PART II RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF MOBILE OFFSHORE DRILLING UNITS

TITLE MODU – MOBILE DRILLING OFFSHORE UNITS

SECTION 1 NAVAL ARCHITECTURE

CHAPTERS

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CHAPTER A
APPROACH

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A1. APPROACH

100. Scope

101. The intact and damage stability and the watertight integrity of units are to comply with the applicable requirements of the present Chapter, or, subject to a preliminary agreement, in accordance with other particular specifications based on the same principles or relevant National or International Regulations.

A2. DEFINITIONS

100. Definitions
[MODU CODE, IACS UR D, OIL AND GAS GLOSSARY]

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

102. **1988 LL Protocol** means the Protocol of 1988 relating to the International Convention on Load Lines, 1966, as amended.

103. **"A" class divisions** are as defined in SOLAS regulation II-2/3.

104. **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.

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

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

107. **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.

108. **"B" class divisions** are as defined in SOLAS regulation II-2/3.

109. **"C" class divisions** are as defined in SOLAS regulation II-2/3.

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

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

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

113. **Continuous "B" class ceilings or linings** are those "B" class ceilings or linings which terminate only at an "A" or "B" class division.

114. **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 Part II Section 7 of the RBNA MODU Rules, the space where the emergency source of power is located is not considered as being a control station.

115. **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.

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

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

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

119. **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.

120. **Draught**: the moulded draught is the vertical distance measured from the moulded base line to the assigned load line. Certain components of a unit's structure, machinery or equipment may extend below the moulded base line.

121. **'Drilling unit'** as used herein means any unit intended for use in offshore drilling operations for the exploration or exploitation of the subsea resources.

122. **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.

123. **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.

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

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

126. **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.

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

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

129. **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.

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

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

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

133. **Lightweight** is the displacement of a unit in tonnes complete unit with all its permanently installed machinery, equipment and outfit, including permanent ballast, spare parts normally retained on board and liquids in machinery and piping to their normal working levels but does not include variable deck load, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and personnel and their effects.

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

135**. 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.

136. **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.

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

a. for main propulsion; or

b. 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.

138. **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.

139. **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.

140. **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.

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

142. **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.

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

144. **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:

a. *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 seabed, as applicable.

b. *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 seabed, as applicable.

c. *Transit conditions* – conditions wherein a unit is moving from one geographical location to another.

145. **Moonpool:** A moon pool is a feature of marine drilling platforms, drill-ships and diving support vessels, some marine research and underwater exploration or research vessels, and underwater habitats. It is an opening in the floor or base of the hull, platform, or chamber giving access to the water below, allowing technicians or researchers to lower tools and instruments into the sea. It provides shelter and protection so that even if the ship is in high seas or surrounded by ice, researchers can work in comfort rather than on a deck exposed to the elements. A moon pool also allows divers or small submersible craft to enter or leave the water easily and in a more protected environment .

FIGURE F.A2.145.1 - MOONPOOL

146. **Moulded base line** is a horizontal line extending through the upper surface of the bottom plating.

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

148. **Normal operational and habitable conditions** means:

a. 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

b. drilling operations.

149. **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/mm^2. Oil transfer pumps are not considered oil fuel units.

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

151. **Other types of drilling units:** Units which are designed as mobile offshore drilling units and which do not fall into the above mentioned categories will be treated on an individual basis and be assigned an appropriate classification designation.

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

153. **'Rules'** as used herein refers to the currently applicable Rules of the RBNA.

154. **Self-elevating unit** – also called a "Jack-up Rig" - is a unit with movable legs capable of raising its hull above the surface of the sea and lowering it back into the sea.

155. **Self-propelled un**it as used herein refers to a unit which is designed for unassisted passage. All other units are considered as nonself-propelled.

156. **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.

157. **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.

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

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

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

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

a. electric steering gear, an electric motor and its associated electrical equipment;

b. electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump;

c. other hydraulic gear, a driving engine and connected pump.

162 **Surface unit** is a unit with a unit- or barge-type displacement hull of single or multiple hull construction intended for operation in the floating condition. These units have no propulsion machinery

163. The term **'unit'** as used herein is intended to mean any mobile offshore structure or unit, whether designed for operation afloat or supported by the sea bed, built in accordance with the Requirements and classed by a member Society, and includes the entire structure and components covered by the Requirements.

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

165. **Water depth** as used herein is the vertical distance from the sea bed to the mean low water level plus the height of astronomical and storm tides.

166. **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.

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

168. **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.

200. Construction documents

201. The construction documents are to be part of the unit's files to be assembled during construction and to be submitted to the surveyor. Those documents are part of RBNA final report for new buildings. See Part I, Title 01, Section 2, C5.700.

CHAPTER B
REGULATIONS

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B1 REGULATIONS

100. National Authorities requirements for vessels subject to Brazilian Flag.

101. For vessels under the Brazilian Flag, the DPC regulations contained in the NORMAM 01 Chapter 9 are to be complied with.

200. National Authorities requirements for vessels subject to Foreign Flags

201. Specific regulations and special legal provisions of National Authorities which units may have to comply with according to their flag, structural type, size, operational site and intended service, as well as other particulars and details.

300. International Regulations

301. The unit shall comply with such as IMO Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU code), in particular for drilling units.

400. Classification and statutory requirements

401. In case of conflict between the Rules and statutory requirements, the latter ones are to take precedence over the requirements of the present Rules. However, the requirements of the Rules shall be adopted when they are stricter.

B2. TECHNICAL STANDARDS

100. Industrial Standards

101. The present Rules follow industrial standards where applicable to materials and equipment destined to be installed on board units classified by RBNA or other societies. Where this is the case, the applicable standards are indicated in the relevant Chapters of the Rules.

200. References

201. The present Section makes reference to the following:

- IMO MODU Code
- IMO Intact Stability Code
- IACS UR D
- NORMAM 01 Chapter 9

CHAPTER D
ACTIVITIES AND SERVICES

CHAPTER CONTENTS

D1. OPERATION AND MAINTENANCE OF UNITS

100. Adequate crew

101. The application of the present Rules is based on the principle that the units are going to be loaded, operated and maintained adequately by competent and qualified crew or operating personnel, according to the environmental, loading, operating and other criteria on which classification is based. In particular, it will be assumed that the unit will not exceed the draught of the assigned freeboard, or the maximum allowed by Classification.

102. The RBNA interventions and the relevant reports reflect the condition of the unit at the moment of the intervention. It is the responsibility of the interested parties to ensure proper maintenance until the next survey required by the Rules.

103. The Interested Party has the duty of to inform the Surveyor whenever circumstances occur that might affect the unit's class.

200. Mode of operation

201. **Operation condition** is a condition wherein a unit is on location for the purpose of operations.

202. **Severe storm condition** is a condition during which the unit is subject to the most severe environmental loadings for which the unit has been designed.

203. **Transit condition is** a condition wherein the unit is moving from one geographical location to another, without operations related to its mission.

204. **Temporary mooring condition** is a condition wherein the unit is temporarily moored in the afloat condition.

CHAPTER E
CONFIGURATIONS

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E1. CONFIGURATIONS

100. Basic configurations

101. **Column-stabilized unit** is a unit with the main deck connected to the underwater hull or footings by columns or caissons. Column stabilized drilling units depend upon the buoyancy of widely spaced columns for flotation and stability for all afloat modes of operation or in the raising or lowering of the unit, as may be applicable. The columns are connected at their top to an upper structure supporting the drilling equipment. Lower hulls or footings may be provided at the bottom of the columns for additional buoyancy or to provide sufficient area to support the unit on the sea bed. Bracing members of tubular or structural sections may be used to connect the columns, lower hulls or footings and to support the upper structure. Drilling operations may be carried out in the floating condition, in which condition the unit is described as a semisubmersible, or when the unit is supported by the sea bed, in which condition the unit is described as a submersible. A semisubmersible unit may be designed of operate either floating or supported by the sea bed, provided each type of operation has been found to be satisfactory.

FIGURE F.E1.1012.1 – COLUMN-STABILIZED UNIT

102. **Self-elevating unit** – also called a “Jack-up Rig” - is a unit with movable legs capable of raising its hull above the surface of the sea and lowering it back into the sea. Self-elevating drilling units have hulls with sufficient buoyancy to safely transport the unit to the desired location, after which the hull is raised to a predetermined elevation above the sea surface on its legs, which are supported on the sea bed. Drilling equipment and supplies may be transported on the unit, or may be added to the unit in its elevated position. The legs of such units may penetrate the sea bed, may be fitted with enlarged sections or footings to reduce penetration, or may be attached to a bottom pad or mat.

FIGURE F.E1.102.1 – SELF-ELEVATING OR “JACK-UP” UNIT

FIGURE F.E1.102.2 – BOTTOM PAD

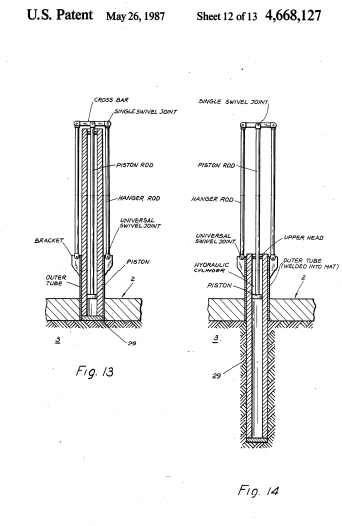


FIGURE F.E1.102.3 – BOTTOM PAD

FIGURE F.E1.102.4 – BOTTOM PAD

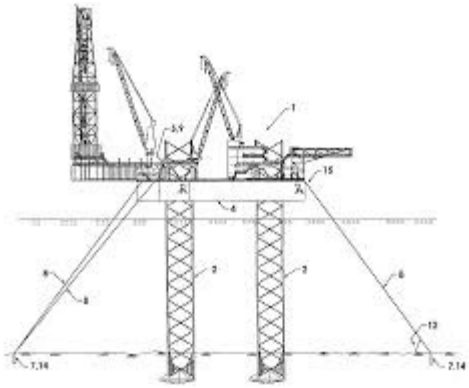
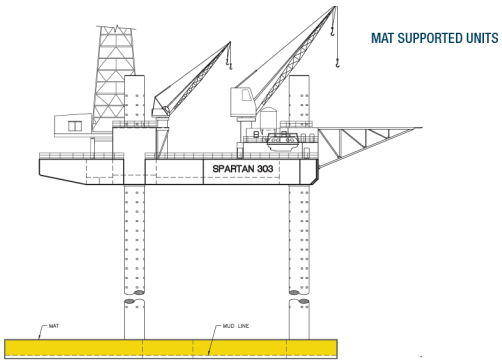


FIGURE F.E12.102.5 – BOTTOM MAT



103. **Surface unit** is a unit with a ship-type or barge-type displacement hull of single or multiple hull construction intended for operation in the floating condition. These units have no propulsion machinery.

a. *Ship type drilling units* are seagoing unit-shaped units having a displacement-type hull or hulls, of the single, catamaran or trimaran types, which have been designed or converted for drilling operations in the floating condition. Such types have propulsion machinery.

FIGURE F.E1.103.1 – UNIT TYPE SURFACE UNIT

FIGURE F.E1.103.2 – UNIT TYPE SURFACE UNIT

b. *Barge-type drilling units* are seagoing units having a displacement type hull or hulls, which have been designed or converted for drilling operations in the floating condition.

FIGURE F.E1.103.3 – BARGE TYPE SURFACE UNIT

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

105. **Moonpool:** an open shaft in the centre of the hull of a ship engaged in deep-sea drilling through which drilling takes place

CHAPTER H
LOADING CONDITIONS, BUOYANCY AND STABILITY

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References:
MODU Code Chapter 3 - Subdivision, Stability anf Freeboard
IACS UR D - 7 - Watertight integrity
IACS UI LL6 - Free surface
IMO Resolutons A.650(16), A.651(16) (examples of alternative stability criteria)

H1. APPLICATION

100. General

101. Unit stability and watertight integrity are to comply with the applicable requirements of the present Chapter, or, subject to a preliminary agreement, in accordance with other particular specifications based on the same principles or relevant National or International Regulations.

H2. LOAD LINE

100. Watertight integrity
[MODU Code 3.6 / IACS UR D7]

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

102. Where valves are provided at watertight boundaries to maintain watertight integrity, these valves shall be capable of being locally operated. Remote operation may be 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 shall be provided at the remote control station.

103. Watertight doors shall be designed to withstand water pressure to a head up to the bulkhead deck or freeboard deck respectively. A prototype pressure test shall be conducted for each type and size of door to be installed on the unit at a test pressure corresponding to at least the head required for the intended location. The prototype test shall be carried out before the door is fitted. The installation method and procedure for fitting the door on board shall correspond to that of the prototype test. When fitted on board, each door shall be checked for proper seating between the bulkhead, the frame and the door. Large doors or hatches of a design and size that would make pressure testing impracticable may be exempted from the prototype pressure test, provided that it is demonstrated by calculations that the doors or hatches maintain watertightness at the design pressure, with a proper margin of resistance. After installation, every such door, hatch or ramp shall be tested by means of a hose test or equivalent.

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

200. Internal openings

201. The means to ensure the watertight integrity of internal openings shall comply with the following:

a. Doors and hatch covers which are used during the operation of the unit while afloat shall be remotely controlled from the central ballast control station and shall also be operable locally from each side. Open/shut indicators shall be provided at the control station.

b. Doors or hatch covers in self-elevating units, or doors placed above the deepest load line draft in column-stabilized and surface units, which are normally closed while the unit is afloat may be of the quick acting type and shall 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 shall be affixed to each such door or hatch cover stating that it is not to be left open while the unit is afloat.

c. Remotely operated doors shall meet SOLAS regulation II-1/25-9.2.

202. The means to ensure the watertight integrity of internal openings which are intended only to provide access for inspection and are kept permanently closed during the operation of the unit, while afloat, shall have a notice 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.

300. External openings

301. 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 shall be fitted with a suitable watertight closing appliance, such as closely spaced bolted covers.

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

400. Freeboard

401. The requirements of the 1988 LL Protocol, including those relating to certification, shall apply to all units and certificates shall be issued as appropriate. The minimum freeboard of units which cannot be computed by the normal methods laid down by that Protocol shall 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 shall not be less than that computed from the Protocol where applicable.

402. The requirements of the 1988 LL Protocol with respect to weathertightness and watertightness of decks, superstructures, deckhouses, doors, hatchway covers, other openings, ventilators, air pipes, scuppers, inlets and discharges, etc., shall be taken as a basis for all units in the afloat condition.

403. In general, heights of hatch and ventilator coamings, air pipes, door sills, etc., in exposed positions and their means of closing shall be determined by consideration of the provisions regarding both intact and damage stability.

404. 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 shall be fitted with weathertight closing appliances.

405. With regard to damage stability, the provisions of Subchapter H5 shall apply.

406. Special consideration shall be given 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.

500. Surface units

501. Load lines shall be assigned to surface units as calculated under the terms of the 1988 LL Protocol and shall be subject to all the conditions of assignment of that Protocol.

502. Where it is necessary to assign a greater than minimum freeboard to meet the provisions regarding intact or damage stability or on account of any other restriction imposed by the RBNA, regulation 6(6) of the 1988 LL Protocol shall apply. When such a freeboard is assigned, seasonal marks above the centre of the ring shall not be marked and any seasonal marks below the centre of the ring shall be marked. If a unit is assigned a greater than minimum freeboard, at the request of the owner regulation 6(6) of the 1988 LL Protocol does not apply.

503. Where moonpools are arranged within the hull in open communication with the sea, the volume of the moonpool shall not be included in the calculation of any hydrostatic properties. If the moonpool has a larger cross-sectional area above the waterline at 85% of the depth for freeboard than below, an addition shall be made to the geometric freeboard corresponding to the lost buoyancy. This addition for the excess portion above the waterline at 85% of the depth for freeboard shall be made as prescribed below for wells or recesses. If an enclosed superstructure contains part of the moonpool, deduction shall 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 85% of the depth for freeboard shall 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 shall be taken into account in stability calculations.

504. The procedure described in H1.501 shall also apply in cases of small notches or relatively narrow cut-outs at the stern of the unit.

505. Narrow wing extensions at the stern of the unit shall be considered as appendages and excluded for the determination of length (*L*) and for the calculation of freeboards. The RBNA shall determine the effect of such wing extensions with regard to the provisions relating to the strength of unit based upon length (*L*).

600. Self-elevating units

601. Load lines shall be assigned to self-elevating units as calculated under the terms of the 1988 LL Protocol. When floating, or when in transit from one operational area to another, units shall be subject to all the conditions of assignment of that Protocol unless specifically excepted. However, these units shall not be subject to the terms of that Protocol while they are supported by the seabed or are in the process of lowering or raising their legs.

602. The minimum freeboard of units which due to their configuration cannot be computed by the normal methods laid down by the 1988 LL Protocol shall be determined on the basis of meeting applicable provisions regarding intact stability, damage stability and structure in the afloat condition.

603. Where it is necessary to assign a greater than minimum freeboard to meet intact or damage stability provisions or on account of any other restriction imposed by the Administration, regulation 6(6) of the 1988 LL Protocol shall apply. When such a freeboard is assigned, seasonal marks above the centre of the ring shall not be marked and any seasonal marks below the centre of the ring shall be marked. If a unit is assigned a greater than minimum freeboard at the request of the owner, regulation 6(6) need not apply.

604. Where moonpools are arranged within the hull in open communication with the sea, the volume of the moonpool shall not be included in the calculation of any hydrostatic properties. If the moonpool has a larger cross-sectional area above the waterline at 85% of the depth for freeboard than below, an addition shall be made to the geometric freeboard corresponding to the lost buoyancy. This addition for the excess portion above the waterline at 85% of the depth for freeboard shall be made as prescribed below for wells or recesses. If an enclosed superstructure contains part of the moonpool, deduction shall 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 85% of the depth for freeboard shall 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 shall be taken into account in stability calculations.

605. The procedure described in H5.604 shall apply in cases of small notches or relatively narrow cut-outs at the stern of the unit.

606. Narrow wing extensions at the stern of the unit shall be considered as appendages and excluded for the determination of length (*L*) and for the calculation of freeboards. The RBNA shall determine the effect of such wing extensions with regard to the requirements of the 1988 LL Protocol for the strength of unit based upon length (*L*).

607. Self-elevating units may be manned when under tow. In such cases a unit would be subject to the bow height and reserve buoyancy requirements which may not always be possible to achieve. In such circumstances, the RBNA shall consider the extent of application of regulations 39(1), 39(2) and 39(5) of the 1988 LL Protocol, as amended, and give special consideration to such units, having regard to the occasional nature of such voyages on predetermined routes and to prevailing weather conditions.

608. 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 shall be ignored in the calculation of freeboard. The mat or similar supporting structure shall, 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.

700. Column-stabilized units

701. The hull form of this type of unit makes the calculation of geometric freeboard in accordance with the provisions of chapter III of the 1988 LL Protocol impracticable. Therefore the minimum freeboard of each column-stabilized unit shall be determined by meeting the applicable provisions for:

a. the strength of the unit's structure;

b. the minimum clearance between passing wave crests and deck structure; and

c. intact and damage stability.

702. The minimum freeboard shall be marked in appropriate locations on the structure.

703. The enclosed deck structure of each column-stabilized unit shall be made weathertight.

704. Windows, side-scuttles and portlights, including those of the non-opening type, or other similar openings shall not be located below the deck structure of column-stabilized units.

705. Special consideration shall be given 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.

H3. INCLINING TEST
[MODU Code 3.1]

100. Inclining test

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

102. For successive units which are identical by design, the light unit data of the first unit of the series may be accepted by the RBNA in agreement with the Administration in lieu of an inclining test, provided the difference in light unit 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 unit displacement and principal horizontal dimensions as determined for the first of the series. Extra care shall 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.

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

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

105**. For column-stabilized units**:

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

b. 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 H5.104, light unit 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 exceed 1% of the operating displacement, a lightweight survey shall be completed in accordance with H5.105.a.

106. The inclining test or lightweight survey shall be carried out in the presence of a RBNA surveyor.

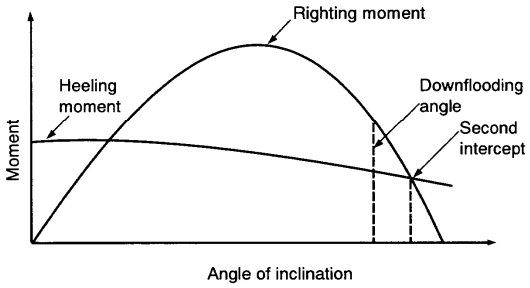
H4. STABILITY CRITERION UNDER WIND FORCE

[MODU Code 3.2]

100. Intact Condition - Righting moments and heeling moments

101. Curves of righting moments and of wind heeling moments similar to figure F.H4.101.1with supporting calculations shall 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 shall be related to the most critical axes. Account shall be taken of the free surface of liquids in tanks.

FIGURE F.H4.101.1 – ANGLE OF INCLINATION



102. 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 shall clearly indicate the position of such equipment. Provisions regarding the lowering and effective stowage of such equipment shall be included in the operating manual.

103. The curves of wind heeling moments shall be drawn for wind forces calculated by the following formula:

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

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 T.H4.103.1)

C_H = the height coefficient depending on the height above sea level of the structural member exposed to wind (see table T.H4.103.2.)

ρ = the air mass density (1.222 kg/m^3)

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).

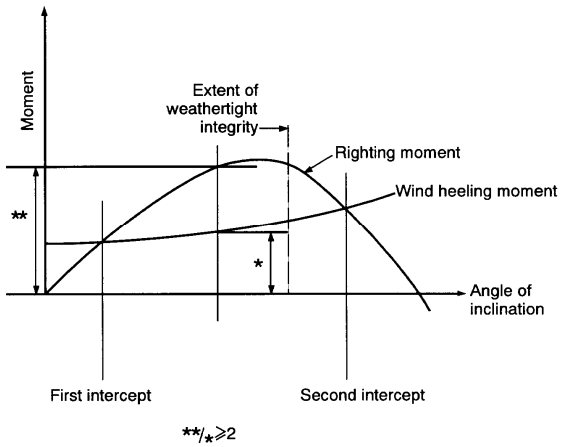
104. Wind forces shall be considered from any direction relative to the unit and the value of the wind velocity shall be as follows:

a. In general a minimum wind velocity of 36 m/s (70 knots) for offshore service shall be used for normal operating conditions and a minimum wind velocity of 51.5 m/s (100 knots) shall be used for the severe storm conditions.

b. Where a unit is to be limited in operation to sheltered locations (protected inland waters such as lakes, bays, swamps, rivers, etc.) consideration shall be given to a reduced wind velocity of not less than 25.8 m/s (50 knots) for normal operating conditions.

105. 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., shall 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.

FIGURE F.H4.105.1 – RIGHTING MOMENT AND HEELING MOMENT CURVES



106. In calculating the wind heeling moments, the lever of the wind overturning force shall 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.

107. The wind heeling moment curve shall 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 unit heel.

108. 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 H5.203 to H5.207. Such heeling moment determination shall include lift and drag effects at various applicable heel angles.

TABLE T.H4.103.1 – 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 T.H4.103.2 – 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

109. **Thrusters effect:** When deemed necessary, for units on which dynamic positioning is installed, the thrusters negative effect on stability is to be taken into account

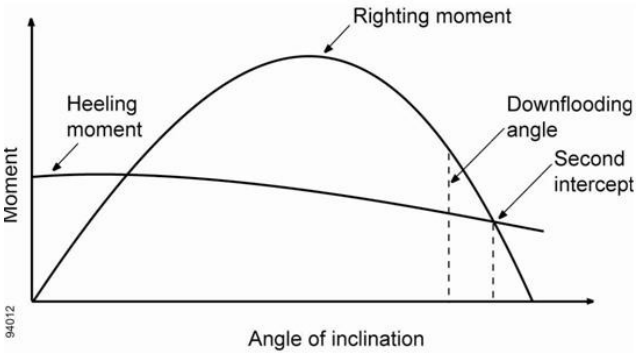
H5. INTACT STABILITY CRITERIA

100. Intact stability criteria

[MODU Code 3.3]

101. The stability of a unit in each mode of operation shall meet the following criteria:

FIGURE F.H5.101.1. – ANGLE OF INCLINATION



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

103. **For column-stabilized units** (*) the area under the righting moment curve to the angle of downflooding shall be not less than 30% in excess of the area under the wind heeling moment curve to the same limiting angle.

(*)Refer to An example of alternative intact stability criteria for twin-pontoon column-stabilized semisubmersible units, adopted by the Organization by resolution A.650(16), an abstract of which is reproduced in H5.400 .

104. The righting moment curve shall be positive over the entire range of angles from upright to the second intercept.

105. Free surface
[IACS UI LL61]

a. For all loading conditions, the initial metacentric height and the righting lever curve shall be corrected for the effect of free surfaces of liquids in tanks

b. Free surface effects shall be considered whenever the filling level in a tank is less than 98% of full condition. Free surface effects need not be considered where a tank is nominally full, i.e. filling level is 98% or above. Free surface effects for small tanks may be ignored under condition specified in H5.215 of the present subchapter.

c. Nominally full cargo tanks shall be corrected for free surface effects at 98% filling level. In doing so, the correction to initial metacentric height shall be based on the inertia moment of liquid surface at 5° of the heeling angle divided by displacement, and the correction to righting lever is suggested to be on the basis of real shifting moment of cargo liquids.

106. Permeability values are normally required to be in accordance with Tab t.h5.106.1. Other values may be used if adequately supported by calculations and if consistent with operating practices. The volume of moonpools, when fitted within the hull in open communication with the sea, is not to be included in calculation of any hydrostatic properties.

TABLE T.H5.106.1 – PERMEABILITY OF COMPARTMENTS

Spaces	Permeability
Store rooms	0,60
Accommodation	0,95
Machinery	0,85
Intended for liquids	0,95

200. Severe storm condition

201. Each unit shall be capable of attaining a severe storm condition in a period of time consistent with the meteorological conditions.

202. The procedures recommended and the approximate length of time required, considering both operating conditions and transit conditions, shall be contained in the operating manual.

203. It shall be possible to achieve the severe storm condition without the removal or relocation of solid consumables or other variable load. However, the RBNA 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:

a. 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

b. 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.

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

d. Towing condition, if relevant.

300. Alternative stability criteria

301. Alternative stability criteria may be considered by the RBNA 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 RBNA shall consider at least the following and take into account as appropriate:

a. environmental conditions representing realistic winds (including gusts) and waves appropriate for world-wide service in various modes of operation;

b. dynamic response of a unit. Analysis shall include the results of wind tunnel tests, wave tank model tests, and non-linear simulation, where appropriate. Any wind and wave spectra used shall cover sufficient frequency ranges to ensure that critical motion responses are obtained;

c. potential for flooding taking into account dynamic responses in a seaway;

d. susceptibility to capsizing considering the unit's restoration energy and the static inclination due to the mean wind speed and the maximum dynamic response;

e. an adequate safety margin to account for uncertainties.

400. An example of alternative intact stability criteria for twin-pontoon column-stabilized semi-submersible units
[IMO Res..A650(16)]

401. **Geometric parameters**

A_{wp} is the waterplane area at the survival draught including the effects of bracing members as applicable (in square metres).

A_w is the effective wind area with the unit in the upright position (i.e. the product of projected area, shape coefficient and height coefficient) (in square metres).

BM is the vertical distance from the metacentre to the centre of buoyancy with the unit in the upright position (in metres).

D_m is the initial survival draught (in metres).

FBD_o is the vertical distance from Dm to the top of the upper exposed weathertight deck at the side (in metres).

GM for H5.405 GM is the metacentric height measured about the roll or diagonal axis, whichever gives the minimum reserve energy ratio, 'B' / 'A'. This axis is usually the diagonal axis as it possesses a characteristically larger projected wind area which influences the three characteristic angles mentioned above.

for H5.406 GM is the metacentric height measured about the axis which gives the minimum downflooding distance margin (i.e. generally the direction that gives the largest QSD1) (in metres).

I_{wp} is the waterplane second moment of inertia at the survival draught including the effects of bracing members as applicable (in metres to the power of 4).

L_{ccc} is the longitudinal distance between centres of the corner columns (in metres).

L_{ptn} is the length of each pontoon (in metres).

S_{ptn} is the transverse distance between the centreline of the pontoons (in metres).

V_c is the total volume of all columns from the top of the pontoons to the top of the column structure, except for any volume included in the upper deck (in cubic metres).

V_p is the total combined volume of both pontoons (in cubic metres).

V_t is the total volume of the structures (pontoons, columns and bracings) contributing to the buoyancy of the unit, from its baseline to the top of the column structure, except for any volume included in the upper deck (in cubic metres).

VCP_{w1} is the vertical centre of wind pressure above Dm (in metres).

402. The criteria given below apply only to twin-pontoon column-stabilized semi-submersible units in severe storm conditions which fall within the following **range of parameters:**

V_p/V_t is between 0.48 and 0.58

$A_{wp}/(V_c)^{2/3}$ is between 0.72 and 1.00

$I_{wp}/[V_c \times (L_{ptn}/2)]$ is between 0.40 and 0.70

403. The parameters used in the above equations are defined in H4.401 above.

404. **Intact stability criteria**
The stability of a unit in the survival mode of operation shall meet the following criteria:

405. **Capsize criteria**

These criteria are based on the wind heeling moment and righting moment curves calculated as shown in H4.100 of the Code at the survival draught. The reserve energy area 'B'must be equal or greater than 10% of the dynamic response area 'A'as shown in figure F.H5.406.13.

Area 'B' /Area 'A' ≥ 0.10

where:

Area 'A'is the area under the righting moment curve measured from θ_1 to ($\theta_1 + 1.15\ \theta_{dyn}$)

Area 'B' is the area under the righting moment curve measured from ($\theta_1 + 1.15\ \theta_{dyn}$) to θ_2
θ_1 is the first intercept with the 100 knot wind moment curve

θ_2 is the second intercept with the 100 knot wind moment curve
θ_{dyn} is the dynamic response angle due to waves and fluctuating wind

$\theta_{dyn} = (10.3 + 17.8\ C)/(1 + GM/(1.46 + 0.28\ BM))$

$C = (L_{ptn}^{5/3} \times VCP_{w1} \times A_w \times V_p \times V_c^{1/3})/(I_{wp}^{5/3} \times V_t)$

406. **Downflooding criteria**

These criteria are based on the physical dimensions of the unit and the relative motion of the unit about a static inclination due to a 7 knot wind measured at the survival draught. The initial downflooding distance (DFDo) shall be greater than the reduction in downflooding distance at the survival draught as shown in figure F.H5.406.1 below.

$DFD_o - RDFD > 0.0$

Where:

DFD_o is the initial downflooding distance to Dm in metres

RDFD is the reduction in downflooding distance in metres equal to SF (k × QSD1 + RMW)

SF is equal to 1.10, which is a safety factor to account for uncertainties in the analysis, such as non-linear effects

k (correlations factor) is equal to
0.55 + 0.08 (a - 4.0) + 0.056 (1.52 - GM)
(GM cannot be taken to be greater than 2.44 m)

A is equal to $(FBD_o/D_m)(S_{ptn} \times L_{ccc})/A_{wp}$ (a cannot be taken to be less than 4.0)

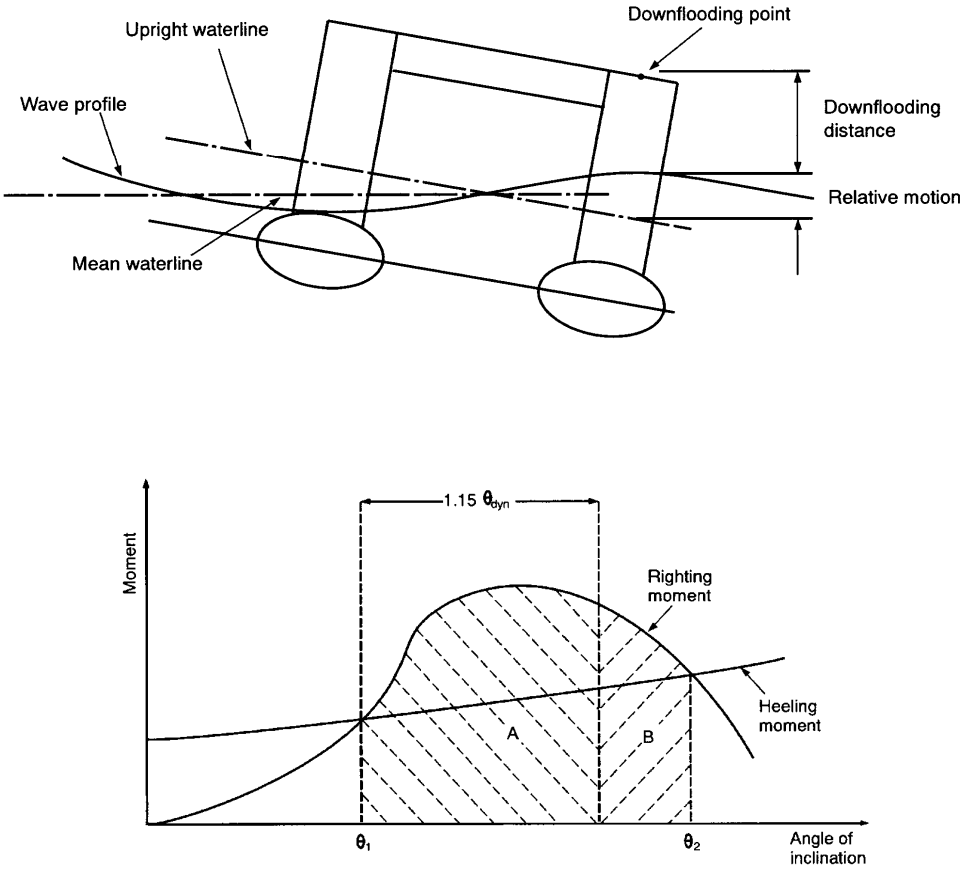
QSD_1 is equal to DFD_o - quasi-static downflooding distance at θ_1, in metres, but not to be taken less than 3.0 m.

RMW is the relative motion due to waves about θ_1 in metres, equal to 9.3 + 0.11(X-12.19)

X is equal to $D_m(V_t/V_p)(Awp^2/Iwp)(L_{ccc}/L_{ptn})$
(X cannot be taken to be less than 12.19

The parameters used in the above equations are defined in H5.401 above.

FIGURE F.H5.406.1 - RIGHTING MOMENT AND HEELING MOMENT CURVES



407. **Capsize criteria assessment form**

Input data

GM _____=_____m
BM_____ =_____m
VCP_{wl} _____=_____m
A_w _____=_____m^2
V_t_____=_____m^3
V_c_____=_____m
V_p_____=_____m^3
I_{wp} _____=_____m^4
L_{ptn} _____ =_____m

Determine
θ_1 _____=_____deg
θ_2 _____=_____deg

$C = (L_{ptn}^{5/3} \times VCP_{w1} \times A_w \times V_p \times V_c^{1/3}) / (I_{wp}^{5/3} \times V_t)$ =_____m-1

$\theta_{dyn} = (10.3 + 17.8C) / (1.0 + GM/(1.46+0.28BM))$ _____=_____deg
Area 'A' _____=_____m-deg
Area 'B'_____=_____m-deg

Results
Reserve energy ratio:
'B'/'A'= _____(min = 0.10)
GM = _____ m (KG = _____m)

Note : The minimum GM is that which produces a 'B'/'A' ratio = 0.10

Downflooding criteria assessment form

Input data

DFDo__ =_____m
_____
FBDo__ =_____m
_____
GM_____ =_____m
_____
Dm ___ =_____m
_____
Vt____ =_____m_3
_____
Vp___ =_____m_3
_____
Awp__ =_____m_3
_____
Iwp___ =_____m_4
_____
Lccc__ =_____m
_____
Lptn__ =_____m
_____
Sptn___ =_____m
_____
SF____
_____ _____= 1.10

Determine

θ_1 _____=_____deg

DFD_1_____=_____m

$QSD_1 = DFD_o - DFD_1$ =_____m

$a = (FBD_o/D_m)(S_{ptn} \times L_{ccc})/A_{wp}$ = _____(a_{min} = 4.0)

$k = 0.55+0.08(a-4.0)+0.056(1.52-GM)$ =_____(GM_{MAX} = 2.44 m)

$X = D_m(V_t/V_p)(A_{wp}^2/ I_{wp})(L_{ccc}/L_{ptn})$=_____m = ($X_{MIN}$=12.19 m)

RMW = 9.3 + 0.11(X-12.19) = _____m

$RDFD = SF (k \times QSD_1 + RMW)$ =_____m

Results Downflooding margin:

$DFD_o - RDFD$ = _____(minimum = 0.0 m)

GM = _____ m (KG = _____m)

Note : The minimum GM is that which produces a downflooding margin = 0.0 m.

H6. SUBDIVISION AND DAMAGE STABILITY
[MODU Code 3.7]

100. All units

101. All units are to have sufficient stability to withstand the flooding from the sea of any single compartment or any combination of compartments consistent with the damage assumption set out in H7.100, H7.200 and H7.300, for operating and transit modes of operation.

Guidance

Except otherwise required by National Authorities, damage stability requirements are applicable only to the following units:

a. units intended to receive service notations DRILL, drilling assistance, accommodation and diving support

b. units intended to receive more than 100 persons on board.

c. In other cases, damage stability requirements of the present Chapter may be used as a guidance.

End of guidance

102. The unit is to possess sufficient reserve stability in the damaged condition to withstand the additional heeling moment of a 25,8 m/s (50 knots) sustained wind superimposed from any direction.

103. Additionally, column-stabilized units are to have sufficient stability to withstand, in any operating or transit condition with the assumption of no wind, the flooding of any single watertight compartment located 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.

104. For all types of units, the ability to compensate for damage incurred, by pumping out or by ballasting other compartments, etc., is not to be considered as alleviating the above requirements. For the purpose of calculation, it is to be assumed that the unit is floating free of mooring restraints. However, possible detrimental effects of mooring restraints are to be considered.

105. Compliance with the provisions of H6.101 to H6.300 shall 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 shall be assumed that the unit is in the worst anticipated service condition as regards stability and is floating free of mooring restraints.

106**.** The ability to reduce angles of inclination by pumping out or ballasting compartments or application of mooring forces, etc., shall not be considered as justifying any relaxation of these provisions.

107. 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 shall consider at least the following and take into account:

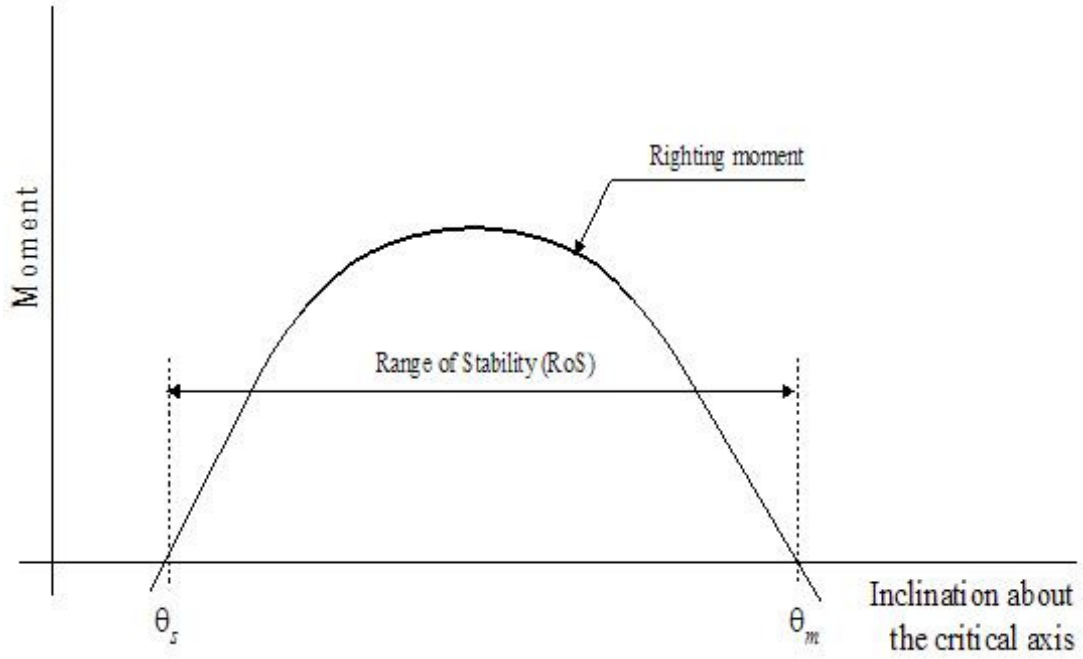
a. extent of damage as set out in Subchapter H7

b. on column-stabilized units, the flooding of any one compartment as set out in H6.302;

c. the provision of an adequate margin against capsizing.

200. Surface and self-elevating units

FIGURE F.H6.201.1 – RESIDUAL STABILITY FOR SELF-ELEVATING UNITS



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

a. 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

b. for a self-elevating unit, the flooding of any single compartment while meeting the following criterion (see figure F.F6.201.1):

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

where:

$RoS \geq 10^{\circ}$

RoS = 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.

202. The unit shall 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, shall be below the lower edge of any downflooding opening.

300. Column-stabilized units

301. The unit shall 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:

a. the angle of inclination after the damage set out in H7301.b shall not be greater than 17°;

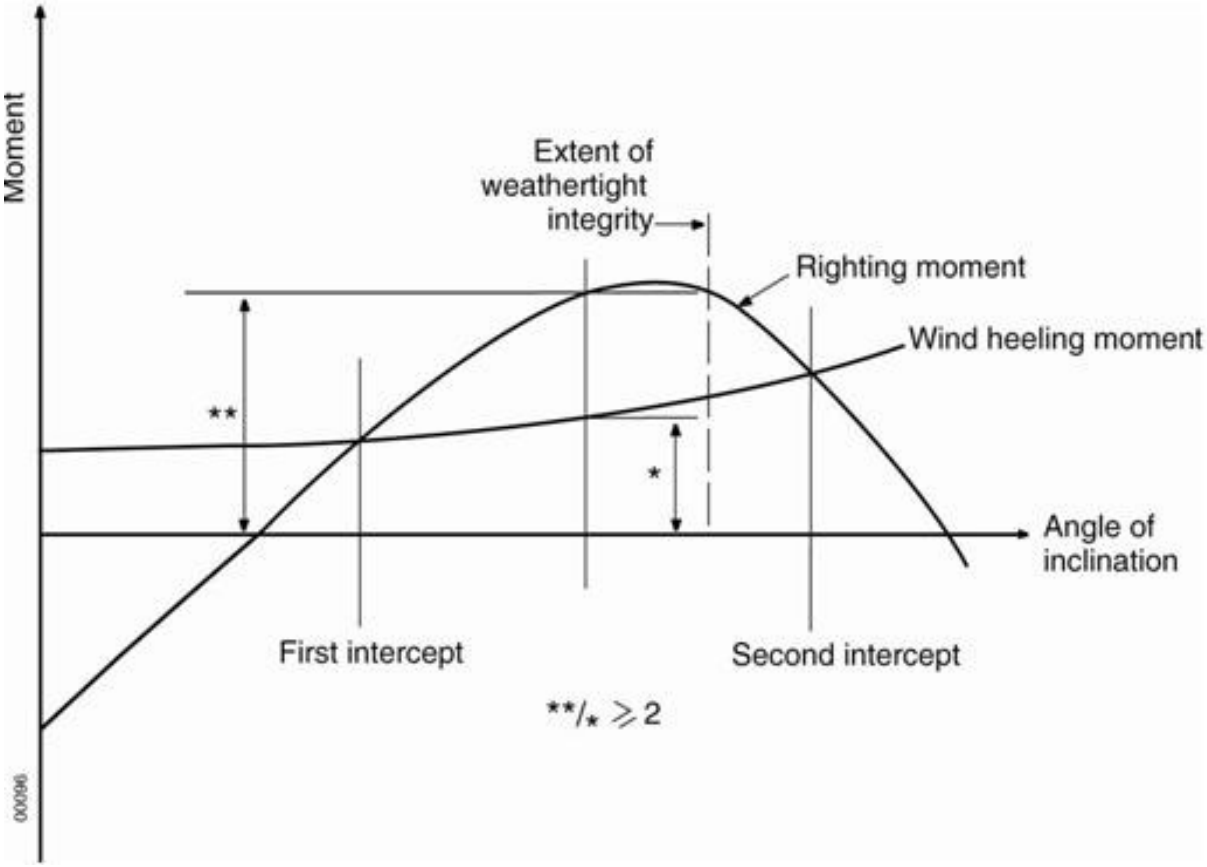
b. any opening below the final waterline shall be made watertight, and openings within 4 m above the final waterline shall be made weathertight;

c. the righting moment curve, after the damage set out above, shall have, from the first intercept to the lesser of the extent of weathertight integrity under H6.301.b and the second intercept, a range of at least 7. Within this range, the righting moment curve shall reach a value of at least twice the wind heeling moment curve, both being

measured at the same angle.(*) See figure F.H6.301.1 below.

(*) Refer to An example of alternative stability criteria for a range of positive stability after damage or flooding for column-stabilized semisubmersible units, adopted by the Organization by resolution A.651(16), an abstract of which follows in H6.400..

FIGURE F.H6.301.1 – RIGHTING MOMENT AND WIND HEELING CURVES



302. The unit shall 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:

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

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

c. a range of positive stability * shall be provided, beyond the calculated angle of inclination in these conditions, of at least 7°.

*Refer to An example of alternative stability criteria for a range of positive stability after damage or flooding for column-stabilized semisubmersible units, adopted by the Organization by resolution A.651(16), of which an abstract is given below:.

400. An example of alternative stability criteria for a range of positive stability after damage or flooding for column-stabilized semisubmersible units
[IMO Res.A651(16)]

401. The criteria hereunder constitute an alternative to those of H6.301.3 and H6.302.c. These criteria apply only to column-stabilized semisubmersible units which have buoyant volumes contained in watertight upper-deck structure.

402. The righting lever curve after damage or flooding, as set out in H7.301 and H6.302 respectively, should, before the second intercept angle, reach a value of at least 2.5 m (see figure below). At least 1.0 m of this righting lever should arise from enclosed watertight volumes above watertight flats positioned at, or above, the lowest continuous deck.

403. The righting lever curve after damage or flooding, as set out in H7.301 and H6.302 de respectively, should have a positive range of at least 10° between the first and second intercept.

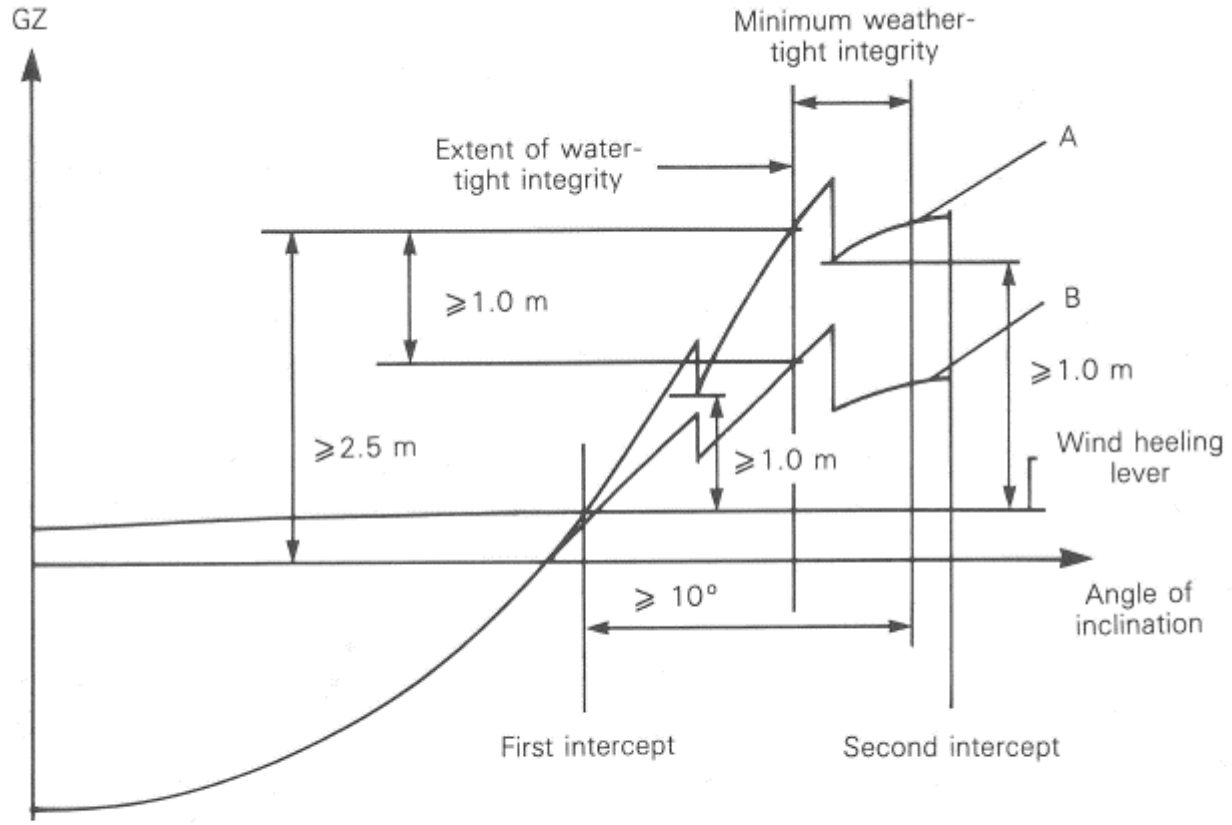
404. For the purposes of calculating the righting lever curve, buoyancy may be assumed from all spaces which are closed as described in H6.405 and H6.406 below. If the lower edge of any opening which is not closed as required in

H6.405 and H6.406 is submerged, then the corresponding space shall be excluded from the buoyancy beyond the angle where this opening is submerged. but shall be included up to the angle where this opening is submerged. Any such loss of buoyancy shall not cause the righting lever to fall below 1.0 m above the wind lever curve within the range specified in H6.403.

405. Any opening submerged before the angle at which the righting lever required in H6.4021 is reached should be fitted with a remotely operated watertight means of closure. Means of closure of a self-activating type may also be accepted by the Administration.

406. Any opening submerged after the angle referred to in H6.405 is reached and within the range specified in H6.403 should be fitted with means of closure as required in H6.405 or with easily operable weathertight means of closure.

FIGURE F.H6.402.1 – RIGHITING CURVE AFTER DAMAGE OR FLOODING



A = GZ-curve including enclosed volumes above watertight flats at or above the lowest continuous deck

B = GZ-curve excluding enclosed volumes above watertight flats at or above the lowest continuous deck

H7. EXTENT OF DAMAGE

100. Surface units
[MODU Code 3.5]

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

a. horizontal penetration: 1.5 m; and

b. vertical extent: from the base line upwards without limit.

c. The distance between effective watertight bulkheads or their nearest stepped portions which are positioned within the assumed extent of horizontal penetration shall be not less than 3 m; where there is a lesser distance, one or more of the adjacent bulkheads shall be disregarded.

102. Where damage of a lesser extent than in H7.101 results in a more severe condition, such lesser extent shall be assumed.

103. All piping, ventilation systems, trunks, H7.100 shall be assumed to be damaged. Positive means of closure shall be provided at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

200. Self-elevating units

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

a. horizontal penetration: 1.5 m; and

b. vertical extent: from the base line upwards without limit.

202. The distance between effective watertight bulkheads or their nearest stepped portions which are positioned within the assumed extent of horizontal penetration shall be not less than 3 m; where there is a lesser distance, one or more of the adjacent bulkheads shall be disregarded.

203. Where damage of a lesser extent than in paragraph 3.5.5 results in a more severe condition, such lesser extent shall be assumed.

204. Where a mat is fitted, the above extent of damage shall 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.

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

300. Column-stabilized units

301. In assessing the damage stability of column-stabilized units, the following extent of damage shall be assumed:

a. Only those columns, underwater hulls and braces on the periphery of the unit shall be assumed to be damaged and the damage shall be assumed in the exposed portions of the columns, underwater hulls and braces.

b. Columns and braces shall be assumed to be flooded by damage having a vertical extent of 3 m occurring at any level between 5 m above and 3 m below the draughts specified in the operating manual. Where a watertight flat is located within this region, the damage shall 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 shall extend at least 1.5 m above and below the draught specified in the operating manual.

c. No vertical bulkhead shall 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 shall be disregarded.

d. Horizontal penetration of damage shall be assumed to be 1.5 m.

e. Underwater hull or footings shall be assumed to be damaged when operating in a transit condition in the same manner as indicated in H7.202, having regard to their shape.

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

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