

2009 MODU CODE

CODE FOR THE CONSTRUCTION AND
EQUIPMENT OF MOBILE OFFSHORE
DRILLING UNITS, 2009

2020 EDITION



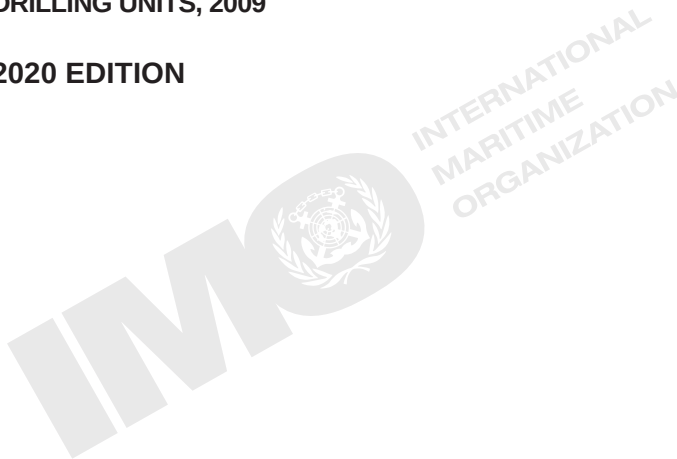
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First published in 2010
by the INTERNATIONAL MARITIME ORGANIZATION
4 Albert Embankment, London SE1 7SR
www.imo.org

Printed and bound by CPI Group (UK) Ltd, Croydon CR0 4YY

Second edition, 2020

ISBN 978-92-801-0054-9

IMO PUBLICATION
Sales number: IA810E

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Foreword

The Assembly, at its twenty-sixth session (23 November to 2 December 2009), adopted by resolution A.1023(26) the Code for the *Construction and Equipment of Mobile Offshore Drilling Units, 2009* (2009 MODU Code), which had been developed following a thorough revision of the 1989 MODU Code adopted by resolution A.649(16).

In adopting the 2009 MODU Code, the Assembly recalled in particular that, since the adoption of the 1989 MODU Code, the Organization had adopted a significant number of amendments to many of the regulations of the International Convention for the Safety of Life at Sea, 1974 (SOLAS) referenced in the Code, and also that the International Civil Aviation Organization (ICAO) had adopted amendments to the Convention on International Civil Aviation which impacted on the provisions for helicopter facilities as contained in the Code.

The 2009 MODU Code provides an international standard for MODUs of new construction which facilitates their international movement and operation and ensures a level of safety for such units and for personnel on board, equivalent to that required by the 1974 SOLAS Convention and the Protocol of 1988 relating to the *International Convention on Load Lines, 1966*, for conventional ships engaged on international voyages.

The 2009 MODU Code supersedes the 1989 MODU Code, adopted by resolution A.649(16), for mobile offshore drilling units the keels of which were laid or which were at a similar stage of construction on or after 1 January 2012.

This edition incorporates the 2013 (MSC.359(92)), 2014 (MSC.384(94)) and MSC.387(94), 2016 (MSC.407(96)) and 2017 (MSC.435(98)) amendments to the Code.

For mobile offshore drilling units constructed before 1 January 2012, the provisions of the previous MODU Codes (1989* and 1979†) apply, depending on the date of their construction.

* Refer to resolution A.649(16) adopting the 1989 MODU Code, as amended.

† Refer to resolution A.414(XI) adopting the 1979 MODU Code, as amended.



Resolution A.1023(26)*

adopted on 2 December 2009

CODE FOR THE CONSTRUCTION AND EQUIPMENT OF MOBILE OFFSHORE DRILLING UNITS, 2009 (2009 MODU CODE)

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

NOTING that mobile offshore drilling units continue to be moved and operated internationally,

RECOGNIZING that the design criteria for such units are often quite different from those of conventional ships and that, by virtue of this, international conventions (such as the *International Convention for the Safety of Life at Sea, 1974*, as amended, and the *International Convention on Load Lines, 1966*, as amended) cannot apply in respect of mobile offshore drilling units,

RECALLING FURTHER that, when the *Code for the Construction and Equipment of Mobile Offshore Drilling Units* (MODU Code) was adopted in 1979 by resolution A.414(XI), it was recognized that the design technology of mobile offshore drilling units was rapidly evolving and that new features of mobile offshore drilling units were being introduced to improve technical and safety standards,

RECALLING ALSO the adoption of the *Code for the Construction and Equipment of Mobile Offshore Drilling Units* (MODU Code), 1989, which superseded the 1979 MODU Code, by resolution A.649(16), following a number of tragic MODU casualties which emphasized the need for a review of the international safety standards developed by the Organization,

NOTING that, since the adoption of the 1989 MODU Code, ICAO has adopted amendments to the *Convention on International Civil Aviation*,

* As amended by resolutions MSC.359(92), MSC.384(94), MSC.387(94), MSC.407(96) and MSC.435(98).

which impact on the 1989 Code provisions for helicopter facilities; and that the Organization has, since, adopted a number of amendments to SOLAS regulations, which are referenced in the 1989 MODU Code,

HAVING considered the recommendation made by the Maritime Safety Committee at its eighty-sixth session,

1. ADOPTS the *Code for the Construction and Equipment of Mobile Offshore Drilling Units, 2009* (2009 MODU Code), set out in the Annex to this resolution, which supersedes the existing 1989 MODU Code adopted by resolution A.649(16), for mobile offshore drilling units, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2012;

2. INVITES Governments concerned to:

- (a) take appropriate action to give effect to the 2009 MODU Code;
- (b) consider the Code as equivalent, for purposes of application to mobile offshore drilling units, to the technical requirements of the conventions specified in the third preambular paragraph; and
- (c) inform the Organization of measures taken in this respect;

3. AUTHORIZES the Maritime Safety Committee to amend the 2009 MODU Code as appropriate, taking into consideration developments in design and technology, in consultation with appropriate organizations.

Preamble

1 This Code has been developed to provide an international standard for mobile offshore drilling units of new construction which will facilitate the international movement and operation of these units and ensure a level of safety for such units, and for personnel on board, equivalent to that required by the *International Convention for the Safety of Life at Sea, 1974*, as amended, and the *Protocol of 1988 relating to the International Convention on Load Lines, 1966*, for conventional ships engaged on international voyages. It is not intended that the provisions of the *Code of Safety for Special Purpose Ships* be applied in addition to the provisions of this Code.

2 Throughout the development of the Code, it was recognized that it must be based upon sound design and engineering principles and experience gained from operating such units; it was further recognized that design technology of mobile offshore drilling units is not only a complex technology but is continually evolving and that the Code should not remain static but be re-evaluated and revised as necessary. To this end the Organization will periodically review the Code, taking into account both experience and future development.

3 Any existing unit which complies with the provisions of this Code should be considered eligible for issuance of a certificate in accordance with this Code.

4 This Code is not intended to prohibit the use of an existing unit simply because its design, construction and equipment do not conform to this Code. Many existing mobile offshore drilling units have operated successfully and safely for extended periods of time and their operating history should be considered in evaluating their suitability to conduct international operations.

5 The coastal State may permit any unit designed to a lower standard than that of the Code to engage in operations having taken account of the local conditions (e.g. meteorological and oceanographic). Any such unit should, however, comply with safety requirements which in the opinion of the coastal State are adequate for the intended operation and ensure the overall safety of the unit and the personnel on board.

6 This Code does not include requirements for the drilling of subsea wells or the procedures for their control. Such drilling operations are subject to control by the coastal State.



Chapter 1

General

1.1 Purpose

The purpose of the *Code for the Construction and Equipment of Mobile Offshore Drilling Units, 2009*, hereinafter referred to as “the Code”, is to recommend design criteria, construction standards and other safety measures for mobile offshore drilling units so as to minimize the risk to such units, to the personnel on board and to the environment.

1.2 Application

1.2.1 The Code applies to mobile offshore drilling units as defined in section 1.3, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2012.

1.2.2 The coastal State may impose additional requirements regarding the operation of industrial systems not dealt with by the Code.

1.3 Definitions

For the purpose of the Code, unless expressly provided otherwise, the terms used therein have the meanings defined in this section.

1.3.1 *1988 LL Protocol* means the Protocol of 1988 relating to the *International Convention on Load Lines, 1966*, as amended.

1.3.2 “A” class divisions are as defined in SOLAS regulation II-2/3.

1.3.3 *Accommodation spaces* are those used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, pantries containing no cooking appliances and similar spaces. Public spaces are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

1.3.4 *Administration* means the Government of the State whose flag the unit is entitled to fly.

1.3.5 *Anniversary date* means the day and month of each year which will correspond to the date of expiry of the certificate.

1.3.6 *Auxiliary steering gear* is the equipment which is provided for effecting movement of the rudder for the purpose of steering the unit in the event of failure of the main steering gear.

1.3.7 *“B” class divisions* are as defined in SOLAS regulation II-2/3.

1.3.8 *“C” class divisions* are as defined in SOLAS regulation II-2/3.

1.3.9 *Certificate* means Mobile Offshore Drilling Unit Safety Certificate.

1.3.10 *Coastal State* means the Government of the State exercising administrative control over the drilling operations of the unit.

1.3.11 *Column-stabilized unit* is a unit with the main deck connected to the underwater hull or footings by columns or caissons.

1.3.12 *Continuous “B” class ceilings or linings* are those “B” class ceilings or linings which terminate only at an “A” or “B” class division.

1.3.13 *Control stations* are those spaces in which the unit’s radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment or the dynamic positioning control system is centralized or where a fire-extinguishing system serving various locations is situated. In the case of column-stabilized units a centralized ballast control station is a “control station”. However, for purposes of the application of chapter 9, the space where the emergency source of power is located is not considered as being a control station.

1.3.14 *D or D-value* means the largest dimension of the helicopter when rotor(s) are turning measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor path plane or helicopter structure.

1.3.15 *Dead ship condition* is the condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.

1.3.16 *Depth for freeboard* has the same meaning as defined in regulation 3 of the 1988 LL Protocol.

1.3.17 *Diving system* is the plant and equipment necessary for the safe conduct of diving operations from a mobile offshore drilling unit.

1.3.18 *Downflooding* means any flooding of the interior of any part of the buoyant structure of a unit through openings which cannot be closed watertight or weathertight, as appropriate, in order to meet the intact or damage stability criteria, or which are required for operational reasons to be left open.

1.3.19 *Emergency source of electrical power* is a source of electrical power intended to supply the necessary services in the event of failure of the main source of electrical power.

1.3.20 *Emergency switchboard* is a switchboard which, in the event of failure of the main system of electrical power supply, is directly supplied by the emergency source of electrical power and/or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services.

1.3.21 *Enclosed spaces* are spaces delineated by floors, bulkheads and/or decks which may have doors or windows.

1.3.22 *Freeboard* is the distance measured vertically downwards amidships from the upper edge of the deck line to the upper edge of the related load line.

1.3.23 *FSS Code* means the *International Code for Fire Safety Systems*, adopted by the Maritime Safety Committee of the Organization by resolution MSC.98(73), as amended.

1.3.24 *FTP Code* means the *International Code for Application of Fire Test Procedures, 2010*, adopted by the Maritime Safety Committee of the Organization by resolution MSC.61(67), as amended.

1.3.25 *Castight door* is a solid, close-fitting door designed to resist the passage of gas under normal atmospheric conditions.

1.3.26 "H" class divisions are those divisions which meet the same requirements as "A" class divisions, as defined in SOLAS regulation II-2/3, except that, when tested according to the Fire Test Procedures Code, the furnace control temperature curve is replaced with the furnace control temperature curve for hydrocarbon fires defined in national or international standards.*

* Refer to national standards such as: BS EN 1363-2:1999 *Fire resistance tests. Alternative and additional procedures*; or ASTM 1529-14a *Standard Test Methods for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies*; or ISO/DIS 20902-1 *Fire test procedures for divisional elements that are typically used in oil, gas and petrochemical industries – Part 1: General requirements*.

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

1.3.28 *Helideck* is a purpose built helicopter landing platform located on a mobile offshore drilling unit (MODU).

1.3.29 *Industrial machinery and components* are the machinery and components which are used in connection with the drilling operation.

1.3.30 *Length (L)* has the same meaning as defined in regulation 3 of the 1988 LL Protocol.

1.3.31 *Lightweight* is the displacement of a unit in tonnes without variable deck load, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and personnel and their effects.

1.3.32 *Low-flame spread* has the same meaning as defined in SOLAS regulation II-2/3.

1.3.33 *LSA Code* means the *International Life-Saving Appliance Code*, adopted by the Maritime Safety Committee of the Organization by resolution MSC.48(66), as amended.

1.3.34 *Machinery spaces* are all machinery spaces of category A and all other spaces containing propelling machinery, boilers and other fired processes, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery and similar spaces; and trunks to such spaces.

1.3.35 *Machinery spaces of category A* are all spaces which contain internal combustion-type machinery used either:

- .1 for main propulsion; or
- .2 for other purposes where such machinery has in the aggregate a total power of not less than 375 kW;

or which contain any oil-fired boiler or oil fuel unit; and trunks to such spaces.

1.3.36 *Main source of electrical power* is a source intended to supply electrical power for all services necessary for maintaining the unit in normal operational and habitable conditions.

1.3.37 *Main steering gear* is the machinery, the steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock, e.g. tiller or quadrant, necessary for effecting movement of the rudder for the purpose of steering the unit under normal service conditions.

1.3.38 *Main switchboard* is a switchboard directly supplied by the main source of electrical power and intended to distribute electrical energy to the unit's services.

1.3.39 *Maximum ahead service speed* is the greatest speed which the unit is designed to maintain in service at sea at its deepest seagoing draught.

1.3.40 *Maximum astern speed* is the speed which it is estimated the unit can attain at the designed maximum astern power at its deepest seagoing draught.

1.3.41 *Mobile offshore drilling unit (MODU) or unit* is a vessel capable of engaging in drilling operations for the exploration for or exploitation of resources beneath the sea-bed such as liquid or gaseous hydrocarbons, sulphur or salt.

1.3.42 *Mode of operation* means a condition or manner in which a unit may operate or function while on location or in transit. The modes of operation of a unit include the following:

- .1** *Operating conditions* – conditions wherein a unit is on location for the purpose of conducting drilling operations, and combined environmental and operational loadings are within the appropriate design limits established for such operations. The unit may be either afloat or supported on the sea-bed, as applicable.
- .2** *Severe storm conditions* – conditions wherein a unit may be subjected to the most severe environmental loading for which the unit is designed. Drilling operations are assumed to have been discontinued due to the severity of the environmental loading. The unit may be either afloat or supported on the sea-bed, as applicable.
- .3** *Transit conditions* – conditions wherein a unit is moving from one geographical location to another.

1.3.43 *Non-combustible material* has the same meaning as defined in SOLAS regulation II-2/3.

1.3.44 *Normal operational and habitable conditions* means:

- .1** conditions under which the unit as a whole, its machinery, services, means and aids ensuring safe navigation when underway, safety when in the industrial mode, fire and flooding safety, internal and external communications and signals, means of escape and winches for rescue boats, as well as the means of ensuring the minimum comfortable conditions of habitability, are in working order and functioning normally; and
- .2** drilling operations.

1.3.45 *Oil fuel unit* is the equipment used for the preparation of oil fuel for delivery to an oil fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure more than 0.18 N/mm². Oil transfer pumps are not considered oil fuel units.

1.3.46 *Organization* means the International Maritime Organization (IMO).

1.3.47 *Rescue boat* has the same meaning as defined in SOLAS regulation III/3.

1.3.48 *Self-elevating unit* is a unit with movable legs capable of raising its hull above the surface of the sea and lowering it back into the sea.

1.3.49 *Semi-enclosed locations* are locations where natural conditions of ventilation are notably different from those on open decks due to the presence of structures such as roofs, windbreaks and bulkheads and which are so arranged that dispersion of gas may not occur.

1.3.50 *Service spaces* are those used for galleys, pantries containing cooking appliances, lockers and store-rooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces.

1.3.51 *SOLAS* means the *International Convention for the Safety of Life at Sea, 1974*, as amended.

1.3.52 *Standard fire test* is as defined in SOLAS regulation II-2/3.

1.3.53 *Steel or equivalent material* has the same meaning as defined in SOLAS regulation II-2/3.

1.3.54 *Steering gear power unit* means, in the case of:

- .1** electric steering gear, an electric motor and its associated electrical equipment;
- .2** electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump;
- .3** other hydraulic gear, a driving engine and connected pump.

1.3.55 *Surface unit* is a unit with a ship- or barge-type displacement hull of single or multiple hull construction intended for operation in the floating condition.

1.3.56 *Survival craft* has the same meaning as defined in SOLAS regulation III/3.

1.3.57 *Visitors* are personnel not regularly assigned to the unit.

1.3.58 *Watertight* means the capability of preventing the passage of water through the structure in any direction under a head of water for which the surrounding structure is designed.

1.3.59 *Weathertight* means that in any sea conditions, water will not penetrate into the unit.

1.3.60 *Working spaces* are those open or enclosed spaces containing equipment and processes, associated with drilling operations, which are not included in *hazardous areas* and *machinery spaces*.

1.4 Exemptions

An Administration may exempt any unit which embodies features of a novel kind from any of the provisions of the Code, the application of which might impede research into the development of such features. Any such unit should, however, comply with safety requirements which, in the opinion of that Administration, are adequate for the service intended and are such as to ensure the overall safety of the unit. The Administration which allows any such exemption should list such exemptions on the certificate and communicate to the Organization the particulars, together with the reasons therefor, so that the Organization may circulate the same to other Governments for the information of their officers.

1.5 Equivalents

1.5.1 Where the Code provides that a particular detail of design or construction, fitting, material, appliance or apparatus, or type thereof, should be fitted or carried in a unit, or that any particular provision should be made, the Administration may allow any other detail of design or construction, fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in that unit, if it is satisfied by trial thereof or otherwise that such detail of design or construction, fitting, material, appliance or apparatus, or type thereof, or provision, is at least as effective as that provided for in the Code.

1.5.2 When an Administration so allows any fitting, material, appliance, apparatus, item of equipment or type thereof, or provision, procedure, arrangement, novel design or application to be substituted, it should communicate to the Organization the particulars thereof, together with a report on the evidence submitted, so that the Organization may circulate the same to other Governments for the information of their officers.

1.6 Surveys and certification

1.6.1 Each unit should be subject to the surveys specified below:

- .1** an *initial survey* before the unit is put in service or before the certificate is issued for the first time;
- .2** a *renewal survey* at intervals specified by the Administration but not exceeding 5 years except where paragraph 1.6.11.2.1, 1.6.11.5 or 1.6.11.6 is applicable;
- .3** an *intermediate survey* within 3 months before or after the second anniversary date or within 3 months before or after the third anniversary date of the certificate, which should take the place of one of the annual surveys specified in paragraph 1.6.1.4;
- .4** an *annual survey* within 3 months before or after each anniversary date of the certificate;
- .5** a minimum of two *dry-dock surveys* during any 5-year period, except where paragraph 1.6.11.5 is applicable. Where paragraph 1.6.11.5 is applicable this 5-year period may be extended to coincide with the extended period of the validity of the certificate. In all cases the intervals between any two such surveys should not exceed 36 months;
- .6** *radio station surveys* in accordance with section 11.9; and
- .7** an *additional survey* as the occasion arises.

1.6.2 The surveys referred to in paragraph 1.6.1 should be carried out as follows:

- .1 the initial survey should include a complete inspection of the structure, safety equipment and other equipment, fittings, arrangements and material to ensure that they comply with the provisions of the Code, are in satisfactory condition and are fit for the service for which the unit is intended;
- .2 the renewal survey should include an inspection of the structure, safety equipment and other equipment as referred to in paragraph 1.6.2.1 to ensure that they comply with the provisions of the Code, are in satisfactory condition and are fit for the service for which the unit is intended;
- .3 the intermediate survey should include an inspection of the structure, fittings, arrangements and safety equipment to ensure that they remain satisfactory for the service for which the unit is intended;
- .4 the annual survey should include a general inspection of the structure, safety equipment and other equipment as referred to in paragraph 1.6.2.1, to ensure that they have been maintained in accordance with paragraph 1.6.6.1 and that they remain satisfactory for the service for which the unit is intended;
- .5 the dry-dock survey and the inspection of items surveyed at the same time should be such as to ensure that they remain satisfactory for the service for which the unit is intended. An Administration may allow underwater inspections in lieu of a dry-dock survey provided that they are satisfied that such an inspection is equivalent to a dry-dock survey;
- .6 the radio survey should be sufficient to assure compliance with the relevant provisions for cargo ships of SOLAS chapter IV; and
- .7 an additional survey, either general or partial according to the circumstances, should be made after a repair resulting from investigations prescribed in paragraph 1.6.6.3, or wherever any important repairs or renewals are made. The survey should be such as to ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are in all respects satisfactory, and that the unit complies in all respects with the provisions of the Code.

1.6.3 The intermediate, annual and dry-dock surveys referred to in paragraphs 1.6.2.3, 1.6.2.4 and 1.6.2.5 should be endorsed on the certificate.

1.6.4 As an alternative to the renewal and intermediate surveys provided for in paragraphs 1.6.2.2 and 1.6.2.3 respectively, the Administration may, at the owner's request, approve a continuous survey programme provided that the extent and frequency of the surveys are equivalent to renewal and intermediate surveys. A copy of the continuous survey programme, together with the record of the surveys, should be kept on board the unit and the certificate annotated accordingly.

1.6.5.1 The inspection and survey of the units, so far as regards the enforcement of the provisions of the Code and the granting of exemptions therefrom, should be carried out by officers of the Administration. The Administration may, however, entrust the inspections and surveys either to surveyors nominated for the purpose or to organizations recognized by it.

1.6.5.2 An Administration nominating surveyors or recognizing organizations to conduct inspections and surveys as set forth in paragraph 1.6.5.1 should as a minimum empower any nominated surveyor or recognized organization to:

- .1** require repairs to a unit; and
- .2** carry out inspections and surveys if requested by the appropriate authorities of a port or coastal State.

The Administration should notify the Organization of the specific responsibilities and conditions of the authority delegated to nominated surveyors or recognized organizations.

1.6.5.3 When a nominated surveyor or recognized organization determines that the condition of the unit or its equipment does not correspond substantially with the particulars of the certificate or is such that the unit is not fit to operate without danger to the unit, or persons on board, such surveyor or organization should immediately ensure that corrective action is taken and should in due course notify the Administration. If such corrective action is not taken the certificate should be withdrawn and the Administration should be notified immediately; and, if the unit is in an area under the jurisdiction of another Government, the appropriate authorities of the port or coastal State should be notified immediately. When an officer of the Administration, a nominated surveyor or recognized organization has notified the appropriate authorities of the port or coastal State, the Government of the port or coastal State concerned should give such officer, surveyor or organization any necessary assistance to carry out their obligations under this regulation.

When applicable, the Government of the port or coastal State concerned should ensure that the unit should not continue to operate until it can do so without danger to persons, the environment or the unit.

1.6.5.4 In every case, the Administration should fully guarantee the completeness and efficiency of the inspection and survey, and should undertake to ensure the necessary arrangements to satisfy this obligation.

1.6.6.1 The condition of the unit and its equipment should be maintained to conform with the provisions of the Code to ensure that the unit in all respects will remain fit to operate without danger to persons, the environment or the unit.

1.6.6.2 After any survey of the unit under this regulation has been completed, no change should be made to structure, equipment, fittings, arrangements and materials covered by the survey, without the sanction of the Administration.

1.6.6.3 Should an incident occur, or a defect be discovered, which affects the safety of the unit or the efficiency or completeness of the structure, equipment, fittings, arrangements or materials, the person in charge or the owner of the unit should report the incident or defect at the earliest opportunity to the Administration. In addition, the nominated surveyor or recognized organization responsible, who should cause investigations to be initiated, should determine whether a survey is necessary. If the unit is in an area under the jurisdiction of another Government, the person in charge or the owner of the unit should also report the incident or defect immediately to the appropriate authorities of the port or coastal State and the nominated surveyor or recognized organization should ascertain that such a report has been made.

1.6.7 A certificate called a Mobile Offshore Drilling Unit Safety Certificate (2009) may be issued after an initial or renewal survey to a unit which complies with the provisions of the Code. The Certificate should be issued or endorsed either by the Administration or by any person or organization recognized by it. In every case, that Administration assumes full responsibility for the certificate.

1.6.8 Any exemptions granted under section 1.4 should be clearly noted on the Certificate.

1.6.9 A Contracting Government to both SOLAS and the 1988 LL Protocol may, at the request of the Administration, cause a unit to be surveyed and, if satisfied that the provisions of the Code are complied with, should issue or authorize the issue of a certificate to the unit and, where appropriate, endorse

or authorize the endorsement of a certificate on the unit in accordance with the Code. Any certificate so issued should contain a statement to the effect that it has been issued at the request of the Government of the State the flag of which the unit is entitled to fly, and it should have the same force and receive the same recognition as a certificate issued under paragraph 1.6.7.

1.6.10 The certificate should be drawn up in the form corresponding to the model given in the appendix to the Code. If the language used is neither English nor French, the text should include a translation into one of these languages.

1.6.11.1 The Mobile Offshore Drilling Unit Safety Certificate (2009) should be issued for a period specified by the Administration which should not exceed 5 years.

1.6.11.2.1 Notwithstanding the provisions of paragraph 1.6.11.1, when the renewal survey is completed within 3 months before the expiry date of the existing certificate, the new certificate should be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing certificate.

1.6.11.2.2 When the renewal survey is completed after the expiry date of the existing certificate, the new certificate should be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of expiry of the existing certificate.

1.6.11.2.3 When the renewal survey is completed more than 3 months before the expiry date of the existing certificate, the new certificate should be valid from the date of completion of the renewal survey to a date not exceeding 5 years from the date of completion of the renewal survey.

1.6.11.3 If a certificate is issued for a period of less than 5 years, the Administration may extend the validity of the certificate beyond the expiry date to the maximum period specified in paragraph 1.6.11.1, provided that the surveys when a certificate is issued for a period of 5 years are carried out.

1.6.11.4 If a renewal survey has been completed and a new certificate cannot be issued or placed on board the unit before the expiry date of the existing certificate, the person or organization authorized by the Administration may endorse the existing certificate and such a certificate should be accepted as valid for a further period which should not exceed 5 months from the expiry date.

1.6.11.5 If a unit at the time when a certificate expires is not in the place in which it is to be surveyed, the Administration may extend the period of validity of the certificate, but this extension should be granted only for the purpose of allowing the unit to proceed to the place in which it is to be surveyed, and then only in cases where it appears proper and reasonable to do so. No certificate should be extended for a period longer than 3 months, and a unit to which an extension is granted should not, on its arrival in the place in which it is to be surveyed, be entitled by virtue of such extension to leave that place without having a new certificate. When the renewal survey is completed, the new certificate should be valid to a date not exceeding 5 years from the date of expiry of the existing certificate before the extension was granted.

1.6.11.6 In special circumstances, as determined by the Administration, a new certificate need not be dated from the date of expiry of the existing certificate as provided for in paragraph 1.6.11.2.2 or 1.6.11.5. In these circumstances, the new certificate should be valid to a date not exceeding 5 years from the date of completion of the renewal survey.

1.6.11.7 If an annual or intermediate survey is completed before the period specified, then:

- .1** the anniversary date shown on the relevant certificate should be amended by endorsement to a date which should not be more than 3 months later than the date on which the survey was completed;
- .2** the subsequent annual or intermediate survey required by the relevant regulations should be completed at the intervals prescribed by this regulation using the new anniversary date; and
- .3** the expiry date may remain unchanged provided one or more annual or intermediate surveys, as appropriate, are carried out so that the maximum intervals between the surveys under paragraphs 1.6.1.3 and 1.6.1.4 are not exceeded.

1.6.11.8 A certificate issued under paragraph 1.6.7 or 1.6.9 should cease to be valid in any of the following cases:

- .1** if the relevant surveys are not completed within the periods specified in paragraph 1.6.1;
- .2** if the certificate is not endorsed in accordance with paragraph 1.6.3;

- .3** upon transfer of the unit to the flag of another State. A new certificate should only be issued when the Government issuing the new certificate is fully satisfied that the unit is in compliance with the provisions of paragraphs 1.6.6.1 and 1.6.6.2. In the case of a transfer between Governments that are Contracting Governments to both SOLAS and the 1988 LL Protocol, if requested within 3 months after the transfer has taken place, the Government of the State whose flag the unit was formerly entitled to fly should, as soon as possible, transmit to the Administration a copy of the certificate carried by the unit before the transfer and, if available, copies of the relevant survey reports.

1.6.12 The privileges of the Code may not be claimed in favour of any unit unless it holds a valid certificate.

1.7 Control

1.7.1 Every unit when in an area under the jurisdiction of another Government is subject to control by officers duly authorized by such Government in so far as this control is directed towards verifying that the certificate issued under section 1.6 is valid.

1.7.2 Such certificate, if valid, should be accepted unless there are clear grounds for believing that the condition of the unit or its equipment does not correspond substantially with the particulars of the certificate or that the unit and its equipment are not in compliance with the provisions of paragraphs 1.6.6.1 and 1.6.6.2.

1.7.3 In the circumstances given in paragraph 1.7.2 or where the certificate has expired or ceased to be valid, the officer carrying out the control should take steps to ensure that the unit should not continue to operate (except, when appropriate, on a temporary basis) or leave the area for the purpose of proceeding to an area for repair if this could cause danger to the unit or persons on board.

1.7.4 In the event of this control giving rise to an intervention of any kind, the officer carrying out the control should forthwith inform, in writing, the consul or, in his absence, the nearest diplomatic representative of the State whose flag the unit is entitled to fly of all the circumstances in which intervention was deemed necessary. In addition, nominated surveyors or recognized organizations responsible for the issue of the certificates should also be notified. The facts concerning the intervention should be reported to the Organization.

1.7.5 When exercising control under this regulation all possible efforts should be made to avoid the operation of the unit being unduly interrupted or delayed. If a unit is unduly interrupted or delayed it should be entitled to compensation for any loss or damage suffered.

1.7.6 Notwithstanding the provisions of paragraphs 1.7.1 and 1.7.2, the provisions of section 1.6 are without prejudice to any rights of the coastal State under international law to impose its own requirements relating to the regulation, surveying and inspection of units engaged, or intending to engage, in the exploration or exploitation of the natural resources of those parts of the sea-bed and subsoil over which that State is entitled to exercise sovereign rights.

1.8 Casualties

1.8.1 Each Administration and each coastal State should undertake to conduct an investigation of any casualty occurring to any unit subject to its jurisdiction and subject to the provisions of the Code when it judges that such an investigation may assist in determining what changes in the Code might be desirable.*

1.8.2 Each Administration and each coastal State should undertake to supply the Organization with pertinent information concerning the findings of such investigations. No reports or recommendations of the Organization based upon such information should disclose the identity or nationality of the units concerned or in any manner fix or imply responsibility upon any unit or person.

1.9 Review of the Code

1.9.1 The Code should be reviewed by the Organization as necessary to consider the revision of existing provisions and the formulation of provisions for new developments in design, equipment or technology.

1.9.2 Where a new development in design, equipment or technology has been found acceptable to an Administration, that Administration may submit particulars of such development to the Organization for consideration of its incorporation into the Code.

* Refer to the *Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident* (Casualty Investigation Code) (resolution MSC.255(84), as amended).



Chapter 2

Construction, strength and materials

2.1 General

2.1.1 Administrations should take appropriate action to ensure uniformity in the implementation and application of the provisions of this chapter.

2.1.2 The review and approval of the design of each unit should be carried out by officers of the Administration. However, the Administration may entrust this function to certifying authorities nominated for this purpose or to organizations recognized by it. In every case the Administration concerned should fully guarantee the completeness and efficiency of the design evaluation.

2.1.3 In addition to the provisions contained elsewhere in this Code, units should be designed, constructed and maintained in compliance with the structural, mechanical and electrical requirements of a classification society which:

- .1** has recognized and relevant competence and experience with offshore petroleum activities;
- .2** has established rules and procedures for classification of mobile offshore drilling units; and
- .3** is recognized by the Administration in accordance with the provisions of SOLAS regulation XI-1/1, or with applicable national standards of the Administration which provide an equivalent level of safety.

2.2 Access

2.2.1 Means of access

2.2.1.1 Each space within the unit should be provided with at least one permanent means of access to enable, throughout the life of a unit, overall and close-up inspections and thickness measurements of the unit's structures to be carried out by the Administration, the company, and the unit's personnel and others as necessary. Such means of access should comply

with the provisions of paragraph 2.2.4 and with the Technical provisions for means of access for inspections, adopted by the Maritime Safety Committee by resolution MSC.133(76), as may be amended by the Organization.

2.2.1.2 Where a permanent means of access may be susceptible to damage during normal operations or where it is impracticable to fit permanent means of access, the Administration may allow, in lieu thereof, the provision of movable or portable means of access, as specified in the Technical provisions, provided that the means of attaching, rigging, suspending or supporting the portable means of access forms a permanent part of the unit's structure. All portable equipment should be capable of being readily erected or deployed by the unit's personnel.

2.2.1.3 The construction and materials of all means of access and their attachment to the unit's structure should be to the satisfaction of the Administration. The means of access should be subject to inspection prior to, or in conjunction with, its use in carrying out surveys in accordance with section 1.6.

2.2.2 Safe access to holds, tanks, ballast tanks and other spaces

2.2.2.1 Safe access* to holds, cofferdams, tanks and other spaces should be direct from the open deck and such as to ensure their complete inspection. Safe access may be from a machinery space, pump room, deep cofferdam, pipe tunnel, hold, double hull space or similar compartment not intended for the carriage of oil or hazardous materials where it is impracticable to provide such access from an open deck.

2.2.2.2 Tanks, and subdivisions of tanks, having a length of 35 m or more, should be fitted with at least two access hatchways and ladders, as far apart as practicable. Tanks less than 35 m in length should be served by at least one access hatchway and ladder. When a tank is subdivided by one or more swash bulkheads or similar obstructions which do not allow ready means of access to the other parts of the tank, at least two hatchways and ladders should be fitted.

2.2.2.3 Each hold should be provided with at least two means of access as far apart as practicable. In general, these accesses should be arranged diagonally, e.g. one access near the forward bulkhead on the port side, the other one near the aft bulkhead on the starboard side.

* Refer to the *Revised recommendations for entering enclosed spaces aboard ships* (resolution A.1050(27)).

2.2.3 Access manual

2.2.3.1 A unit's means of access to carry out overall and close-up inspections and thickness measurements should be described in an access manual which may be incorporated in the unit's operating manual. The manual should be updated as necessary, and an updated copy maintained on board. The structure access manual should include the following for each space:

- .1 plans showing the means of access to the space, with appropriate technical specifications and dimensions;
- .2 plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans should indicate from where each area in the space can be inspected;
- .3 plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans should indicate the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected;
- .4 instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space;
- .5 instructions for safety guidance when rafting is used for close-up inspections and thickness measurements;
- .6 instructions for the rigging and use of any portable means of access in a safe manner;
- .7 an inventory of all portable means of access; and
- .8 records of periodical inspections and maintenance of the unit's means of access.

2.2.3.2 For the purpose of this paragraph "critical structural areas" are locations which have been identified from calculations to require monitoring or from the service history of similar or sister units to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the unit.

2.2.4 General technical specifications

2.2.4.1 For access through horizontal openings, hatches or manholes, the dimensions should be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also provide a clear opening to facilitate the hoisting of an injured person from the bottom of a confined space. The minimum clear opening should not be less than 600 mm × 600 mm. When access to a hold is arranged through a flush manhole in the deck or a hatch, the top of the ladder should be placed as close as possible to the deck or hatch coaming. Access hatch coamings having a height greater than 900 mm should also have steps on the outside in conjunction with the ladder.

2.2.4.2 For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum clear opening should be not less than 600 mm × 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other footholds are provided.

2.3 Design loads

2.3.1 The modes of operation for each unit are to be investigated using realistic loading conditions including gravity loading with relevant environmental loading for its intended areas of operation. The following environmental considerations should be included where applicable: wind, wave, current, ice, sea-bed conditions, temperature, fouling and earthquake.

2.3.2 Where possible, the above design environmental conditions should be based upon significant data with a period of recurrence of at least 50 years for the most severe anticipated environment.

2.3.3 Results from relevant model tests may be used to substantiate or amplify calculations.

2.3.4 Limiting design data for each mode of operation should be stated in the operating manual.

Wind loading

2.3.5 Sustained and gust wind velocities, as relevant, should be considered when determining wind loading. Pressures and resultant forces should be calculated by the method referred to in section 3.2 or by some other method to the satisfaction of the Administration.

Wave loading

2.3.6 Design wave criteria should be described by design wave energy spectra or deterministic design waves having appropriate shape and size. Consideration should be given to waves of lesser height, where, due to their period, the effects on structural elements may be greater.

2.3.7 The wave forces utilized in the design analysis should include the effects of immersion, heeling and accelerations due to motion. Theories used for the calculation of wave forces and the selection of coefficients should be to the satisfaction of the Administration.

Current loading

2.3.8 Consideration should be given to the interaction of current and waves. Where necessary, the two should be superimposed by adding the current velocity vectorially to the wave particle velocity. The resultant velocity should be used in calculating the structural loading due to current and waves.

Loading due to vortex shedding

2.3.9 Consideration should be given to loading induced in structural members due to vortex shedding.

Deck loading

2.3.10 A loading plan should be prepared to the satisfaction of the Administration showing the maximum design uniform and concentrated deck loading for each area for each mode of operation.

Other loadings

2.3.11 Other relevant loadings should be determined in a manner to the satisfaction of the Administration.

2.4 Structural analysis

2.4.1 Sufficient loading conditions for all modes of operation should be analysed to enable the critical design cases for all principal structural components to be evaluated. This design analysis should be to the satisfaction of the Administration.

2.4.2 The scantlings should be determined on the basis of criteria which combine, in a rational manner, the individual stress components in each

structural element. The allowable stresses should be to the satisfaction of the Administration.

2.4.3 Local stresses, including stresses caused by circumferential loading on tubular members, should be added to primary stresses in evaluating combined stress levels.

2.4.4 The buckling strength of structural members should be evaluated where appropriate.

2.4.5 Where deemed necessary by the Administration, a fatigue analysis based on intended operating areas or environments should be provided.

2.4.6 The effect of notches, local stress concentrations and other stress raisers should be allowed for in the design of primary structural elements.

2.4.7 Where possible, structural joints should not be designed to transmit primary tensile stresses through the thickness of plates integral with the joint. Where such joints are unavoidable, the plate material properties and inspection procedures selected to prevent lamellar tearing should be to the satisfaction of the Administration.

2.5 Special considerations for surface units

2.5.1 The required strength of the unit should be maintained in way of the drilling well, and particular attention should be given to the transition between fore-and-aft members. The plating of the well should also be suitably stiffened to prevent damage when the unit is in transit.

2.5.2 Consideration should be given to the scantlings necessary to maintain strength in way of large hatches.

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.

2.6.12 Deckhouses located near the side shell of a unit may be required to have scantlings similar to those of an unprotected house front. Other deckhouses should have scantlings suitable for their size, function and location.

2.7 Special considerations for column-stabilized units

2.7.1 Unless deck structures are designed for wave impact, a clearance acceptable to the Administration should be maintained between passing wave crests and the deck structure. The Administration should be provided with model test data, reports on past operating experience with similar configurations or by calculations showing that adequate provision is made to maintain this clearance.

2.7.2 For units designed to be supported by the sea-bed the clearance in paragraph 2.6.2 should be maintained.

2.7.3 The structural arrangement of the upper hull is to be considered with regard to the structural integrity of the unit after the assumed failure of any primary girder. The Administration may require a structural analysis showing satisfactory protection against overall collapse of the unit after such an assumed failure when exposed to environmental loading corresponding to a 1-year return period for the intended area of operation.

2.7.4 The scantlings of the upper structure should not be less than those required for the loading shown in the deck loading plan.

2.7.5 When an approved mode of operation or damage condition in accordance with the provisions governing stability allows the upper structure to become waterborne, special consideration should be given to the resulting structural loading.

2.7.6 The scantlings of columns, lower hulls and footings should be based on the evaluation of hydrostatic pressure loading and combined loading including wave and current considerations.

2.7.7 Where a column, lower hull or footing is a part of the overall structural frame of a unit, consideration should also be given to stresses resulting from deflections due to the applicable combined loading.

2.7.8 Particular consideration should be given to structural arrangements and details in areas subject to high local loading resulting from, for example, external damage, wave impact, partially filled tanks or bottom bearing operations.

2.7.9 When a unit is designed for operations while supported by the sea-bed, the footings should be designed to withstand the shock of bottom contact due to wave action on the hull. Such units should also be evaluated for the effects of possible scouring action (loss of bottom support). The effect of skirt plates, where provided, should be given special consideration.

2.7.10 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.

2.7.11 Bracing members should be designed to make the structure effective against applicable combined loading and, when the unit is supported by the sea-bed, against the possibility of uneven bottom bearing loading. Bracing members should also be investigated, where applicable, for combined stresses including local bending stresses due to buoyancy, wave forces and current forces.

2.7.12 The unit's structure should be able to withstand the loss of any slender bracing member without causing overall collapse when exposed to environmental loading corresponding to a 1-year return period for the intended area of operation.

2.7.13 Where applicable, consideration should be given to local stresses caused by wave impact.

2.7.14 Where bracings are watertight they should be designed to prevent collapse from hydrostatic pressure. Underwater bracing should be made watertight and have a leak detection system.

2.7.15 Consideration should be given to the need for ring frames to maintain stiffness and shape in tubular bracing members.

2.8 Towing arrangements

2.8.1 The design and arrangement of towing fittings should have regard to both normal and emergency conditions.

2.8.2 Arrangements, equipment and fittings provided in accordance with paragraph 2.8.1 should meet the appropriate requirements of the Administration or an organization recognized by the Administration under paragraph 1.6.5.1.*

2.8.3 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.

2.9 Fatigue analysis

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

2.9.2 The fatigue analysis should be based on the intended mode and area of operations to be considered in the unit's design.

2.9.3 The fatigue analysis should take into account the intended design life of the unit and the accessibility of load carrying members for inspection.

2.10 Materials

2.10.1 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.

2.10.2 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.†

2.10.3 Materials which contain asbestos should be prohibited.

2.11 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*.

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

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

2.12 Protective coatings of dedicated seawater ballast tanks

2.12.1 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.

2.12.2 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.†

2.13 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.

2.14 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.

2.15 Testing

Upon completion, boundaries of tanks should be tested to the satisfaction of the Administration.

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

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

2.16 Drainage and sediment control*

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.



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

Chapter 3

Subdivision, stability and freeboard

3.1 Inclining test

3.1.1 An inclining test should be required for the first unit of a design, when the unit is as near to completion as possible, to determine accurately the light ship data (weight and position of centre of gravity).

3.1.2 For successive units which are identical by design, the light ship data of the first unit of the series may be accepted by the Administration in lieu of an inclining test, provided the difference in light ship displacement or position of centre of gravity due to weight changes for minor differences in machinery, outfitting or equipment, confirmed by the results of a lightweight survey, is less than 1% of the values of the light ship displacement and principal horizontal dimensions as determined for the first of the series. Extra care should be given to the detailed weight calculation and comparison with the original unit of a series of column-stabilized, semisubmersible types as these, even though identical by design, are recognized as being unlikely to attain an acceptable similarity of weight or centre of gravity to warrant a waiver of the inclining test.

3.1.3 The results of the inclining test, or those of the lightweight survey together with the inclining test results for the first unit should be indicated in the operating manual.

3.1.4 A record of all changes to machinery, structure, outfitting and equipment that affect the light ship data should be maintained in a light ship data alterations log and be taken into account in daily operations.

3.1.5 For column-stabilized units:

- .1** A lightweight survey or inclining test should be conducted at the first renewal survey. If a lightweight survey is conducted and it indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement, an inclining test should be conducted, or the difference in weight should be placed in an indisputably conservative vertical centre of gravity and approved by the Administration.

- .2** If the survey or test at the first renewal survey demonstrated that the unit was maintaining an effective weight control programme, and at succeeding renewal surveys this is confirmed by the records under paragraph 3.1.4, light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the actual displacement based upon draught readings exceeds 1% of the operating displacement, a lightweight survey should be completed in accordance with paragraph 3.1.5.1.

3.1.6 The inclining test or lightweight survey should be carried out in the presence of an officer of the Administration, or a duly authorized person or representative of an approved organization.

3.2 Righting moment and heeling moment curves

3.2.1 Curves of righting moments and of wind heeling moments similar to figure 3-1 with supporting calculations should be prepared covering the full range of operating draughts, including those in transit conditions, taking into account the maximum loading of materials in the most unfavourable position applicable. The righting moment curves and wind heeling moment curves should be related to the most critical axes. Account should be taken of the free surface of liquids in tanks.

3.2.2 Where equipment is of such a nature that it can be lowered and stowed, additional wind heeling moment curves may be necessary and such data should clearly indicate the position of such equipment. Provisions regarding the lowering and effective stowage of such equipment should be included in the operating manual under section 14.1.

3.2.3 The curves of wind heeling moments should be drawn for wind forces calculated by the following formula:

$$F = 0.5C_s C_H \rho V^2 A$$

where:

F = the wind force (newtons)

C_s = the shape coefficient depending on the shape of the structural member exposed to the wind (see table 3-1)

C_H = the height coefficient depending on the height above sea level of the structural member exposed to wind (see table 3-2)

ρ = the air mass density (1.222 kg /m³)

V = the wind velocity (metres per second)

A = the projected area of all exposed surfaces in either the upright or the heeled condition (square metres).

Table 3-1 – Values of the coefficient C_s

Shape	C_s
Spherical	0.4
Cylindrical	0.5
Large flat surface (hull, deckhouse, smooth under-deck areas)	1.0
Drilling derrick	1.25
Wires	1.2
Exposed beams and girders under deck	1.3
Small parts	1.4
Isolated shapes (crane, beam, etc.)	1.5
Clustered deckhouses or similar structures	1.1

Table 3-2 – Values of the coefficient C_H

Height above sea level (metres)	C_H
0–15.3	1.00
15.3–30.5	1.10
30.5–46.0	1.20
46.0–61.0	1.30
61.0–76.0	1.37
76.0–91.5	1.43
91.5–106.5	1.48
106.5–122.0	1.52
122.0–137.0	1.56
137.0–152.5	1.60
152.5–167.5	1.63
167.5–183.0	1.67
183.0–198.0	1.70
198.0–213.5	1.72
213.5–228.5	1.75
228.5–244.0	1.77
244.0–259.0	1.79
above 259	1.80

3.2.4 Wind forces should be considered from any direction relative to the unit and the value of the wind velocity should be as follows:

- .1** In general a minimum wind velocity of 36 m/s (70 knots) for offshore service should be used for normal operating conditions and a minimum wind velocity of 51.5 m/s (100 knots) should be used for the severe storm conditions.
- .2** Where a unit is to be limited in operation to sheltered locations (protected inland waters such as lakes, bays, swamps, rivers, etc.) consideration should be given to a reduced wind velocity of not less than 25.8 m/s (50 knots) for normal operating conditions.

3.2.5 In calculating the projected areas to the vertical plane, the area of surfaces exposed to wind due to heel or trim, such as under-deck surfaces, etc. should be included using the appropriate shape factor. Open truss work may be approximated by taking 30% of the projected block area of both the front and back section, i.e. 60% of the projected area of one side.

3.2.6 In calculating the wind heeling moments, the lever of the wind overturning force should be taken vertically from the centre of pressure of all surfaces exposed to the wind to the centre of lateral resistance of the underwater body of the unit. The unit is to be assumed floating free of mooring restraint.

3.2.7 The wind heeling moment curve should be calculated for a sufficient number of heel angles to define the curve. For ship-shaped hulls the curve may be assumed to vary as the cosine function of vessel heel.

3.2.8 Wind heeling moments derived from wind tunnel tests on a representative model of the unit may be considered as alternatives to the method given in paragraphs 3.2.3 to 3.2.7. Such heeling moment determination should include lift and drag effects at various applicable heel angles.

3.3 Intact stability criteria

3.3.1 The stability of a unit in each mode of operation should meet the following criteria (see also figure 3-1):

- .1** For surface and self-elevating units the area under the righting moment curve to the second intercept or downflooding angle, whichever is less, should be not less than 40% in excess of the area under the wind heeling moment curve to the same limiting angle.

- .2 For column-stabilized units* the area under the righting moment curve to the angle of downflooding should be not less than 30% in excess of the area under the wind heeling moment curve to the same limiting angle.
- .3 The righting moment curve should be positive over the entire range of angles from upright to the second intercept.

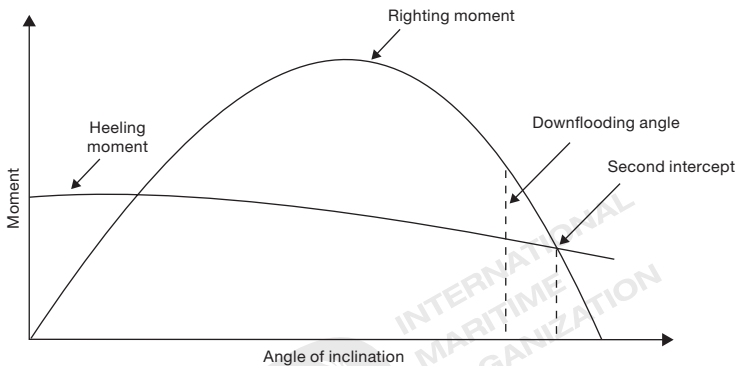


Figure 3-1 – *Righting moment and heeling moment curves*

3.3.2 Each unit should be capable of attaining a severe storm condition in a period of time consistent with the meteorological conditions. The procedures recommended and the approximate length of time required, considering both operating conditions and transit conditions, should be contained in the operating manual. It should be possible to achieve the severe storm condition without the removal or relocation of solid consumables or other variable load. However, the Administration may permit loading a unit past the point at which solid consumables would have to be removed or relocated to go to severe storm condition under the following conditions, provided the allowable KG is not exceeded:

- .1 in a geographic location where weather conditions annually or seasonally do not become sufficiently severe to require a unit to go to severe storm condition; or
- .2 where a unit is required to support extra deck load for a short period of time that falls well within a period for which the weather forecast is favourable.

* Refer to: *An example of alternative intact stability criteria for twin-pontoon column-stabilized semisubmersible units* (resolution A.650(16)).

The geographic locations, weather conditions and loading conditions in which this is permitted should be identified in the operating manual.

3.3.3 Alternative stability criteria may be considered by the Administration, provided an equivalent level of safety is maintained and if they are demonstrated to afford adequate positive initial stability. In determining the acceptability of such criteria, the Administration should consider at least the following and take into account as appropriate:

- .1 environmental conditions representing realistic winds (including gusts) and waves appropriate for world-wide service in various modes of operation;
- .2 dynamic response of a unit. Analysis should include the results of wind tunnel tests, wave tank model tests, and non-linear simulation, where appropriate. Any wind and wave spectra used should cover sufficient frequency ranges to ensure that critical motion responses are obtained;
- .3 potential for flooding taking into account dynamic responses in a seaway;
- .4 susceptibility to capsizing considering the unit's restoration energy and the static inclination due to the mean wind speed and the maximum dynamic response;
- .5 an adequate safety margin to account for uncertainties.

3.4 Subdivision and damage stability

Surface and self-elevating units

3.4.1 The unit should have sufficient freeboard and be subdivided by means of watertight decks and bulkheads to provide sufficient buoyancy and stability to withstand:

- .1 in general, the flooding of any one compartment in any operating or transit condition consistent with the damage assumptions set out in section 3.5; and
- .2 for a self-elevating unit, the flooding of any single compartment while meeting the following criterion (see figure 3-2):

$$RoS \geq 7^\circ + (1.5\theta_s)$$

where:

$$RoS \geq 10^\circ$$

$$RoS = \text{range of stability, in degrees} = \theta_m - \theta_s$$

where:

- θ_m = maximum angle of positive stability, in degrees
 θ_s = static angle of inclination after damage, in degrees

The range of stability is determined without reference to the angle of downflooding.

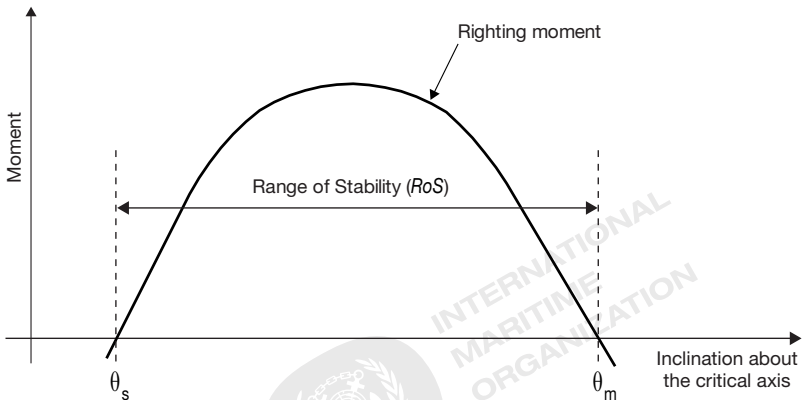


Figure 3-2 – *Residual stability for self-elevating units*

3.4.2 The unit should have sufficient reserve stability in a damaged condition to withstand the wind heeling moment based on a wind velocity of 25.8 m/s (50 knots) superimposed from any direction. In this condition the final waterline, after flooding, should be below the lower edge of any downflooding opening.

Column-stabilized units

3.4.3 The unit should have sufficient freeboard and be subdivided by means of watertight decks and bulkheads to provide sufficient buoyancy and stability to withstand a wind heeling moment induced by a wind velocity of 25.8 m/s (50 knots) superimposed from any direction in any operating or transit condition, taking the following considerations into account:

- .1 the angle of inclination after the damage set out in paragraph 3.5.10.2 should not be greater than 17°;
- .2 any opening below the final waterline should be made watertight, and openings within 4 m above the final waterline should be made weathertight;