bulk carriers (SOLAS Regulation XI-1/2).
3. MSC.1/Circ.1330: Guidelines for maintenance and repair of protective coatings.
4. MSC.1/Circ.1544: Unified interpretations for the application of chapter 2 of the 2009 MODU Code and the revised technical provisions for means of access for inspections (resolution MSC.158(78)).
5. MSC.1/Circ.1671: Unified interpretation on implementation of regulation 2.10.3 of the 2009 MODU Code, regulation 2.8.2 of the 1989 MODU Code and regulation 2.7.2 of the 1979 MODU Code.
6. MSC.1/Circ.1672: Guidelines for maintenance and monitoring of materials containing asbestos on board MODUs.

List of reference IACS documents in *Part II*

Recommendations (Rec.)

Rec No. 90/Rev.1	Ship Structural Access Manual
Rec No. 91/Rev.3	Guidelines for Approval/ Acceptance of Alternative Means of Access

List of IACS resolutions implemented to *Part II*

Unified Requirements (UR)

D3/Rev.6	General design parameters
D4/Rev.3	Self-elevating drilling units
D5/Rev.3	Column stabilized drilling units
D6/Rev.1	Surface type drilling units
D7/Rev.3	Watertight integrity

Unified Interpretations (UI)

MODU 1/Rev.1/Corr.1	IACS Unified Interpretations for the application of MODU Code Chapter 2 paragraphs 2.1, 2.2, 2.3, 2.4 and revised technical provisions for means of access for inspections (resolution MSC.158(78))