

Code for the Construction and Equipment of Mobile Offshore Drilling Units

Consolidated Edition, 2001

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Foreword

The Code for the Construction and Equipment of Mobile Offshore Drilling Units, 1989 (1989 MODU Code) was adopted by Assembly resolution A.649(16) for mobile offshore drilling units, the keels of which are laid or are at a similar stage of construction on or after 1 May 1991. The 1989 MODU Code supersedes the 1979 MODU Code adopted by Assembly resolution A.414(XI).

The Maritime Safety Committee, at its fifty-ninth session (13 to 24 May 1991), adopted amendments to the 1989 MODU Code (originally circulated in MSC/Circ.561) and decided that, to maintain compatibility with SOLAS, the amendments should become effective on 1 February 1992. New section 10.13, Radio life-saving appliances, and new chapter 11, Radiocommunication installations, introduced by the amendments apply to all MODUs the keels of which are laid or are at a similar stage of construction on or after 1 May 1991, in the same way as the 1988 (GMDSS) amendments to SOLAS apply to ships. The Committee also recommended that Member Governments encourage the fitting of all MODUs with the GMDSS equipment specified in the amendments to the 1989 Code, and ensure that all MODUs comply with section 10.13 of the amendments to the 1989 Code not later than 1 February 1995, and with chapter 11 of the amendments not later than 1 February 1999.

The Maritime Safety Committee, at its sixty-third session (16 to 25 May 1994), adopted further amendments to the 1989 MODU Code (resolution MSC.38(63)) to introduce the harmonized system of survey and certification (HSSC) into the Code (amendments to chapter 1 and the appendix); provide guidelines for vessels with dynamic positioning systems (amendments to chapters 4 and 5); and provisions for helicopter facilities (new chapter 13). The Committee decided that the amendments introducing the HSSC system should become effective on the same date as the 1988 SOLAS and Load Line Protocols relating to the HSSC (i.e. 3 February 2000), and that those providing guidelines for vessels with dynamic positioning systems and provisions for helicopter facilities should become effective on 1 July 1994.

In 1995, the Assembly adopted the Code on Alarms and Indicators, 1995 (resolution A.830(19)), which is intended to provide general design guidance and to promote uniformity of type, location and priority for those alarms and indicators which are required by the 1974 SOLAS Convention, MARPOL 73/78 and other IMO instruments, including the 1989 MODU Code. The Assembly recommended Governments, *inter alia*, to take appropriate steps to apply the Code and to use it as an international safety standard for designing alarms and indicators for ships (and MODUs) and their equipment and machinery.

This publication contains the consolidated text of the 1989 MODU Code and the 1991 and 1994 amendments, but does not include the relevant

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provisions of the Code on Alarms and Indicators, 1995. The intention of this publication is to provide an easy reference to up-to-date requirements of the 1989 MODU Code.

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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 International Convention on Load Lines, 1966, as amended, for conventional ships engaged on international voyages.

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 rapidly 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 The Code is not intended to prohibit the use of an existing unit simply because its design, construction and equipment do not conform to the requirements of 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 environmental conditions. 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 The 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, 1989, as amended, 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 1.3.1 to 1.3.4, the keels of which are laid or which are at a similar stage of construction on or after 1 May 1991.

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 this Code, unless expressly provided otherwise, the terms used therein have the meanings defined in the following paragraphs.

1.3.1 *Mobile offshore drilling unit* 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.

1.3.2 *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.

1.3.3 *Self-elevating unit* is a unit with movable legs capable of raising its hull above the surface of the sea.

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

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

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

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

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

1.3.9 *1974 SOLAS Convention* means the International Convention for the Safety of Life at Sea, 1974, as amended.

1.3.10 *1966 Load Line Convention* means the International Convention on Load Lines, 1966.

1.3.11 *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.

1.3.12 *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.

1.3.13 *Length (L)* means 96% of the total length on a waterline at 85% of the least moulded depth (*D*) measured from the top of the keel, or the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that be greater. In units designed with a rake of keel, the waterline on which this length is measured should be parallel to the designed waterline.

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

1.3.15 *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.

1.3.16 *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.

1.3.17 *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 under way, 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.

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

1.3.19 *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.

1.3.20 *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.

1.3.21 *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.

1.3.22 *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.

1.3.23 *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.

1.3.24 *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.

1.3.25 *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.

1.3.26 *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.

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

1.3.28 *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.

1.3.29 *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.

1.3.30 *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.

1.3.31 *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 dynamical 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.

1.3.32 *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.

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

1.3.34 *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.

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

1.3.36 *Non-combustible material** means a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when

* If a material passes the test as specified in annex 1, part I of the International Code for Application of Fire Test Procedures (FTP Code) it should be considered as "non-combustible" even if it consists of a mixture of inorganic and organic substances.

heated to approximately 750°C, this being determined to the satisfaction of the Administration by an established test procedure. Any other material is a combustible material.

1.3.37 *A standard fire test* is a test as defined in regulation II-2/3.2 of the 1974 SOLAS Convention.

1.3.38 *“A” class divisions* are those divisions as defined in regulation II-2/3.3 of the 1974 SOLAS Convention.

1.3.39 *“B” class divisions* are those divisions as defined in regulation II-2/3.4 of the 1974 SOLAS Convention.

1.3.40 *“C” class divisions* are divisions constructed of approved non-combustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise.

1.3.41 *Steel or equivalent material.* Where the words “steel or equivalent material” occur, “equivalent material” means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable standard fire test (e.g. aluminium alloy with appropriate insulation).

1.3.42 *Low flame spread* means that the surface thus described will adequately restrict the spread of flame, this being determined to the satisfaction of the Administration by an established test procedure.

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

1.3.44 *Working spaces* are those open or enclosed spaces containing equipment and processes, associated with drilling operations, which are not included in 1.3.30 or 1.3.32.

1.3.45 *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.

1.3.46 *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.

1.3.47 *Fuel oil 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

1.3.48 *Survival craft* are craft capable of removing persons from a unit to be abandoned and capable of sustaining persons until retrieval is completed.

1.3.49 *Rescue boat* is an easily manoeuvred power boat capable of rapid launching and adequate for quick recovery of a man overboard and towing a liferaft away from immediate danger.

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

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

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 requires that a particular fitting, material, appliance, apparatus, item of equipment or type thereof should be fitted or carried in a unit, or that any particular provision should be made, or any procedure or arrangement should be complied with, the Administration may allow any other fitting, material, appliance, apparatus, item of equipment or type thereof to be fitted or carried, or any other provision, procedure or arrangement to be made in that unit, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance, apparatus, item of equipment or type thereof or that any particular provision, procedure or arrangement is at least as effective as that required by 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 1.6.11.2.1 or 1.6.11.5 or 1.6.11.6 is applicable;
- .3 an *intermediate survey* within three months before or after the second anniversary date or within three months before or after the third anniversary date of the certificate, which should take the place of one of the annual surveys specified in 1.6.1.4;
- .4 an *annual survey* within three months before or after each anniversary date of the certificate;
- .5 a minimum of two *drydock surveys* during any five-year period, except where 1.6.11.5 is applicable. Where 1.6.11.5 is applicable this five-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 11.10;
- .7 an *additional survey* as the occasion arises.

1.6.2 The surveys referred to in 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 requirements 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 1.6.2.1 to ensure that they comply with the requirements 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 1.6.2.1, to ensure that they have been maintained in accordance with 1.6.6.1 and that they remain satisfactory for the service for which the unit is intended;
- .5 the drydock 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 drydock survey provided that they are satisfied that such an inspection is equivalent to a drydock survey;

- .6 the radio survey should include a complete inspection of the radio installation to ensure that it complies with the requirements of the Code, is in satisfactory condition and is fit for the service for which the unit is intended;
- .7 an additional survey, either general or partial according to the circumstances, should be made after a repair resulting from investigations prescribed in 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 requirements of the Code.

1.6.3 The intermediate, annual and drydock surveys referred to in 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 required by 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 present regulations 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.

.2 An Administration nominating surveyors or recognising organizations to conduct inspections and surveys as set forth in 1.6.5.1 should as a minimum empower and nominate a surveyor or recognized organization to:

- .2.1 require repairs to a unit;
- .2.2 carry out inspections and surveys if requested by the appropriate authorities of a port State.

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

- .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 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 State, the Government of the port 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 State concerned should ensure that the unit should not continue to operate until it can do so without danger to the unit or the persons on board.

- .4** In every case, the Administration shall 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 this Code to ensure that the unit in all respects will remain fit to operate without danger to the unit or the persons on board.

- .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.
- .3** Whenever an accident occurs to a unit or a defect is discovered, either of which affects the safety of the unit or the efficiency or completeness of structure, equipment, fittings, arrangements and materials, the person in charge or owner of the unit should report at the earliest opportunity to the Administration, the nominated surveyor or recognized organization responsible, who should cause investigations to be initiated to determine whether a survey, as required by this regulation, is necessary. If the unit is in an area under the jurisdiction of another Government, the person in charge or the owner should also report immediately to the appropriate authorities of the port 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 (1989) may be issued after an initial or renewal survey to a unit which complies with the requirements 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 1.4 should be clearly noted on the certificate.

1.6.9 A Contracting Government to both the 1974 SOLAS Convention and the 1966 Load Line Convention may, at the request of the Administration, cause a unit to be surveyed and, if satisfied that the requirements 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 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 (1989) should be issued for a period specified by the Administration which should not exceed five years.

- .2.1** notwithstanding the requirements of 1.6.11.1, when the renewal survey is completed within three 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 five years from the date of expiry of the existing certificate;
- .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 five years from the date of expiry of the existing certificate;
- .2.3** when the renewal survey is completed more than three 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 five years from the date of completion of the renewal survey.
- .3** If a certificate is issued for a period of less than five years, the Administration may extend the validity of the certificate beyond the expiry date to the maximum period specified in 1.6.11.1, provided that the surveys when a certificate is issued for a period of 5 years are carried out.
- .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.

- .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 shall 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 shall be extended for a period longer than three 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 shall be valid to a date not exceeding 5 years from the date of expiry of the existing certificate before the extension was granted.
- .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 required by 1.6.11.2.2 or 1.6.11.5. In these circumstances, the new certificate shall be valid to a date not exceeding five years from the date of completion of the renewal survey.
- .7** If an annual or intermediate survey is completed before the period specified in the relevant regulations then:
 - .7.1** the anniversary date shown on the relevant certificate should be amended by endorsement to a date which should not be more than three months later than the date on which the survey was completed;
 - .7.2** 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;
 - .7.3** 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 prescribed by 1.6.1.3 and 1.6.1.4 are not exceeded.
- .8** A certificate issued under 1.6.7 or 1.6.9 shall cease to be valid in any of the following cases:
 - .8.1** if the relevant surveys are not completed within the periods specified in 1.6.1;
 - .8.2** if the certificate is not endorsed in accordance with 1.6.3;

- .8.3** 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 requirements of 1.6.6.1 and 1.6.6.2. In the case of a transfer between Governments that are Contracting Governments to both the 1974 SOLAS Convention and the 1966 Load Line Convention, if requested within three 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 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 1.6.6.1 and 1.6.6.2.

1.7.3 In the circumstances given in 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 without 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 1.7.1 and 1.7.2, the requirements of 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 seabed and subsoil over which that State is entitled to exercise sovereign rights.

1.8 Casualties

Each Administration should supply the Organization with pertinent information concerning the findings of investigations of any casualty occurring to any of its units subject to the provisions of the Code. 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 will 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.

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.

2.2 Design loads

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

2.2.2 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.

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

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

Wind loading

2.2.5 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 3.2 or by some other method to the satisfaction of the Administration.

Wave loading

2.2.6 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.

2.2.7 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

2.2.8 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

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

Deck loading

2.2.10 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

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

2.3 Structural analysis

2.3.1 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.

2.3.2 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.

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

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

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

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

2.3.7 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.

2.4 Special considerations for surface units

2.4.1 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.

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

2.4.3 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.

2.5 Special considerations for self-elevating units

2.5.1 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.

2.5.2 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.

2.5.3 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.

2.5.4 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.

2.5.5 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.

2.5.6 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.

2.5.7 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.

2.5.8 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.

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

2.5.10 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.

2.5.11 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.

2.5.12 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.

2.6 Special considerations for column-stabilized units

2.6.1 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 calculations showing that adequate provision is made to maintain this clearance.

2.6.2 For units operating while supported by the sea-bed the clearance required in 2.5.2 should be maintained.

2.6.3 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 one-year return period for the intended area of operation.

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

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

2.6.6 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.

2.6.7 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.

2.6.8 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.

2.6.9 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.

2.6.10 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.

2.6.11 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.

2.6.12 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 one-year return period for the intended area of operation.

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

2.6.14 Where bracings are watertight they should be designed to prevent collapse from hydrostatic pressure. Underwater bracing should normally be made watertight and have a leak detection system to make it possible to detect fatigue cracks at an early stage.

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

2.7 Fatigue analysis

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

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

2.7.3 The fatigue analysis should take into account the intended design life and the accessibility of individual structural members for inspection.

2.8 Materials

Units should be constructed from steel or other suitable material having properties acceptable to the Administration.

2.9 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.

2.10 Welding

The welding procedures employed during construction should be to the satisfaction of the Administration. Welders should be qualified in the welding processes and procedures utilized. The selection of welds for testing and the methods utilized should be to the satisfaction of the Administration.

2.11 Testing

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

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 deadweight survey, are 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 deadweight survey and inclining experiment adjusted for weight differences, 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 the operating manual or in a light ship data alterations log and be taken into account in daily operations.

3.1.5 For column-stabilized units, a deadweight survey should be conducted at intervals not exceeding 5 years. Where the deadweight survey indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement, an inclining test should be conducted.

3.1.6 The inclining test or deadweight 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 deck cargo and equipment 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 required and such data should clearly indicate the position of such equipment.

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

$$F = 0.5C_sC_H\rho V^2A$$

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)

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 3.2.3 to 3.2.7. Such heeling moment determination should include lift and drag effects at various applicable heel angles.

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 – 256.0	1.79
above 256	1.80

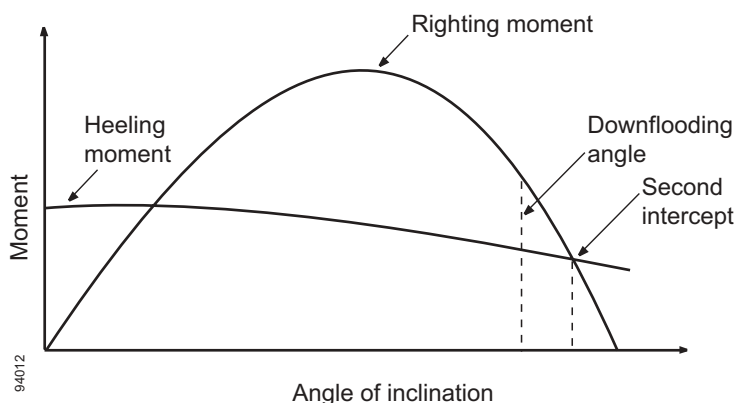


Figure 3-1 – Righting moment and heeling moment curves

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.

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

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

following conditions, provided the allowable KG requirement 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.

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 in general the flooding of any one compartment in any operating or transit condition consistent with the damage assumptions set out in 3.5.

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 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;
- .3 the righting moment curve, after the damage set out above, should have, from the first intercept to the lesser of the extent of weathertight integrity required by 3.4.3.2 and the second intercept, a range of at least 7° . Within this range, the righting moment curve should reach a value of at least twice the wind heeling moment curve, both being measured at the same angle.* See figure 3-2 below.

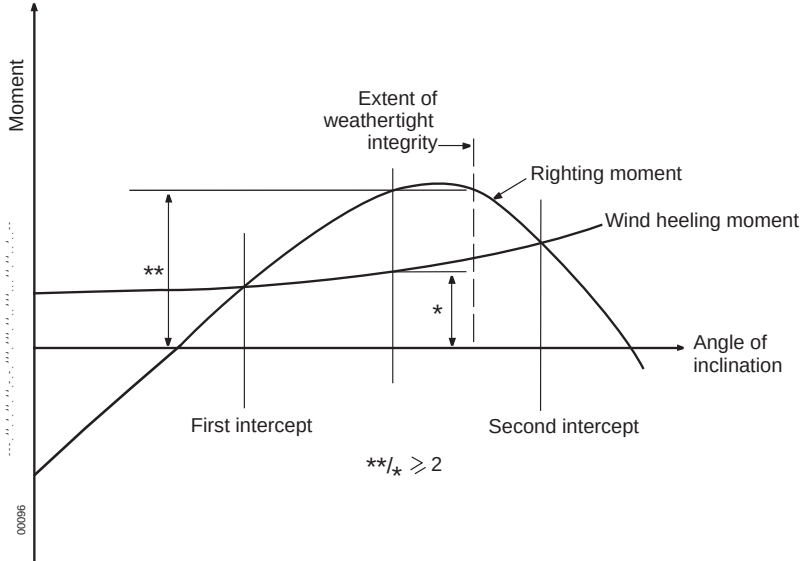


Figure 3-2 – Righting moment and wind heeling moment curves

* Refer to resolution A.651(16) – An example of alternative stability criteria for a range of positive stability after damage or flooding for column-stabilized semisubmersible units.

3.4.4 The unit should provide sufficient buoyancy and stability in any operating or transit condition to withstand the flooding of any watertight compartment wholly or partially below the waterline in question, which is a pump-room, a room containing machinery with a salt water cooling system or a compartment adjacent to the sea, taking the following considerations into account:

- .1** the angle of inclination after flooding should not be greater than 25° ;
- .2** any opening below the final waterline should be made watertight;
- .3** a range of positive stability* should be provided, beyond the calculated angle of inclination in these conditions, of at least 7° .

All types of units

3.4.5 Compliance with the requirements of 3.4.1 to 3.4.4 should be determined by calculations which take into consideration the proportions and design characteristics of the unit and the arrangements and configuration of the damaged compartments. In making these calculations, it should be assumed that the unit is in the worst anticipated service condition as regards stability and is floating free of mooring restraints.

3.4.6 The ability to reduce angles of inclination by pumping out or ballasting compartments or application of mooring forces, etc., should not be considered as justifying any relaxation of the requirements.

3.4.7 Alternative subdivision and damage stability criteria may be considered for approval by the Administration provided an equivalent level of safety is maintained. In determining the acceptability of such criteria, the Administration should consider at least the following and take into account:

- .1** extent of damage as set out in 3.5;
- .2** on column-stabilized units, the flooding of any one compartment as set out in 3.4.4;
- .3** the provision of an adequate margin against capsizing.

3.5 Extent of damage

Surface units

3.5.1 In assessing the damage stability of surface units, the following extent of damage should be assumed to occur between effective watertight bulkheads:

- .1** horizontal penetration: 1.5 m; and
- .2** vertical extent: from the base line upwards without limit.

* Refer to resolution A.651(16) – An example of alternative stability criteria for a range of positive stability after damage or flooding for column-stabilized semisubmersible units.

3.5.2 The distance between effective watertight bulkheads or their nearest stepped portions which are positioned within the assumed extent of horizontal penetration should be not less than 3.0 m; where there is a lesser distance, one or more of the adjacent bulkheads should be disregarded.

3.5.3 Where damage of a lesser extent than in 3.5.1 results in a more severe condition, such lesser extent should be assumed.

3.5.4 All piping, ventilation systems, trunks, etc., within the extent of damage referred to in 3.5.1 should be assumed to be damaged. Positive means of closure should be provided at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

Self-elevating units

3.5.5 In assessing the damage stability of self-elevating units, the following extent of damage should be assumed to occur between effective watertight bulkheads:

- .1 horizontal penetration: 1.5 m; and
- .2 vertical extent: from the base line upwards without limit.

3.5.6 The distance between effective watertight bulkheads or their nearest stepped portions which are positioned within the assumed extent of horizontal penetration should be not less than 3.0 m; where there is a lesser distance, one or more of the adjacent bulkheads should be disregarded.

3.5.7 Where damage of a lesser extent than in 3.5.5 results in a more severe condition, such lesser extent should be assumed.

3.5.8 Where a mat is fitted, the above extent of damage should be applied to both the platform and the mat but not simultaneously, unless deemed necessary by the Administration due to their close proximity to each other.

3.5.9 All piping, ventilation systems, trunks, etc., within the extent of damage referred to in 3.5.5 should be assumed to be damaged. Positive means of closure should be provided at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

Column-stabilized units

3.5.10 In assessing the damage stability of column-stabilized units, the following extent of damage should be assumed:

- .1 Only those columns, underwater hulls and braces on the periphery of the unit should be assumed to be damaged and the damage should be assumed in the exposed portions of the columns, underwater hulls and braces.
- .2 Columns and braces should be assumed to be flooded by damage having a vertical extent of 3.0 m occurring at any level between 5.0 m above and 3.0 m below the draughts specified in the operating manual. Where a watertight flat is located within

this region, the damage should be assumed to have occurred in both compartments above and below the watertight flat in question. Lesser distances above or below the draughts may be applied to the satisfaction of the Administration, taking into account the actual operating conditions. However, the required damage region should extend at least 1.5 m above and below the draught specified in the operating manual.

- .3** No vertical bulkhead should be assumed to be damaged, except where bulkheads are spaced closer than a distance of one eighth of the column perimeter at the draught under consideration, measured at the periphery, in which case one or more of the bulkheads should be disregarded.
- .4** Horizontal penetration of damage should be assumed to be 1.5 m.
- .5** Underwater hull or footings should be assumed to be damaged when operating in a transit condition in the same manner as indicated in 3.5.10.1, 3.5.10.2, 3.5.10.4 and either 3.5.10.3 or 3.5.6, having regard to their shape.
- .6** All piping, ventilation systems, trunks, etc., within the extent of damage should be assumed to be damaged. Positive means of closure should be provided at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

3.6 Watertight integrity

3.6.1 The number of openings in watertight subdivisions should be kept to a minimum compatible with the design and proper working of the unit. Where penetrations of watertight decks and bulkheads are necessary for access, piping, ventilation, electrical cables, etc., arrangements should be made to maintain the watertight integrity of the enclosed compartments.

3.6.2 Where valves are provided at watertight boundaries to maintain watertight integrity, these valves should be capable of being operated from a pump-room or other normally manned space, a weather deck, or a deck which is above the final waterline after flooding. In the case of a column-stabilized unit this would be the central ballast control station. Valve position indicators should be provided at the remote control station.

3.6.3 For self-elevating units the ventilation system valves required to maintain watertight integrity should be kept closed when the unit is afloat. Necessary ventilation in this case should be arranged by alternative approved methods.

Internal openings

3.6.4 The means to ensure the watertight integrity of internal openings should comply with the following:

- .1 Doors and hatch covers which are used during the operation of the unit while afloat should be remotely controlled from the central ballast control station and should also be operable locally from each side. Open/shut indicators should be provided at the control station.
- .2 Doors or hatch covers which are normally closed while the unit is afloat should be provided with an alarm system (e.g. light signals) showing personnel both locally and at the central ballast control station whether the doors or hatch covers in question are open or closed. A notice should be affixed to each such door or hatch cover stating that it is not to be left open while the unit is afloat.

3.6.5 The means to ensure the watertight integrity of internal openings which are kept permanently closed during the operation of the unit, while afloat, should comply with the following:

- .1 A notice should be affixed to each such closing appliance stating that it is to be kept closed while the unit is afloat; however, manholes fitted with close bolted covers need not be so marked.
- .2 On self-elevating units, an entry should be made in the official log-book or tour report, as applicable, stating that all such openings have been witnessed closed before the unit becomes waterborne.

External openings

3.6.6 All downflooding openings the lower edge of which is submerged when the unit is inclined to the first intercept between the righting moment and wind heeling moment curves in any intact or damaged condition should be fitted with a suitable watertight closing appliance, such as closely spaced bolted covers.

3.6.7 Where flooding of chain lockers or other buoyant volumes may occur, the openings to these spaces should be considered as downflooding points.

3.7 Freeboard

General

3.7.1 The requirements of the 1966 Load Line Convention, including those relating to certification, should apply to all units and certificates should be issued as appropriate. The minimum freeboard of units which cannot be computed by the normal methods laid down by that Convention should be determined on the basis of meeting the applicable intact stability, damage stability and structural requirements for transit conditions and drilling operations while afloat. The freeboard should not be less than that computed from the Convention where applicable.

3.7.2 The requirements of the 1966 Load Line Convention with respect to weathertightness and watertightness of decks, superstructures, deckhouses, doors, hatchway covers, other openings, ventilators, air pipes, scuppers, inlets and discharges, etc., should be taken as a basis for all units in the afloat condition.

3.7.3 In general, heights of hatch and ventilator coamings, air pipes, door sills, etc., in exposed positions and their means of closing should be determined by consideration of both intact and damage stability requirements.

3.7.4 All downflooding openings which may become submerged before the angle of inclination at which the required area under the intact righting arm curve is achieved should be fitted with weathertight closing appliances.

3.7.5 With regard to damage stability, the requirements in 3.4.3.2, 3.4.4 and 3.6.6 should apply.

3.7.6 Administrations should give special consideration to the position of openings which cannot be closed in emergencies, such as air intakes for emergency generators, having regard to the intact righting arm curves and the final waterline after assumed damage.

Surface units

3.7.7 Load lines should be assigned to surface units as calculated under the terms of the 1966 Load Line Convention and should be subject to all the conditions of assignment of that Convention.

3.7.8 Where it is necessary to assign a greater than minimum freeboard to meet intact or damage stability requirements or on account of any other restriction imposed by the Administration, regulation 6(6) of the 1966 Load Line Convention should apply. When such a freeboard is assigned, seasonal marks above the centre of the ring should not be marked and any seasonal marks below the centre of the ring should be marked. If a unit is assigned a greater than minimum freeboard at the request of the owner, regulation 6(6) need not apply.

3.7.9 Where moonpools are arranged within the hull in open communication with the sea, the volume of the moonpool should not be included in the calculation of any hydrostatic properties. If the moonpool has a larger cross-sectional area above the waterline at $0.85D$ than below, an addition should be made to the geometric freeboard corresponding to the lost buoyancy. This addition for the excess portion above the waterline at $0.85D$ should be made as prescribed below for wells or recesses. If an enclosed superstructure contains part of the moonpool, deduction should be made for the effective length of the superstructure. Where open wells or recesses are arranged in the freeboard deck, a correction equal to the volume of the well or recess to the freeboard deck divided by the waterplane area at $0.85D$ should be made to the freeboard obtained after all other corrections, except bow height correction, have been made. Free surface effects of the flooded well or recess should be taken into account in stability calculations.

3.7.10 The procedure described in 3.7.9 should also apply in cases of small notches or relatively narrow cut-outs at the stern of the unit.

3.7.11 Narrow wing extensions at the stern of the unit should be considered as appendages and excluded for the determination of length (L) and for the calculation of freeboards. The Administration should determine the effect of such wing extensions with regard to the requirements for the strength of unit based upon length (L).

Self-elevating units

3.7.12 Load lines should be assigned to self-elevating units as calculated under the terms of the 1966 Load Line Convention. When floating or when in transit from one operational area to another units should be subject to all the conditions of assignment of that Convention unless specifically excepted. However, these units should not be subject to the terms of that Convention while they are supported by the sea-bed or are in the process of lowering or raising their legs.

3.7.13 The minimum freeboard of units which due to their configuration cannot be computed by the normal methods laid down by the 1966 Load Line Convention should be determined on the basis of meeting applicable intact stability, damage stability and structural requirements in the afloat condition.

3.7.14 Where it is necessary to assign a greater than minimum freeboard to meet intact or damage stability requirements or on account of any other restriction imposed by the Administration, regulation 6(6) of the 1966 Load Line Convention should apply. When such a freeboard is assigned, seasonal marks above the centre of the ring should not be marked and any seasonal marks below the centre of the ring should be marked. If a unit is assigned a greater than minimum freeboard at the request of the owner, regulation 6(6) need not apply.

3.7.15 Where moonpools are arranged within the hull in open communication with the sea, the volume of the moonpool should not be included in the calculation of any hydrostatic properties. If the moonpool has a larger cross-sectional area above the waterline at $0.85D$ than below, an addition should be made to the geometric freeboard corresponding to the lost buoyancy. This addition for the excess portion above the waterline at $0.85D$ should be made as prescribed below for wells or recesses. If an enclosed superstructure contains part of the moonpool, deduction should be made for the effective length of the superstructure. Where open wells or recesses are arranged in the freeboard deck, a correction equal to the volume of the well or recess to the freeboard deck divided by the waterplane area at $0.85D$ should be made to the freeboard obtained after all other corrections, except bow height correction have been made. Free surface effects of the flooded well or recess should be taken into account in stability calculations.

3.7.16 The procedure described in 3.7.15 should apply in cases of small notches or relatively narrow cut-outs at the stern of the unit.

3.7.17 Narrow wing extensions at the stern of the unit should be considered as appendages and excluded for the determination of length (L) and for the calculation of freeboards. The Administration should determine the effect of such wing extensions with regard to the requirements for the strength of unit based upon length (L).

3.7.18 Self-elevating units may be manned when under tow. In such cases a unit would be subject to a bow height requirement which may not always be possible to achieve. In such circumstances, the Administration should consider the extent of application of regulation 39(3) of the 1966 Load Line Convention to such units, having regard to the occasional nature of such voyages on predetermined routes and to prevailing weather conditions.

3.7.19 Some self-elevating units utilize a large mat or similar supporting structure which contributes to the buoyancy when the unit is floating. In such cases the mat or similar supporting structure should be ignored in the calculation of freeboard. The mat or similar supporting structure should, however, always be taken into account in the evaluation of the stability of the unit when floating since its vertical position relative to the upper hull may be critical.

Column-stabilized units

3.7.20 The hull form of this type of unit makes the calculation of geometric freeboard in accordance with the provisions of chapter III of the 1966 Load Line Convention impracticable. Therefore the minimum freeboard of each column-stabilized unit should be determined by meeting the applicable requirements for:

- .1 the strength of the unit's structure;
- .2 the minimum clearance between passing wave crests and deck structure (see 2.6.1 to 2.6.3); and
- .3 intact and damage stability requirements.

3.7.21 The minimum freeboard should be marked in appropriate locations on the structure.

3.7.22 The enclosed deck structure of each column-stabilized unit should be made weathertight.

3.7.23 Windows, sidescuttles and portlights, including those of the non-opening type, or other similar openings should not be located below the deck structure of column-stabilized units.

3.7.24 Administrations should give special consideration to the position of openings which cannot be closed in emergencies, such as air intakes for emergency generators, having regard to the intact righting arm curves and the final waterline after assumed damage.