ACS **(Asia Classification Society)**

Rules for Building and Classing Mobile Offshore Drilling Units (MODU Rules)

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Contents

PART

1

Conditions of Classification

(Supplement to the ACS Generic Rules for Conditions of Classification – Offshore Units and Structures)

Chapter 1 Scope and Conditions of Classification

SECTION 1 Classification

1 General

The requirements for conditions of classification are contained in the separate, ACS Generic Rules for Conditions of Classification – Offshore Units and Structures (Part 1).

Additional requirements specific to mobile offshore drilling units are contained in the following sections of this Part.

2 Classification Symbols and Notations

List of Classification Symbols and Notations for Mobile Offshore Drilling Units is available from ACS Generic Rules for Conditions of Classification – Offshore Units and Structures (Part 1).

3 Application of Rules

3.1

These Rules are applicable to Mobile Offshore Drilling Units intended for unrestricted ocean service, except where specifically mentioned otherwise.

These requirements are applicable to those features that are permanent in nature and can be verified by plan review, calculation, physical survey or other appropriate means. Any statement in the Rules regarding other features is to be considered as a guidance to the designer, builder, Owner, et al.

3.2

The application of the Rules is, in general, based on the contract date for construction between the shipbuilder and the prospective owner. (e.g., Rules which became effective on 1 July 2004 are not applicable to a drilling unit for which the contract for construction was signed on 30 June 2004.)

4 Plans and Design Data to be submitted

4.1 Hull and Design Data

Plans showing the scantlings, arrangements and details of the principal parts of the structure of each unit to be built under survey and supporting analyses and calculations are to be submitted for review and approved before the work of construction are commenced.

4.2 Machinery Plans

Plans are to be submitted showing the arrangements and details of all propulsion and auxiliary machinery, steering gear, boilers and pressure vessels, electrical systems, jacking or other self-elevating systems, bilge and ballast systems, fire extinguishing systems, and other pumps and piping systems.

4.3 Additional Plans

Where additional class notations or certification under the other Rules, Guides or regulations are requested, submission of additional plans and calculations may be required.

4.4 Submissions

Plans from designers and builders should generally be submitted electronically to ACS. However, hard copies will also be accepted.

All plan submissions originating from manufacturers are understood to have been made with the cognizance of the builder.

5 Operating Manual

5.1

An Operating Manual which is consistent with the information and criteria upon which classification is based is to be placed aboard the unit for the guidance of the operating personnel. The primary language of the Operating Manual is to be English. Units not meeting the criteria for unrestricted service are to have the notation Restricted Service and details of the service restrictions are to be placed in the Operating Manual. Insofar as classification is concerned, the Operating Manual is to include, as appropriate, the following information:

5.1.1

A general description of the unit, including major dimensions, lightship characteristics;

5.1.2

Summaries of approved modes of operation, including for each mode of operation:

i) Limiting environmental conditions, including wave height and period, wind velocity, current velocity, service temperature of the unit, minimum expected sea temperature, sea bed penetration, spud can-soil stiffness, air gap, and water depth ;

ii) Design deck loadings, mooring loads, icing loads, variable load, total elevated load, cantilever load, rated capacities of derricks, cranes and elevating systems and types of helicopter for which the helideck is designed;

iii) Draft or draft range, leg length, spud can position and whether buoyant or non-buoyant, disposition of movable equipment such as cantilevers, drilling masts, crane booms, etc.;

iv) Maximum allowable KG versus draft curves or equivalent and associated limitations or assumptions upon which the allowable KG is based;

v) Disposition (open or closed) of watertight and weathertight closures;

vi) Identification of “Restricted Service” conditions.

5.1.3

Information showing:

i) General arrangements;
ii) Preload capacity;
iii) Watertight and weathertight boundaries, location of unprotected openings, and watertight and weathertight closures;
iv) Type, location and quantities of permanent ballast;
v) Allowable deck loadings;
vi) Capacity, centers of gravity and free surface correction for each tank;
vii) Capacity and centers of gravity of each void provided with sounding arrangements but not provided with means of draining;
viii) Location and means of draining voids;
ix) Hydrostatic curves or equivalent;
x) Hazardous areas;
xi) Simplified electrical one line diagrams of main power and emergency power systems;
xii) Schematic diagrams of the bilge, ballast and ballast control system;

5.1.4

Ballasting procedure;

5.1.5

Recommended sequence of emergency shut-downs;

5.1.6

Procedure for elevating and preloading;

5.1.7

Loading and KG work sheets, sample calculations for each mode of operation and instructions for their use. Work sheets and instructions are to include guidance for the routine recording of lightweight alterations.

5.1.8

A description of the specific locations on the unit where equipment brought onboard for the purpose of conducting well test operations may be placed and any action that need be taken to safely accommodate this equipment.

5.2

The Operating Manual is to be submitted for review by ACS solely to verify the presence of the above information which is to be consistent with the design information and limitations considered in the unit's classification. The Asia Classification Society is not responsible for the operation of the unit.

The Operating Manual required by this sub-section does not need to be in addition to that required by flag and coastal Administrations. These administrations may require that additional information be included in the Operating Manual.

SECTION 2 Definitions

1 General

For the purpose of ACS MODU Rules, the following definitions and explanations, in alphabetical order, shall apply:

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

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

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

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

Certificate means Mobile Offshore Drilling Unit Safety Certificate.

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

Column-Stabilized Unit is a unit with the main deck connected to the underwater hull or footings by columns or caissons.

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 servicing various locations is situated. In the case of column-stabilized units a centralized ballast control station is a "control station".

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.

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

Dimensions:

- **Length (L)**

(i) For surface type drilling units L is to be taken as 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.

(ii) For self-elevating drilling units L is to be taken as the distance between the inside of the shell plating at the fore and after ends.

(iii) For Column stabilized drilling units L is to be taken as the maximum distance between the inside of the shell plating at the fore and after ends of the primary hull structure which is projected to the center line of the hull.

- **Breadth (B)**

(i) For surface type and self-elevating drilling units B is to be taken as the horizontal distance between outsides of frames at the broadest part of the hull.

(ii) For Column stabilized drilling units B is to be taken as the horizontal distance between measured perpendicularly to the length at the broadest part of the primary hull structure.

- **Depth (D)**

(i) For surface type and self-elevating drilling units D is to be taken as the vertical distance measured from the top of the keel to the top of beam of the uppermost continuous deck at side measured at middle of L.

(ii) For Column stabilized drilling units D is to be taken as the vertical distance between the top of bottom plating of the lower hull or footing, to the top of beam of the uppermost continuous deck at side measured at middle of L.

- **Moulded Draught (T)**

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

- **Moulded Base Line**

The moulded base line is a horizontal line extending through the upper surface of the bottom plating.

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

Down Flooding means any flooding of the interior or any part of the buoyant structure of a unit through openings which cannot be closed weathertight, watertight or which are required for operational reasons to be left open in all weather conditions, as appropriate for the intact and damage stability criteria.

Drilling Units Types:

(a) 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 seabed. 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 section or footings to reduce penetration, or may be attached to a bottom pad or mat.

(b) 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 are to support the unit on the seabed. 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.

(c) Surface Type Drilling Units:

(1) Ship-Type Drilling Units are seagoing ship-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.

(2) Barge-Type Drilling Units are seagoing units having a displacement type hulls, which have been designed or converted for drilling operations in the floating condition. These units have no propulsion machinery.

(d) Other Types of Drilling Units
Units which are designed as mobile offshore drilling units which do not fall into the above mentioned categories will be treated on an individual basis and be assigned an appropriate classification designation.

(Standard) Fire Test is a test as defined in regulation II-2/3.2 of the 1974 SOLAS Convention.

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.

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.

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.

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

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

Industrial Machinery and Components are the machinery and components which are used in connection with the drilling operation.

Light Ship Weight is defined as the weight of the 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 liquids in storage or reserve supply tanks, items of consumable or variable loads, stores or crew and their effects.

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

Materials:

(i) **Non-Combustible Material** means a material which neither burns nor gives off flammable vapours in sufficient quantity for self- ignition when heated to approximately 750°C, this being determined to the satisfaction of ACS by an established test procedure. Any other material is a combustible material.

(ii) **Steel or Equivalent Materials**. 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. aluminum alloy with appropriate insulation).

Mobile Offshore Drilling Unit or unit as used herein is intended to mean any mobile offshore structure or drilling unit, whether designed for operation afloat or supported by the sea bed, built in accordance with the requirements and of these rules, and includes the entire structure and components covered by the requirements. The term 'drilling unit' as used herein means any unit intended for use in offshore drilling operations for the exploration or exploitation of the subsea resources. The term 'self-propelled unit' as used herein refers to a unit which is designed for unassisted passage. All other units are considered as non-self- propelled.

Modes of Operation. A mode of operation is a condition or manner in which a unit may operate or function while on location or in transit. Insofar as the rules are concerned, the approved modes of operation of a unit should include the following:

(a) **Operating Conditions:** Conditions wherein a unit is on location for purposes of drilling or other similar operations, and combined environmental and operational loadings are within the appropriate design limits established for such operations. Unit may be either afloat or supported on the seabed, as applicable.

(b) **Severe Storm Conditions:** A condition during which a unit may be subjected to the most severe environmental loadings for which the unit is designed. Drilling or similar operations may have been discontinued due to the severity of the environmental loadings. Unit may be either afloat or supported on the seabed, as applicable.

(c) **Transit Conditions:** All unit movements from one geographical location to another, including the stages of retrieval and jacking.

Moveable cantilever structures are those which extend beyond the hull structure during drilling operations.

Moveable skid beam structures are those which are fully supported by hull structure during drilling operations.

Normal Operational and Habitable Conditions means:

(i) 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

(ii) Drilling Operations.

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 1.8 bar.

Organization means the International Maritime Organization (IMO).

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

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

Ship Divisions:

(i) **"A" Class Divisions** are those divisions as defined in regulation II-2/3.3 of the 1974 SOLAS Convention.

(ii) **"B" Class Divisions** are those divisions as defined in regulation II-2/3.4 of the 1974 SOLAS Convention.

(iii) **"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.

(iv) **Continuous "B" Class Ceilings or Linings** are those "B" class ceilings or linings which terminate only at an "A" or "B" class division.

Source of Power:

(a) **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.

(b) **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.

Ship Spaces:

(i) **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.

(ii) **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".

(iii) **Enclosed Spaces** are spaces delineated by floors, bulkheads and/or decks which may have doors or windows.

(iv) **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.

(v) **Machinery Spaces of Category A** are all spaces which contain internal combustion-type machinery used either for main propulsion or 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.

(vi) **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.

(vii) **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.

(viii) **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.

(ix) **Working Spaces** are those open or enclosed spaces containing equipment and processes, associated with drilling operations.

Speed:

(a) **Maximum Ahead Service Speed** is the greatest speed which the unit is designed to maintain in service at sea at its deepest seagoing draught.

(b) **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.

Steering Gear:

(1) **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.

(2) **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.

(3) **Steering Gear Power Unit** means, in the case of:

(i) Electric Steering Gear, an electric motor and its associated electrical equipment;

(ii) Electro-Hydraulic Steering Gear, an electric motor and its associated electrical equipment and connected pump;

(iii) Other Hydraulic Gear, a driving engine and connected pump.

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.

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

Switchboards:

(a) **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.

(b) **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.

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.

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

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

PART

2

Materials and Welding

Chapter 1 Manufacture, Survey and Certification

SECTION 1 General

1 Application

1.1

Materials, used for the construction or repair of the hull and machinery of drilling units which are classed or intended to be classed with ACS, are to be manufactured, tested and inspected in accordance with the requirements of Part 2 of ACS Rules for Classification of Vessels.

1.2

Materials complying with recognized national or international standards with specifications equivalent to above may also be accepted.

2 Hazardous Substances

2.1

Consideration is to be given to the minimization of hazardous substances used in the construction of the unit and is to facilitate recycling and removal of hazardous materials.

2.2

Materials which contain asbestos are not permitted.

Chapter 2 Materials for Construction

SECTION 1 Hull Steel Grades

1 General

1.1

For surface type units the materials for hull construction are to be in accordance with the requirements of Part 2 of ACS Rules for Classification of Vessels depending on the air temperature in area of operation, thickness of material and the stress pattern associated with its location.

1.2

For self-elevating and column-stabilized units the material for hull construction are to be selected considering the defined minimum service temperature, influencing factors and application as given in the 2-2-1/1.3 to 1.5.

1.3 Minimum Service Temperature of Materials

The minimum service temperature of the steel is to be assumed equal to the lowest of the average daily atmospheric temperatures, based on meteorological data, for any anticipated area of operation. If data giving the lowest daily average temperature is not available and some other criterion is used (such as lowest monthly average temperature), then such data will be specially considered by ACS.

1.4 Influencing Factors

A particular application in association with a defined minimum service temperature depends on toughness parameters, taking the following influencing factors into account:

- **Stress Relieving:** A lower service temperature than stipulated in the Table 2.1 for the relevant steel grade may be considered when a stress relieving heat treatment is employed.

- **Cold Forming:** When cold forming subjects the extreme fiber to greater than about 3 per cent strain consideration is to be given to applying a suitable heat treatment.

- **Steel Manufacturing Process:** When a steel manufacturing process, such as normalizing, controlled or TM rolling, or grain refinement, is utilized when not specifically required by Part 2 of ACS Rules for Classification of Vessels, a lower service temperature may be used subject to agreement of ACS.

1.5 Application

For the purpose of ACS MODU Rules, structural members have been grouped into three application categories of increasing importance as follows:

- **Secondary:** Structural elements of minor importance, failure of which is unlikely to affect the overall integrity of the unit.

- **Primary:** Structural elements essential to the overall integrity of the unit.

- **Special**: Those portions of primary structural elements which are in way of critical load transfer points, stress concentrations, etc.

Some specific examples of structural elements which would fall into the aforementioned categories are given in Table 2.2 (See Figures 2.1, 2.2 and 2.3).

Table 2.1: Thickness limitations [mm] of hull structural steel according to various application categories and design temperatures

Category	Minimum Design Temperature						
	Grade	**0°C**	**-10°C**	**-20°C**	**-30°C**	**-40°C**	**-50°C**
Secondary	A	30	20	10	X	X	X
	B	40	30	20	10	X	X
	D	50	50	45	35	25	15
	E	50	50	50	50	45	35
	AH	40	30	20	10	X	X
	DH	50	50	45	35	25	15
	EH	50	50	50	50	45	35
	FH	50	50	50	50	50	50
	AQ	40	25	10	X	X	X
	DQ	50	45	35	25	15	X
	EQ	50	50	50	45	35	25
	FQ	50	50	50	50	50	45
Primary	A	20	10	X	X	X	X
	B	25	20	10	X	X	X
	D	45	40	30	20	10	X
	E	50	50	50	40	30	20
	AH	25	20	10	X	X	X
	DH	45	40	30	20	10	X
	EH	50	50	50	40	30	20
	FH	50	50	50	50	50	40
	AQ	20	X	X	X	X	X
	DQ	45	35	25	15	X	X
	EQ	50	50	45	35	25	15
	FQ	50	50	50	50	45	35

Table 2.1 continued on next page

Table 2.1 (Contd.): Thickness limitations [mm] of hull structural steel according to various application categories and design temperatures

Category	Minimum Design Temperature						
	Grade	**0°C**	**-10°C**	**-20°C**	**-30°C**	**-40°C**	**-50°C**
Special	A	X	X	X	X	X	X
	B	15	X	X	X	X	X
	D	30	20	10	X	X	X
	E	50	45	35	25	15	X
	AH	15	X	X	X	X	X
	DH	30	20	10	X	X	X
	EH	50	45	35	25	15	X
	FH	50	50	50	50	40	30
	AQ	X	X	X	X	X	X
	DQ	25	15	X	X	X	X
	EQ	50	40	30	20	10	X
	FQ	50	50	50	40	30	20

“X” indicates No Application

Notes:

1. Thicknesses greater than shown in the Table will be specially considered by ACS.
2. Substitutions of materials considered to be equivalent to the Grades shown, or steels of different strength levels, will be specially considered by ACS.
3. Interpolation of thicknesses for intermediate temperatures may be considered.

Table 2.2 : Examples of structural elements falling in different application categories

Category	(i) Column-Stabilized Units
Secondary	(a) Internal structure including bulkheads and girders in vertical columns, decks, lower hulls and diagonal and horizontal bracing and framing members
	(b) Upper platform decks, or decks of upper hulls except areas where the structure is considered primary or special application
	(c) Certain large diameter vertical columns with low length to diameter ratios, except at inter-sections
Primary	(a) External shell structure of vertical columns, lower and upper hulls and diagonal and horizontal braces
	(b) Deck plating, heavy flanges and bulkhead within the upper hull or platform which form "Box" or "I" type supporting structure which do not receive major concentrated loads
	(c) Bulkheads, flats or decks and framing which provide local re-inforcement or continuity of structure in way of intersections except areas where the structure is considered special application
Special	(a) External shell structure in way of intersections or vertical columns, decks and lower hulls
	(b) Portions of deck plating, heavy flanges and bulkheads within the upper hull or platform which from "Box" or "I" type supporting structure when receive major concentrated loads
	(c) Major intersections of bracing members
	(d) External brackets, portions of bulkheads, flats and frames which are designed to receive concentrated loads at intersections of major structural members

Table 2.2 continued on next page

Table 2.2 (Contd.) : Examples of structural elements falling in different application categories	
Category	**(ii) Self-Elevating Units**
Secondary	(a) Internal framing, including bulkheads and girders, in cylindrical legs
	(b) Internal bulkheads and framing members of upper hull structure
	(c) Internal bulkheads of bottom mat supporting structure except where the structure is considered primary or special application
	(d) deck, side and bottom plating of upper hull except where the structure is considered primary application
Primary	(a) External plating of cylindrical legs
	(b) Plating of all components of lattice type legs
	(c) Combination of bulkhead, deck, side and bottom plating within the upper hull which form "Box" or "I" type main supporting structure
	(d) Jack-house supporting structure and bottom footing structure which receives initial transfer of load from legs
	(e) Internal bulkheads, shell and deck of bottom mat supporting structure which are designed to distribute major loads, either uniform or concentrated, into the mat structure
Special	(a) Vertical columns in way of intersection with the mat structure
	(b) Intersections of lattics type leg structure which incorporate novel construction, including the use of steel castings

Table 2.2 continued on next page

Table 2.2 (Contd.) : Examples of structural elements falling in different application categories

Category	(iii) Ship-Type Units
Secondary	(a) Longitudinal bulkhead strakes within 0.4L amidships, except where the structure is considered primary application
	(b) Deck plating exposed to weather within 0.4L amidships, except where the structure is considered primary or special application
	(c) Side plating within 0.4L amidships
	(d) Sheer strake at strength deck outside 0.6L amidships
	(e) Stringer plate in strength deck outside 0.6L amidships
	(f) Deck strake at longitudinal bulkhead outside 0.6L amidships
	(g) Bilge strake outside 0.6L amidships
Primary	(a) Bottom plating, including keel plate, within 0.4L amidships
	(b) Strength deck plating within 0.4*L* amidships, except where the structure is considered special application
	(c) Continuous longitudinal members above strength deck within 0.4*L* amidships
	(d) Uppermost strake in longitudinal bulkhead within 0.4*L* amidships
	(e) Sheer strake at strength deck outside 0.4*L* but within 0.6*L* amidships
	(f) Stringer plate in strength deck outside 0.4*L* but within 0.6*L* amidships
	(g) Deck strake at longitudinal bulkhead outside 0.4*L* but within 0.6*L* amidships
	(h) Inner bottom plating located at corners of the moonpool opening
Special	(a) Sheer strake at strength deck within 0.4*L* amidships
	(b) Stringer plate in strength deck within 0.4*L* amidships
	(c) Deck strake at longitudinal bulkhead within 0.4*L* amidships
	(d) Deck or bottom plating located at corners of the moonpool opening
	(e) Bilge strake within 0.4*L* amidships

Table 2.2 continued on next page

Table 2.2 (Contd.) : Examples of structural elements falling in different application categories

Category	(iv) Barge-Type Units
Secondary	(a) Side shell plating within and outside 0.4*L* amidships
	(b) Strength deck plating within line of hatches and exposed to weather, in general; within and outside 0.4*L* amidships
	(c) Lowest strake in single bottom barges within and outside 0.4*L* amidships
	(d) Bottom plating including keel plate outside 0.4*L* amidships
	(e) Strength deck plating outside 0.4*L* amidships
	(f) Uppermost strake including that of the top wing tank outside 0.4*L* amidships
	(g) Continuous longitudinal members above strength deck outside 0.4*L* amidships
	(h) Strength members not referred to in above categories and local structures
Primary	(a) Bottom plating including keel plate within 0.4*L* amidships
	(b) Strength deck plating within 0.4*L* amidships
	(c) Uppermost strake including that of the top wing tank within 0.4*L* amidships
	(d) Continuous longitudinal members above strength deck within 0.4*L* amidships
	(e) Bilge strake outside 0.4*L* but within 0.6*L* amidships
	(f) Shear strake at strength deck outside 0.4*L* amidships
	(g) Stringer plate in strength deck outside 0.4*L* amidships
	(h) Strength deck strake on tank barge at longitudinal bulkhead outside 0.4*L* amidships
	(i) Inner bottom plating located at corners of the moonpool opening
Special	(a) Bilge strake within 0.4L amidships
	(b) Sheer strake at strength deck within 0.4L amidships
	(c) Stringer plate in strength deck within 0.4L amidships
	(d) Strength deck strake on tank barge at longitudinal bulkhead within 0.4L amidships
	(e) Deck or bottom plating located at corners of the moonpool opening

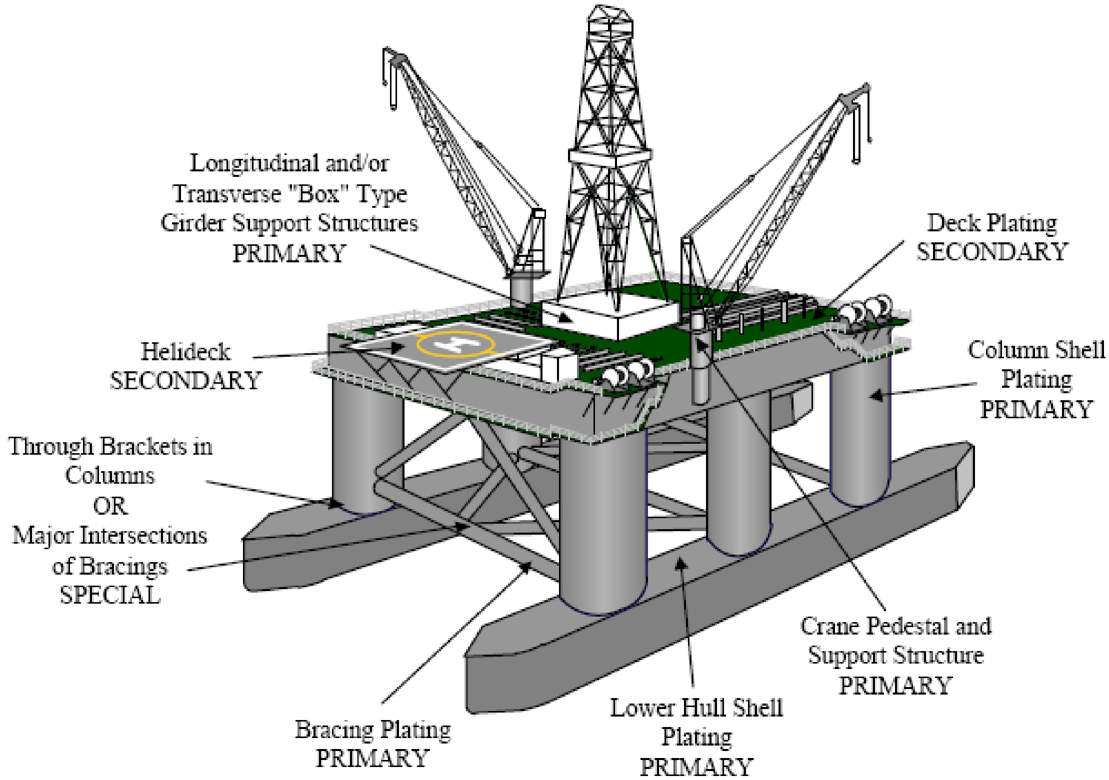


Figure 2.1 : Typical Categories for Column-Stabilized Drilling Units

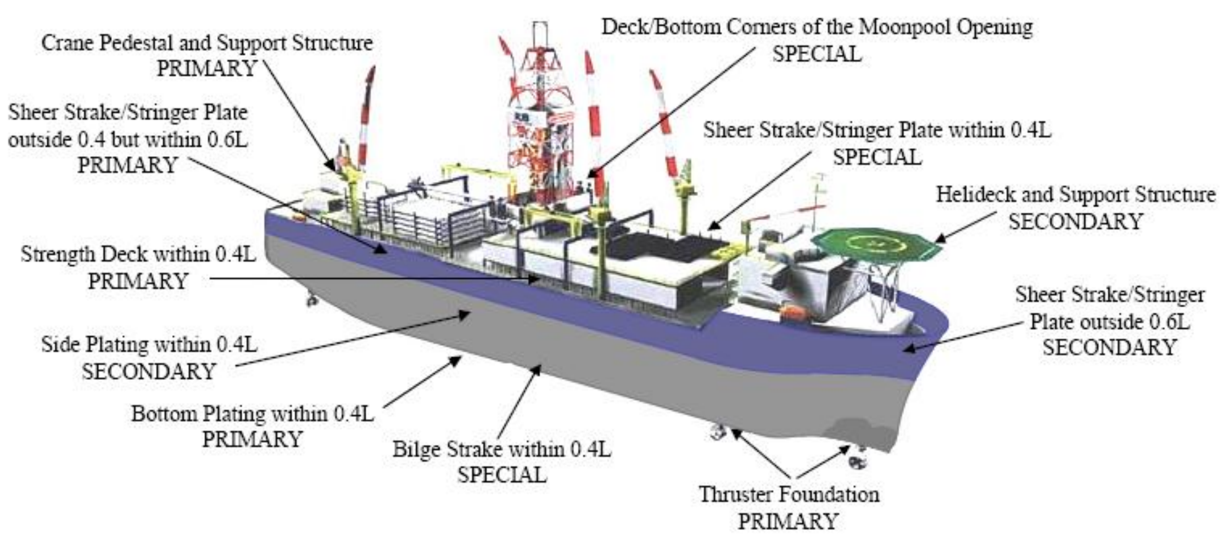


Figure 2.2 : Typical Categories for Surface Type Drilling Units

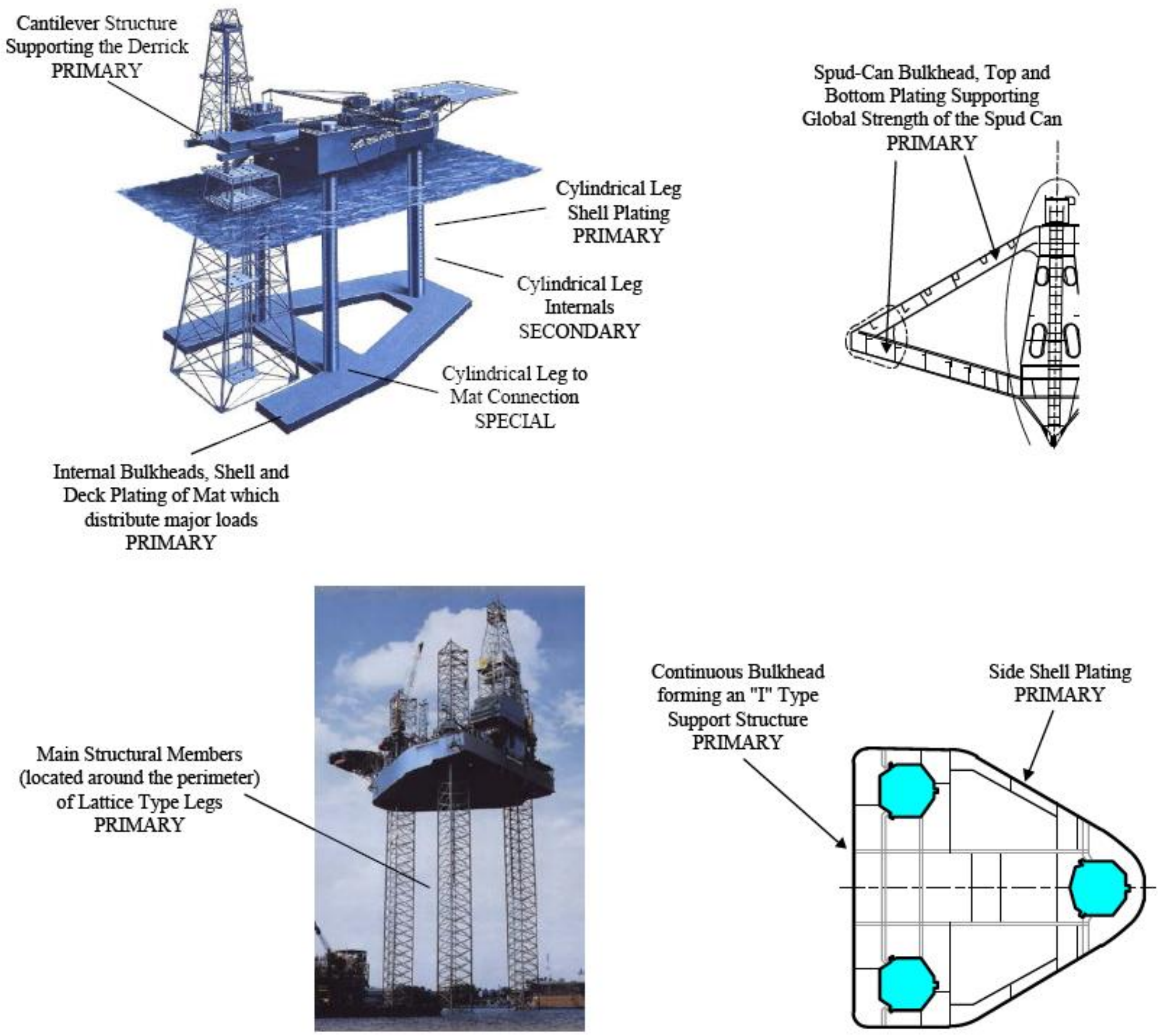


Figure 2.3 : Typical Categories for Self-Elevating Drilling Units

SECTION 2 Material Selection for Machinery

Materials to be used for construction of machinery are to be selected in accordance with Part 2 and Part 4 of ACS Rules for Classification of Vessels.

Chapter 3 Welding, Workmanship and Inspection

SECTION 1 General

1 Application

The welding, workmanship and inspection are in general to be as required by ACS Rules for Classification of Vessels, however, following special requirements are to be complied with.

2 Thickness in Excess of 50 mm

Special precautions, with regard to joint preparation, pre-heat, welding sequence, heat input and interpass temperature, are to be taken for welding thick sections. Ultrasonic inspection to insure the absence of injurious laminations may be required for material used where through-thickness (Z direction) properties are important. Stress relieving, when specified, is to be carried out using an approved method.

SECTION 2 Extent of Inspection of Welds

1 General

All welds are to be subject to visual inspection. Representative nondestructive testing is to be carried out to the satisfaction of the Surveyor. Such testing is to be carried out after all forming and post weld heat treatment. Welds which are inaccessible or difficult to inspect in service may be subjected to increased levels of nondestructive inspection. A plan for nondestructive testing is to be submitted.

2 Extent

2.1

As a minimum the following welds (2-3-2/2.2) are to be subjected to 100% nondestructive testing (Radiographic, ultrasonic, magnetic particle, dye-penetrant, or equivalent).

In addition to surface nondestructive testing, at least 20% of full penetration welded joints in primary structure and all full penetration welded joints in special application structure are to be subjected to 100% radiographic or ultrasonic inspection. Additional nondestructive testing may be required by the Surveyor.

2.2

(i) Self-Elevating Units: Weld joints of lattice- type leg structure (including chords, braces, racks, and rack attachments), circumferential joints of cylindrical-type legs, structure in way of leg guides and jack house attachments to deck, and attachments of legs to spud cans or mat.

(ii) Column-Stabilized Units: Weld attachments of columns to pontoons or lower hulls, braces to column, columns to upper hull, braces to upper hull, brace-to-brace intersections, and in way of any temporary access closures or inserts in main structures.

PART

3

Design Loads

Chapter 1 General

SECTION 1 Introduction

Various modes of operation of a drilling unit are to be investigated using realistic loading conditions, including gravity loadings together with relevant environmental loadings due to the effects of wind, waves, currents, ice and, where deemed necessary by the owner/designer, the effects of earthquake, sea bed supporting capabilities, temperature, fouling, etc. Where applicable, the design loadings indicated herein are to be adhered to for all types of mobile offshore drilling units.

The owner/designer will specify the environmental conditions for which the unit is to be approved. Where possible, the design environmental criteria determining the loads on the unit and its individual elements is to be based upon significant statistical information and are to have a return period (period of recurrence) of at least 50 years for the most severe anticipated environment. If a unit is restricted to seasonal operations in order to avoid extremes of wind and wave, such seasonal limitations are to be specified.

Limiting design data for each mode of operation is to be stated in the Operating Manual.

Chapter 2 Wind Loads

SECTION 1 Wind Velocity

1 General

1.1

Sustained and gust velocities, as relevant, are to be considered when determining wind loadings. These may be specified by the owner/designer but the wind velocities measured at a reference height of 10 m above sea level are not to be taken less than those given in 3-2-1/1.2.

1.2

The design wind velocity for units intended for unrestricted offshore service is not to be less than 36 m/sec (70 knots) for all normal operating conditions and not less than 51.5 m/sec (100 knots) for the severe storm condition.

For units intended for restricted service lesser wind velocities as specified by the owner/designer may be considered, but they are not to be less than 25.8 m/sec (50 knots).

SECTION 2 Wind Pressures and Forces

1 General

Pressures and resultant forces are to be calculated as per 3-2-2/2.1 and 3.1. Where wind tunnel data obtained from tests on a representative model of the unit by a recognized laboratory are submitted, these data will be considered for the determination of pressures and resulting forces.

2 Wind Pressure

2.1

The wind pressure, P, is to be obtained from the following formula:

$$P = 6.11\, C_h\, C_s\, V^2 \times 10^{-4} \qquad \left(kN/m^2\right)$$

Where:

C_s = the shape coefficient, see Table 3.1(a)

C_h = the height coefficient, see Table 3.1(b)

V = the wind velocity (m/sec)

Table 3.1 (a): Values of C_s

Shape	C_s
Spherical	0.4
Cylindrical	0.5
Hull (surface type)	1.0
Deck house	1.0
Large flat surface	1.0
Drilling derrick (each face)	1.25
Exposed under-deck beams and girders	1.30
Isolated structural shapes	1.50

Note:
Shapes or combinations of shapes which do not readily fall into the specified categories will be subject to special consideration by ACS.

Table 3.1 (b): Values of C_h

Height* (m)		C_h
Over	**Not Exceeding**	
0	15.3	1.0
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

* The height of the centre of the wind exposed area from sea level

3 Wind Force

3.1

The wind Force, F, is to be obtained from the following formula:

$$F = PA \qquad (kN)$$

Where:
P = the wind pressure
A = the projected area of all exposed surfaces in either the upright or the heeled condition

3.2

In calculating the wind forces, the following procedures are recommended:

(a) In the case of units with columns, the projected areas of all columns are to be included; i.e. no shielding allowance is to be taken.

(b) Areas exposed due to heel, such as underdecks, etc., are to be included using the appropriate shape coefficients.

(c) The block projected area of a clustering of deckhouses may be used in lieu of calculating each individual area. In this case, the shape coefficient may be taken as $C_s = 1.10$.

(d) Isolated houses, structural shapes, cranes, etc., are to be calculated individually, using the appropriate shape coefficient.

(e) Open truss work commonly used for derrick towers, booms and certain types of masts may be approximated by taking 30% of the projected block area of each side, e.g. 60% of the projected block area of one side for double-sided truss work. An appropriate shape coefficient is to be taken from the Table 3.1 (a).

Chapter 3 Wave Loads

SECTION 1 Wave Criteria

1 General

1.1

Design wave criteria specified by the owner/designer may be described either by means of design wave energy spectra or by deterministic design waves having appropriate shape, size and period. Consideration is to be given to waves of less than maximum height where, due to their period, the effects on various structural elements may be greater.

SECTION 2 Determination of Wave Loads

1 General

1.1

The determination of wave loads for use in structural design is to be based on acceptable calculations, model tests or full scale measurements. For structures comprised of slender members which do not significantly alter the incident wave field, semi-empirical formulations such as Morison's equation (see 3-3-2/2.1) may be used. For calculations of wave loads on structural configurations which significantly alter the incident wave field, diffraction methods are to be used which account for both the incident wave force (i.e. Froude-Krylov force) and the forces resulting from wave diffraction and radiation.

1.2

The wave forces utilized in the design analysis are to include the effects of immersion, heeling and accelerations due to motion.

1.3

In general, Morison's equation may be used for structures comprised of slender members having diameters (or equivalent diameters giving the same cross- sectional areas parallel to the flow) less than 20% of the wave lengths being considered and are small in relation to the distances between structural members subject to wave loading (e.g. self- elevating units in the elevated condition and most column-stabilized units).

1.4

For each combination of wave height, wave period and water depth being considered, a range of wave crest positions relative to the structure is to be investigated to ensure an accurate determination of the maximum wave force on the structure.

2 Hydrodynamic Forces

2.1 Morison's Equation

The hydrodynamic force acting normal to the axis of a cylindrical member, as given by Morison's equation, is expressed as the sum of the force vectors indicated in the following equation:

$$F_W = F_D + F_I$$

where:

$F_W \equiv$ Hydrodynamic force vector per unit length along the member, acting normal to the axis of the member.

$F_D \equiv$ Drag force vector per unit length, see 3-3-2/2.2

$F_I \equiv$ Inertia force vector per unit length, see 3-3-2/2.3

2.2 Drag Force

The drag force vector per unit length, F_D, for a stationary, rigid member is given by:

$$F_D = \frac{1}{2}\rho C_D\, D\, u_n\, |u_n| \qquad (kN/m)$$

where:

$\rho = 1.025\ tonnes/m^3$, Sea Water Density

$C_D \equiv$ Drag Coefficient (dimensionless), see 3-3-2/2.6

$D \equiv$ Projected Width of the member in the direction of the cross-flow component of velocity (in the case of a circular cylinder, D denotes the diameter), (m)

$u_n \equiv$ Component of the Velocity Vector, normal to the axis of the member, see 3-3-2/2.6, (m/s)

$|u_n| \equiv$ Absolute Value of u_n, (m/s)

2.3 Inertia Force

The inertia force vector per unit length, F_I, for a stationary, rigid member is given by:

$$F_I = \rho C_I \left(\pi \frac{D^2}{4}\right) a_n \qquad (kN/m)$$

where:

$C_I \equiv$ Inertia Coefficient based on the displaced mass of fluid per unit length (dimensionless), see 3-3-2/2.6

$a_n \equiv$ Component of the Fluid Acceleration Vector normal to the axis of the member, see 3-3-2/2.6, (m/s^2)

2.4

For structures which exhibit substantial rigid body oscillations due to wave action, the modified form of Morison's equation given below may be used to determine the hydrodynamic force per unit length:

$$F_W = F_D + F_I = \frac{1}{2}\rho\, C_D\, D\left(u_n - q_n\right)\left|u_n - q_n\right| + \rho\left(\pi \frac{D^2}{4}\right)\left\{a_n + C_M\left(a_n - \dot{q}_n\right)\right\}$$

where:

$q_n \equiv$ Component of the Velocity Vector of the Structural Member normal to its axis, (m/s)

$\dot{q}_n \equiv$ Component of the Acceleration Vector of the Structural Member normal to its axis, (m/s^2)

$C_M \equiv$ Added Mass Coefficient, i.e. $C_M = C_I - 1$

2.5

For structural shapes other than circular cylinders, the term ($\pi D^2/4$) in 3-3-2/2.3 and 2.4 is to be replaced by the actual cross-sectional area of the shape.

2.6

Values of u_n and a_n in Morison's equation are to be determined using wave theories appropriate to the wave heights, wave periods and water depths being considered.

Drag and inertia coefficients vary considerably with section shape, Reynold's number, Keulegan-Carpenter number and surface roughness. They are to be based on reliable data obtained from literature, model or full scale tests.

For circular cylindrical members at Reynold's numbers greater than 1×10^6, C_D and C_I may be taken as 0.62 and 1.8 respectively provided that marine fouling is prevented or periodically removed.

Chapter 4 Current Loads

SECTION 1 Currents associated with Waves

1 General

1.1

When determining loads due to the simultaneous occurrence of waves and current using Morison's equation, the current velocity is to be added vectorially to the wave particle velocity before the total force is computed. When diffraction methods are used for calculating wave force the drag force due to current should be calculated in accordance with 3-4-1/2.1 and added vectorially to the calculated wave force.

1.2

The current velocity is to include components due to tidal current, storm surge current and wind driven current. In lieu of defensible alternative methods, the vertical distribution of current velocity in still water and its modification in the presence of waves as shown in Fig. 3.1 are recommended, where:

$$V_c = V_t + V_s + V_w\left[(h-z)/h\right] \qquad for\ z \le h$$
$$V_c = V_t + V_s \qquad for\ z > h$$

where:

$V_c \equiv$ Current Velocity, (m/s)

$V_t \equiv$ Component of Tidal Current Velocity in the direction of the wind, (m/s)

$V_s \equiv$ Component of Storm Surge Current, (m/s)

$V_w \equiv$ Wind Driven Current Velocity, (m/s)

$h \equiv$ Reference Depth for Wind Driven Current, (m);
(in the absence of other data h may be taken as 5 m)

$z \equiv$ Distance below Still Water Level (SWL) under consideration, (m)

$d \equiv$ Still Water Depth, (m)

In the presence of waves, the current velocity profile is to be modified, as shown in Fig. 3.1, such that the current velocity at the instantaneous free surface is a constant.

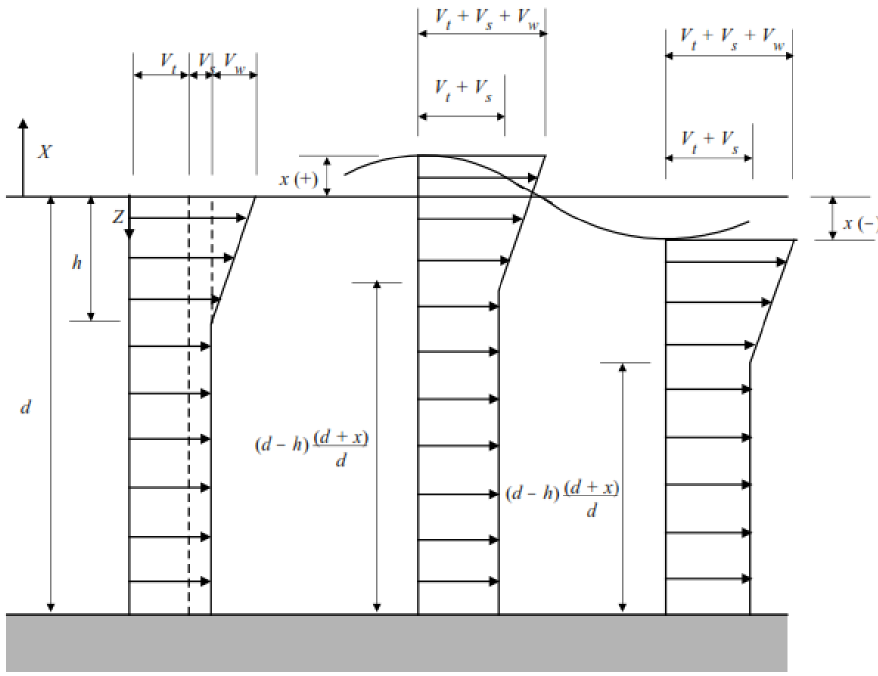


Figure 3.1: Current Velocity Profile

2 Drag Force

2.1

When calculating the drag force on submerged parts of the structure due to current alone, the following equation may be used:

$$f_D = \frac{1}{2}\rho C_D\, D\, u_c\, |u_c| \qquad (kN/m)$$

where:

$f_D \equiv$ Current Drag Force vector per unit length along the member, acting normal to the axis of the member, (kN/m)

$u_c \equiv$ Component of the Current Velocity Vector, V_c, normal to the axis of the member

$\rho, C_D, D \equiv$ as defined in 3-3-2/2.2.

Drag coefficients in steady flow vary considerably with section shape, Reynold's number and surface roughness and are to be based on reliable data obtained from literature, model or full scale tests.

2.2

Consideration is to be given to the possibility of wave induced vibration.

Chapter 5 Vortex Shedding

SECTION 1 Loading due to Vortex Shedding

1 General

1.1

Consideration is to be given to the possible dynamic effects induced in structural members due to vortex shedding.

Chapter 6 Deck Loads

SECTION 1 General

1 General

1.1

A loading plan is to be prepared for each design. This plan is to show the maximum design uniformly distributed and concentrated loading for all areas for each mode of operation.

In the preparation of this plan, the following loadings are to be considered as minimums:

Space	Min. Design Loading
Crew Spaces (walkways, general traffic areas, etc.)	4510 (N/m^2)
Work Areas	9020 (N/m^2)
Storage Areas	13000 (N/m^2)
Helicopter Platform	2010 (N/m^2)

Chapter 7 Other Loadings

SECTION 1 General

1 General

1.1

Other relevant loadings are to be determined in a manner to the satisfaction of ACS. (For example, operational loads due to drilling derrick and riser tensioners, seismic loads, ice loads etc.).

PART

4

Subdivision and Stability

Chapter 1 Stability

SECTION 1 General

1 Stability Afloat

1.1

All units are to have positive stability in calm water equilibrium position, for the full range of draughts when in all modes of operation afloat, and for temporary positions when raising or lowering. In addition, all units are to meet the stability requirements set forth in this section, for all applicable conditions.

For the purpose of calculations it is to be assumed that the unit is floating free of mooring restraints. However, the possible detrimental effects of mooring restraints are to be considered.

2 Units Resting on the Sea Bed

2.1

Units designed to rest on the sea bed are to have sufficient positive downward gravity loadings on the support footings or mat to withstand the overturning moment of the combined environmental forces from any direction, with a reserve against the loss of positive bearing of any footing or segment of the area thereof, for each design loading condition. Variable loads are to be considered in a realistic manner, to the satisfaction of ACS.

3 Inclining Test

3.1

An inclining test is to be conducted 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 center of gravity). An inclining test procedure is to be submitted for review prior to the test, which is to be witnessed by a Surveyor of ACS.

3.2

For successive units which are identical by design, the light ship data of the first unit of the series may be accepted by ACS in lieu of an inclining test, provided the difference in light ship displacement or position of center of gravity due to weight changes for minor differences in machinery, outfitting or equipment, confirmed by the results of a lightweight survey, is less than 1% of the values of the light ship displacement or principal horizontal dimensions respectively as determined for the first of the series.

Extra care to be given to the detailed weight calculation and comparison with the original unit of a series of column-stabilized, semi- submersible types as these, even though identical by design, are recognized as being unlikely to attain an acceptable similarity of weight or center of gravity to warrant a waiver of the inclining test.

3.3

The results of the inclining test, or lightweight survey and inclining experiment adjusted for weight difference, are to be reviewed by ACS prior to inclusion in the Operating Manual.

3.4

A record of all changes to machinery, structure, outfitting and equipment that affect the light ship data is to be maintained in the operating manual or in a light ship data alteration log and is to be taken into account in the daily operations.

3.5 Column-Stabilized Units:

(i) A lightweight survey or inclining test is to be conducted at the first renewal survey. If a lightweight survey is conducted and it indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement, an inclining test is to be conducted, or the difference in weight is to be placed in an indisputably conservative vertical center of gravity and approved by ACS.

(ii) 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 in 4-1-1/3.4, light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the actual displacement based upon draught readings exceed 1% of the operating displacement, a lightweight survey is to be completed in accordance with paragraph (i) above.

3.6

The inclining test or lightweight survey is to be carried out in the presence of ACS Surveyor.

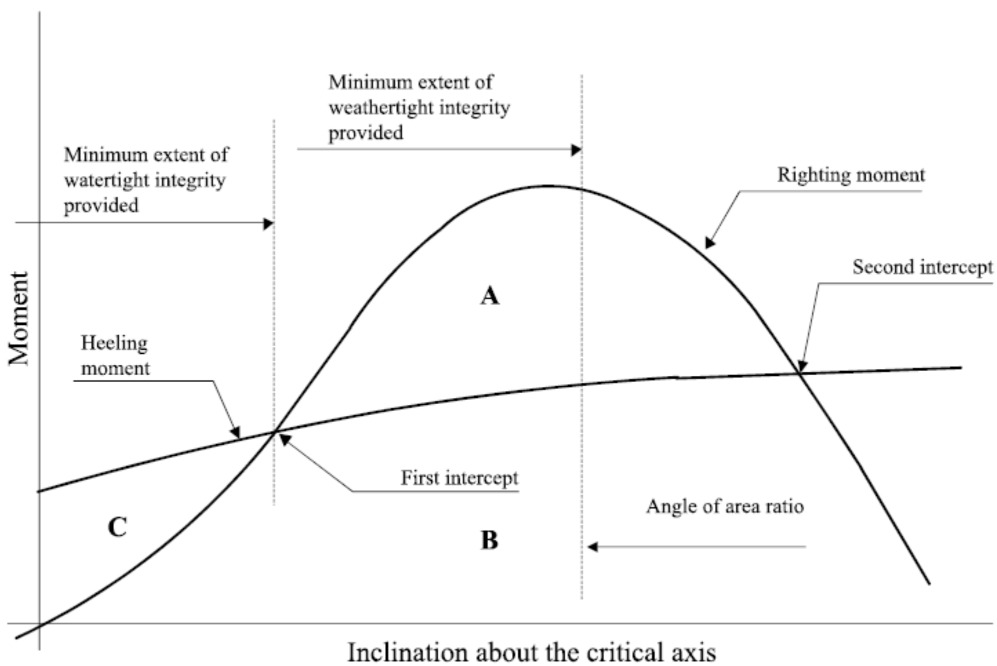
4 Righting Moment and Heeling Moment Curves

4.1

Curves of righting moments and of wind heeling moments similar to Fig. 4.1 with supporting calculations are to 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 are to be related to the most critical axes. Account is to be taken of the free surface of liquids in tanks.

4.2

Where equipment is of such a nature that it can be lowered and stowed, additional wind heeling moment curves may be necessary and such data are to clearly indicate the position of such equipment. Provisions regarding the lowering and effective stowage of such equipment are to be included in the Operating Manual.



Area[A+B] ≥ K Area[B+C]
K = 1.3 for column-stabilized units
K = 1.4 for all other units

Figure 4.1: Righting Moment and Heeling Moment Curves

4.3

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

$$F = 0.5\, C_h\, C_s\, \rho\, V^2\, A$$

where:

F = the wind force (N)

C_s = the shape coefficient, depending on the shape of the structural member exposed to the wind, see Table 3.1(a).

C_h = the height coefficient, depending on the height above sea level of the structural member exposed to wind, see Table 3.1(b).

V = the wind velocity (m/sec)

$\rho = 1.222\ kg/m^3$, air density

A = projected area (m^2) of all exposed surfaces in either the upright or the heeled condition

4.4

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

(a) In general a minimum wind velocity of 36 (m/s) or 70 (knots) for offshore services are to be used for normal operating conditions and a minimum wind velocity of 51.5 (m/s) or 100 (knots) is to 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 is to be given to a reduced wind velocity of not less than 25.8 (m/s) or 50 (knots) for normal operating conditions.

4.5

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., are to 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.

4.6

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

4.7

The wind heeling moment curve is to 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.

4.8

Wind heeling moments derived from wind tunnel tests on a representative model of the unit may be considered as alternative to the method given in 4-1-1/4.3 to 4.7. Such heeling moment determination is to include lift and drag effects at various applicable heel angles.

SECTION 2 Intact Stability Criteria

1 General

1.1

The stability of a unit in each mode of operation is to meet the following criteria (Also see Fig. 4.1):

(i) For self-elevating and surface type units, the area under the righting moment curve to the second intercept or downflooding angle, whichever is less, is not to be less than 40% in excess of the area under the wind heeling moment curve to the same limiting angle, i.e. :
Area (A+B) $\geq$ 1.4 x Area (B+C)

(ii) For column-stabilized units, the area under the righting moment curve to the angle of downflooding is not to be less than 30% in excess of the area under the wind heeling moment curve to the same limiting angle, i.e. :
Area (A+B) $\geq$ 1.3 x Area (B+C)

(iii) In all cases, the righting moment curve is to be positive over the entire range of angles from upright to the second intercept.

1.2

Each unit is to 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, are to 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, ACS 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.

The geographic locations, weather conditions and loading conditions in which this is permitted is to be identified in the Operating Manual.

1.3

Alternative stability criteria may be considered by ACS, provided an equivalent level of safety is maintained and if it is demonstrated to afford adequate positive initial stability. In determining the acceptability of such criteria, at least the following is to be taken into account, as appropriate:

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

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

(iii) potential for flooding taking into account dynamic responses in a seaway;

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

(v) an adequate safety margin to account for uncertainties.

SECTION 3 Damage Stability

1 General

1.1

The unit is to 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 single compartment or any combination of compartments in any operating or transit condition consistent with the damage assumptions set out in Section 4 below;

(b) For a self-elevating unit, the flooding of any single compartment while meeting the following criterion (See Fig. 4.2):

$$RoS \geq 7° + (1.5\ \theta_s)$$

RoS is not to be less than 10 degrees.

where:

RoS = minimum Range of Stability, (degrees)

$= \theta_m - \theta_s$

θ_m = maximum angle of positive stability, (degrees)

θ_s = static angle of inclination after damage, (degrees)

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

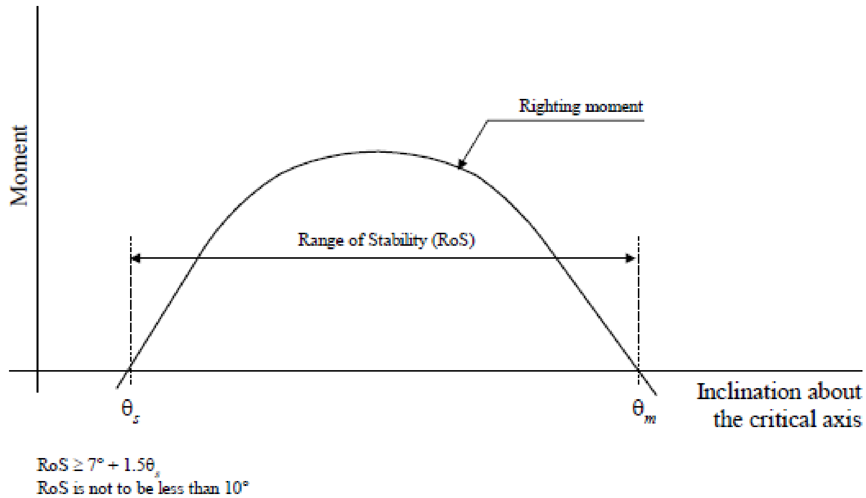


Figure 4.2: Residual Damage Stability Requirements for Self-Elevating Units

1.2

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) or 50 (knots) superimposed from any direction. The final waterline after flooding in this condition is to be below the lower edge of any downflooding opening.

1.3 Column-Stabilized Units

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) or 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 4-1-4/3.1 (ii) is not to be greater than 17°;

(b) any opening below the final waterline is to be made watertight and openings within 4 (m) above the final waterline is to be made weathertight;

(c) the righting moment curve, after the damage set out above, to have, from the first intercept to the lesser of the extent of weathertight integrity under 4-1-3/1.3 (b) and the second intercept or downflooding angle, a range of at least 7°. Within this range, the righting moment curve is to reach a value of at least twice the wind heeling moment curve, both being measured at the same angle. (See Fig. 4.3).

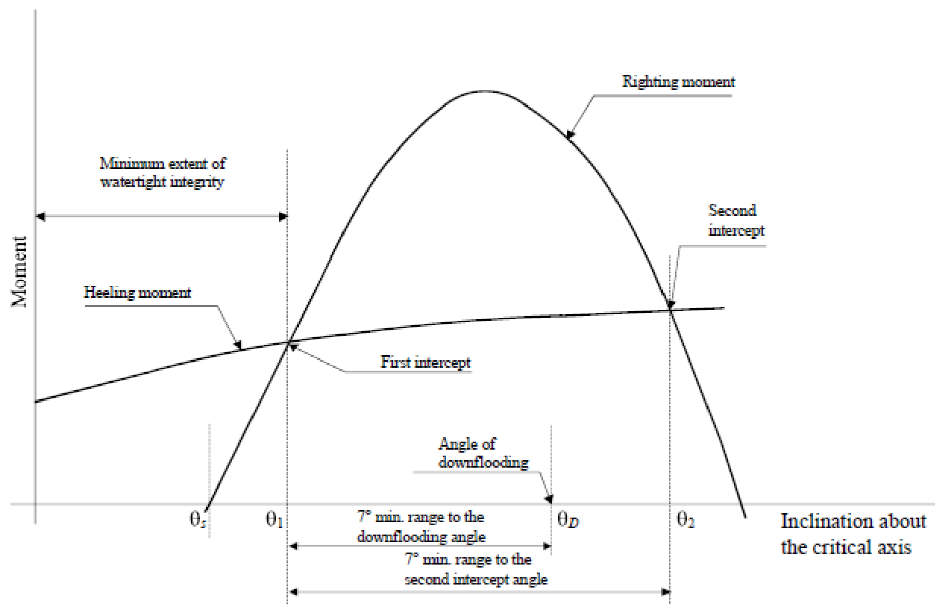


Figure 4.3: Residual Damage Stability Requirements for Column-Stabilized Units

1.4

The unit is to provide sufficient buoyancy and stability in any operating or transit condition with the assumption of no wind 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 is not to be greater than 25°;

(2) any opening below the final waterline is to be made watertight;

(3) a range of positive stability of at least 7° is to be provided, beyond the calculated angle of inclination in these conditions.

1.5 All Types of Units

Compliance with the provisions of 4-1-3/1.1 to 1.4 are to 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 is assumed that the unit is in the worst anticipated service condition as regards stability and is floating free of mooring restraints.

1.6

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

1.7

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

(i) extent of damage as set out in section 4 below;

(ii) on column-stabilized units, the flooding of any one compartment as set out in 1.4 above;

(iii) the provision of an adequate margin against capsizing.

SECTION 4 Extent of Damage

1 Surface Type Units

1.1

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

(i) horizontal penetration: 1.5 m; and

(ii) vertical extent: from the base line upwards without limit.

1.2

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

1.3

Where damage of a lesser extent than in 4-1-4/1.1 results in a more severe condition, such lesser extent is to be assumed.

1.4

All piping, ventilation systems, trunks, etc., within the extent of damage referred to in 4-1-4/1.1 is to be assumed to be damaged. Positive means of closure are to be provided at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

2 Self-Elevating Units

2.1

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

(i) horizontal penetration: 1.5 m; and

(ii) vertical extent: from the base line upwards without limit.

2.2

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

2.3

Where damage of a lesser extent than in 4-1-4/1.1 results in a more severe condition, such lesser extent is to be assumed.

2.4

Where a mat is fitted, the above extent of damage is to be applied to both the platform and the mat simultaneously, only when the highest draught allows any part of the mat to fall within 1.5 (m) vertically of the waterline and the difference in horizontal dimension of the upper hull and the mat is less than 1.5 (m) in any area under consideration.

2.5

All piping, ventilation systems, trunks, etc., within the extent of damage referred to in 4-1-4/1.1 is to be assumed to be damaged. Positive means of closure are to be provided at watertight boundaries to preclude the progressive flooding of other spaces which are intended to be intact.

3 Column-Stabilized Units

3.1

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

(i) Only those columns, underwater hulls and braces on the periphery of the unit is to be assumed to be damaged and the damage is to be assumed in the exposed portions of the columns, underwater hulls and braces.

(ii) Columns and braces are to 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 is to 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 ACS, taking into account the actual operating conditions. However, the required damage region is to extend at least 1.5 m above and below the draught specified in the Operating Manual.

(iii) No vertical bulkhead is to 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 are to be disregarded.

(iv) Horizontal penetration of damage is to be assumed to be 1.5 m.

(v) Underwater hull or footings are to be assumed to be damaged when operating in a transit condition in the same manner as indicated in 4-1-4/3.1 (i), (ii), (iv) and either 4-1-4/3.1 (iii) or 4-1-4/2.2 having regard to their shape.

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

Chapter 2 Watertight / Weathertight Integrity

SECTION 1 Watertight Boundaries

1 General

1.1

All drilling units are to be provided with watertight bulkheads necessary to meet the damage stability criteria and their scantlings are to be in accordance with the requirements given in Part 5. In the case of column-stabilized drilling units, the scantlings of the watertight flats and bulkheads are to be made effective to that point necessary to meet the requirements of damage stability and are to be indicated on the appropriate plans. In all cases, the plans submitted are to clearly indicate the location and extent of the bulkheads.

1.2

All surface type drilling units are to be fitted with a collision bulkhead as may be required by ACS Rules for Classification of Vessels. Sluice valves, cocks, manholes, watertight doors, etc; are not to be fitted in the collision bulkhead. Elsewhere, watertight bulkheads are to be fitted as necessary to provide transverse strength and subdivision.

SECTION 2 Boundary Penetrations

1 General

1.1

Where watertight boundaries are required for damage stability, they are to be made watertight throughout, including piping, ventilation, shafting, electrical penetrations, etc. Where individual lines, ducts or piping systems serve more than one compartment or are within the extent of damage, satisfactory arrangements are to be provided to preclude the possibility of progressive flooding through the system to other spaces in the event of damage, to ensure compliance with the requirements of damage stability given in 4-1-3.

1.2

Piping systems and ventilation ducts designed to watertight standards of the type mentioned in 4-2-2/1.1 are to be provided with valves in each compartment served. These valves are to be capable of being remotely operated from the weather deck, pump room or other normally manned space. Valve position indicators are to be provided at the remote control stations.

1.3

Non-watertight ventilation ducts as mentioned in 4-2-2/1.1 are to be provided with watertight valves at the subdivision boundaries and the valves are to be capable of being operated from a remote location, with position indicators on the weather deck, or in a normally manned space. For self-elevating drilling units, ventilating systems which are not used during the transit operations may be secured by alternative methods, subject to special consideration by ACS.

SECTION 3 Closures

1 General

1.1

External closing appliances are to be as prescribed by applicable load line requirements. Special consideration will be given to openings in the upper deck of column-stabilized units.

2 General Requirements related to Watertight Integrity

2.1

External openings such as air pipes (regardless of closing appliances), ventilators, ventilation intakes and outlets, non-watertight hatches and weathertight doors, which are used during operation while afloat:

(a) These are not to submerge when the drilling unit is inclined to the first intercept of the righting moment and wind heeling moment curves in any intact or damaged condition. See Fig. 4.1, 4.2 and 4.3.

(b) Openings, such as side scuttles of the non-opening type, manholes and small hatches which are fitted with appliances to ensure watertight integrity, may be submerged, except in case of the column of column-stabilized drilling units.

Such openings are not to be regarded as emergency exits. Where flooding of chain lockers or other buoyant volumes may occur, the openings to these spaces should be considered as downflooding points.

2.2

Internal openings, fitted with appliances to ensure watertight integrity, are to comply with the following:

(i) Doors or hatch covers which are used during the operation of the unit while afloat is to be remotely controlled from the central ballast control station and is to also be operable locally from each side. Open/shut indicators are to be provided at the control station. In addition, remotely operated doors provided to ensure the watertight integrity of internal openings which are used while at sea are to be sliding watertight doors with audible alarm. The power, control and indicators are to be operable in the event of main power failure. Particular attention is to be paid to minimizing the effect of control system failure. Each power-operated sliding watertight door is to be provided with an individual hand operated mechanism. It is to be possible to open and close the door by hand at the door itself from both sides.

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

(iii) The closing appliances are to have strength, packing and means for securing which are sufficient to maintain watertightness under the design water pressure of the watertight boundary under consideration.

2.3

Internal and external openings, kept permanently closed while afloat, are to comply with the following:

(a) A signboard stating that the opening is always to be kept closed while afloat is to be fitted on the closing appliance in question.

(b) Opening and closing of such closure devices are to be noted in the drilling unit's logbook, or equivalent.

(c) Manholes fitted with bolted covers need not be dealt with as under (a).

(d) The closing appliances are to have strength, packing and means for securing which are sufficient to maintain watertightness under the design water pressure of the watertight boundary under consideration.

3 General Requirements related to Weathertight Integrity

3.1

Any opening, such as an air pipe, ventilator, ventilation intake or outlet, non-watertight side scuttle, small hatch, door, etc., having its lower edge submerged below a waterline associated with the zones indicate in (i) or (ii) below, is to be fitted with a weathertight closing appliance to ensure the weathertight integrity, when:

(i) a unit is inclined to the range between the first intercept of the righting moment curve and the wind heeling moment curve and the angle necessary to comply with the requirements of 4-1-3 above during the intact condition of the unit while afloat; and

(ii) a column-stabilized unit is inclined to the range:

- necessary to comply with the requirements of 4-1-3/2.3 (c) and with a zone measured 4.0 (m) perpendicularly above the final damaged waterline per 4-1-3/2.3 (a) referred to Fig.4.4 and
- necessary to comply with the requirements of 4-1-3/1.4 (3).

3.2

External openings fitted with appliances to ensure weathertight integrity, which are kept permanently closed while afloat, are to comply with the requirements of 4-2-3/2.3.

3.3

External openings fitted with appliances to ensue weathertight integrity, which are secured while afloat are to comply with the requirements of 4-2-3/3.2.

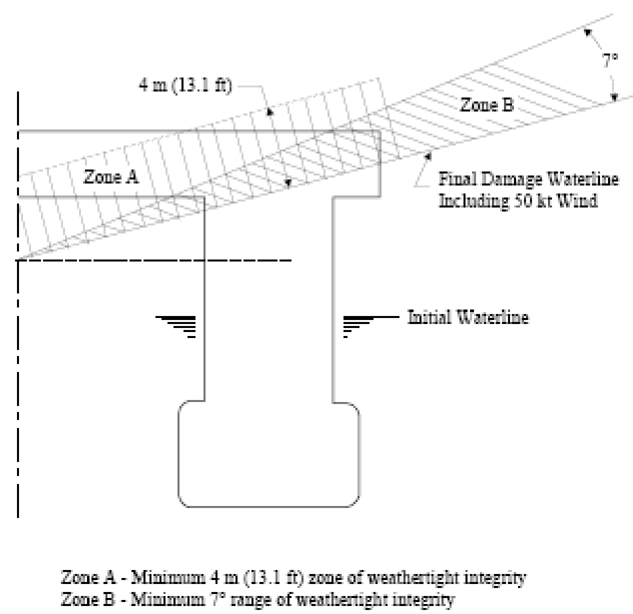


Figure 4.4: Minimum Weathertight Integrity Requirements for Column-Stabilized Units

Chapter 3 Loadline

SECTION 1 General

1 All Drilling Units

1.1

The requirements of the International Convention on Load Lines, 1966(ICLL66), including those relating to certification, apply to all drilling units. The minimum freeboard of units which due to their configuration cannot be computed by the normal methods laid down by the Load Line Convention is to be determined on the basis of meeting applicable intact stability, damage stability and structural requirements for transit and drilling operating conditions while afloat. In no case is the draught to exceed that permitted by the International Convention on Load Lines, where applicable.

1.2

The requirements of ICLL66, in respect of weathertightness and watertightness of decks, superstructures, deckhouses, doors, hatchway covers, other openings, ventilators, air pipes, scuppers, discharges, etc; are to be taken as a basis for all drilling units in afloat condition.

Sill heights of hatch coamings, ventilator coamings, air pipes, doors, etc; in exposed positions and their means of closing are also comply with both the intact stability and damage stability requirements given in 4-1-3.

Load line markings including such seasonal allowances as may be determined, are to be placed at suitable visible locations on the structure, to the satisfaction of ACS. These marks, where practicable, are to be visible to the person in charge of mooring, lowering or otherwise operating the unit.

1.3

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

1.4

A load line, where assigned, is not applicable to bottom-supported units when resting on the sea bed, or when lowering to or raising from such position.

2 Self-Elevating and surface type drilling units

2.1

Where it is necessary to assign a greater than minimum freeboard to meet intact or damage stability requirements or on any other restriction imposed by the Administration, regulation 6(6) of ICLLC66, is to be applied. In such cases, seasonal marks above the centre of the ring should not be marked and any seasonal marks below the centre of ring should be marked. However, when a unit is assigned a greater than minimum freeboard at the request of the owner, regulation 6(6) need not be applied.

2.2 Moonpools, open wells and recesses etc.

(a) Where moonpools are arranged within the hull in open communication with the sea, the volume of the moonpool is not to 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 (depth for freeboard has the same meaning as defined in Regulation 3 of the 1988 LL Protocol than below, an addition is to be made to the geometric freeboard corresponding to the lost buoyancy. This addition for the excess portion above the 85% of the depth for freeboard waterline is to be made as prescribed below for wells or recesses. If an enclosed superstructure contains part of the moonpool, deduction is to 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 is to be added to the freeboard obtained after all other corrections, except bow height correction, have been applied. Free surface effects of the flooded well/recess are to be taken into account in stability calculations.

(b) The procedure described in (a) above is also to apply in cases of small notches or relatively narrow cut-outs at the stern of the unit.

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

2.3 Self-Elevating Units

Load lines are to 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 are to be subjected to all the conditions of assignment of that Protocol unless specifically excepted. However, these units are not to 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.

2.4

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

2.5 Self-Elevating Units with large mat/similar supporting structures

In case of a self-elevating unit utilizing a large mat or similar supporting structures for contribution to buoyancy in afloat conditions, the mat or similar supporting structure is to be ignored while calculating the freeboard. However, as their vertical position relative to the upper hull may be critical, they are to be taken into account in the evaluation of the stability of the unit while afloat.

2.6

In case of a self-elevating unit which may be manned when under tow, any required exemption or relaxation of the applicable bow height requirement, is to be authorized by the Administration.

3 Column-Stabilized units

3.1

The hull form of column stabilized units makes the calculations of geometric freeboard in accordance with the provisions of the Load Line Convention impracticable. Therefore, the minimum freeboard of each column stabilized unit is to be determined by meeting the applicable requirements for:

(i) the strength of unit's structure;
(ii) the minimum clearance between passing wave crests and deck structure and;
(iii) intact and damage stability requirements.

3.2

Windows, side scuttles and portlights, including those of non-opening type or other similar openings are not to be located below the deck structure of column-stabilized units. The position of openings which cannot be closed in emergencies, such as air intakes for emergency generators will be specially considered having regards to the intact righting arm curves and the final waterline after assumed damage.

3.3

The minimum freeboard is to be marked in appropriate locations on the structure.

3.4

The enclosed deck structure of each column-stabilized unit is to be made weathertight.

PART

5

Structures

Chapter 1 General

SECTION 1 Materials

1 Scope of Application

1.1

The scantling requirements specified in this Part are intended for drilling units constructed of steel which has been manufactured and tested according to the requirements given in Part 2.

Where it is intended to use other approved materials, the scantlings will be specially considered.

SECTION 2 General Requirements for Scantlings

1 General

1.1

In general, the scantlings of major structural elements of all units are to comply with the applicable requirements of ACS Rules for Classification of Vessels, except as noted below and in Parts 6, 7 and 8 relating to the special requirements for individual types of drilling units.

The scantling requirements of some structural elements which are common feature of all drilling units are given in Chapter 2 of this Part.

1.2

The primary structures of all units are to be analyzed as detailed in Chapter 3 of this Part.

Where a unit is not fitted with an acceptable corrosion protection system, the scantlings determined on the basis of the structural analysis are to be increased by corrosion additions appropriate to the environmental conditions and usage of the relevant spaces.

Chapter 2 Common Structures

SECTION 1 Structures Supporting the Drilling Derrick

1 Substructures

1.1

Substructures supporting the drilling derrick, drill floor and associated equipment are to be analysed as required by Chapter 3 of this Part. Stresses are not to exceed those permitted by Chapter 3 of this Part.

(a) Individual Loads:

Individual loads to be considered are the operating loads specified by the owner or designer and should include, but are not limited to the following, as applicable:

- Dead load (steel weight, fixed equipment)
- Floor load (personnel, moveable equipment, material)
- Snow or ice load
- Hook, setback, rotary table and riser tensioner loads

(b) Combined Loads:

Environmental loads due to wind, including severe storm wind load, are to be combined with the individual loads indicated in a) to reflect the applicable operational requirements for the range of anticipated conditions. Loads due to unit motions are to be considered for all afloat conditions.

2 Substructure Supporting Arrangement

2.1

Moveable cantilevers and skid beams supporting substructures are to be analysed as required by Chapter 3 of this Part. Stresses are not to exceed those permitted by Chapter 3 of this Part. Loads imposed on the hull structure are to include maximum reactions from the cantilever or skid beam.

3 Moveable cantilever and skid beam testing

3.1

Prior to placing the unit in service, a functional test of the longitudinal skidding arrangements of the moveable cantilever and skid beam as well as any transverse skidding arrangements such as the sub-base (drill floor) is to be carried out by skidding the completed drilling structures with derrick assembly to the maximum limits of travel.

SECTION 2 Helicopter Deck

1 General

1.1

Plans showing the arrangement, scantlings and details of the helicopter deck are to be submitted for approval. The arrangement plan is to show the overall size of the helicopter deck and the designated landing area. If the arrangement provides for the securing of a helicopter or helicopters to the deck, the predetermined position(s) selected to accommodate the secured helicopter, in addition to the location of deck fittings for securing the helicopter, are to be shown. The helicopter for which the deck is designed is to be specified, and calculations for the relevant loading conditions are to be submitted. The particulars of helicopter used for design purposes are to be included in the Operating Manual.

2 Structural Design

2.1

Scantlings of helicopter decks and supporting structure are to be determined on the basis of the following design loading conditions in association with the allowable stresses shown in Table 5.1.

2.2 Overall distributed loading

A minimum distributed loading of 2010 N/m^2 is to be taken over the entire helicopter deck.

2.3 Stowed Helicopter loading

If provisions are made to accommodate helicopters secured to the deck in a predetermined position, the structure is to be designed for a local loading equal to the manufacturer's recommended wheel loadings at maximum take-off weight, multiplied by a dynamic amplification factor based on the predicted motions of the unit for this condition. In addition, a uniformly distributed loading of 0.5 (kN/m^2), representing wet snow or ice, is to be considered, if applicable. For the design of girders, stanchions, truss supports, etc., the structural weight of the helicopter deck is also to be considered.

Table 5.1: Allowable Stresses for Helicopter Deck

(σ_y = specified minimum yield strength of the material)

Loading Conditions	Allowable Stress		
	Plating (See Note 1)	Beams	Girders, Stanchions, Truss Supports, etc. (See Note 2)
Overall Distributed Loading	0.6 σ_y	0.6 σ_y	0.6 σ_y
Helicopter Landing Impact Loading	See Note. 3	σ_y	0.9 σ_y
Stowed Helicopter Loading	σ_y	0.9 σ_y	0.8 σ_y

Notes:

1- The Minimum Plate Thickness , t , is generally not to be less than obtained from the following:

Beam Spacing	t
460 mm	4.0 mm
610 mm	5.0 mm
760 mm	6.0 mm

2- For members subjected to axial compression, the yield strength or critical buckling stress, whichever is less, is to be considered.

3- At the discretion of ACS. ACS may allow proper increase of allowable stress for landing impact loading, provided the rationale of the analysis is sufficiently conservative.

4- Helicopters fitted with landing gear other than wheels shall be specially considered by ACS.

5- Wind loadings and possible wave impact loadings on helicopter decks are to be considered in a realistic manner, to the satisfaction of ACS.

SECTION 3 Bulwarks and Guard Rails

1 General

1.1

Except for helicopter landing decks and areas not normally occupied, the unprotected perimeter of all floor or deck areas and openings is to be protected with efficient guard rails or bulwarks of height not less than 1 (m) above the deck. Where this height would interfere with the normal operation of the unit, a lesser height may be considered. The clear opening below the lowest course of the guard rails is not to exceed 230 (mm). The other courses are not to be more than 380 (mm) apart. In the case of units with rounded gunwales the guard rail supports are to be placed on the flat of the deck.

SECTION 4 Means of Access

1 General

1.1

Each space within the unit should be provided with at least one permanent means of access to enable, throughout the life of a unit, overall and close-up inspections and thickness measurements of the unit's structures to be carried out by ACS, the unit's personnel and others as necessary. Such means of access should comply with the technical provisions for means of access for inspections, adopted by the Maritime Safety Committee by Resolution MSC.133(76).

1.2

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

2 Safe Access to Holds, Tanks, Ballast Tanks and other Spaces

2.1

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

2.2

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

2.3

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

3 Access Manual

3.1

A unit's means of access to carry out overall and close-up inspections and thickness measurements are to be described in an access manual which may be incorporated in the unit's Operating Manual. The manual is to be updated as necessary and an updated copy maintained onboard. The structure access manual is to include the following for each space:

a) Plans showing the means of access to the space, with appropriate technical specifications and dimensions;

b) Plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans should indicate from where each area in the space can be inspected;

c) Plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans are to be indicated with the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected;

d) Instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space;

e) Instructions for safety guidance when rafting is used for close-up inspections and thickness measurements;

f) Instructions for the rigging and use of any portable means of access in a safe manner;

g) An inventory of all portable means of access; and

h) Records of periodical inspections and maintenance of the unit's means of access.

3.2

"Critical Structural Areas" are locations which have been identified from calculations to require monitoring or from the service history of similar or sister units to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the unit.

4 General Technical Specifications

4.1

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

4.2

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

SECTION 5 Anti-Fouling Systems

1 General

1.1

If anti-fouling systems are installed, they are to conform to the requirements of the International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001.

SECTION 6 Protective Coatings of Dedicated Seawater Ballast Tanks

1 General

1.1

All dedicated seawater ballast tanks are to be coated during construction. For the purpose of this section pre-load tanks on self-elevating units are to be considered dedicated seawater ballast tanks. Mat tanks and spud cans on such units are not to be considered dedicated seawater ballast tanks.

1.2

Maintenance of the protective coating system is to be included in the overall unit's maintenance scheme. The effectiveness of the protective coating system is to be verified during the life of a unit through periodical surveys.

Chapter 3 Structural Analysis

SECTION 1 General

1 General

1.1

The primary structure of the drilling unit is to be analysed using the design loads given in Part 3 and loading conditions stipulated below for determination of the resultant stresses. Sufficient conditions, representative of all modes of operation, are to be considered, to enable critical design cases to be determined. Calculations for relevant conditions are to be submitted for review. The analysis is to be performed using an appropriate calculation method and is to be fully documented and referenced.

For each loading condition considered, the following stresses are to be determined and these are not to exceed the appropriate allowable stresses given in 5-2-2 or 5-2-3:

(i) Stresses due to static loadings only, in calm water conditions, where the static loads include service load such as operational gravity loadings and weight of the unit, with the unit afloat or resting on the sea bed, as applicable.

(ii) Stresses due to combined loadings, where the applicable static loads in 5-1-1/1.1 (i) are combined with relevant design environmental loadings, including acceleration and heeling forces.

2 Consideration of Local Stresses

2.1

Local stresses, including those due to circumferential loading on tubular members, are to be added to the primary stresses to determine total stress levels.

3 Combination of Stress Components

3.1

The scantlings are to be determined on the basis of a recognized method which combines, in a rational manner, the individual stress components acting on the various structural elements of the unit.

4 Consideration of buckling

4.1

The critical buckling stress of structural elements is to be considered, where appropriate, in relation to the computed stresses.

5 Determination of Bending Stresses

5.1 Effective Flange Area

When computing bending stresses, the effective flange areas are to be determined in accordance with the requirements of Part 3 of ACS Rules for Classification of Vessels.

5.2 Eccentric Axial Loading

Where appropriate, elastic deflections are to be taken into account when determining the effects of eccentricity of axial loading and the resulting bending moments superimposed on the bending moments computed for other types of loadings.

6 Determination of Shear Stress

6.1

When computing shear stresses in structural members, only the effective shear area of the web is to be considered. In this regard, the total depth of the girder may be considered as the web depth.

7 Equivalent Stress Criteria for Plated Structures

7.1

For plated structures, members may be designed according to the von Mises equivalent stress criterion, where the equivalent stress σ_{eq} is defined as follows:

$$\sigma_{eq} = \sqrt{\sigma_{xx}^{2} + \sigma_{yy}^{2} - \sigma_{xx}\sigma_{yy} + 3\tau_{xy}^{2}}$$

where:

σ_{xx} = stress in the x direction

σ_{yy} = stress in the y direction

τ_{xy} = shear stress in the x-y plane

8 Stress Concentration

8.1

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

9 Analysis and Details of Structural Connections

9.1

Unless connections of structural members are specifically detailed as hinged joints, proper consideration is to be given in the structural analysis to the degree of restraint at such connections. Structural connections are to be detailed in such a manner as to ensure full transmission of stresses between members joined, and to minimize stress concentrations. The following details are to be considered, as may be appropriate:

(a) Shear web plates, continuous through the joint to transmit tension and compression loads between members by means of shear in the web plate.

(b) Flaring or transitioning of the joint, to lower stress levels or to minimize concentrations of stress or both.

(c) Thicker joint material, high strength steel, or both, consistent with good weldability, to reduce the effect of high stress levels.

(d) Brackets or other supplemental transition members, with scallops and proper end attachment details to minimize high stress concentrations.

9.2

Critical connections that depend upon the transmission of tensile stresses through the thickness of the plating of one of the members may result in lamellar tearing and are to be avoided wherever possible. Where unavoidable, plate material with suitable through thickness (Z direction) properties may be required with appropriate inspection procedures.

10 Fatigue Analysis

10.1

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

The type and extent of the fatigue analysis will be dependent on the intended mode and area of operations to be considered in the unit's design. An appropriate loading spectrum in accordance with accepted theories is to be used in the fatigue analysis.

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

11 Plastic Analysis

11.1

Plastic analysis methods will be subject to special consideration.

SECTION 2 Allowable Stresses

1 General

1.1

The scantlings of effective structural elements of the primary frame of the unit, analysed in accordance with 5-3-1, are to be determined on the basis of the allowable stresses specified herein.

2 Individual Stresses

2.1

Individual stress components and where applicable, direct combinations of such stresses, are not to exceed the allowable stresses specified in Table 5.2.

Table 5.2: Allowable Stresses for Static Loading and Combined Loading

Type of Stress	Static Loading (See 5-3-1/1.1(i))	Combined Loading (See 5-3-1/1.1(ii))
Tensile	$0.6 \times \sigma_y$	$0.8 \times \sigma_y$
Bending	$0.6 \times \sigma_y$ or $0.6 \times \sigma_{cr}$ whichever is smaller	$0.8 \times \sigma_y$ or $0.8 \times \sigma_{cr}$ whichever is smaller
Shearing	$0.4 \times \sigma_y$ or $0.6 \times \tau_{cr}$ whichever is smaller	$0.53 \times \sigma_y$ or $0.8 \times \tau_{cr}$ whichever is smaller
Compressive	$0.6 \times \sigma_y$ or $0.6 \times \sigma_{cr}$ whichever is smaller	$0.8 \times \sigma_y$ or $0.8 \times \sigma_{cr}$ whichever is smaller

where:

σ_y = specified minimum yield strength of the material (N/mm^2)

σ_{cr} , τ_{cr} = critical compressive and shear buckling stress, respectively, (N/mm^2) depending on the dimensions, stiffening, boundary conditions, loading pattern and material of the structural member under consideration

2.2

The equivalent stress in plate elements clear of discontinuities is generally not to exceed 0.7 and 0.9 of the yield strength of the material, for the loading conditions given in 5-3-1/1.1(i) and (ii), respectively.

SECTION 3 Members Subjected to Combined Axial Load and Bending

1 General

1.1

When structural members are subjected to axial compression in combination with compression due to bending, the computed stresses are to comply with the following requirements:

when $\sigma_a/F_a \le 0.15$: $\sigma_a/F_a + \sigma_b/F_b \le 1.0$

when $\sigma_a/F_a > 0.15$: $\sigma_a/F_a + \dfrac{C_m\,\sigma_b}{(1 - \sigma_a/F_e')\,F_b} \le 1.0$

and in addition, at ends of members:

$1.67(\sigma_a/\sigma_y) + \sigma_b/F_b \le 1.0$: for static loadings, as defined in 5-3-1/1.1(i)

$1.25(\sigma_a/\sigma_y) + \sigma_b/F_b \le 1.0$: for combined loadings, as defined in 5-3-1/1.1(ii)

However, the computed bending compressive stress, σ_b, taken alone shall not exceed F_b.

1.2

When structural members are subjected to axial tension in combination with tension due to bending, the computed stresses are to comply with the following requirements:

$\sigma_a + \sigma_b \le 0.6\sigma_y$: for static loadings, as defined in 5-3-1/1.1(i)

$\sigma_a + \sigma_b \le 0.8\sigma_y$: for combined loadings, as defined in 5-3-1/1.1(ii)

where:

σ_a = computed axial compressive or tensile stress

σ_b = computed compressive or tensile stress due to bending

σ_y = specified minimum yield strength of the material

F_a = allowable axial compressive stress, which is to be the least of the following:

(i) Allowable axial stress as per Table 5.2;

(ii) Overall buckling stress multiplied by factor of safety specified in 5-3-4/1.1;

(iii) Local buckling stress multiplied by factor of safety for axial stress specified in 5-3-4/2.1 .

F_b = Allowable axial compressive stress due to bending, as per Table 5.2 (Only local buckling related σ_{cr} to be considered.)

$F'_e \equiv$ Euler buckling stress $= \dfrac{5.15\,E}{(K\,l/r)^2}$, may be increased by 1/3 for combined loadings as defined in 5-3-1/1.1(ii).

E = Modulus of Elasticity

l = unsupported length of column

K = effective length factor which accounts for support conditions at ends of length l .For cases where lateral deflection of end supports may exist, K is not to be considered less than 1.0.

r = radius of gyration

C_m = is a coefficient as follows:

(1) For compression members in frames subject to joint translation (sideways): $C_m = 0.85$

(2) For restrained compression members in frames braced against joint translation and not subject to transverse loading between their supports, in the plane of bending: $C_m = 0.6 - 0.4(M_1/M_2)$, but not less than 0.4, where M_1/M_2 is the ratio of the smaller to larger moments at the ends of that portion of the member unbraced in the plane of bending under consideration. M_1/M_2 is positive when the member is bent in reverse curvature and negative when it is bent in single curvature

(3) For compressive members in frames braced against joint translation in the plane of loading and subject to transverse loading between their supports, the value of C_m may be determined by rational analysis. However, in lieu of such analysis, the following values may be used:

a) For members whose ends are restrained, $C_m = 0.85$;

b) For members whose ends are unrestrained, $C_m = 1.0$

SECTION 4 Column Buckling Stresses

1 Overall Buckling

1.1

For compression members which are subject to overall column buckling, the critical buckling stress is to be obtained from the following equations:

$$\sigma_{cr} = \sigma_y - \left(\sigma_y^2 / 4\pi^2 E\right)\left(Kl/r\right)^2 \qquad \text{when} \quad Kl/r < \sqrt{2\pi^2 E/\sigma_y}$$

$$\sigma_{cr} = \pi^2 E / \left(Kl/r\right)^2 \qquad \text{when} \quad Kl/r \ge \sqrt{2\pi^2 E/\sigma_y}$$

where:

$\sigma_{cr} \equiv$ critical overall buckling stress

E, K, l, r,and σ_y are defined in 5-3-3/1.2

The factor of safety, $F.S.$, for overall column buckling is to be as follows:

(a) For static loadings, as defined in as defined in 5-3-1/1.1(i)

$$F.S. = 1.67\left[1 + 0.15\frac{Kl/r}{\sqrt{2\pi^2 E/\sigma_y}}\right] \qquad \text{when} \quad Kl/r < \sqrt{2\pi^2 E/\sigma_y}$$

$$F.S. = 1.92 \qquad \text{when} \quad Kl/r \ge \sqrt{2\pi^2 E/\sigma_y}$$

(b) For combined loadings, as defined in 5-3-1/1.1(ii)

$$F.S. = 1.25\left[1 + 0.15\frac{Kl/r}{\sqrt{2\pi^2 E/\sigma_y}}\right] \qquad \text{when} \quad Kl/r < \sqrt{2\pi^2 E/\sigma_y}$$

$$F.S. = 1.44 \qquad \text{when} \quad Kl/r \ge \sqrt{2\pi^2 E/\sigma_y}$$

2 Local Buckling

2.1

Members which are subjected to axial compression or compression due to bending are to be investigated for local buckling, as appropriate, in addition to overall buckling, as specified in 5-3-4/1.1.

2.2

In the case of unstiffened or ring-stiffened cylindrical shells, local buckling is to be investigated if the proportions of the shell conform to the following relationship:

$$\frac{D}{t} > \frac{E}{9\sigma_y}$$

where:

D = mean diameter of cylindrical shell
t = thickness of cylindrical shell (expressed in the same units as D)
E and σ_y are defined in 5-3-3/1.2

Chapter 4 Towing Arrangements

SECTION 1 General

1 General

1.1

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

1.2

Arrangements, equipment and fittings provided in accordance with 5.4.1/1.1 are to meet the requirements of ACS Rules for Classification of Vessels.

1.3

Each fitting or item of equipment is to be clearly marked with any restrictions associated with its safe operation, taking into account the strength of its attachment to the unit's structure.

PART

6

Self-Elevating Drilling Units

Chapter 1 General

SECTION 1 General

1 Application

1.1

This Part applies to Self-Elevating Drilling Units as defined in 1-1-2.

2 Wave Clearance

2.1

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

3 Sea Bed Conditions

3.1

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

4 Safety against Overturning

4.1

Units which are to rest on the sea bed are to have sufficient positive downward gravity loadings on the support footings or mat to withstand the overturning moment due to the combined environmental loads from any direction with the lateral deflection of the legs taken into consideration.

4.2

The safety against overturning is to be assessed using the most unfavourable direction and combination of environmental, gravity, variable and drilling loads in both normal drilling and severe storm conditions as follows:

(a) Normal Drilling Condition: Units are assumed to have minimum design variable loads and the cantilever in the most unfavourable position with the associated design drilling load.

(b) Severe Storm Condition: Units are assumed to have minimum design variable loads and the cantilever in the design position.

4.3

Units with individual footings are to have righting moments calculated about the most unfavourable axis though the center of one or more footings and are to have a minimum factor of safety of 1.1 for the conditions defined above.

4.4

Units with a mat, are to have righting moments calculated about the most highly stressed edge of the mat and are to have a minimum factor of safety of 1.3 for the conditions defined above.

5 Preload Capability

5.1

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

6 Field Transit Moves

6.1

Field transit moves may only be undertaken when the predicted weather is such that the anticipated motions of the unit will not exceed the design condition. The duration of a field transit move may be for a considerable period of time and should be related to the accuracy of weather forecasting in the area concerned. Such a move should not normally exceed a twelve hour voyage between protected locations, or locations where the unit may be safely elevated; however, during any portion of the move, the unit is not normally to be more than a six hour voyage to a protected location or a location where the unit may be safely elevated. The approved condition is to be included in the Operating Manual.

Chapter 2 Structural Considerations

SECTION 1 General

1 General

1.1

The hull is to be considered as a complete structure having sufficient strength to resist all induced stresses while in the elevated position and supported by all legs. All fixed and variable loads are to be distributed, using an accepted method of rational analysis, from the various points of application to the supporting legs. The scantlings of the hull are then to be determined consistent with this load distribution, in accordance with Part 5.

1.2

The conditions valid for towing/conveyances, for the elevating and lowering procedures and for the operating phases, while standing on the sea floor, shall be clearly indicated in the Operating Manual.

1.3

For the elevated position, special attention is to be paid to the distribution of the loads from the supporting points (legs) into the hull structure, taking account also of possible load redistributions resulting from lack of support at one leg.

1.4

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 are to have scantlings suitable for their size, function and location.

2 Legs

2.1 Leg Types

Legs may be either shell type or truss type. Shell type legs may be designed as either stiffened or unstiffened shells. In addition, individual footing may be fitted or legs may be permanently attached to a bottom mat.

2.2 Legs without Mats

Where footings or mats are not fitted, proper consideration is to be given to the leg penetration of the sea bed and the end fixity of the leg.

2.3 Legs in the Field Transit Condition

The legs are to have sufficient strength for the bending moment 'M' obtained from the following formula:

$$M = M_1 + 1.2 M_2 \quad \text{(N-m)}$$

where:

M_1 = Dynamic bending moment caused by a 6-degree single amplitude of roll or pitch at the natural period of the unit.

M_2 = Static bending moment due to gravity caused by a 6-degree legs' angle of inclination.

Special consideration, based on submitted data, will be given to angles of inclination less than 6 degrees when the separation between the bottom of the hull and the top of the mat or the lower tip of the spud can exceeds 15% of the maximum separation.

The legs are to be investigated for any proposed leg arrangement with respect to vertical position during field transit moves, and the approved positions are to be specified in the Operating Manual. Such investigation is to include strength and stability aspects.

2.4 Legs in the Ocean Transit Condition

Legs are to be designed for acceleration and gravity moments resulting from the motions in the most severe anticipated environmental transit conditions, together with corresponding wind moments.
The legs are to have sufficient strength for the bending moment 'M' obtained from the following formula:

$$M = M_3 + 1.2 M_4 \quad \text{(N-m)}$$

where:

M_3 = Dynamic bending moment caused by a 15-degree single amplitude of roll or pitch at a 10-second period

M_4 = Static bending moment due to gravity caused by a 15-degree legs' angle of inclination

For ocean transit conditions, it may be necessary to reinforce or support the legs, or to remove sections of them. The approved condition is to be included in the Operating Manual.

2.5 Condition: while lowering to bottom

Legs are to be designed to withstand the dynamic loads which may be encountered by their unsupported length just prior to touching bottom, and also to withstand the shock of touching bottom while the unit is afloat and subject to wave and wind motions.
The maximum design motions, bottom conditions and sea state while lowering legs are to be clearly indicated in the Operating Manual, and the legs are not to be permitted to touch bottom when the site conditions exceed the allowable.

2.6

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

2.7 Condition: while elevating the unit

The legs are to be designed to withstand the loads acting on both, the unit's hull and the legs themselves, during the elevating procedure. The environmental conditions are the same as foreseen for lowering of the legs. The analysis may have to be done for several intermediate positions of the hull.

2.8 Unit in the elevated position

When computing the stresses in legs, the maximum overturning load on the unit, using the most adverse combination of applicable variable loadings together with the loading as outlined in Part 3, is to be considered. Forces and moments due to lateral frame deflections of the legs are to be taken into account.

2.9 Leg Scantlings

Leg scantlings are to be determined in accordance with the requirements of Part 5.

3 Structure in way of Jacking or other Elevating Arrangements

3.1

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

3.2

The structure surrounding the legs (points of support) shall be designed with particular regard to the introduction of local concentrated forces; main load bearing elements should be continuous in the vertical direction. Regarding the maximal force to be transmitted, preloading of the legs shall be considered.

3.3

For loose elements, e.g. bars, rods, bolts, pins, serving for transmission of forces to support the unit, special requirements may be imposed regarding dimensioning safety factors and testing.

4 Bottom Mat

4.1

When the bottoms of the legs are attached to a mat, particular attention is to be given to the attachment and the framing and bracing of the mat, in order that the loads transmitted between the legs and the mat are properly distributed.

The boundary plating of tanks which are not vented freely to the sea is not to be less in thickness than would be required by the Rules for tanks, using a head to the design water level, taking into account the astronomical and storm tides. The mat is to be further investigated while resting on the sea bed with 20% of the bottom bearing area washed away due to scouring. The effects of skirt plates, where provided, will be specially considered. Mats are to be designed to withstand the shock of touching bottom while the unit is afloat and subject to wave motions.

PART

7

Column-Stabilized Drilling Units

Chapter 1 General

SECTION 1 General

1 Application

1.1

This Part applies to Column-Stabilized Drilling Units as defined in 1-1-2.

2 Wave Clearance

2.1 Afloat Condition

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

2.2 On-Bottom Condition

For on-bottom modes of operation, clearances are to be in accordance with those specified in Part 6 for self-elevating units.

Chapter 2 Structural Considerations

SECTION 1 General

1 General

1.1 Special Considerations Regarding Stresses

For unit of this type, the highest stresses in some members may be associated with less severe environmental conditions than the maximum specified by the owner (designer).

Where considered necessary, account is to be taken of the consequent increased possibility of encounter of significant stress levels, by either or both of the following:

(a) Suitable reduction of the allowable stress levels for combined loadings given in Chapter 3 of Part 5.

(b) Detailed investigation of the fatigue properties in order to evaluate the possibility of high stresses in association with probability of occurrence.

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

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

1.2

For units designed to be supported by the seabed the clearance in paragraph 6-1-1/2.1 is to be maintained.

1.3

Local structures in way of fairleads, winches, etc., forming part of the position mooring system, are to be designed to withstand forces equivalent to the breaking strength of the mooring line.

1.4

Where a bridge is provided for access from the shore, the jointed part of the hull with the bridge is to be sufficiently strengthened.

1.5

For contact with other ships, the unit is to be equipped with sufficient fenders and particular attention is to be given to the reinforcement of shell plating, frames, girders, etc.

1.6

Conditions for towing/conveyances, for ballasting/deballasting procedures and mooring operations shall be clearly indicated in the Operating Manual.

SECTION 2 Upper Structure

1 General

1.1

The scantlings of the upper structure are not to be less than those required by ACS Rules for Classification of Vessels in association with the loadings indicated on the deck loading plan (which are not to be less than the minimum specified in Chapter 6 of Part 3).

In addition, when the upper structure is considered to be an effective member of the overall structural frame of the unit, the scantlings are to be sufficient to withstand actual local loadings plus any additional loadings superimposed due to frame action, within the stress limitations given in Chapter 3 of Part 5.

1.2

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

1.3

Special attention is to be paid to the foundations (supporting structure) and fastening of drilling derrick(s) (see also Chapter 2 of Part 5), cranes and similar installations.

1.4

The upper structure, including the opening parts of the well, etc., is to be good in the continuity of longitudinal strength and transverse strength. Scantlings of structural elements are to be in accordance with the requirements of ACS Rules for Classification of Vessels.

1.5

Deckhouses fitted to the upper structure are to be designed in accordance with ACS Rules for Classification of Vessels, with due consideration given to their location and to the environmental conditions in which the unit will operate.

1.6 Upper Structure not subjected to Wave Loading

Where it can be shown that the upper structure is not subject to wave loading, required in any mode of operation to be watertight or weathertight, the scantlings can be determined not taking into consideration of the watertightness nor the effects of the wave.

1.7 Buoyant Upper Structure

Where the upper structure is designed to be buoyant in any mode of operation or damaged condition or to meet any stability requirement, it will be subject to special consideration.

1.8 Storage Tanks on Upper Decks

Storage tanks built into or on upper decks are to have scantlings as required for ship's internal tanks.

SECTION 3 Columns, Lower Hulls and Footings

1 General

1.1

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

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

1.2

Where columns, lower hulls or footings are designed with stiffened plating, the minimum scantlings of plating, framing, girders, etc., may be determined in accordance with the requirements of ship's internal tanks, in association with the following:

(i) **Tank spaces:** Where the internal space is a tank, the head h is to be taken to a point located at two-thirds of the distance from the top of the tank to the top of the overflow, or to a point 0.91 [m] above the top of the tank, whichever is grater. For tanks intended to carry contents with a specific gravity in excess of 1.05, the head is to be increased by a factor equal to the ratio of the specified gravity to 1.0.

(ii) **Void Compartment Spaces:** Where an internal space is a void compartment, the design head used in association with the above is not to be less than that corresponding to the maximum allowable waterline of the unit in service.

(iii) **Areas subjected to Wave Immersion:** For all areas subject to wave immersion, a minimum head of 6.0 m is to be used.

(iv) **Minimum Scantling:** In general, the scantlings are not to be less than required for watertight bulkheads in association with a head equivalent to the maximum damaged waterline.

1.3

Where columns, lower hulls or footings do not incorporate framing members and are designed as shells, either unstiffened or ring stiffened, the minimum scantlings of shell plating and ring stiffeners are to be determined on the basis of established shell analysis using the appropriate factor of safety and the design heads as given in 7-2-3/1.2.

1.4 Additional Structural Requirements

(a) Provision for Wave and Current Loadings:
Scantlings of columns, lower hulls or footing as determined by 7-2-3/1.2 and 1.3 are minimum requirements for hydrostatic pressure loads. Where wave and current forces are superimposed, the local structure of the shell is to be increased in scantlings as necessary, to meet the strength requirements of Chapter 3 of Part 5.

(b) Provision for Frame Action:
When the column, lower hull or footing is an effective member of the overall structural frame of the unit, the scantlings are to be sufficient to meet these requirements plus any additional stresses superimposed due to frame action, within the stress limitations of Chapter 3 of Part 5.

(c) Consideration for High Local Loading:
Particular consideration is to be given to structural details, reinforcement, etc., in areas subject to high local loadings, or to such loadings that may cause shell distortion; for example:

- bottom bearing loads, where applicable;
- partially filled tanks;
- local strength against external damage;
- continuity through joints;
- wave impacts.

(d) Scouring Consideration:
For units designed to rest on the sea bed, the effect of scouring action (partial loss of bottom support) is to be considered as follows:

- for a broad mat type (lower hull) support, 20% of the bottom bearing area is to be considered unsupported.

- when there are individual footings or pads, any one such support is to be considered unsupported on 50% of its bottom bearing area.

- other configurations will be specially considered.

Where skirt plates are provided their effectiveness in preventing loss of bottom support due to scouring will be specially considered.

1.5 Bracing Members

(i) Stresses in bracing members due to all anticipated loadings are to be determined in accordance with the following requirements in conjunction with the relevant requirements of Chapter 3 of Part 5.

(ii) **Arrangement of Braces:**
Where braces are essential for the structural integrity of the unit, they should be so arranged that they are protected as far as possible against boat impact (collisions) and other forces resulting from normal operations.

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

(iv) **Effect of Wave Impact:**
Where relevant, consideration is to be given to local stresses due to wave impact.

(v) **Reinforcement of Tabular Bracing Members:**
When bracing members are of tubular section, ring frames may be required to maintain stiffness and roundness of shape.

(vi) **Watertight bracing members:**
Underwater bracing members are normally to be made watertight. When bracings are watertight, they are to be suitably designed to prevent collapse from external hydrostatic pressure. They are to be accessible for internal inspection, or else adequate means are to be provided in order to detect leakages at an early stage.

1.6 Opening in Columns

Portlights or other similar openings are not to be fitted to columns.

SECTION 4 Structural Redundancy

1 General

1.1

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

(a) The unit's structure is to be able to withstand the loss of any slender bracing member without causing overall collapse of the unit's structure.

(b) Structural Redundancy is to be based on the applicable design load requirements of Part 3 except:

(i) When considering environmental loads such as wind force, wave forcing etc. minimum one year return period may be assumed for intended operations.

(ii) When considering environmental factors, the applied loads are not to be less than 80% of the loads associated with severe storm condition.

(iii) Notwithstanding the kind of stress, the allowable stress at the combined loads condition is to be following formula:

$$\sigma_a = \sigma_y$$

where:

σ_a = allowable stress (N/mm^2)

σ_y = specified minimum yield strength of the material (N/mm^2)

(iv) When taking into consideration redistribution of forces due to yielding or buckling and overall strength is to be satisfied with 7-2-4/1.1(a), the criteria of allowable stress may be exceeded for local stress.

1.2

The structural arrangement of the upper hull is to be considered with regard to the structural integrity of the unit after the failure of any primary girder.

PART

8

Surface Type Drilling Units

Chapter 1 General

SECTION 1 General

1 Application

1.1

This Part applies to Surface Type Drilling Units as defined in 1-1-2.

Chapter 2 Structural Considerations

SECTION 1 General

1 General

1.1

Scantlings of the hull structure of both ship type and barge type drilling units are, in general, to comply with the applicable requirements of ACS Rules for Classification of Vessels, as mentioned in Part 5. Special consideration will be given in respect of the following items which may require some deviation or additions to the Rules.

SECTION 2 Strength in way of Drilling Well and Large Hatches

1 General

1.1

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

1.2

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

SECTION 3 Concentrated Loads

1 General

1.1

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

1.2

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

PART

9

Temporary Mooring Equipment and Position Keeping Systems

Chapter 1 General

SECTION 1 General

1 Application

1.1

All drilling units are to be provided with equipment necessary for their temporary mooring in accordance with the requirements of Chapter 2 of Part 9.

1.2

Drilling units provided with position keeping systems and equipment, are to be in accordance with the requirements of Chapter 3 of Part 9.

Chapter 2 Temporary Mooring Equipment

SECTION 1 Anchors, Chain Cables, Wire Ropes and Windlass

1 Application

1.1

Anchors, chain cables, wire ropes and windlass necessary for temporary mooring of the units are to be provided in accordance with the requirements of ACS Rules for Classification of Vessels.

1.2

Where equipment is provided for keeping position during operations, the same may be accepted in lieu of the equipment specified in 9-2-1/1.1, provided that it can be released in an emergency during any transit condition and its mooring effect can be considered equivalent or more.

Chapter 3 Position Keeping Systems and Equipment - Anchoring Systems

SECTION 1 General

1 General

1.1

The anchors, cables, shackles and other associated connecting equipment should be designed, manufactured and tested in accordance with the requirements of ACS Rules for Classification of Vessels.

Documentation of testing, where applicable, should be maintained on board the unit.

Provisions should be made on board for the recording of changes to and inspection of the equipment.

1.2

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

SECTION 2 Design

1 General

1.1

An analysis of the anchoring arrangements expected to be utilized in the units' operation is to be submitted for approval. Among the items to be addressed are:

(i) Design environmental conditions of waves, winds, currents, tides and ranges of water depth.

(ii) Air and sea temperature.

(iii) Description of analysis methodology

1.2

The anchoring system is to be designed so that a sudden failure of any single component will not cause progressive failure of remaining anchoring arrangements.

1.3

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

1.4

When a Quasi-Static Analysis Method is applied, the tension in each anchor line is to be calculated at the maximum excursion for each design condition defined in 9-3-2/1.5, combining the following steady state and dynamic responses of the Unit:

(i) steady mean offset due to the defined wind, current, and steady wave forces;

(ii) maximum surge/sway excursions of the unit due to first-order wave excitations in a storm sea-state of three hours' duration. Significant values of surge/sway excursions due to first-order wave excitations may be used for evaluating transient conditions resulting from the sudden failure of any one anchor line.

The effects of second order wave-induced motions are to be included for units when the magnitudes of such motions are considered to be significant.

1.5

Factors of safety (FOS) are dependent on the design conditions of the system (intact, damaged, or transient), as well as the level of analyses (Quasi static or dynamic analysis). The minimum Quasi Static FOS, specified in the table below, at the maximum excursion of the unit for a range of headings is to be satisfied if the quasi static method outlined in 9-3-2/1.4 is applied. Otherwise, the minimum Dynamic Analysis FOS in the table below is to be satisfied, including the effects of line dynamics when these effects are considered significant.

Design Condition	**Anchor Line FOS**	
	Quasi Static	**Dynamic Analysis**
Operating Intact	2.7	2.25
Operating Damaged	1.8	1.57
Operating Transient	1.4	1.22
Severe Storm Intact	2.0	1.67
Severe Storm Damaged	1.43	1.25
Severe Storm Transient	1.18	1.05

where:

$$FOS = PB / T_{max}$$

PB = maximum rated breaking load of the weakest component of the anchor line.

T_{max} = maximum anchor line tension calculated in accordance with 9-3-2/1.4 or Section 5.1.3.2 of API RP 2SK for each of the following design conditions:

(a) *Operating Intact:* T_{max} , determined under the most severe design environmental conditions for normal operations specified by the Owner or designer with all anchor lines intact.

(b) *Operating Damaged:* T_{max} , under the operating environmental conditions specified above, but assuming the sudden failure of any one anchor line, after reaching a steady-state condition.

(c) *Operating Transient:* $T_{\max}$, under the operating environmental conditions specified above, due to transient motions resulting from the sudden failure of any one anchor line.

(d) *Severe Storm Intact:* $T_{\max}$, determined under the most severe design environmental conditions for severe storm specified by the Owner or designer with all anchor lines intact.

(e) *Severe Storm Damaged:* $T_{\max}$, under the severe storm environmental conditions specified above, but assuming the sudden failure of any one anchor line, after reaching a steady-state condition.

(f) *Severe Storm Transient*: $T_{\max}$, under the severe storm environmental conditions specified above, due to transient motions resulting from the sudden failure of any one anchor line.

1.6

Anchor lines are to be of adequate length to prevent uplift forces on the anchors (unless anchors are specifically designed to withstand such forces) under the design conditions specified in 9-3-2/1.5. However, only steady wind, wave and current forces need be applied in evaluating anchor uplift forces in transient conditions.

1.7

In general, the maximum surge/sway excursions of the unit due to wave excitation about the steady mean offset are to be obtained by means of model tests. Analytical calculations may be acceptable, provided that the proposed method is based on methodologies validated by model tests.

1.8

Other analysis methodologies may be acceptable, provided that a level of safety equivalent to that required by 9-3-2/1.4 and 1.5 is attained.

1.9

Special consideration will be given to arrangements where the anchoring systems are used in conjunction with thrusters to maintain the unit on station.

1.10 Dynamic Positioning Systems

Dynamic positioning systems used as a sole means of position keeping are to provide a level of safety equivalent to that provided for anchoring arrangements(Refer to Guidance for Dynamic Position System (DP) Operator Training (MSC.1/Circ.738/Rev.1) and Guidelines for Vessels with Dynamic Positioning Systems (MSC/Circ.645)).

SECTION 3 Equipment

1 Winches and Windlasses

1.1

The design of mooring winches and windlasses is to provide for adequate dynamic braking capacity to control normal combinations of loads from the anchor, anchor line and anchor handling vessel during the deployment of the anchors at the maximum design payout speed of the windlass. Winch and windlass foundations and adjacent hull structures are to be designed to withstand an anchor line load at the winch or windlass at least equal to the rated breaking load of the anchor line.

1.2

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

1.3

On loss of power to the winches or windlasses, the power operated braking system is to be automatically applied and be capable of holding against 50 percent of the total static braking capacity of mooring winch or windlass.

2 Fairleads and Sheaves

2.1

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

3 Anchor Lines

3.1

The anchor lines are to be of a type that will satisfy the design conditions of the anchoring system and may be of wire, rope, chain or any combination thereof. Details are to be submitted.

Chains and accessories are to be in accordance with the requirements of ACS Rules for Classification of Vessels.

3.2

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

3.3

Means are to be provided for measuring anchor line tensions and windlass power load and to indicate the amount of cable paid out.

3.4

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

4 Anchors

4.1

The type and design of anchors are to be submitted for approval together with the documentation estimating their holding down power in various types of soil.

4.2

All anchors are to be suitably stowed to prevent movement during transit.

5 Control Stations

5.1

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

An alarm for maximum limit of anchor line tension is to be provided at the control station with facility for remote release of anchor line tension.

5.2

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

5.3

Each winch or windlass is to be capable of being controlled from a position which provides a good view of the operation. Means are to be provided at the individual winch or windlass control positions to monitor anchor line tension, winch or windlass power load and to indicate the amount of anchor line paid out.

PART

10

Hazardous Areas

Chapter 1 General

SECTION 1 General

1 Application and Definitions

1.1

The drilling units are to be classified into hazardous areas in accordance with 10-1-1/1.2 and 1.3 or alternatively with an acceptable code of practice.

1.2

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

Hazardous areas are subdivided into Zones 0, 1 or 2, the definitions of each category being as follows:

(i) **Zone 0:** an area in which flammable gases or vapours of such concentrations which are liable to get ignited are continuously present or present for long periods.

(ii) **Zone 1:** an area in which flammable gases or vapours of such concentrations which are liable to get ignited are likely to occur in normal operating conditions.

(iii) **Zone 2:** an area in which flammable gases or vapours of such concentrations which are liable to get ignited are not likely to occur, and if it does occur, it will only exist for a short time.

1.4

The hazardous areas defined in 10-1-1/1.2 and 1.3 are those which normally apply to offshore drilling units for oil and gas exploration. Equipment for well testing if present is to be specially considered.

The hazardous areas as specified may be extended or reduced depending on the actual arrangements in each case, by use of windshields, special ventilation arrangements, structural arrangements (e.g. low deck head), etc.

1.5

For the purpose of this Part:

(i) An enclosed space is considered to be a space bounded by bulkheads and decks which may have doors, windows, or other similar openings.

(ii) A semi-enclosed location is considered to be a location where natural conditions of ventilation are notably different from those on open decks due to the presence of structure such as roofs, windbreaks and bulkheads and which are so arranged that the dispersion of gas may not occur.

Chapter 2 Classification of Areas

SECTION 1 General

1 General

1.1

Hazardous areas of Zone 0 include:

The internal spaces of closed tanks and piping containing:

(a) active non-degassed drilling mud, or,

(b) oil that has a closed-cup flashpoint below 60°C, or,

(c) flammable gas and vapour, or,

(d) produced oil and gas,

e.g. escape gas outlet pipes, or spaces in which an oil-gas-air mixture is continuously present or present for long periods.

1.2

Hazardous areas of Zone 1 include:

(a) Enclosed spaces containing any part of the mud-circulating system that has an opening into the spaces and is between the well and the final degassing discharge.

(b) In outdoor or semi-enclosed locations except as provided for in 10-2-1/1.2 (d), the area within 1.5 m of the boundaries of any openings to equipment which is part of the mud system as specified in 10-2-1/1.2 (a), any ventilation outlets of Zone 1 spaces, or any access to Zone 1 spaces.

(c) Pits, ducts or similar structures in locations which otherwise would be Zone 2 but which are arranged so that the dispersion of gas may not occur.

(d) Enclosed spaces or semi-enclosed locations that are below the drill floor and contain a possible source of release such as the top of a drilling nipple.

(e) Outdoor locations below the drill floor and within a radius of 1.5 m from a possible source of release such as the top of a drilling nipple.

(f) Enclosed spaces that are on the drill floor and which are not separated by a solid floor from the spaces in 10-2-1/1.2 (d).

1.3

Hazardous areas of Zone 2 include:

(a) Enclosed spaces which contain open sections of the mud circulating system from the final degassing discharge to the mud pump suction connection at the mud pit.

(b) Outdoor locations within the boundaries of the drilling derrick up to a height of 3 m above the drill floor.

(c) Semi-enclosed derricks to the extent of their enclosures above the drill floor or to a height of 3 m above the drill floor, whichever is greater.

(d) Semi-enclosed locations below and continuous with the drill floor and to the boundaries of the derrick or to the extent of any enclosure which is liable to trap gases.

(e) Outdoor locations below the drill floor and within a radius of 1.5 m area beyond the zone 1 area as specified in 10-2-1/1.2 (e).

(f) The areas 1.5 m beyond the Zone 1 areas specified in 10-2-1/1.2 (b) and beyond the semi-enclosed locations specified in 10-2-1/1.2 (d).

(g) Outdoor spaces within 1.5 m of the boundaries of any ventilation outlet from or access to a Zone 2 space.

(h) Air locks between a Zone 1 and a non- hazardous areas.

SECTION 2 Openings, access and ventilation conditions affecting the Extent of Hazardous Zones

1 General

1.1

Except for operational reasons access doors or other openings are not to be provided between:

- a non-hazardous space and a hazardous zone;
- a Zone 2 space and a Zone 1 space.

Where a sub access doors or other openings are provided, any enclosed space not referred to under 10-2-1/1.2 or 1.3 and having a direct access to any Zone 1 location or Zone 2 location becomes the same zone as the location except that:

(a) an enclosed space with direct access to any Zone 1 location can be considered as Zone 2 if:

i. the access is fitted with a self- closing gas-tight door opening into the Zone 2 space, and

ii. ventilation is such that the air flow with the door open is from the Zone2 space into the Zone 1 location, and

iii. loss of ventilation is alarmed at a manned station;

(b) an enclosed space with direct access to any Zone 2 location is not considered hazardous if:

i. the access is fitted with a self- closing gas-tight door that opens into the non-hazardous location, and

ii. ventilation is such that the air flow with the door open is from the non-hazardous space into the Zone 2 locations, and

iii. loss of ventilation is alarmed at a manned station;

(c) an enclosed space with direct access to any Zone 1 location is not considered hazardous if:

i. the access is fitted with two gas- tight self-closing doors forming an air lock, and

ii. the space has ventilation overpressure in relation to the hazardous space, and

iii. loss of ventilation overpressure is alarmed at a manned station

1.2

Where ventilation arrangements of the intended safe space are considered sufficient by ACS to prevent any ingress of gas from the Zone 1 location, the two self-closing doors forming an air lock may be replaced by a single self-closing gas-tight door which opens into the non- hazardous location and has no hold-back device.

1.3

Piping systems are to be designed to preclude direct communication between hazardous areas of different classifications and between hazardous and non-hazardous areas.

1.4

Hold-back devices are not to be used on self-closing gastight doors forming hazardous area boundaries.

Chapter 3 Ventilation

SECTION 1 General

1 General

1.1

Attention is to be given to ventilation inlet and outlet location and airflow in order to minimize the possibility of cross contamination. Inlets are to be located in non-hazardous areas as high and as far away from any hazardous area as practicable. All air inlets for hazardous enclosed spaces are to be located in non- hazardous areas. Each air outlet is to be located in an outdoor area which, in the absence of the considered outlet, is of the same or lesser hazard than the ventilated space. Ventilation for hazardous areas is to be completely separate from that used for non-hazardous areas. Where passing through hazardous areas of a higher level, the ventilation duct is to have overpressure in relation to this area; Where the ventilation duct passes through a hazardous area of a lower level, the ventilation duct is to have underpressure in relation to this area.

SECTION 2 Ventilation of Hazardous Areas

1 General

1.1

Enclosed hazardous spaces are to be provided with adequate ventilation with under pressure in relation to the less hazardous space or zone. Hazardous enclosed mud processing spaces are to be ventilated at a minimum rate of 12 air changes per hour. Where mechanical ventilation is applied it is to be such that the hazardous enclosed spaces are maintained with underpressure in relation to the less hazardous spaces or areas and non-hazardous enclosed spaces are maintained in overpressure in relation to adjacent hazardous locations.
The arrangement of ventilation inlet and outlet openings in the space is to be such that the entire space is efficiently ventilated, giving special consideration to location of equipment which may release gas, and to spaces where gas may accumulate.

1.2

The outlet air from Zone 1 and Zone 2 spaces is to be led in separate ducts to outdoor locations. The internal spaces of such ducts belong to the same Zone as the inlet space. Air inlet ducts designed for constant relative underpressures are to be rigidly constructed to avoid air leaks. Fans are to be designed so as to reduce the risk that sparks may occur.

Chapter 4 Dangerous Goods

SECTION 1 General

1 General

1.1

Dangerous goods are to be stored safely and appropriately according to the nature of the goods. Incompatible goods are to be segregated from one another.

1.2

Explosives which present a serious risk are to be stored in a suitable magazine which is to be kept securely closed. Such explosives are to be segregated from detonators. Electrical apparatus and cables in any compartment in which it is intended to store explosives are to be designed and used so as to minimize the risk of fire or explosion.

1.3

Flammable liquids which give off dangerous vapours and flammable gases are to be stored in a well-ventilated space or on deck.

1.4

Substances which are liable to spontaneous heating or combustion are not to be carried unless adequate precautions have been taken to prevent the outbreak of fire.

1.5

Radioactive substances are to be stored and handled in a safe manner.

PART

11

Machinery

Chapter 1 General

SECTION 1 Scope

1 General

1.1

The following requirements apply to the machinery essential to the safe operation of the drilling unit. These requirements do not apply to equipment and systems used solely for the drilling operation, except in so far as safety is concerned.

1.2

Systems and equipment that are used solely for drilling and that may affect the safety of the drilling unit on which they are installed may be designed to the alternative requirements of recognized standards acceptable to ACS. Codes and standards of practice which have been proven to be effective by actual application by the offshore drilling industry which are not in conflict with the Rules, and which are acceptable to ACS, may be applied in addition to these provisions.

1.3

All propulsion and auxiliary machinery including shafting and propellers, steering arrangements, boilers and other pressure vessels, control systems, jacking systems, pumping and piping systems necessary for the safe operation of the drilling unit are to satisfy the requirements specified in this Part. Other applicable requirements for construction and installation in accordance with ACS Rules for Classification of Vessels are also to be complied with.

The above machinery are to be of a design and construction adequate for the intended service and are to be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design is to have regard to materials used in construction, and to the marine and industrial purposes for which the equipment is intended, the working conditions and the environmental conditions to which it will be subjected. Consideration is to be given to the consequences of the failure of systems and equipment essential to the safety of the unit.

1.4

When alternative design or arrangements deviate from the provisions of the Rules, an engineering analysis, evaluation and approval of the design and arrangements is to be carried out in accordance with MODU Code 2009 (IMO Resolution A1023(26)) Chapter 4, Sec.4.2.

SECTION 2 Machinery Installations - Inclinations

1 Non Self-Propelled Drilling Units

1.1

All machinery, components and systems essential to the safe operation of a drilling unit are to be designed to operate under the following static conditions of inclination:

i. When column-stabilized drilling units are upright and inclined to an angle up to 15 degrees in any direction;

ii. When self-elevating drilling units are upright and inclined to an angle up to 10 degrees in any direction;

iii. When surface type drilling units are upright and level trim and when inclined to an angle of list up to 15 degrees either way and simultaneously trimmed to an angle up to 5 degrees by the bow or stern.

1.2

ACS may permit or require deviations from these angles, taking into consideration the type, size and service conditions of the drilling unit.

2 Self-Propelled Drilling Units

2.1

Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the drilling unit are to be capable of operating under the static conditions required by 11-1-2/1 and the following dynamic conditions:

i. In case of column-stabilized drilling units, inclination up to 22.5 degrees in any direction;

ii. In case of self-elevating drilling units, inclination up to 15 degrees in any direction;

iii. In case of surface type drilling units, inclination up to 22.5 degrees rolling and simultaneously pitching 7.5 degrees by bow or stern.

2.2

ACS may permit deviation from these angles, taking into consideration the type, size and service conditions of the drilling unit.

3 Emergency Source of Power on all Drilling Units

3.1

The emergency generator and its prime mover and any emergency accumulator battery are to be capable of supplying the power required by Part 12 of these Rules when upright and when inclined to the greater of the first intercept angles at which compliance with the intact and damage stability criteria of Part 4 are satisfied. However, in no case need the equipment be designed to operate when inclined more than:

i. 25 degrees in any direction on a column-stabilized drilling unit;

ii. 15 degrees in any direction on a self- elevating drilling unit; and

iii. 22.5 degrees about the longitudinal axis and/or when inclined 10 degrees about the transverse axis on surface type drilling unit.

SECTION 3 Jacking Systems

1 General

1.1

The jacking system is to be designed and constructed to maintain the safety of the drilling unit in the event of failure of a critical component during operation of the jacking system. Suitable monitoring is to be provided at a manned control station to indicate such failure.

1.2

Jacking mechanisms are to be:

(a) arranged so that a single failure of any component does not cause an uncontrolled descent of the unit;

(b) designed and constructed for the maximum lowering and lifting loads of the unit as specified in the unit's operating manual in accordance with Part 1.

(c) able to withstand the forces imposed on the unit from the maximum environmental criteria for the unit; and

(d) constructed such that the elevation of the leg relative to the unit can be safely maintained in case of loss of power (e.g., electric, hydraulic, or pneumatic power).

1.3

The elevating system is to be operable from a central jacking control station. The jacking control station is to have the following:

i. audible and visual alarms for jacking system overload and out-of-level. Units whose jacking systems are subject to rack phase differential are also to have audible and visual alarms for rack phase differential; and

ii. instrumentation to indicate:
   a. the inclination of the unit on two horizontal perpendicular axes;
   b. power consumption or other indicators for lifting or lowering the legs, as applicable; and,
   c. brake release status

iii. A communication system is to be provided between the central jacking control and a location at each leg.

SECTION 4 Machinery for Non Self-Propelled Drilling Units

1 Machinery Arrangements

1.1

Adequate provisions and arrangements are to be made to facilitate safe access, cleaning, inspection and maintenance of machinery including boilers and pressure vessels.

1.2

All gearing, shafts and couplings used for transmission of power to machinery are to be designed and constructed so that they will withstand the maximum working stresses to which they may be subjected in all service conditions, taking into account the type of engines by which they are driven or of which they form part.

1.3

Machinery, where applicable, is to be provided with automatic shutoff arrangements or alarms in the case of failures, such as lubricating oil supply failure, which could lead rapidly to complete breakdown, damage or explosion. ACS may accept provisions for overriding automatic shutoff devices.

1.4

As far as possible, fitting of internal combustion engines in hazardous areas is to be avoided. When this cannot be avoided, special consideration may be given to the proposed arrangement.

1.5

Internal combustion engines of a cylinder diameter of 200 mm or a crankcase volume of 0.6 m^3 and above are to be provided with crankcase explosion relief valves of an approved type with sufficient relief area. The relief valves are to be arranged or provided with means to ensure that discharge from them is directed so as to minimize the possibility of injury to personnel.

Crankcase explosion relief valves are to be type tested in a configuration that represents the installation arrangements that will be used on an engine, in accordance with ACS Rules for Classification of Vessels.

Internal combustion engines of 2,250 kW and above or having cylinders of more than 300 mm bore are to be provided with crankcase oil mist detectors or engine bearing temperature monitors or equivalent devices.

1.6

Where risk from over-speeding of machinery exists, means are to be provided to ensure that the safe speed is not exceeded.

1.7

Exhaust outlets of internal combustion engines are to be fitted with efficient spark arresting devices and are to discharge outside the hazardous areas. Exhaust outlets of fired boilers are to discharge outside hazardous areas.

1.8

Air intakes for internal combustion engines are not to be less than 3 m from the hazardous areas.

1.9

All boilers, all parts of machinery, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure are to be subjected to appropriate tests including a pressure test before being put into service for the first time.

1.10

Where machinery including pressure vessels or any parts of such machinery are subject to internal pressure and may be subject to dangerous overpressure, means are to be provided where applicable, which will protect against such excessive pressure.

1.11

Boilers and steam generators are to be fitted with not less than two safety valves, each having a minimum internal diameter of 25 mm, but those having a total heating surface of less than 50 m^2 may have one valve not less than 50 mm diameter.

1.12

Every oil-fired boiler which is intended to operate without manual supervision is to have safety arrangements which shut off the fuel supply and give an alarm at an attended location in the case of low water level, air supply failure or flame failure.

1.13

Every steam generating system which could be rendered dangerous by the failure of its feed water supply is to be provided with not less than two separate feed water systems from and including the feed pumps, noting that a single penetration of the steam drum is acceptable. For those services not essential for the safety of the unit, only one feed water system is required if automatic shutdown of the steam generating system upon loss of the feed water supply is provided. Means are to be provided which will prevent overpressure in any part of the feed water system.

1.14

Boilers are to be provided with means to supervise and control the quality of the feed water. As far as practicable, means are to be provided to preclude the entry of oil or other contaminants which may adversely affect the boiler.

1.15

Every boiler essential for the safety of the unit and which is designed to have a water level is to be provided with at least two means for indicating its water level, at least one of which is to be a direct-reading gauge glass.

1.16

Fired boilers are not to be installed in hazardous areas.

1.17

Means are to be provided to ensure that machinery can be brought into operation from the “dead ship” condition without external aid.

1.18

Means are to be provided whereby normal operation of vital systems, such as ballast systems in semisubmersible units, jacking systems in self-elevating units and blow- out preventers, can be sustained or restored even though one of the essential auxiliaries becomes inoperable.

1.19

The control systems and indicators required in 4-2-3/2.2 are to be operable in both normal conditions and in the event of main power failure. Where stored energy is provided for this purpose, its capacity is to be to the satisfaction of ACS.

2 Machinery Controls

2.1

Machinery essential for the safety of the unit is to be provided with effective means for its operation and control.

2.2

Automatic starting, operational and control systems for machinery essential for the safety of the unit are to, in general, include provisions for manually overriding the automatic controls. Failure of any part of the automatic and remote control system is not to prevent the use of the manual override. Visual indication is to be provided to show whether or not the override has been actuated.

SECTION 5 Machinery for Self-Propelled Drilling Units

1 General

1.1

The provisions of this Section apply to units which are designed to undertake self- propelled passages without external assistance and are not applicable to units which are fitted only with means for the purpose of positioning or of assistance in towing operations. These provisions are additional to those in 11-1-4 and 11-1-7.

1.2

Means are to be provided whereby normal operation of propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative. Special consideration is to be given to the malfunction of:

1. a generator set which serves as a main source of electrical power;
2. the sources of steam supply;
3. the arrangements for boiler feedwater;
4. the arrangements which supply fuel oil for boilers or engines;
5. the sources of lubricating oil pressure;
6. the sources of cooling water pressure;
7. a condensate pump and the arrangements to maintain vacuum in condensers;
8. the mechanical air supply for boilers;
9. an air compressor and receiver for starting or control purposes; and
10. the hydraulic, pneumatic or electrical means for control in main propulsion machinery including controllable-pitch propellers.

However, a partial reduction in capability from full normal operation may be accepted, having regard to overall safety considerations.

1.3

Special consideration is to be given to the design, construction and installation of propulsion machinery systems so that any mode of their vibrations will not cause undue stresses in this machinery in the normal operating ranges.

2 Means of Going Astern

2.1

Units are to have sufficient power for going astern to secure proper control of the unit in all normal circumstances.

2.2

The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time and so to bring the unit to rest within a reasonable distance from maximum ahead service speed is to be demonstrated.

2.3

The stopping times, unit headings and distances recorded on trials, together with the results of trials to determine the ability of units having multiple propellers to navigate and manoeuvre with one or more propellers inoperative, are to be available on board for the use of the master or other designated personnel. (Refer to the IMO resolution A.601(15) "Recommendation on the provision and display of manoeuvring information on board ships")

2.4

Where the unit is provided with supplementary means for manoeuvring or stopping, these are to be demonstrated and recorded as referred to in 11-1-5/2.2 and 2.3 .

3 Steam Boilers and Boiler Feed Systems

3.1

Water tube boilers serving turbine propulsion machinery are to be fitted with a high-water-level alarm.

3.2

Every steam generating system which provides services essential for the propulsion of the unit is to be provided with not less than two separate feed water systems from and including the feed pumps, noting that a single penetration of the steam drum is acceptable. Means are to be provided which will prevent overpressure in any part of the systems.

4 Machinery Controls

4.1

Main and auxiliary machinery essential for the propulsion of the unit are to be provided with effective means for its operation and control. All control systems essential for the propulsion, control and safety of the unit are to be independent or designed such that failure of one system does not degrade the performance of another system. A pitch indicator is to be provided on the navigating bridge for controllable-pitch propellers.

4.2

Where remote control of propulsion machinery from the navigating bridge is provided and the machinery spaces are intended to be manned, the following are to apply:

1. The speed, direction of thrust and, if applicable, the pitch of the propeller are to be fully controllable from the navigating bridge under all sailing conditions, including manoeuvring;

2. The remote control is to be performed, for each independent propeller, by a control device so designed and constructed that its operation does not require particular attention to the operational details of the machinery. Where more than one propeller is designed to operate simultaneously, these propellers may be controlled by one control device;

3. The main propulsion machinery is to be provided with an emergency stopping device on the navigating bridge and independent from the bridge control system;

4. Propulsion machinery orders from the navigating bridge are to be indicated in the main machinery control station or at the manoeuvring platform as appropriate;

5. Remote control of the propulsion machinery is to be possible from only one station at a time; at one control station interconnected control units are permitted. There is to be at each station an indicator showing which station is in control of the propulsion machinery. The

transfer of control between navigating bridge and machinery spaces is to be possible only in the machinery space or machinery control room.
The system is to include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;

6. It is to be possible to control the propulsion machinery locally, even in the case of failure in any part of the automatic or remote control system;

7. the design of the remote control system is to be such that in case of its failure an alarm will be given at the navigating bridge and at the main machinery control station and the preset speed and direction of thrust is maintained until local control is in operation, unless it is considered impracticable;

8. indicators are to be fitted on the navigating bridge for:
   a. propeller speed and direction in case of fixed-pitch propellers;
   b. propeller speed and pitch position in case of controllable-pitch propellers.

9. An alarm is to be provided at the navigating bridge and in the machinery space to indicate low starting air pressure set at a level which still permits main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start are to be limited to safeguard sufficient starting air pressure for starting locally; and

10. Automation systems are to be designed in a manner which ensures a threshold warning of impending or imminent slowdown or shutdown of the propulsion system is given to the officer in charge of the navigational watch in time to assess navigational circumstances in an emergency. In particular, the systems are to control, monitor, report, alert and take safety action to slow down or stop propulsion while providing the officer in charge of the navigational watch an opportunity to manually intervene, except for those cases where manual intervention will result in total failure of the engine and/or propulsion equipment within a short time, for example in the case of over-speed.

4.3

Where the main propulsion and associated machinery including sources of main electrical supply are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room, this control room is to be designed, equipped and installed so that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose 11-1-6/3 to 11-1-6/5, 11-4-10, 13-5-1/2, 13-6-5 and 13-7-8 are to apply as appropriate. Particular consideration is to be given to protection against fire and flooding.

5 Steering

5.1

Except as provided in 11-1-5/5.18, units are to be provided with a main steering gear and an auxiliary steering gear to the satisfaction of ACS. The main steering gear and the auxiliary steering gear are to be so arranged that a single failure in one of them, so far as is reasonable and practicable, will not render the other one inoperative.

5.2

The main steering gear is to be of adequate strength and sufficient to steer the unit at maximum service speed and this is to be demonstrated. The main steering gear and rudder stock are to be so designed that they will not be damaged at maximum astern speed but this design requirement need not be proved by trials at maximum astern speed and maximum rudder angle.

5.3

The main steering gear is to, with the unit at its deepest seagoing draught, be capable of putting the rudder over from 35° on one side to 35° on the other side with the unit running ahead at maximum service speed. The rudder is to be capable of being put over from 35° on either side to 30° on the other side in not more than 28 sec, under the same conditions.

5.4

The main steering gear is to be operated by power where necessary to fulfill the provisions of 11-1-5/5.3 and in any case in which a rudder stock of over 120 mm diameter is required in way of the tiller.

5.5

The main steering gear power unit or units are to be arranged to start automatically when power is restored after a power failure.

5.6

The auxiliary steering gear is to be of adequate strength and sufficient to steer the unit at navigable speed and capable of being brought speedily into action in an emergency.

5.7

The auxiliary steering gear is to be capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 sec with the unit at its deepest seagoing draught while running at one half of its maximum speed ahead or seven knots, whichever is the greater.

5.8

The auxiliary steering gear is to be operated by power where necessary to fulfill the provisions of 11-1-5/5.7, and in any case in which a rudder stock of over 230 mm diameter is required in way of the tiller.

5.9

Where the main steering gear comprises two or more identical power units an auxiliary steering gear need not be fitted if the main steering gear is capable of operating the rudder in accordance with the provisions of 11-1-5/5.3 while operating with all power units. As far as is reasonable and practicable the main steering gear is to be so arranged that a single failure in its piping or in one of the power units will not impair the integrity of the remaining part of the steering gear.

5.10

Control of the main steering gear is to be provided both on the navigating bridge and in the steering gear compartment. If the steering gear control system which provides for control from the navigating bridge is electric, it is to be supplied from the steering gear power circuit from a point within the steering gear compartment.

5.11

When the main steering gear is arranged according to 11-1-5/5.9 two independent control systems are to be provided, each of which can be operated from the navigating bridge. Where the control system comprises a hydraulic telemotor, waiver of the provisions for a second independent control system may be considered.

5.12

Where the auxiliary steering gear is power operated, it is to be provided with a control system operated from the navigating bridge and this is to be independent of the control system for the main steering gear.

5.13

Means are to be provided in the steering gear compartment to disconnect the steering gear control system from the power circuit.

5.14

A means of communication is to be provided between the navigating bridge and:

1. the steering gear compartment; and
2. the emergency steering position, if provided.

5.15

The exact angular position of the rudder, if power operated, is to be indicated on the navigating bridge. The rudder angle indication is to be independent of the steering gear control system.

5.16

The angular position of the rudder is to be recognizable in the steering gear compartment.

5.17

An alternative power supply, sufficient at least to supply a steering gear power unit which complies with the provisions of 11-1-5/5.7 and also its associated control system and the rudder angle indicator, is to be provided, automatically, within 45 sec, upon failure of main power supply, either from the emergency source of electrical power or from another independent source of power located in the steering gear compartment. This independent source of power is to be used only for this purpose and is to have a capacity sufficient for 10 min of continuous operation.

5.18

Where a non-conventional rudder is installed or where a unit is steered by means other than a rudder, special consideration may be given to the steering system so as to ensure that an acceptable degree of reliability and effectiveness, which is based on 11-1-5/5.1, is provided. (Also refer ACS Rules for Classification of Vessels)

6 Electric and Electro-hydraulic Steering Gear

6.1

Indicators for running of the motors of electric and electro-hydraulic steering gear are to be installed on the navigating bridge and at a suitable machinery control position.

6.2

Each electric or electro-hydraulic steering gear comprising one or more power units is to be served by at least two circuits fed from the main switchboard. One of the circuits may pass through the emergency switchboard. An auxiliary electric or electro-hydraulic steering gear associated with a main electric or electro-hydraulic steering gear may be connected to one of the circuits supplying this main steering gear. The circuits supplying an electric or electro-hydraulic steering gear are to have adequate rating for supplying all motors which can be simultaneously connected to it and have to operate simultaneously.

6.3

Short-circuit protection and an overload alarm are to be provided for these circuits and motors. Protection against excess current, if provided, is to be for not less than twice the full load current of the motor or circuit so protected, and is to be arranged to permit the passage of the appropriate starting currents. Where a three- phase supply is used, an alarm is to be provided that will indicate failure of any one of the supply phases. The alarms required above are to be both audible and visual and be situated in a position on the navigating bridge where they can be readily observed.

7 Communication between the Navigating Bridge and the Engine Room

7.1

Units are to be provided with at least two independent means for communicating orders from the navigating bridge to the position in the machinery space or control room from which the engines are normally controlled, one of which is to provide visual indication of the orders and responses both in the engine-room and on the navigating bridge. Consideration will be given to providing a means of communication to any other positions from which the engines may be controlled.

8 Engineers' Alarm

8.1

An engineers' alarm is to be provided to be operated from the engine control room or at the manoeuvring platform, as appropriate, and clearly audible in the engineers' accommodation.

SECTION 6 Periodically Unattended Machinery Spaces for all types of Units

1 General

1.1

The provisions of 11-1-6, 11-4-10 and Part 13 are additional to those of 11-1-4 and 11-1-5 and apply to periodically unattended machinery spaces specified herein. The arrangements are to ensure that the safety of the unit in the marine mode, including manoeuvring, and in machinery spaces of category A during drilling operations, where applicable, is equivalent to that of a unit having manned machinery spaces.

2 Application

2.1

The provisions of 11-1-6/3 to 11-1-6/8, 11-4-10, 13-5-1/2, 13-6-5 and 13-7-8 apply to units which are designed to undertake self-propelled passages without external assistance.

2.2

Units other than those designed for unassisted passages, having periodically unattended spaces in which machinery associated with the marine mode is located, are to comply with the applicable parts of sections 11-1-6/3, 11-1-6/6, 11-1-6/7, 11-1-6/8, 11-4-10, 13-5-1/2, 13-6-5 and 13-7-8.

2.3

Where in any unit, machinery spaces of category A for drilling purposes are intended to be periodically unattended, 11-1-6/3, 11-1-6/8, 13-5-1/2, 13-6-5 and 13-7-8 would be applied to machinery spaces of category A, due consideration being given to the characteristics of the machinery concerned and to the supervision envisaged to ensure safety.

2.4

Measures are to be taken to the satisfaction of ACS to ensure that the equipment of every unit is functioning in a reliable manner and that satisfactory arrangements are made for regular inspections and routine tests to ensure continuous reliable operation.

2.5

Every unit is to be provided with documentary evidence, to the satisfaction of ACS, of its fitness to operate with periodically unattended machinery spaces.

3 Fire Prevention

3.1

Where necessary, oil fuel and lubricating oil pipes are to be screened or otherwise suitably protected to avoid, as far as practicable, oil spray or oil leakages on to hot surfaces or into machinery air intakes. The numbers of joints in such piping systems are to be kept to a minimum and, where practicable, leakages from high-pressure oil fuel pipes are to be collected and arrangements provided for an alarm to be given.

3.2

Where daily service oil fuel tanks are filled automatically, or by remote control, means are to be provided to prevent overflow spillages. Other equipment which treats flammable liquids automatically, e.g., oil fuel purifiers, which, whenever practicable, are to be installed in a special space reserved for purifiers and their heaters, are to have arrangements to prevent overflow spillages.

3.3

Where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high-temperature alarm is to be provided if the flashpoint of the oil fuel can be exceeded.

3.4

Means are to be provided in case of fire:

1. in boiler air supply casings and exhausts (uptakes); and
2. in scavenging air belts of propulsion machinery

to detect fires and give alarms at an early stage, unless it is considered unnecessary in a particular case by ACS.

4 Bridge Control of Propulsion Machinery

4.1

Remote control of propellers from the navigating bridge should also ensure automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.

5 Communication

5.1

A reliable means of vocal communication is to be provided between the main machinery control station or the propulsion machinery control position as appropriate, the navigating bridge, the engineer officers' accommodation and, on column-stabilized units, the central ballast control station.

6 Alarm System

6.1

An alarm system is to be provided in the main machinery control station giving audible and visual indication of any fault requiring attention. It is to also:

1. activate an audible and visual alarm at another normally manned control station;
2. activate the engineers' alarm provided in accordance with 11-1-5/8, or an equivalent alarm acceptable to ACS, if an alarm function has not received attention locally within a limited time;
3. as far as is practicable be designed on the fail-to-safety principle; and
4. when in the marine mode, activate an audible and visual alarm on the navigating bridge for any situation which requires action by the officer on watch or which is to be brought to the attention of the officer on watch.

6.2

The alarm system is to be continuously powered and is to have an automatic change- over to a stand-by power supply in case of loss of normal power supply.

6.3

Alarm is to be provided for failure of the normal power supply of the alarm system.

6.4

The alarm system is to be able to indicate at the same time more than one fault and the acceptance of any alarm is to not inhibit another alarm.

6.5

Acceptance at the position mentioned in 11-1-6/1 of any alarm condition is to be indicated at the positions where it has been shown. Alarms are to be maintained until they are accepted and the visual indications are to remain until the fault has been corrected, when the alarm system is to automatically reset to the normal operating condition.

7 Special Provisions for Machinery, Boiler and Electrical Installations

7.1

The special provisions for the machinery, boiler and electrical installations are to be to the satisfaction of ACS and are to include at least the requirements of this Chapter.

7.2 Change-over function

Where stand-by machines are required for other auxiliary machinery essential to propulsion, automatic change-over devices are to be provided. An alarm is to be activated on automatic change-over.

7.3 Automatic control and alarm systems

(1) The control systems are to be such that the services needed for the operation of the main propulsion machinery and its auxiliaries are ensured through the necessary automatic arrangements.

(2) Means are to be provided to keep the starting air pressure at the required level where internal combustion engines are used for main propulsion.

(3) An alarm system complying with 11-1-6/6 is to be provided for all important pressures, temperatures and fluid levels and other essential parameters.

8 Safety System

8.1

A safety system is to be provided to ensure that serious malfunction in machinery or boiler operations, which presents an immediate danger, is to initiate the automatic shutdown of that part of the plant and that an alarm is to be given at the locations determined in accordance with 11-1-6/1. Shutdown of the propulsion system is not to be automatically activated except in cases which could lead to serious damage, complete breakdown, or explosion. Where arrangements for overriding the shutdown of the main propelling machinery are fitted, these are to be such as to preclude inadvertent operation. Visual means are to be provided to indicate when the override has been activated.

SECTION 7 Machinery Installations in Hazardous Areas

1 General

1.1

Mechanical equipment is to be limited to that necessary for operational purposes.

1.2

Mechanical equipment and machinery in hazardous areas are to be so constructed and installed as to reduce the risk of ignition from sparking due to the formation of static electricity or friction between moving parts and from high temperatures of exposed parts due to exhausts or other emissions (Refer Part 10 for Zone Classification of Hazardous Areas).

1.3

The installation of internal combustion machinery may be permitted in zone 1 and zone 2 hazardous areas, provided ACS is satisfied that sufficient precautions have been taken against the risk of dangerous ignition (Refer "ASTM F2876-10 Standard Practice for Thermal Rating and Installation of Internal Combustion Engines Packages for use in Hazardous Locations in Marine Applications").

1.4

The installation of fired equipment may be permitted in zone 2 hazardous areas, provided that ACS is satisfied that sufficient precaution has been taken against the risk of dangerous ignition.

SECTION 8 Diving Systems

1 General

1.1

Diving systems, if provided, are to be installed, protected and maintained so as to minimize, so far as practicable, any danger to personnel or the unit, due regard being paid to fire, explosion or other hazards.

1.2

Diving systems are to be designed, constructed, maintained and certified in accordance with a national or international standard or code acceptable to ACS, which may be employed for fixed diving systems, if provided.

Chapter 2 Piping Systems

SECTION 1 General

1 General

1.1

Pipes are to be arranged inboard of the zone of assumed damage penetration unless special consideration has been taken in the damage stability review.

1.2

Piping systems carrying non-hazardous fluids are generally to be separate from piping systems which may contain hazardous fluids. Cross connection of the piping systems may be permitted where means for avoiding possible contamination of the non-hazardous fluid system by the hazardous medium are provided.

1.3

Where air or steam is used to atomize well bore fluids prior to flaring, a non-return valve is to be fitted in the air or steam line. This valve is to be part of the permanently installed piping, readily accessible and as close as possible to the burner boom. Alternative arrangements shown to provide an equivalent level of safety may be accepted by ACS.

2 Valve Arrangements

2.1

Where valves of piping systems are arranged for remote control and are power operated, a secondary means of operating the valves which may be manual control is to be provided.

2.2 Remote Operation of Sea-Water Inlet and Discharge Valves

1. Inlet and discharge valves in compartments situated below the assigned load line (normally unattended compartments) are to be provided with remote controlled valves operable from an accessible position outside the space. Where remote operation is provided by power actuated valves for sea-water inlets and discharges for operation of propulsion and power generating machinery, power supply failure of the control system is not to result in:
   (a) closing of open valves;
   (b) opening of closed valves

2. Consideration will be given to accepting bilge alarms in lieu of remote operation for surface type and self-elevating drilling units only

Chapter 3 Ballast Systems for Column-Stabilized Drilling Units

SECTION 1 General

1 General

1.1

Each ballast tank is to be capable of being pumped out by at least two independent power-driven pumps so that the system remains operational in the event of failure of any one such pump and arranged so that tanks can be drained at all normal operating and transit conditions. Alternatively, controlled gravity ballasting may be accepted by ACS.

The ballast pumps are to be of the self-priming type or be provided with a separate priming system. The pumps provided need not be dedicated ballast pumps, but are to be readily available for such use at all times.

1.2

All ballast pipes are to be of steel or other suitable material having properties acceptable to ACS. Special consideration is to be given to the design of ballast lines passing through ballast tanks, taking into account effects of corrosion or other deterioration.

SECTION 2 Capacity

1 General

1.1

The system is to be capable of raising the drilling unit, while in an intact condition, starting from a level trim condition at deepest normal operating draft, to the severe storm draft, or a greater distance as may be specified by ACS, within three hours.

SECTION 3 System Arrangement

1 General

1.1

The ballast system is to be arranged and operated so as to prevent the inadvertent transfer of ballast water from one tank or hull to another of the drilling unit, which could result in moment shifts leading to excessive angles of heel or trim. The system is also to be arranged so that the transfer of ballast water from one tank to any other tank through a single valve is not possible except where such a transfer would not adversely affect the stability of the drilling unit.

1.2

Air pipes are to be provided on each ballast tank sufficient in number and cross- sectional area to permit the efficient operation of the ballast pumping system under the conditions referred to in this section.

In the case of all tanks which can be pumped up either by ship's pumps or by shore pumps through a filling main, the total crosssectional area of the vent pipes to each tank, or of the overflow pipes where an overflow system is provided, is to be not less than 25 per cent greater than the effective area of the respective filling pipes. Where tanks are fitted with cross flooding connections, the vent pipes are to be of adequate area for these connections. Vent pipes are not to be less than 50 mm bore.

In order to allow deballasting of the ballast tanks intended to be used to bring the unit back to normal draught and to ensure no inclination after damage, air pipe openings for these tanks are to be above the worst damage waterline specified in Part 4. Such air pipes are to be positioned outside the extent of damage, as defined in Part 4.

SECTION 4 Operation in Damaged Condition

1 General

1.1

The ballast system is to be arranged so that even with any one pump inoperable, the remaining pumps are capable of restoring the drilling unit to a level trim condition and draft acceptable to ACS with respect to stability, where necessary without taking on additional ballast, when subject to the damage conditions specified in Part 4.

ACS may accept counter-flooding as an operational procedure. Counter-flooding is not to be considered as a means to improve the suction head available to the ballast pumps when considering the operability of the ballast system after the damage specified in Part 4.

SECTION 5 Control Features

1 General

1.1

Ballast pumps, ballast tank valves and sea chest valves are to be provided with a means of remote control from a central ballast control station. Pumps are also to be provided with a means of local control in the pump room operable in the event of remote control failure. A manually operated independent means of control of the valves is also to be provided. The independent local control of each ballast pump and of its associated ballast tank valves is to be in the same location. This ballast control station and any back-up stations are to be readily accessible, located above the worst damage waterline and protected from the weather when the drilling unit is subject to the assumed conditions of severe storm and damage. Additionally, these stations are not to be located within the assumed damaged penetration zone. The central ballast control station is to include the following control and indicating systems, having appropriate audible and visual alarms, where applicable:

- ballast pump control system;
- ballast pump suction and discharge pressure;
- ballast pump status-indicating system;
- ballast valve control system;
- A valve position indicating system. All valves and operating controls are to be clearly marked to identify the function they serve. Means is to be provided locally to indicate whether a valve is open or closed.
- A tank level indicating system. A draft indicating system.
- heel and trim indicators;
- power availability indicating system (main and emergency);
- ballast control system hydraulic/pneumatic pressure-indicating system.
- A permanently installed means of communication independent of the unit's main source of electrical power, between the central ballast control station and those spaces containing the alternative means of control for the ballast pumps and valves or other spaces that may contain equipment necessary for the operation of the ballast system.

The tank level indicating system listed above is to provide means to:

1. indicate liquid levels in all ballast tanks. A secondary means of determining levels in ballast tanks, which may be a sounding pipe, is to be provided. Tank level sensors are not to be situated in the tank suction lines;

2. indicate liquid levels in other tanks, such as fuel oil, fresh water, drilling water or liquid storage tanks, the filling or emptying of which, in the view of ACS, could affect the stability of the unit. Tank level sensors are not to be situated in the tank suction lines.

The draught indicating system is to display the draught as measured at each corner of the unit or at representative positions as required by ACS.

Enclosures housing ballast system electrical components, the failure of which would cause unsafe operation of the ballast system upon liquid entry into the enclosure, are to comply with Part 12.

A means to indicate whether a valve is open or closed is to be provided at each location from which the valve can be controlled. The indicators are to rely on movement of the valve spindle, or be otherwise arranged with equivalent reliability.

Means are to be provided at the central ballast control station to isolate or disconnect the ballast pump control and ballast valve control systems from their sources of electrical, pneumatic or hydraulic power.

1.2

The control and indicating systems are to function independently of each other so that a failure in any one system will not affect the operation of the other systems. The ballast pump and ballast valve control systems are to be arranged so that the loss of any one of their components will not cause the loss of operation to the other pumps or valves.

1.3

To ensure that uncontrolled transfer of ballast water will not continue upon loss of power, ballast tank valves are to close automatically upon loss of power or be provided with an arrangement considered equivalent to the satisfaction of ACS. Upon reactivation of control power, each such valve is to remain closed until the ballast control operator assumes control of the reactivated system.

1.4

It is to be possible to supply each ballast pump provided to meet 11-3-1 from the emergency source of power. The arrangements are to be such that the system is capable of restoring the unit from an inclination specified in 11-1-2/1 to a level trim and safe draught condition after loss of any single component in the power supply system.

Chapter 4 Bilge System

SECTION 1 General

1 General

1.1

In general, the bilge system is to be in accordance with ACS Rules for Classification of Vessels. An efficient bilge pumping system is to be provided, capable of pumping from and draining watertight compartments other than spaces permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions whether the unit is upright or inclined, as specified in 11-1-2/1.

These compartments are to be drained with at least two self-priming power bilge pumps, or equivalent means. Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connections to the bilge pumping system.

Additional suctions are to be provided in large compartments or compartments of unusual form, as deemed necessary by ACS. Arrangements are to be made whereby water inthe compartment may find its way to the suction pipes. Compartments not provided with a bilge suction may be drained to other spaces provided with bilge pumping capability. Means is to be provided to detect the presence of water in such compartments which are adjacent to the sea or adjacent to tanks containing liquids and in void compartments through which pipes conveying liquids pass. If ACS is satisfied that the safety of the unit is not impaired the bilge pumping arrangements and the means to detect the presence of water may be dispensed with in particular compartments.

All bilge pipes are to be of steel or other suitable material having properties acceptable to ACS. Special consideration is to be given to the design of bilge lines passing through ballast tanks taking into account effects of corrosion or other deterioration.

The arrangement of the bilge pumping system is to be such as to prevent the possibility of water passing from the sea into dry spaces, or inadvertently from one compartment to another.

1.2

All distribution boxes and manually operated valves in connection with the bilge pumping arrangements are to be in positions which are accessible under normal circumstances. Where such valves are located in normally unmanned spaces below the assigned load line and not provided with high bilge water level alarms, they are to be operable from outside the space.

A means to indicate whether a valve is open or closed is to be provided at each location from which the valve can be controlled. The indicator is to rely on movement of the valve spindle.

SECTION 2 Size of Bilge Main

1 General

1.1

The cross-sectional area of the main bilge line is not to be less than the combined areas of the two largest branch suctions.

SECTION 3 Size of Bilge Branch Suctions

1 General

1.1

The internal diameter of branch suctions from each compartment is not to be less than stipulated by the following formula, rounded to the nearest 5 mm size:

$$d = 2.15\sqrt{A} + 25 \quad mm$$

where:

$A \equiv$ wetted surface (m^2) of the compartment, excluding stiffening nenbers when the compartment is half filled with water.

The internal diameter of any bilge line is not to be less than 50 mm.

SECTION 4 Size of Bilge Pumps

1 General

1.1

Each bilge pump is to be capable of giving a speed of water through the bilge main of not less than 2 m per second. When more than two pumps are connected to the bilge system, their aggregate capacity is not to be less effective.

SECTION 5 Chain Lockers

1 General

1.1

Chainlockers are to be capable of being drained by a permanently installed bilge or drainage system or by portable means.

Means are to be provided for removal of mud and debris from the bilge or drainage system.

SECTION 6 Void Compartments

1 General

1.1

Void compartments adjacent to the sea or to tanks containing liquids, and void compartments through which piping conveying liquids passes, are to be capable of being drained by permanently installed bilge or drainage systems or by portable means.

If portable pumps are used, two pumps are to be provided and both pumps and arrangements for pumping are to be readily accessible.

Void compartments as defined above which are not provided with bilge or drainage systems in compliance with the above are to be accounted for in the drilling unit's stability analysis.

SECTION 7 Bilge Alarm

1 General

1.1

Propulsion rooms or pump rooms in lower hulls of column stabilized drilling units which normally are unattended are to be provided with two independent systems of high bilge level detection.

SECTION 8 Bilge Suctions from Hazardous Areas

1 General

1.1

Piping systems are to be designed to preclude direct communication between hazardous areas of different classifications and between hazardous and non-hazardous areas.

SECTION 9 Additional Requirements for Column-Stabilized Drilling Units

1 General

1.1

Chain lockers which, if flooded, could substantially affect the drilling unit's stability are to be provided with a remote means to detect flooding and a permanently installed means of dewatering. Remote indication of flooding is to be provided at the central ballast control station.

1.2

At least one of the pumps referred to in 11-4-1/1.1 and all pump-room bilge suction valves are to be capable of both remote and local operation.

1.3

Propulsion rooms and pump-rooms in lower hulls are to be provided with two independent systems for high bilge water level detection providing an audible and visual alarm at the central ballast control station.

SECTION 10 Additional Requirements for Periodically Unattended Machinery Spaces

1 General

1.1

High bilge-water level in periodically unattended machinery spaces below the assigned load line is to activate an audible and visual alarm at the locations determined in accordance with 11-1-6/6.1.

1.2

Bilge wells are to be provided, where practicable, in periodically unattended machinery spaces and are to be large enough to accommodate easily the normal drainage during unattended periods. They are to be located and monitored in such a way that the accumulation of liquids is detected at pre-set levels, at normal angles of inclination.

1.3

Where the bilge pumps are capable of being started automatically, means are to be provided to indicate at the locations determined in accordance with 11-1-6/6.1 when the influx of liquid is greater than the pump capacity or when the pump is operating more frequently than would normally be expected. In these cases, smaller bilge wells to cover a reasonable period of time may be permitted. Where automatically controlled bilge pumps are provided, special attention is to be given to oil pollution prevention requirements.

Chapter 5 Tank Vents, Overflows and Sounding Arrangements

SECTION 1 General

1 General

1.1

Tank vents and overflows are to be located giving due regard to damage stability and the location of the final calculated immersion line in the assumed damage condition. Tank vents and overflows which could cause progressive flooding are to be avoided unless special consideration has been taken in the damage stability review. Location and arrangement of vent pipes for fuel oil service, settling and lubrication oil tanks are to be such that, in the event of a broken vent pipe, the risk of ingress of rainwater or seawater is minimized.

1.2

In cases where tank vents and overflows terminate externally or in spaces assumed flooded, the vented tanks are to be also considered flooded. In cases where tanks are considered damaged, the spaces in which their vents or overflows terminate are also to be considered flooded.

1.3

Vents and overflows from tanks not considered flooded as a result of damage and located above the final calculated immersion line may require to be fitted with automatic means of closing.

SECTION 2 Vent Size

1 General

1.1

The size of the vents is to be in accordance with ACS Rules for Classification of Vessels with due consideration being given to the design pressure of the tank.

SECTION 3 Sounding Arrangements

1 General

1.1

All tanks are to be provided with separate sounding pipes, or approved remote level indicating system. Where a sounding pipe exceeds 20 m in length, the minimum internal diameter is to be to at least 50 mm.

1.2

Where a remote level indicating system is used, an additional sounding system is to be provided for tanks which are not always accessible.

1.3

Void compartments adjacent to the sea or tanks containing liquids and void compartments through which piping carrying liquids passes are to be fitted with separate sounding pipes, approved tank liquid level indicating apparatus or be fitted with means to determine if the void tanks contain liquids. Voids as defined above which do not comply with this requirement are to be accounted for in the drilling unit's stability analysis.

Chapter 6 Flammable Oils

SECTION 1 General

1 General

1.1

Use of oil fuels of a flash point below 60°C but not less than 43°C, closed cup test, may be accepted in the following cases :

- Drilling units classed for restrictive service within areas where the ambient temperature of spaces, where such fuel is stored, will not rise to within 10°C of the flash point of the oil fuel; and
- For emergency generators.

1.2

Units carrying oil fuel, as defined in regulation 1 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, are to be provided with material safety data sheets, based on the IMO resolution MSC 286(86), prior to the bunkering of oil fuel.

SECTION 2 Fuel Storage for Helicopter Facilities

1 General

1.1

Areas where such fuel tanks are situated and fueling operations conducted are to be suitably isolated from enclosed spaces or other areas which contain a source of vapour ignition.

Fuel storage tanks are to be of approved metallic construction and are to be adequate for the installation. Special attention is to be given to the design, mounting and securing arrangements and electrical bonding of the tank and fuel transfer system.

The storage and handling area is to be permanently marked. Coamings or other arrangements are to be provided to contain fuel-oil spills.

SECTION 3 Arrangements for Oil Fuel, Lubricating Oil and other Flammable Oils

1 General

1.1

Arrangements for the storage, distribution and utilization of oil fuel, oil used in pressure lubrication systems, other flammable oils employed under pressure in power transmission systems, control and activating systems and heat transfer systems are to be such as to ensure the safety of the unit and persons on board.

1.2

In machinery spaces pipes, fittings and valves carrying flammable oils are to be of a material approved by ACS, having regard to the risk of fire.

1.3

Two fuel oil service tanks for each type of fuel used on board necessary for propulsion and vital systems or equivalent arrangements are to be provided, each with a capacity of at least eight hours at the maximum continuous rating of the propulsion plant, if any, and normal operating load of the generator plant.

1.4 High Pressure Fuel Delivery Lines

(a) All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors are to be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system is to include a means for collection of leakages and arrangements are to be provided for an alarm to be given of a fuel line failure.

(b) All surfaces with temperatures above 220°C, which may be impinged as a result of a fuel system failure, are to be properly insulated.

(c) Oil fuel lines are to be screened or otherwise suitably protected to avoid, as far as practicable, oil spray or oil leakages onto hot surfaces, into machinery air intakes, or other sources of ignition. The numbers of joints in such piping systems are to be kept to a minimum.

Chapter 7 Steam Pipe Systems

SECTION 1 General

1 General

1.1

Every steam pipe and every fitting connected thereto through which steam may pass is to be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected.

1.2

Efficient means are to be provided for draining every steam pipe where dangerous water hammer action might otherwise occur.

1.3

If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed, a suitable reducing valve, relief valve and pressure gauge are to be fitted.

Chapter 8 Air Pressure Systems

SECTION 1 General

1 General

1.1

In every unit means are to be provided to prevent excess pressure in any part of compressed air systems and where water jackets or casings of air compressors and coolers might be subjected to dangerous excess pressure due to leakage into them from air pressure parts. Suitable pressure-relief arrangements are to be provided for all systems.

SECTION 2 Starting Air Systems

1 General

1.1

The starting air arrangements for internal combustion engines are to be adequately protected against the effects of backfiring and internal explosions in the starting air pipes.

1.2

Starting air pipes from the air receivers to internal combustion engines are to be entirely separate from the compressor discharge pipe system.

1.3

Provision is to be made to reduce to a minimum the entry of oil into the starting air pressure systems and to drain these systems.

PART

12

Electrical Installations

Chapter 1 General

SECTION 1 Scope

1 General

1.1

The following requirements apply to electrical equipment essential to the safe operation of the drilling unit. These requirements do not apply to electrical equipment and systems used solely for the drilling operation except in so far as safety is concerned. Attention is, however, to be given to any relevant statutory regulation of the National Authority of the country in which the drilling unit is to be registered.

SECTION 2 Design and Construction

1 General

1.1

Electrical propelling machinery and associated equipment together with auxiliary services essential for the safety of the drilling unit are to be constructed and installed in accordance with the relevant requirements of ACS Rules for Classification of Vessels and as specified herein.

The following equipment is regarded as essential:

i. Ventilation of hazardous areas and those areas maintained at an overpressure to exclude the ingress of dangerous gases;

ii. Navigation and special purpose lights, lights for all machinery spaces, control stations, alleyways, stairway and exits;

iii. Fire Pumps;

iv. Propulsion Equipment;

v. Power Generation Equipment;

vi. Bilge Pumps;

vii. Ballast Pumps for Column-Stabilized Drilling Units.

1.2

The design and installation of other equipment including that used for drilling operations is to be such that there is minimal risk of fire due to its failure. It must, as a minimum, comply with an acceptable specification, standard or code, revised where necessary, for the ambient conditions.

1.3

For lighting in hazardous areas or spaces, switches are to be of the two-pole type and wherever practicable located in a non- hazardous area.

1.4

Electrical installations are to be such that:

1. all electrical services necessary for maintaining the unit in normal operational and habitable conditions will be assured without recourse to the emergency source of power;
2. electrical services essential for safety will be assured in case of failure of the main source of electrical power;
3. electromagnetic compatibility of electrical and electronic equipment is assured; and
4. the safety of personnel and unit from electrical hazards will be assured.

SECTION 3 Cathodic Protection

1 General

1.1

Details of impressed-current cathodic protection systems, including installation and locations, are to be submitted for approval when such systems are installed.

SECTION 4 Alternative Design and Arrangements

1 General

1.1

When alternative design or arrangements deviate from the provisions of the rules, an engineering analysis, evaluation and approval of the design and arrangements is to be carried out in accordance with MODU Code 2009 (IMO Resolution A1023(26)) Chapter 4, Sec.4.2.

Chapter 2 Cables and Electrical Equipment in Hazardous Areas

SECTION 1 General

1 General

1.1

Electrical equipment and wiring installed in hazardous areas are to be limited to that necessary for operational purposes. Only the cables and types of equipment described in this section may be installed. Selection and installation of equipment and cables in hazardous areas are to be in accordance with international standards. (Refer to the list of recommendations 'A' by the International Electrotechnical Commission given at Annex 1 to this Part).

1.2

In selection of electrical apparatus for use in hazardous areas, consideration is to be given to:

1. the zone in which the apparatus will be used;
2. the sensitivity to ignition of the gases or vapours likely to be present, expressed as a gas group; and
3. the sensitivity of the gases or vapours likely to be present to ignition by hot surfaces, expressed as a temperature classification.

1.3

Electrical apparatus used in hazardous areas is to be manufactured, tested, marked and installed in accordance with international standards and certified by an independent testing laboratory recognized by the ACS. (Refer to the list of recommendations 'B' by the International Electrotechnical Commission given at Annex 1 to this Part).

Equipment classified in accordance with the Table 12.1 protection classes may be used:

Table 12.1: Electrical Protection Type	
Type	**Protection Method**
ia & ib	Intrinsic Safety
d	Flameproof Enclosures
e	Increased Safety
m	Encapsulation
n	Non Incendive
o	Oil Immersion
p	Pressurized Enclosures
q	Powder Filling
s	Special

1.4

Types of electrical equipment permitted are to be determined according to the electrical hazardous area classification of the location in which the equipment is to be installed. Permissible equipment is shown by a "✓" in Table 12.2. The use of type "O" (Oil Immersion) is to be limited. For transportable apparatus, protection type "O" is to not be used:

Table 12.2: Type of Electrical Apparatus used in Hazardous Zones										
Protection Type	ia	ib	d	e	m	n	o	p	q	s
Zone 0	✓									
Zone 1	✓	✓	✓	✓	✓		✓	✓	✓	
Zone 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1.5

Group selection for electrical equipment is to be as follows:

(1) Group II is to be selected for types "e", "m", "n", "o", "p", "q" and "s" apparatus;

(2) Group IIA, IIB or IIC is to be selected for types "i", "d", and certain types of "n" apparatus according to Table 12.3.

Table 12.3: Relationship between Gas/Vapour Group and Permitted Equipment Group	
Gas/Vapour Group	**Electrical Equipment Group**
IIC	IIC
IIB	IIB or IIC
IIA	IIA, IIB or IIC

1.6

Electrical apparatus is to be so selected that its maximum surface temperature will not reach ignition temperature of any gas/vapour possibly presenting in the hazardous areas in which the electrical apparatus is located. The relationship among equipment temperature class, equipment maximum surface temperature, gas/vapour ignition temperature is shown in Table 12.4.

Table 12.4: Relationship among Temperature Class, Maximum Surface Temperatur and Ignition Temperature		
Electrical Apparatus Temperature Class	**Electrical Apparatus Maximum Surface Temperature (°C)**	**Gas/Vapour Ignition Temperature (°C)**
T1	450	>450
T2	300	>300
T3	200	>200
T4	135	>135
T5	100	>100
T6	85	>85

1.7

Electrical apparatus located in hazardous drilling well and mud processing areas is to meet at least Group IIA and temperature class T3.

1.8

Electrical cables are to meet the following:

(1) Only cables associated with type “ia” equipment are to be permitted in zone 0 areas.

(2) Thermoplastic sheathed cables, thermosetting sheathed cables or elastomeric sheathed cables are to be used for fixed wiring in zone 2 areas.

(3) Flexible and portable cables, where necessary, used in zone 1 and zone 2 areas are to be to the satisfaction of ACS.

(4) Permanently installed, fixed cable passing through zone 1 hazardous areas is to be fitted with conductive covering, braiding or sheathed for earth detection.

Chapter 3 Main Source of Power

SECTION 1 Non Self-Propelled Drilling Units

1 General

1.1

Every unit is to be provided with a main source of electrical power which is to include at least two generating sets.

1.2

The power of these sets is to be such that it is still possible to ensure the functioning of the services referred to in 12-1-2/1.4, except for power servicing drilling operations, in the event of any one of these generating sets being stopped.

1.3

Where transformers or converters constitute an essential part of the supply system, the system is to be so arranged as to ensure the same continuity of the supply as stated in 12-3-1/1.2.

1.4

A main electrical lighting system which is to provide illumination throughout those parts of the unit normally accessible to and used by personnel is to be supplied from the main source of power.

1.5

The arrangement of the main lighting system is to be such that a fire or other casualty in the space or spaces containing the main source of power, including transformers or converters, if any, will not render the emergency lighting system under 12-4 inoperative.

1.6

The arrangement of the emergency lighting system is to be such that a fire or other casualty in the space or spaces containing the emergency source of power, including transformers or converters, if any, will not render the main lighting system required by this Chapter inoperative.

1.7

The main source of electrical power is to comply with the following:

1. Where the electrical power can normally be supplied by one generator, suitable load-shedding arrangements are to be provided to ensure the integrity of supplies to services required for propulsion and steering as well as the safety of the unit. In the case of loss of the generator in operation, adequate provision is to be made for automatic starting and connecting to the main switchboard of a standby generator of sufficient capacity to ensure safe navigation when underway and to ensure the safety of the unit with automatic restarting of the essential auxiliaries including, where necessary, sequential operations. ACS may dispense with these provisions where the power necessary to ensure the functioning of the service referred to in 12-1-2/1.4, except for power servicing drilling operations, is 250 kW or less.

2. If the electrical power is normally supplied by more than one generator simultaneously in parallel operation, provision is to be made, for instance, by load shedding to ensure that, in case of loss of one of these generating sets, the remaining ones are kept in operation without overload to ensure safe navigation when underway and to ensure the safety of the unit.

SECTION 2 Self-Propelled Drilling Units

1 General

1.1

In addition to complying with section 12-3-1, the main source of electrical power is to comply with the following:

1. The arrangement of the unit's main source of power is to be such that the services referred to in 12-1-2/1.4 can be maintained regardless of the speed and direction of the main propelling engines or shafting.

2. The generating plant is to be such as to ensure that with any one generator or its primary source of power out of operation, the remaining generator or generators will be capable of providing the electrical services necessary to start the main propulsion plant from a dead ship condition. The emergency generator may be used for the purpose of starting from a dead ship condition if its capability either alone or combined with that of any generator is sufficient to provide at the same time those services required by 12-4-1/1.10 unless an independent supply from an accumulator battery suitably located for use in an emergency and sufficient for the period of 18 hours is installed.

3. For electrically self-propelled units the application of 12-3-1/1.2 need only include for propulsion sufficient power to ensure safe navigation when underway.

4. Where electrical power is necessary to restore propulsion, the capacity is to be sufficient to restore propulsion to the unit in conjunction with other machinery, as appropriate, from a dead ship condition within 30 min after blackout.

1.2

The main switchboard is to be so placed relative to one main generating station that, as far as is practicable, the integrity of the normal supply may be affected only by a fire or other casualty in one space. An environmental enclosure for the main switchboard, such as may be provided by a machinery control room situated within the main boundaries of the space, is not to be considered as separating the switchboards from the generators.

1.3

Where the main source of electrical power is necessary for propulsion of the unit, the main busbar is to be subdivided into at least two parts which are to normally be connected by circuit breakers or other approved means; so far as is practicable, the connection of generating sets and other duplicated equipment is to be equally divided between the parts.

Chapter 4 Emergency Source of Power

SECTION 1 Non Self-Propelled Drilling Unit

1 General

1.1

Every unit is to be provided with a self- contained emergency source of power.

1.2

The emergency source of power is to be installed in a non-hazardous space. The emergency source of power, the transitional source of emergency power and the emergency switchboard is to be located on or above the uppermost continuous deck and above the worst damage waterline and inboard of the damage conditions specified in Part 4 and be readily accessible. They are to not be forward of the collision bulkhead, if any.

1.3

The location of emergency source of power and its arrangement in relation to the main source of electric power is to be such as to ensure that a fire, flooding or other failure in the space containing the main source or in any machinery space of category A will not interfere with the supply or distribution of emergency power. As far as practical, the space containing the emergency source of power, the transitional source of emergency power and the emergency switchboard are to not be contiguous to boundaries of machinery spaces of category A or of those spaces containing the main source of electrical power. Where the emergency source of power, the transitional source of emergency power, and the emergency switchboard are contiguous to the boundaries of machinery spaces of category A or to those spaces containing the main source of electrical power, or to spaces of zone 1 or zone 2, the contiguous boundaries are to be in compliance with Part 13.

1.4

Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency switchboard may be used to supply non-emergency circuits, and the emergency generator may be used exceptionally and for short periods to supply non-emergency circuits.

1.5

For units where the main source of electrical power is located in two or more spaces which have their own systems, including power distribution and control systems, completely independent of the systems in the other spaces and such that a fire or other casualty in any one of the spaces will not affect the power distribution from the others, or to the services under 12-4-1/1.6, the provisions of 12-4-1/1.1 may be considered satisfied without an additional emergency source of electrical power, provided that ACS is satisfied that:

1. There are at least two generating sets, meeting the provisions of 12-4-1/1.15 and each of sufficient capacity to meet the provisions of 12-4-1/1.6, in each of at least two spaces;

2. The arrangements under 12-4-1/1.5(1) in each such space are equivalent to those under 12-12-4-1/1.8 and 12-4-1/1.11 to 1.14 and 12-4-3 so that a source of electrical power is available at all times to the services under 12-4-1/1.6;

3. the location of each of the spaces referred to in 12-4-1/1.5(1) is in compliance with 12-4-1/1.2 and the boundaries meet the provisions of 12-4-1/1.3 except that contiguous boundaries are to consist of an “A-60” bulkhead and a cofferdam, or a steel bulkhead insulated to class “A-60” on both sides.

1.6

The power available is to be sufficient to supply all services necessary for the safety of all on board in an emergency due regard being paid to such services as may have to be operated simultaneously. The emergency source of power is to be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation:

1. For a period of 18 hours the following lighting:
   (a) Navigation lights, special purpose lights, warning system, other lights and sound signals, required by the International Regulations for the Prevention of Collisions at Sea, in force;

(b) Emergency lighting for machinery spaces and main generating stations including their control positions, control stations and in all machinery control rooms, at every embarkation station on deck and over sides, all service and accommodation alleyways, personnel lift cars, and personnel lift trunks, stairways and exits;

(c) Emergency lighting for personnel lift cars and personnel lift trunks;

(d) Emergency lighting in all spaces from which control of the drilling process is performed and where controls of machinery essential for this process, or devices for emergency switching-off of the power plant are located;

(e) Emergency lighting at the storage position(s) for firemen's outfits;

(f) Emergency lighting at the sprinkler pump if any, at one of the fire pumps if dependent upon the emergency generator for its source of power, at the emergency bilge pump if any, and at their starting positions;

(g) Emergency lighting on helicopter decks to include perimeter and helideck status lights, wind direction indicator illumination, and related obstruction lights, if any.

2. For a period of 18 hours the following equipment:

(a) General alarm and communications systems that is required in an emergency;

(b) Fire and gas detection systems and their alarms, intermittent operation of the manual fire alarms and all internal signals that are required in an emergency;

(c) Fire extinguishing systems;

(d) One of the fire pumps, if dependent upon the emergency generator for its source of power;

(e) Permanently installed diving equipment necessary for the safe conduct of diving operations, if dependent upon the drilling unit's electrical power;

(f) Abandonment systems dependent on electric power;

(g) The capability of closing the blow-out preventer and of disconnecting the drilling unit from the well head arrangement, if electrically controlled, unless it has an independent supply from an accumulator battery suitably located for use in an emergency and sufficient for the period of 18 hours;

(h) On Column-Stabilized Drilling Units: Ballast valve control system, ballast valve position indicating system, draft level indicating system, tank level indicating system, and the largest single ballast pump required by Part 11.

3. For a period of half an hour:

(a) Power to operate the watertight doors as provided under 4-2-3/2.2, but not necessarily all of them simultaneously, unless an independent temporary source of stored energy is provided; and

(b) power to operate the controls and indicators provided under 4-2-3/2.2.

4. For a period of four days, signaling lights and sound signals required for marking of offshore structures.

1.7

The emergency source of power may be either a generator or an accumulator battery.

1.8

Where the emergency source of power is a generator it is to be:

1. driven by a suitable prime mover with an independent supply of fuel, having a flashpoint of not less than 43°C;

2. started automatically upon failure of the normal electrical supply unless a transitional source of emergency power in accordance with 12-4-1/1.8(3) is provided; where the emergency generator is automatically started, it is to be automatically connected to the emergency switchboard; those services referred to in 12-4-1/1.10 are to then be connected automatically to the emergency generator; and unless a second independent means of starting the emergency generator is provided, the single source of stored energy is to be protected to preclude its complete depletion by the automatic starting system; and

3. provided with a transitional source of emergency power, as specified in 12-4-1/1.10, unless the emergency generator is capable of supplying the services mentioned in 12-4-1/1.10 and of being automatically started and supplying the required load as quickly as is safe and practicable but in not more than 45 sec.

1.9

Where the emergency source of power is an accumulator battery it is to be capable of:

1. carrying the emergency load without recharging while maintaining the voltage of the battery throughout the discharge period within plus or minus 12% of its nominal voltage;

2. automatically connecting to the emergency switchboard in the event of failure of the main power supply; and

3. immediately supplying at least those services specified in 12-4-1/1.10 .

1.10

The transitional source or sources of emergency power, under 12-4-1/1.8(3), are to consist of an accumulator battery suitably located for use in an emergency, which is to operate without recharging whilst maintaining the voltage of the battery throughout the discharge period within plus or minus 12% of its nominal voltage, and be of sufficient capacity and so arranged as to supply automatically, in the event of failure of either the main or the emergency source of power, the following services for half an hour at least if they depend upon an electrical source for their operation:

1. the lighting under 12-4-1/1.6(1). For this transitional phase, the required emergency lighting, in respect of the machinery space and accommodation and service areas, may be provided by permanently fixed, individual accumulator lamps which are automatically charged and operated;
2. all essential internal communication equipment under 12-4-1/1.6(2.a) and (2.b); and
3. intermittent operation of the services referred to in 12-4-1/1.6(2.g),

unless, in the case of 12-4-1/1.10(2) and (3), they have an independent supply from an accumulator battery suitably located for use in an emergency and sufficient for the period specified.

1.11

The emergency switchboard is to be installed as near as is practicable to the emergency source of power and, where the emergency source of power is a generator, the emergency switchboard is to preferably be located in the same space.

1.12

No accumulator battery fitted to meet the provisions for emergency or transitional power supply is to be installed in the same space as the emergency switchboard, unless appropriate measures to the satisfaction of ACS are taken to extract the gases discharged from the said batteries. An indicator is to be mounted in a suitable place on the main switchboard or in the machinery control room to indicate when the batteries constituting either the emergency source of power or the transitional source of power, referred to in 12-4-1/1.10 or 12-4-1/1.11, are being discharged.

1.13

The emergency switchboard is to be supplied in normal operation from the main switchboard by an interconnector feeder which is to be adequately protected at the main switchboard against overload and short circuit. The arrangement at the emergency switchboard is to be such that the interconnector feeder is disconnected automatically at the emergency switchboard upon failure of the main power supply. Where the system is arranged for feedback operation, the interconnector feeder is to also be protected at the emergency switchboard at least against short circuit.

1.14

In order to ensure ready availability of emergency supplies, arrangements are to be made where necessary to disconnect non- emergency circuits automatically from the emergency switchboard to ensure that power is available automatically to the emergency circuits.

1.15

The emergency generator and its prime mover and any emergency accumulator battery are to be designed to function at full rated power when upright and when inclined up to the maximum angle of heel in the intact and damaged condition, as determined in accordance with Part 4. In no case need the equipment be designed to operate when inclined more than:

(1) 25° in any direction on a column-stabilized unit;

(2) 15° in any direction on a self-elevating unit; and

(3) 22.5° about the longitudinal axis and/or when inclined 10° about the transverse axis on a surface unit.

1.16

Provision is to be made for the periodic testing of the complete emergency system.

This is to include the testing of transitional sources and automatic starting arrangements.

SECTION 2 Self-Propelled Drilling Units

1 General

1.1

In addition to complying with Section 1 of this Part, the emergency source of power is to provide:

1. For a period of 18 hours, emergency lighting at the steering gear;

2. For a period of 18 hours:

   2.1 Navigational Aids as required by MODU Code 2009 (IMO Resolution A1023(26)) Chapter 7, Sec.7.10;

   2.2 Intermittent operation of the daylight signalling lamp and the unit's whistle; unless they have an independent supply from an accumulator battery suitably located for use in an emergency and sufficient for the period of 18 hours;

   2.3 For the period of 30 min or a lesser period as permitted by MODU Code 2009 (IMO Resolution A1023(26)) Chapter 7, Sec.7.10, the steering gear.

SECTION 3 Starting Arrangements for Emergency Generators

1 General

1.1

Emergency generators are to be capable of being readily started in their cold condition down to a temperature of 0°C. If this is impracticable, or if lower temperatures are likely to be encountered, consideration is to be given to the provision and maintenance of heating arrangements, acceptable to ACS, so that ready starting will be assured.

1.2

Each emergency generator which is arranged to be automatically started is to be equipped with starting arrangements acceptable to ACS with a storage energy capability of at least three consecutive starts. A second source of energy is to be provided for an additional three starts within 30 min unless hand (manual) starting can be demonstrated to be effective.

1.3

Provision is to be made to maintain the stored energy at all times.

1.4

Electrical and hydraulic starting systems are to be maintained from the emergency switchboard.

1.5

Compressed air starting systems may be maintained by the main or auxiliary compressed air receivers, through a suitable non-return valve or by an emergency air compressor energized by the emergency switchboard.

1.6

All of these starting, charging and energy storing devices are to be located in the emergency generator room; these devices are to not be used for any purpose other than the operation of the emergency generator set. This does not preclude the supply to the air receiver of the emergency generator set from the main or auxiliary compressed air system through a non- return valve fitted in the emergency generator room.

1.7

When automatic starting is not required by these provisions and where it can be demonstrated as being effective, hand (manual) starting is permissible, such as manual cranking, inertia starters, manual hydraulic accumulators, or powder cartridges.

1.8

When hand (manual) starting is not practicable, the provisions in 12-4-3/1.2 and 12-4-3/1.3 to 1.6 are to be complied with, except that starting may be manually initiated.

Chapter 5 Precautions against Shock, Fire and Other Hazards of Electrical Origin

SECTION 1 General

1 General

1.1

Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live are to be earthed (grounded) unless the machines or equipment are:

1. supplied at a voltage not exceeding 55 V direct current or 55 V, root mean square between conductors; auto-transformers are to not be used for the purpose of achieving this voltage; or
2. supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device; or
3. constructed in accordance with the principle of double insulation.

1.2

ACS may require additional precautions for portable electrical equipment for use in confined or exceptionally damp spaces where particular risks due to conductivity may exist.

1.3

All electrical apparatus are to be so constructed and so installed that it does not cause injury when handled or touched in the normal manner.

1.4

Where not obtained through normal construction, arrangements are to be provided to effectively earth (ground) all permanently installed machinery, metal structures of derricks, masts and helicopter decks.

1.5

Switchboards are to be so arranged as to give easy access, where needed, to apparatus and equipment, in order to minimize danger to personnel. The sides and backs and, where necessary, the fronts of switchboards are to be suitably guarded. Exposed live parts having voltages to earth (ground) exceeding 50 V are not to be installed on the front of such switchboards. There are to be non-conducting mats or gratings at the front and rear, where necessary.

1.6

Distribution systems with hull return are to not be installed, but this does not preclude, under conditions approved by ACS, the installation of:

1. impressed current cathodic protective systems;

2. limited and locally earthed systems (e.g. engine starting systems);

3. limited and locally earthed welding systems; where ACS is satisfied that the equipotential of the structure is assured in a satisfactory manner, welding systems with hull return may be installed without this restriction; and

4. insulation level monitoring devices provided the circulation current does not exceed 30 mA under the most unfavourable conditions.

1.7

When a distribution system, whether primary or secondary, for power, heating or lighting, with no connection to earth is used, a device capable of continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values is to be provided.

1.8

Except as permitted by ACS in exceptional circumstances, all metal sheaths and armour of cables are to be electrically continuous and are to be earthed (grounded).

1.9

All electric cables and wiring external to equipment are to be at least of a flame-retardant type and are to be so installed as not to impair their original flame-retarding properties. Where necessary for particular applications, ACS may permit the use of special types of cables such as radio frequency cables, which do not comply with the foregoing.

1.10

Cables and wiring serving essential or emergency power, lighting, internal communications or signals are to, so far as practicable, be routed clear of galleys, machinery spaces of category A and their casings and other high fire risk areas. Cables connecting fire pumps to the emergency switchboard are to be of a fire-resistant type where they pass through high fire risk areas.
Where practicable all such cables are to be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.

1.11

Cables and wiring are to be installed and supported in such a manner as to avoid chafing or other damage. Refer to the recommendations published by the International Electrotechnical Commission concerning flame-retarding properties of bunched cables and characteristics of cables of a fire-resistant type.

1.12

Terminations and joints in all conductors are to be so made that they retain the original electrical, mechanical, flame-retarding and, where necessary, fire-resisting properties of the cable.

1.13

Each separate circuit is to be protected against short circuit and against overload, except as permitted in Part 11, or where ACS may exceptionally otherwise permit.

1.14

The rating or appropriate setting of the overload protection device for each circuit is to be permanently indicated at the location of the protection device.

1.15

Lighting fittings are to be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

1.16

Accumulator batteries are to be suitably housed, and compartments used primarily for their accommodation are to be properly constructed and efficiently ventilated.

1.17

Electrical or other equipment which may constitute a source of ignition of flammable vapours are to not be permitted in these compartments except as permitted in 12-5-1/1.19 .

1.18

Accumulator batteries, except for batteries of self-contained battery-operated lights, are to not be located in sleeping quarters. ACS may grant exemptions from or equivalencies to this provision where hermetically sealed batteries are installed.

1.19

In paint lockers, acetylene stores, and similar spaces where flammable mixtures are liable to collect as well as any compartment assigned principally to accumulator batteries, no electrical equipment is to be installed unless ACS is satisfied that such equipment is:

1. essential for operational purposes;
2. of a type which will not ignite the mixture concerned;
3. appropriate to the space concerned; and
4. appropriately certified for safe usage in the vapours or gases likely to be encountered.

1.20

Electrical apparatus and cables are to, where practicable, be excluded from any compartment in which explosives are stored. Where lighting is required, the light is to come from outside, through the boundaries of the compartment. If electrical equipment cannot be excluded from such a compartment it is to be so designed and used as to minimize the risk of fire or explosion.

1.21

Where spilling or impingement of liquids could occur upon any electrical control or alarm console, or similar electrical enclosure essential to the safety of the unit, such equipment is to have suitable protection against the ingress of liquids.

Chapter 6 Emergency Shutdown Facilities

SECTION 1 Emergency Conditions due to Drilling Operations

1 General

1.1

In view of exceptional conditions in which the explosion hazard may extend outside the areas defined in Part 10, special arrangements are to be provided to facilitate the selective dis-connection of shutdown of:

- Ventilating system except fans necessary for supplying combustion air to prime movers for the production of electrical power;
- All electrical equipment outside Zone 1 areas, except where of a certified safe type for Zone 1 applications;
- Main electrical generators and prime movers including the ventilation systems for these;
- Emergency equipment except those items listed in 12-6-2;
- Emergency generators prime movers

1.2

Initiation of the foregoing shutdown of facilities will be the operator's responsibility. The initiated action may vary according to the nature of the emergency. A recommended sequence of shutdowns is to be included in the Operating Manual.

1.3

In the case of units using dynamic positioning systems as a sole means of position keeping, special consideration may be given to the selective disconnection or shutdown of machinery and equipment associated with maintaining the operability of the dynamic positioning system in order to preserve the integrity of the well.

1.4

Disconnection or shutdown is to be possible from at least two strategic locations, one of which should be outside hazardous areas.

1.5

Shutdown systems that are provided to comply with paragraph 12-6-1/1.1 are to be so designed that the risk of unintentional stoppages caused by malfunction in a shutdown system and the risk of inadvertent operation of a shutdown are minimized.

SECTION 2 Equipment Remaining Operational after Emergency Shutdown

1 General

1.1

At least the following facilities are to be operable after an emergency shutdown. Equipment which is located in spaces other than enclosed spaces and arranged to be operated after complete shutdown as given in 12-4-1 is to be suitable for installation in Zone 2 locations. Such equipment, when located in enclosed spaces, is to be suitable for its intended application to the satisfaction of ACS:

- Emergency lighting required by 12-4-1/1.6 (1) for half an hour;
- blow-out preventer control system;
- General alarm system;
- Public address system; and
- Battery supplied radio communication installations.

Adequate power supply from a separate UPS is to be provided for the above.

Chapter 7 Alarms and Internal Communication

SECTION 1 General

1 General

1.1

Alarms and indicators are to be installed in accordance with the recommendations of ACS.

1.2

Each unit is to be provided with a general alarm system so installed as to be clearly perceptible in all normally accessible parts of the unit, including open decks. Control stations for activating the alarm are to be installed to the satisfaction of ACS. The signals used are to be limited to: general emergency, toxic gas (hydrogen sulphide), combustible gas, fire alarm, and abandon unit signals. These signals are to be described in the muster list and operating manual.

1.3

A public address system is to be provided. The system is to be clearly audible in all spaces that are normally accessible to personnel during routine operations. It is to be possible to make announcements at the following locations (if provided): Emergency response centre, navigation bridge, engine control room, ballast control station, jacking control station, and a location near the drilling console.

1.4

The signals given over the general alarm system are to be supplemented by instructions over the public address system.

1.5

Internal means of communication are to be available for transfer of information between all spaces where action may be necessary in case of an emergency.

1.6

Audible signals in high noise areas are to be supplemented with visual signals. Internal means of communication are to be available for transfer of information between all spaces where action may be necessary in case of an emergency.

Annex 1 List of "International Electrotechnical Commission" Standards

List of recommendations 'A' by the International Electrotechnical Commission:

IEC 61892-1:2001 Mobile and fixed offshore units − Electrical installations − Part 1: General requirements and conditions.

IEC 61892-2:2005 Mobile and fixed offshore units − Electrical installations − Part 2: System design. IEC 61892-3:2007 Mobile and fixed offshore units − Electrical installations − Part 3: Equipment.

IEC 61892-4:2007 Mobile and fixed offshore units − Electrical installations − Part 4: Cables.

IEC 61892-5:2000 Mobile and fixed offshore units − Electrical Installations − Part 5: Mobile units. IEC 61892-6:2007 Mobile and fixed offshore units − Electrical installations − Part 6: Installation.

IEC 61892-7:2007 Mobile and fixed offshore units − Electrical installations − Part 7: Hazardous areas.

List of recommendations 'B' by the International Electrotechnical Commission:

IEC 60079-4: 1975 Electrical apparatus for explosive gas atmospheres − Part 4: Method of test for ignition temperature.

IEC 60079-4A: 1970 Electrical apparatus for explosive gas atmospheres − Part 4: Method of test for ignition temperature − First supplement.

IEC 60079-10: 2002 Electrical apparatus for explosive gas atmospheres − Part 10: Classification of hazardous areas.

IEC/TR 60079-12: 1978 Electrical apparatus for explosive gas atmospheres − Part 12: Classification of mixtures of gases of vapours with air according to their maximum experimental safe gaps and minimum igniting currents.

IEC/TR 60079-13: 1982-01 Electrical apparatus for explosive gas atmosphere − Part 13: Construction and use of rooms or buildings protected by pressurization.
IEC 60079-14: 2007-12 Explosive atmospheres − Part 14: Electrical installations design, selection and erection.

IEC/TR 60079-16: 1990 Electrical apparatus for explosive gas atmospheres − Part 16: Artificial ventilation for the protection of analyser(s) houses.

IEC 60079-17: 2007 Explosive atmospheres − Part 17: Electrical installations inspection and maintenance.

IEC 60079-19: 2006-10 Explosive atmospheres − Part 19: Equipment repair, overhaul and reclamation. IEC/TR 60079-20: 1996 Electrical apparatus for explosive gas atmospheres − Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus.

IEC 60079-25: 2003 Electrical apparatus for explosive gas atmospheres − Part 25: Intrinsically safe systems.

IEC 60079-27: 2008 Explosive atmospheres − Part 27: Fieldbus intrinsically safe concept (FISCO).

IEC 60079-28: 2006 Explosive atmospheres − Part 28: Protection of equipment and transmission systems using optical radiation.

IEC 60079-29-1: 2007 Explosive atmospheres − Part 29-1: Gas detectors − Performance requirements of detectors for flammable gases.

IEC 60079-29-2: 2007 Explosive atmospheres − Part 29-2: Gas detectors − Selection, installation, use and maintenance of detectors for flammable gases and oxygen.

IEC 60079-30-1: 2007 Explosive atmospheres − Part 30-1: Electrical resistance trace heating − General and testing requirements.

IEC 60079-30-2: 2007 Explosive atmospheres − Part 30-2: Electrical resistance trace heating − Application guide for design, installation and maintenance.

PART

13

Safety Features

Chapter 1 General

SECTION 1 Fire Safety

1 General

1.1

Fire protection arrangements and fire extinguishing systems are to be in accordance with the requirements in Chapterss 2 to 10 of this Part.

1.2

Attention is drawn to the appropriate governmental authority in each case, as there may be additional requirements, depending on the size, type and intended service of the drilling units as well as other particulars and details. Consideration will be given to fire protection arrangements and fire extinguishing systems which comply with the published requirements of the governmental authority of the country in which the drilling unit is to be registered.

Also, attention is directed to IMO Resolution A.1023(26) regarding Code for the Construction and Equipment of Mobile Offshore Drilling Units, 2009 (2009 MODU CODE).

1.3

Fire safety systems are to be in accordance with ACS Rules for Classification of Vessels, as applicable.

1.4

When fire safety design or arrangements deviate from the provisions of the Rules, engineering analysis, evaluation and approval of the alternative design and arrangements is to be carried out in accordance with ACS Rules for Classification of Vessels.

SECTION 2 Fire Control Plan

1 General

1.1

A fire control plan complying with ACS Rules for Classification of Vessels is to be submitted for review and permanently exhibited on board on which the following as a minimum, should be clearly shown:

(1) Locations of fire control stations;

(2) Various fire sections enclosed by various classes of fire divisions;

(3) Arrangement of fire detectors and manual fire alarm stations;

(4) Arrangement of combustible gas detectors;

(5) Arrangement of hydrogen sulphide gas detectors;

(6) Locations of respiratory protection equipment for hydrogen sulphide;

(7) General alarm actuating positions;

(8) Arrangement of various fire-extinguishing appliances;

(9) Locations of Fire-fighter's Outfits;

(10) Location of Helicopter Crash Kit;

(11) Arrangement of water spray nozzles and sprinklers (if fitted);

(12) Locations of emergency shutdown (such as oil fuel source shutdown, engine shutdown, etc.) stations;

(13) The Ventilating system including Fire dampers positions, Ventilating Fans control positions with indication of identification numbers of Ventilating Fans serving each section;

(14) Arrangement of fire/watertight doors and their remote control positions;

(15) Blowout preventer control positions;

(16) Escape route and means of access to different compartments, decks, etc. ;

(17) Locations of Emergency Escape Breathing Devices (EEBD); and

(18) Arrangement of emergency muster stations and life-saving appliances.

SECTION 3 Other Safety Arrangements

1 General

1.1

Alarms for the safety of the unit are to be as given in Chapter 11.

Chapter 2 Structural Fire Protection

SECTION 1 General

1 General

1.1

These provisions have been formulated principally for units having their hull superstructure, structural bulkheads, decks and deckhouses constructed of steel.

1.2

Units constructed of other materials may be accepted, provided that, in the opinion of ACS, they provide an equivalent standard of safety.

1.3

Structural fire protection details, materials and methods of construction are to be in accordance with the FTP Code, as applicable, and ACS Rules for Classification of Vessels, as applicable.

SECTION 2 Fire Integrity of Bulkheads and Decks

1 General

1.1

In addition to complying with the specific provisions for fire integrity of bulkheads and decks in this section and in section 2.3, the minimum fire integrity of bulkheads and decks is to be as prescribed in tables 13.1 and 13.2. Exterior boundaries of superstructures and deckhouses enclosing accommodation, including any overhanging decks which support such accommodation, are to be constructed to "A-60" standard for the whole of the portion which faces and is within 30 m of the centre of the rotary table. For units that have a movable substructure the 30 m is to be measured with the substructure at its closest drilling position to the accommodation. ACS may accept equivalent arrangements.

1.2

The following provisions are to govern application of the tables:

1. Tables 13.1 and 13.2 are to apply respectively to the bulkheads and decks separating adjacent spaces.

2. For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk, as shown in categories (1) to (11) below. The title of each category is intended to be typical rather than restrictive. The number in parenthesis preceding each category refers to the applicable column or row in the tables:

   (1) Control stations are spaces as defined in 1.1.2 .
   (2) Corridors mean corridors and lobbies.
   (3) Accommodation spaces are spaces as defined in 1.1.2, excluding corridors, lavatories and pantries containing no cooking appliances.
   (4) Stairways are interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto. In this connection a stairway which is enclosed only at one level is to be regarded as part of the space from which it is not separated by a fire door.
   (5) Service spaces (low risk) are lockers, store- rooms and working spaces in which flammable materials are not stored, drying rooms and laundries.

(6) Machinery spaces of category A are spaces as defined in 1.1.2 .

(7) Other machinery spaces are spaces as defined in 1.1.2 other than machinery spaces of category A.

(8) Hazardous areas are areas as defined in 1.1.2 .

(9) Service spaces (high risk) are lockers, store- rooms and working spaces in which flammable materials are stored, galleys, pantries containing cooking appliances, paint rooms and workshops other than those forming part of the machinery space.

(10) Open decks are open deck spaces, excluding hazardous areas.

(11) Sanitary and similar spaces are communal sanitary facilities such as showers, baths, lavatories, etc., and isolated pantries containing no cooking appliances. Sanitary facilities which serve a space and with access only from that space are to be considered a portion of the space in which they are located.

1.3

Continuous “B” class ceilings or linings in association with the relevant decks or bulkheads may be accepted as contributing wholly or in part to the required insulation and integrity of a division.

1.4

In approving structural fire protection details, ACS will consider the risk of heat transmission at intersections and terminal points of required thermal barriers. The insulation of a deck or bulkhead is to be carried past the penetration, intersection or terminal point for a distance of at least 450 mm in the case of steel and aluminium structures. If a space is divided with a deck or a bulkhead of “A” class standard having insulation of different values, the insulation with the higher value is to continue on the deck or bulkhead with the insulation of the lesser value for a distance of at least 450 mm.

1.5

Windows and sidescuttles, with the exception of navigating bridge windows, are to be of the non-opening type. Navigating bridge windows may be of the opening type provided the design of such windows permits rapid closure. ACS may accept windows and sidescuttles outside hazardous areas to be of the opening type.

1.6

The fire resistance of doors is to, as far as practicable, be equivalent to that of the division in which they are fitted. External doors in superstructures and deckhouses are to be constructed to at least “A-0” class standard and be self-closing, where practicable.

1.7

Self-closing doors in fire rated bulkheads are not to be fitted with hold-back hooks. However, hold-back arrangements incorporating remote release fittings of the fail-safe type may be utilized.

1.8

Windows and side scuttles in boundaries which are required to meet an “A-60” standard which face the drill floor area are to be:

1. constructed to an “A-60” standard; or

2. protected by a water curtain; or

3. fitted with shutters of steel or equivalent material.

SECTION 3 Protection of Accommodation Spaces, Service Spaces and Control Stations

1 General

1.1

In general, accommodation spaces, service spaces and control stations are to not be located adjacent to hazardous areas. However, where this is not practicable, an engineering evaluation is to be performed to ensure that the level of fire protection and blast resistance of the bulkheads and decks separating these spaces from the hazardous areas are adequate for the likely hazard.

1.2

All bulkheads that are to be "A" class divisions are to extend from deck to deck and to the deckhouse side or other boundaries.

1.3

All bulkheads forming "B" class divisions are to extend from deck to deck and to the deckhouse side or other boundaries, unless continuous "B" class ceilings or linings are fitted on both sides of the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining. In corridor bulkheads, ventilation openings may be permitted only in and under the doors of cabins, public spaces, offices and sanitary spaces. The openings are to be provided only in the lower half of the door. Where such an opening is in or under a door, the total net area of any such opening or openings is not to exceed 0.05 m^2 . When such an opening is cut in a door it is to be fitted with a grille made of non-combustible material. Such openings are not to be provided in a door in a division forming a stairway enclosure.

1.4

Stairs are to be constructed of steel or equivalent material.

1.5

Stairways which penetrate only a single deck are to be protected at least at one level by “A” or “B” class divisions and self-closing doors so as to limit the rapid spread of fire from one deck to another. Personnel lift trunks are to be protected by “A” class divisions. Stairways and lift trunks which penetrate more than a single deck are to be surrounded by “A” class divisions and protected by self-closing doors at all levels.

1.6

Air spaces enclosed behind ceilings, panellings or linings are to be divided by close fitting draught stops spaced not more than 14 m apart. In the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc., are to be closed at each deck.

Table 13-1: Fire integrity of Bulkheads Separating Adjacent Spaces

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control Stations	(1)	A-0(d)	A-0	A-60	A-0	A-15	A-60	A-15	A-60(e)	A-60	*	A-0
Corridors	(2)		C	B-0	B-0 A-0(b)	B-0	A-60	A-0	A-0(e)	A-0	*	B-0
Accommodation spaces	(3)			C	B-0 A-0(b)	B-0	A-60	A-0	A-0(e)	A-0	*	C
Stairways	(4)				B-0 A-0(b)	B-0 A-0(b)	A-60	A-0	A-0(e)	A-0	*	B-0 A-0(b)
Service spaces (low risk)	(5)					C	A-60	A-0	A-0	A-0	*	B-0
Machinery spaces of category A	(6)						* (a)	A-0(a)	A-0	A-60	*	A-0
Other machinery spaces	(7)							A-0(a)(c)	A-60	A-0	*	A-0
Hazardous areas	(8)							A-0	A-0	A-0	-	A-0
Service spaces (high risk)	(9)									A-0©	*	A-0
Open decks	(10)										-	*
Sanitary and similar spaces	(11)											C
			See notes under table 13-2									

Table 13-2: Fire integrity of Decks Separating Adjacent Spaces

Spaces Below ▼ Space Above ▶		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control Stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0[e]	A-0	*	A-0
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	A-0[e]	A-0	*	*
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0[e]	A-0	*	*
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0[e]	A-0	*	A-0
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	* [a]	A-60	A-60	A-60	*	A-0
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0(a)	* [a]	A-0	A-0	*	A-0
Hazardous areas	(8)	A-60[e]	A-0[e]	A-0[e]	A-0[e]	A-0	A-60	A-0	-	A-0	*	A-0
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0[c]	*	A-0
Open decks	(10)	*	*	*	*	*	*	*	-	*	-	*
Sanitary and similar spaces	(11)	A-0	A-0	*	A-0	*	A-0	A-0	A-0	A-0	*	*

Notes: to be applied to tables 2.1 and 2.2, as appropriate.

(a) Where the space contains an emergency power source or components of an emergency power source adjoining a space containing a ship's service generator or the components of a ship's service generator, the boundary bulkhead or deck between those spaces is to be an "A-60" class division.
(b) For clarification as to which note applies see 13-2-3/1.3 and 1.5.
(c) Where spaces are of the same numerical category and superscript "c" appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g., in category (9), a galley next to a galley does not require a bulkhead but a galley next to a paint room requires an "A-0" bulkhead.
(d) Bulkheads separating the navigating bridge, chartroom and radio room from each other may be "B-0" rating.
(e) An engineering evaluation is to be conducted in accordance with 13-2-3/1.1. In no case the bulkhead or deck rating is to be less than the value indicated in the tables.

* Where an asterisk appears in the tables, the division is to be of steel or equivalent material, but need not be of "A" class standard. However, where a deck is penetrated for the passage of electric cables, pipes and vent ducts, such penetrations are to be made tight to prevent the passage of flame and smoke.

Chapter 3 Prevention of Fire

SECTION 1 Fire Protection Materials

1 General

1.1

Except for insulation in refrigerated compartments, insulation material, pipe and vent duct lagging, ceilings, linings and bulkheads are to be of non-combustible material. Insulation of pipe fittings for cold service systems and vapour barriers and adhesives used in conjunction with insulation need not be non-combustible but they are to be kept to a minimum and their exposed surfaces are to have low-flame spread characteristics. In spaces where penetration of oil products is possible, the surfaces of the insulation are to be impervious to oil or oil vapours.

1.2

The framing, including grounds and the joint pieces of bulkheads, linings, ceilings and draught stops, are to be of non-combustible material.

1.3

All exposed surfaces in corridors and stairway enclosures and surfaces in concealed or inaccessible spaces in accommodation and service spaces and control stations are to have low-flame spread characteristics. Exposed surfaces of ceilings in accommodation and service spaces and control stations are to have low-flame spread characteristics.

1.4

Bulkheads, linings and ceilings may have combustible veneers provided that the thickness of such veneers are not to exceed 2.5 mm within any space other than corridors, stairway enclosures and control stations where the thickness are not to exceed 1.5 mm. Combustible materials used on these surfaces are to have a calorific value not exceeding 45 mJ/m^2 of the area for the thickness used.

SECTION 2 Smoke Generation and Toxicity

1 General

1.1

Primary deck coverings, if applied within accommodation and service spaces and control stations, are to be of approved material which will not readily ignite, this being determined in accordance with the FTP Code.

1.2

Paints, varnishes and other finishes used on exposed interior surfaces are not to be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the FTP Code.

SECTION 3 Ventilation

1 General

1.1

The main inlets and outlets of all ventilation systems are to be capable of being closed from outside the spaces being ventilated.

1.2

Power ventilation of accommodation spaces, service spaces, control stations, machinery spaces and hazardous areas is to be capable of being stopped from an easily accessible position outside the space being served. The accessibility of this position in the event of a fire in the spaces served is to be specially considered. The means provided for stopping the power ventilation serving machinery spaces or hazardous areas is to be entirely separate from the means provided for stopping ventilation of other spaces.

1.3

The ventilation of the accommodation spaces and control stations is to be arranged in such a way as to prevent the ingress of flammable, toxic or noxious gases or smoke from surrounding areas.

1.4

Means are to be provided for stopping ventilating fans serving machinery and working spaces and for closing all doorways, ventilators, annular spaces around funnels and other openings to such spaces. These means are to be capable of being operated from outside such spaces in case of fire.

SECTION 4 Arrangements in Machinery and Working Spaces

1 General

1.1

Machinery driving forced and induced draught fans, electric motor pressurization fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps is to be fitted with remote controls situated outside the space concerned so that they may be stopped in the event of a fire arising in the space in which they are located.

1.2

Every oil fuel suction pipe from a storage, settling or daily service tank situated above the double bottom is to be fitted with a cock or valve capable of being closed from outside the space concerned in the event of a fire arising in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel, valves on the tanks are to be fitted but control in the event of fire may be affected by means of an additional valve on the pipeline or lines outside the tunnel or tunnels.

SECTION 5 Storage of Gas Cylinders

1 General

1.1

Where more than one cylinder of oxygen and more than one cylinder of acetylene are carried simultaneously, such cylinders are to be arranged in accordance with the following:

1. Permanent piping systems for oxyacetylene systems are acceptable provided that they are designed having due regard to standards and codes of practice to the satisfaction of ACS.

2. Where two or more cylinders of each gas are intended to be carried in enclosed spaces, separate dedicated storage rooms are to be provided for each gas.

3. Storage rooms are to be constructed of steel, and be well ventilated and accessible from the open deck.

4. Provision is to be made for the expeditious removal of cylinders in the event of fire.

5. "NO SMOKING" signs are to be displayed at the gas cylinder storage rooms.

6. Where cylinders are stowed in open locations means are to be provided to:
   a. protect cylinders and associated piping from physical damage;
   b. minimize exposure to hydrocarbons; and
   c. ensure suitable drainage.

1.2

Fire-extinguishing arrangements for the protection of areas or spaces where such cylinders are stored are to be to the satisfaction of ACS.

Chapter 4 Fire Protection of Ventilation Ducts

SECTION 1 Materials

1 General

1.1

Ventilation ducts are to be of non- combustible material. Short ducts, however, not generally exceeding 2 m in length and with a cross-sectional area not exceeding 0.02 m^2 need not be non-combustible, subject to the following conditions:

1. these ducts are to be of a material which, in the opinion of ACS, has a low fire risk;
2. they may only be used at the end of the ventilation device;
3. they are not to be situated less than 600 mm, measured along the duct, from where it penetrates any “A” or “B” class division including continuous “B” class ceilings.

SECTION 2 Duct Penetrations

1 General

1.1

Where a thin plated duct with a free cross- sectional area equal to, or less than, 0.02 m^2 passes through "A" class bulkhead or decks, the opening is to be lined with a steel sheet sleeve having a thickness of at least 3 mm and a length of at least 200 mm, divided preferably into 100 mm on each side of the bulkhead or, in the case of the deck, wholly laid on the lower side of the deck pierced. Where ventilation ducts with a cross-sectional area exceeding 0.02 m^2 pass through class "A" bulkheads or decks, the opening is to be lined with a steel sheet sleeve unless the ducts passing through the bulkheads or decks are of steel in the vicinity of penetrations through the deck or bulkhead; the ducts and sleeves at such places are to comply with the following:

1. The ducts or sleeves are to have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length is to be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, are to be provided with fire insulation. The insulation is to have at least the same fire integrity as the bulkhead or deck through which the duct passes. Equivalent penetration protection may be provided to the satisfaction of ACS.

2. Ducts with a cross-sectional area exceeding 0.075 m^2, except those serving hazardous areas, are to be fitted with fire dampers in addition to meeting the provisions of 13-4-2/1.1(1). The fire damper is to operate automatically but is also to be capable of being closed manually from both sides of the bulkhead or deck. The damper is to be provided with an indicator which shows whether the damper is open or closed. Fire dampers are not required, however, where ducts pass through spaces surrounded by "A" class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they pierce. Operation of the damper only from one side of a division may be specially considered, having regard to the risk of fire in the spaces on each side of the division.

1.2

Ventilation ducts with a cross-sectional area exceeding 0.02 m2 passing through "B" class bulkheads are to be lined with steel sheet sleeves of 900 mm in length divided preferably into 450 mm on each side of the bulkhead unless the duct is of steel for this length.

SECTION 3 Arrangements of Ducts

1 General

1.1

In general, ventilation systems for machinery spaces of category A, galleys and hazardous areas are to be separated from each other and from the ventilation systems serving other spaces. Ducts serving hazardous areas are not to pass through accommodation spaces, service spaces, or control spaces. Ducts provided for the ventilation of machinery spaces of category A and galleys are no to pass through accommodation spaces, control stations or service spaces unless:

1. the ducts are constructed of steel having a thickness of at least 3 mm and 5 mm for ducts the widths or diameters of which are up to and including 300 mm and 760 mm and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 mm and 760 mm, having a thickness obtained by interpolation;

2. the ducts are suitably supported and stiffened;

3. the ducts are fitted with automatic fire dampers close to the boundaries penetrated; and

4. the ducts are insulated to “A-60” class standard from the machinery spaces or galleys to a point at least 5 m beyond each fire damper; or

5. the ducts are constructed of steel in accordance with 13-4-3/1.1(1) and (2); and

6. the ducts are insulated to “A-60” class standard throughout the accommodation spaces, service spaces or control stations.

1.2

Ducts provided for the ventilation of accommodation spaces, service spaces or control stations are not to pass through machinery spaces of category A, galleys or hazardous areas. However, ACS may allow relaxation from these provisions, except for the ducts passing through hazardous areas, provided that:

1. the ducts where they pass through a machinery space of category A or a galley are constructed of steel in accordance with 13-4-3/1.1(1) and (2);

2. automatic fire dampers are fitted close to the boundaries penetrated; and

3. the integrity of the machinery space or galley boundaries is maintained at the penetrations; or

4. the ducts where they pass through a machinery space of category A or a galley are constructed of steel in accordance with 13-4-3/1.1(1) and (2); and

5. are insulated to “A-60” standard within the machinery space or galley.

SECTION 4 Exhaust Ducts from Galley Ranges

1 General

1.1

Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges are to be of equivalent fire integrity to “A” class divisions.

1.2

Each galley exhaust duct is to be fitted with:

1. a grease trap readily removable for cleaning;
2. a fire damper located in the galley end of the duct which is automatically and remotely operated and, in addition a remotely operated fire damper located in the exhaust end of the duct;
3. arrangements, operable from within the galley, for shutting off the exhaust fans; and
4. fixed means for extinguishing a fire within the duct

Chapter 5 Fire and Gas Detection and Alarm Systems

SECTION 1 Fire Detection and Alarm Systems

1 General

1.1

Spaces having identifiable fire risk are to be provided with automatic fire detection and alarm system.

1.2

In selecting the type of detectors, their following features should be taken into account:

(a) Capability to detect fire at the incipient stage;

(b) Ability to avoid spurious alarm and trips; and

(c) Suitability to the located environment.

1.3

The fire detection main indicator board is to be at a manned control station and is to be clearly indicate where fire has been detected.

2 Machinery Spaces

2.1

A fixed fire detection and alarm system is to be fitted in:

1. periodically unattended machinery spaces containing propulsion equipment, fired boilers, internal combustion engines, oil purifiers and similar equipment and so located that all potential fire outbreak points are effectively guarded.

2. machinery spaces where:
   (a) the installation of automatic and remote control system and equipments has been approved in lieu of continuous manning of the spaces, and
   (b) the main propulsion and associated machinery, including the main sources of electrical power, are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room.

The fire detection system is subject to approval in each case and is to be based on the self-monitoring principle and include facilities for periodical testing. The fire detection main indicator board is to be at a manned control station.

2.2

The fire detection system is to comply with the following:

1. This fire detection system is to be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors are not permitted. The detection system is to initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed at the locations determined in accordance with 11-1-6/6.1.

2. After installation the system is to be tested under varying conditions of engine operation and ventilation.

3. The fire detection system, where electrically supplied, is to be fed automatically from an emergency source of power by a separate feeder if the main source of power fails.

3 Accommodation and Service Spaces

3.1

An automatic fire detection and alarm system is to be provided in all accommodation and service spaces. Accommodation space is to be fitted with smoke detectors. Thermal detectors are to be fitted in galleys.

4 Electrical Rooms and Control Stations

4.1

Smoke detectors are to be provided in all electrical rooms and control stations.

5 Drilling and Mud Processing Areas

5.1

Flame or thermal detectors are to be installed in open drilling and/or mud processing areas. Smoke detectors may be used in enclosed mud processing areas.

6 Manually operated alarm system

6.1

Sufficient manual fire alarm stations are to be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point is to be located at each exit. Manually operated call points are to be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point. Measures are to be taken to prevent inadvertent operation of the manual call alarm system.

SECTION 2 Combustible Gas Detection and Alarm Systems

1 Areas for Protection

1.1

Fixed automatic combustible gas detection and alarm systems are to be provided to the satisfaction of ACS so arranged as to monitor continuously all enclosed areas of the unit in which an accumulation of flammable gas may be expected to occur and capable of indicating at the main control point by aural and visual means the presence and location of an accumulation.

At least the following areas are to be monitored:
(i) Cellar deck
(ii) Drill floor
(iii) Mud pit area
(iv) Shale shaker area
(v) Enclosed spaces containing the open components of mud circulation system from the bell nipple to the mud pits.
(vi) Ventilation intakes of enclosed machinery spaces contiguous to hazardous areas and containing internal combustion engines and boilers; and
(vii) Ventilation intakes and near other openings of accommodation spaces

2 Alarms

2.1

The gas detectors are to be connected to an audible and visual alarm system with indicators on the drill floor and in the main control station. The alarm system is to clearly indicate the location and concentration of the gas hazard. The combustible gas detectors are to alarm at not more than 25% and at 60% of the Lower Explosive Limit (LEL).

3 Portable Combustible Gas Detectors

3.1

In addition to the fixed automatic gas detection system, two portable combustible gas detectors are to be provided on the unit.

SECTION 3 Hydrogen Sulphide Detection and Alarm Systems

1 Areas for Protection

1.1

A fixed automatic hydrogen sulphide gas detection and alarm system are to be provided for the following areas:

(a) Drill area;
(b) Mud processing area; and
(c) Well test area.

2 Alarms

2.1

The detectors are to be connected to an audible and visual alarm system with indicators in main control room. The system is to clearly indicate where gas has been detected.

Low level alarm set at 10 ppm and high level alarm set not higher than 300 ppm are to be designed. The high level alarm is to activate an evacuation alarm.

If the alarm at the main control point is not answered within 2 min, the toxic gas (hydrogen sulphide) alarm and the helideck status light are to be automatically activated.

3 Portable Hydrogen Sulphide Gas Detectors

3.1

At least two portable hydrogen sulphide gas monitoring devices are be provided on the unit.

Chapter 6 Fire Fighting Water Supply

SECTION 1 Fire Pumps

1 General

1.1

There are to be at least two independently driven fire pumps each arranged to draw directly from the sea and discharge into a fixed fire main.

1.2

At least one of the required pumps is to be dedicated for fire-fighting duties and be available for such duties at all times.

1.3

The pumps, their source of power and piping and valves are to be so arranged that a fire in any one compartment will not put all fire pumps out of action.

SECTION 2 Pressure

1 General

1.1

The capacity of the required pumps is to be appropriate to the fire-fighting services supplied from the fire main. Where more pumps than required are installed, their capacity is to be to the satisfaction of ACS.

1.2

Each fire pump is to be able to maintain a pressure of at least 3.5 bar at any hydrants with two 19 mm nozzles in action. In addition where a foam system is provided for protection of the helicopter deck, the pump is to be capable of maintaining a pressure of 7.0 bar at the foam installation and the water consumption used for foam system is to be added to the pump capacity. If the water consumption for any other fire protection or fire-fighting purpose could exceed the rate of the helicopter deck foam installation, this consumption is to be the determining factor in calculating the required capacity of the fire pumps.

1.3

Where either of the required pumps is located in a space not normally manned and, in the opinion of ACS, is relatively far removed from working areas, suitable provision is to be made for remote start-up of that pump and remote operation of associated suction and discharge valves.

1.4

Except as provided in 13-6-1/1.2, sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil.

1.5

Every centrifugal pump which is connected to the fire main is to be fitted with a non-return valve.

1.6

Relief valves are to be provided in conjunction with all pumps connected to the fire main if the pumps are capable of developing a pressure exceeding the design pressure of the fire main, hydrants and hoses. Such valves are to be so placed and adjusted as to prevent excessive pressure in the fire main system.

1.7

A fixed fire main is to be provided and be so equipped and arranged as to meet the provisions of 13-6-2/1.8 to 1.17 .

1.8

The diameter of the fire main and water service pipes is to be sufficient for the effective distribution of the maximum required discharge from the required fire pumps operating simultaneously.

1.9

With the required fire pumps operating simultaneously, the pressure maintained in the fire mains is to be to the satisfaction of ACS and be adequate for the safe and efficient operation of all equipment supplied there from.

1.10

The fire main is to, where practicable, be routed clear of hazardous areas and be arranged in such a manner as to make maximum use of any thermal shielding or physical protection afforded by the structure of the unit.

1.11

The fire main is to be provided with isolating valves located so as to permit optimum utilization in the event of physical damage to any part of the main.

1.12

The fire main is not to have connections other than those necessary for fire-fighting purposes.

1.13

All practical precautions consistent with having water readily available are to be taken to protect the fire main against freezing.

1.14

Materials readily rendered ineffective by heat are not to be used for fire mains and hydrants unless adequately protected. The pipes and hydrants are to be so placed that the fire hoses may be easily coupled to them.

1.15

A cock or valve is to be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are operating.

1.16

The number and position of the hydrants are to be such that at least two jets of water, not emanating from the same hydrant, one of which is to be from a single length of fire hose, may reach any part of the unit normally accessible to those on board while the unit is being navigated or is engaged in drilling operations. A hose is to be provided for every hydrant.

1.17

Fire hoses are to be of material approved by ACS and be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Their maximum length is to be to the satisfaction of ACS. Every fire hose is to be provided with a dual-purpose nozzle and the necessary couplings. Fire hoses, together with any necessary fittings and tools, are to be ready for use at any time and are to be kept in conspicuous positions near the water service hydrants or connections.

1.18

Fire hoses are to have a length of at least 10 m, but not more than:

(a) 15 m in machinery spaces;

(b) 20 m in other spaces and open decks; and

(c) 25 m for open decks with a maximum breadth in excess of 30 m.

SECTION 3 Nozzles

1 General

1.1

Dual purpose jet spray nozzles are to be fitted throughout the drilling unit. Nozzles are to comply with the following:

1. Standard nozzle sizes are to be 12 mm, 16 mm and 19 mm or as near thereto as possible. Larger diameter nozzles may be permitted at the discretion of ACS.

2. For accommodation and service spaces, a nozzle size greater than 12 mm need not be used.

3. For machinery spaces and exterior locations, the nozzle size is to be such as to obtain the maximum discharge possible from two jets at the pressure specified in 13-6-2/1.2 from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.

SECTION 4 Supply

1 General

1.1

At least two water supply sources (sea chests, valves, strainers and pipes) are to be provided and so arranged that one supply source failure will not put all supply sources out of action.

1.2

For the self-elevating units, the following additional fire water supply measures are to be provided:

(a) Water is to be supplied from sea water main filled by at least two submersible pumping systems. Failure of any one system is not to put the other system(s) out of function, and

(b) Water is to be supplied from drill water system while unit is lifting or lowering. Water stored in the drill water tank(s) is not to be less than 40 m^3 plus engine cooling water consumptions before the unit starts lifting or lowering. Alternatively, water may be supplied from buffer tank(s) in which sea water stored is not less than the quantity mentioned above.

SECTION 5 Additional Requirements for Periodically Unattended Machinery Spaces

1 General

1.1

Provision is to be made for immediate water delivery from the fire main system at a suitable pressure, due regard being paid to the possibility of freezing, either:

1. by remote starting arrangements for one of the main fire pumps. The starting positions are to be provided at strategic locations including the navigating bridge, if any, and a normally manned control station; or

2. by permanent pressurization of the fire main system, either

   (a) by one of the main fire pumps; or

   (b) by a dedicated pump for the purpose with automatic starting of one of the main fire pumps on reduction of the pressure.

SECTION 6 International Shore Connection

1 General

1.1

The surface unit is to be provided with at least one international shore connection complying with ACS Rules for Classification of Vessels and the FSS Code. Facilities are to be available enabling such a connection to be used on any side of the unit.

Chapter 7 Other Fire Fighting Arrangements

SECTION 1 General

1 General

1.1

This Chapter gives the requirements for fixed fire extinguishing systems (other than fire fighting water supply specified in Chapter 6) and for portable fire extinguishers.

SECTION 2 Fire-extinguishing Arrangement in Machinery Spaces and in Spaces Containing Fired Processes

1 General

1.1

In spaces where main or auxiliary oil-fired boilers and other fired processes of equivalent thermal rating are situated, or in spaces containing oil fuel units or settling tanks, the unit is to be provided with the following:

1. One of the following fixed fire-extinguishing systems complying with ACS Rules for Classification of Vessels:

   (a) a fixed pressure water-spraying system;
   (b) a fixed gas fire-extinguishing system;
   (c) a fixed high-expansion foam installation.

   Where the machinery space and spaces containing fired processes are not entirely separate, or if fuel oil can drain from the latter spaces into the machinery space, the combined machinery space and fired process space is to be considered as one compartment.

2. At least two approved portable foam extinguishers or equivalent in each space containing a fired process and each space in which a part of the oil fuel installation is situated. In addition, at least one extinguisher of the same description with a capacity of 9 litres for each burner, whereby the total capacity of the additional extinguisher or extinguishers need not exceed 45 litres for any one space.

3. A receptacle containing sand, sawdust impregnated with soda, or other approved dry material in such quantity as may be required by ACS. An approved portable extinguisher may be provided as an alternative.

1.2

Spaces containing internal combustion machinery used either for main propulsion or for other purposes, when such machinery has a total power output of not less than 750 kW, are to be provided with the following arrangements:

1. one of the fixed arrangements required by 13-7-2/1.1(1); and
2. one approved foam-type extinguisher of not less than 45 litres capacity or equivalent in every engine space and one approved portable foam extinguisher for each 750 kW of engine power output or part thereof. The total numbers of portable extinguishers so supplied are to be not less than two and need not exceed six.

1.3

ACS may give special consideration to the fire-extinguishing arrangements to be provided in spaces not fitted with fixed fire-extinguishing installations containing steam turbines which are separated from boiler rooms by watertight bulkheads.

1.4

Where, in the opinion of ACS, a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in 13-7-2/1.1 to 1.3, there is to be provided in, or adjacent to, that space a number of approved portable fire extinguishers or other means of fire extinction to the satisfaction of ACS.

SECTION 3 Fixed Fire Extinguishing Systems on Drilling Area

1 General

1.1

The Drilling Area is the drill floor area extending to each corner of the derrick. The following firefighting arrangement is to be provided for the area:

(a) A fixed water spray system is to be provided to protect drilling area. The minimum water application rate is not to be less than 20.4 litres/min-m^2, or

(b) At least two dual-purpose (jet/spray) fire monitors are to be installed to cover drilling and well test areas. The minimum capacity of each monitor is not to be less than 100 m^3/h. The monitors may be operated either remotely or locally. Monitor arranged for local operation is to be sited in an accessible protected position.

SECTION 4 Fixed Fire Extinguishing Systems on Mud Processing Area

1 General

1.1

The Mud Processing Area includes:

(a) Spaces occupied by the open mud circulating system which contain hazardous areas, such as spaces containing gumbo box, shale shaker, degasser, desander, desilter, centrifuge, mud cleaner, etc.

(b) Spaces with open-top mud pits which will be used for oil-based mud.

1.2

The following firefighting arrangement is to be provided for the mud processing area:

A suitable fixed foam system is to be provided. The system is to be capable of delivering foam solution at a rate of not less than 6.5 litres/min-m^2 (4.1 litres/min-m^2 for Aqueous Film Forming Foam or Film-Forming Fluoroprotein Foam) for 15 minutes. Alternatively, a gas fixed fire extinguishing system may be used for enclosed mud processing areas.

SECTION 5 Portable Fire Extinguishers in Accommodation, Service and Working Spaces

1 General

1.1

Except for the supplemental arrangements provided in 13-7-5/1.2, portable fire extinguishers in accommodation spaces, service spaces, control stations, machinery spaces of category A, other machinery spaces, cargo spaces, weather deck and other spaces are to be provided in number and arrangement in accordance with "MSC.1/Circ.1275 " Number and Arrangement of Portable Fire Extinguishers on Board Ships."

1.2

Table 13.3 contains supplemental recommendations for number and distribution of additional portable fire extinguishers on mobile offshore drilling units. Where the recommendations in table 13.3 differ from the MSC.1/Circ.1275, the provisions of table 13.3 are to be followed. In all cases, the selection of the fire extinguishing medium is to be based on the fire hazard for the space protected. The classes of portable fire extinguishers in the table are only for reference.

Table 13.3: Recommended Number and Distribution of Additional Portable Extinguishers

Type of Space	Minimum Number of Extinguishers [1]	Class(es) of Extinguishers
Space containing the controls for the main source of electrical power	1; and 1 additional extinguisher suitable for electrical fires when main switchboards are arranged in the space	A and/or C
Cranes: With Electric Motors / Hydraulics	0	-
Cranes: With Internal Combustion Engine	2 (1 in cab and 1 at exterior of engine compartment)	B
Drill Floor	2 (1 at each exit)	C
Helidecks	In Accordance with 13-7-2	B
Machinery spaces of category A	In Accordance with Section 2 of this Part	B
Machinery spaces of category A which are Periodically Unattended	At each entrance in accordance with 13-7-2 [2]	B
Main Switchboards	2 in the vicinity	C
Mud pits, Mud processing areas	1 for each enclosed space (Travel distance to an extinguisher not to exceed 10 m for open space)	B

1. Minimum size is to be in accordance with paragraph 3.1.1 of Chapter 4 of the FSS Code.

2. A portable extinguisher provided for that space may be located outside near the entrance to that space. A portable fire extinguisher placed outside near the entrance to that space may also be considered as satisfying the provisions for the space in which it is located.

SECTION 6 Fire-Fighters’ Outfits

1 General

1.1

At least two fire-fighters’ outfits complying with the relevant requirements of the FSS Code for Classification of Vessels are to be provided, each with portable instruments for measuring oxygen and flammable vapour concentrations acceptable to ACS.

1.2

Two spare charges are to be provided for each required breathing apparatus. Units that are equipped with suitably located means for fully recharging the air cylinders free from contamination need carry only one spare charge for each required apparatus.

1.3

The fire-fighters’ outfits are to be kept ready for use in an easily accessible location that is permanently and clearly marked. They are to be stored in two or more widely separated locations.

SECTION 7 Recharging of Air Cylinders

1 General

1.1

The apparatus for recharging air cylinders, if provided, is to have its power supplied from the emergency supply or be independently diesel-powered, and be so constructed or equipped that the air cylinders may be used immediately after recharging.

1.2

The apparatus is to be suitably located in a sheltered space above main deck level on the unit.

1.3

Intakes for air compressors are to draw from a source of clean air.

1.4

The air is to be filtered after compression to eliminate compressor oil contamination.

1.5

The recharging capacity is to meet the requirements of ACS Rules for Classification of Vessels.

1.6

The equipment and its installation are to be to the satisfaction of ACS.

SECTION 8 Additional Requirements for Periodically Unattended Machinery Spaces

1 General

1.1

An approved fixed fire-extinguishing system is to be provided in units that are not required to have this provision by 13-7-2.

1.2

ACS may give special consideration to maintaining the fire integrity of the machinery spaces, to the location and centralization of the fire-extinguishing system controls and to the required shutdown arrangements (e.g., ventilation, fuel pumps, etc.); it may require additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus.

Chapter 8 Escape

SECTION 1 Means of Escape

1 General

1.1

Within the accommodation spaces, service spaces and control stations the following provisions are to be applied:

1. In every general area which is likely to be regularly manned or in which personnel are accommodated at least two separate escape routes are to be provided, situated as far apart as practicable, to allow ready means of escape to the open decks and embarkation stations. Exceptionally, ACS may permit only one means of escape, due regard being paid to the nature and location of spaces and to the number of persons who might normally be accommodated or employed there.

2. Stairways are normally to be used for means of vertical escape; however, a vertical ladder may be used for one of the means of escape when the installation of a stairway is shown to be impracticable.

3. Every escape route is to be readily accessible and unobstructed and all exit doors along the route are to be readily operable. Dead-end corridors exceeding 7 m in length are not to be provided.

4. In addition to the emergency lighting, the means of escape in accommodation areas, including stairways and exits, is to be marked by lighting or photoluminescent strip indicators placed not more than 300 mm above the deck at all points of the escape route, including angles and intersections. The marking is to enable personnel to identify the routes of escape and readily identify the escape exits. If electric illumination is used, it is to be supplied by the emergency source of power and it is to be so arranged that the failure of any single light or cut in a lighting strip will not result in the marking being ineffective. Additionally, escape route signs and fire equipment location markings are to be of photoluminescent material or marked by lighting. ACS will verify that such lighting or photoluminescent equipment has been evaluated, tested and applied in accordance with the FSS Code.

1.2

Two means of escape are to be provided from each machinery space of category A. Ladders are to be of steel or other equivalent material. In particular, one of the following provisions is to be complied with:

1. two sets of ladders, as widely separated as possible, leading to doors in the upper part of the space, similarly separated and from which access is provided to the open deck. One of these ladders is to be located within a protected enclosure that satisfies tables 13-1 and 13-2, category (4), from the lower part of the space it serves to a safe position outside the space. Self-closing fire doors of the same fire integrity standards are to be fitted in the enclosure. The ladder is to be fixed in such a way that heat is not transferred into the enclosure through non-insulated fixing points. The enclosure is to have minimum internal dimensions of at least 800 mm by 800 mm, and is to have emergency lighting provisions; or

2. one ladder leading to a door in the upper part of the space from which access is provided to the open deck. Additionally, in the lower part of the space, in a position well separated from the ladder referred to, a steel door capable of being operated from each side is to be provided with access to a safe escape route from the lower part of the space to the open deck.

1.3

From machinery spaces other than those of category A, escape routes are to be provided to the satisfaction of ACS having regard to the nature and location of the space and whether persons are normally employed there.

1.4

Lifts are not to be considered as forming one of the required means of escape.

1.5

Consideration may be given by ACS to the site of superstructures and deckhouses such that in the event of fire at the drill floor at least one escape route to the embarkation position and survival craft is protected against radiation effects of that fire as far as practicable.

1.6

Stairways and corridors used as a means of escape are to meet the provisions of paragraph 13.3 of the FSS Code.

SECTION 2 Emergency Escape Breathing Devices

1 General

1.1

Emergency escape breathing devices (EEBDs) are to comply with Fire Safety Systems Code. Spare emergency escape breathing devices are to be kept on board to the satisfaction of ACS.

1.2

Emergency escape breathing devices are to be provided as follows:

1. In machinery spaces of category A containing internal combustion machinery used for main propulsion, EEBDs are to be positioned as follows:
   (a) one (1) EEBD in the engine control room, if located within the machinery space;
   (b) one (1) EEBD in workshop areas. If there is, however, a direct access to an escape way from the workshop, an EEBD is not required; and
   (c) one (1) EEBD on each deck or platform level near the escape ladder constituting the second means of escape from the machinery space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).
   (d) Alternatively, a different number or location may be determined by ACS taking into consideration the layout and dimensions or the normal manning of the space.

2. For machinery spaces of category A other than those containing internal combustion machinery used for main propulsion, one (1) EEBD is to, as a minimum, be provided on each deck or platform level near the escape ladder constituting the second means of escape from the space (the other means being an enclosed escape trunk or watertight door at the lower level of the space).

3. For other machinery spaces, the number and location of EEBDs will be specially considered.

SECTION 3 Respiratory Protection Equipment for Hydrogen Sulphide

1 General

1.1

(a) A self-contained breathing apparatus (SCBA) positive-pressure/pressure-demand breathing equipment with full-face piece and rated for a minimum of 30 minutes is to be provided for each person in working areas where hydrogen sulphide may be encountered, and a SCBA rated for a minimum of 15 minutes is to be provided for each person in other areas, or,

(b) A positive-pressure/pressure-demand air line breathing equipment with a low pressure warning alarm coupled with a SCBA rated for a minimum of 15 minutes is to be provided for each person on board the unit.

1.2

Breathing air supply line stations are to be provided at least in the following areas:

(a) Living quarter;
(b) Muster/evacuation area;
(c) Drilling areas;
(d) Mud processing areas; and
(e) Other working areas

Chapter 9 Fire Fighting Equipment for Helicopter Facilities

SECTION 1 General

1 General

1.1

Where areas of a drilling unit are designated for helicopter facilities, the fire fighting systems as given in 13-9-2 and 13-9-3 are to be provided and so arranged as to adequately protect both the helicopter deck and fuel storage areas.

This Chapter provides additional measures in order to address the fire safety objectives for units fitted with facilities for helicopters and meets the following functional provisions:

1. helideck structure is to be adequate to protect the unit from the fire hazards associated with helicopter operations;
2. fire-fighting appliances are to be provided to adequately protect the unit from the fire hazards associated with helicopter operations;
3. refuelling facilities and operations are to provide the necessary measures to protect the unit from the fire hazards associated with helicopter operations; and
4. helicopter facility operation manuals, which may be included in the operating manual and training are to be provided.

1.2

The construction of the helidecks is to be of steel or other equivalent materials. If the helideck forms the deckhead of a deckhouse or superstructure, it is to be insulated to “A-60” class standard. If ACS permits aluminum or other low melting point metal construction that is not made equivalent to steel, the following provisions are to be satisfied:

1. if the helideck is cantilevered over the side of the unit, after each fire that may have an effect on the structural integrity of the helideck or its supporting structures, the helideck is to undergo a structural analysis to determine its suitability for further use; and
2. if the helideck is located above the unit's deckhouse or similar structure, the following conditions are to be satisfied:
   (a) the deckhouse top and bulkheads under the helideck are to have no openings;
   (b) windows under the helideck are to be provided with steel shutters; and
   (c) after each fire on the helideck or supporting structure the helideck is to undergo a structural analysis to determine its suitability for further use.

1.3

A helideck is to be provided with both a main and an emergency means of escape and access for fire fighting and rescue personnel. These are to be located as far apart from each other as is practicable and preferably on opposite sides of the helideck.

SECTION 2 Fire Fighting Arrangements

1 Portable Fire Extinguishers

1.1 Primary extinguishers

Dry powder extinguishers of a total capacity of not less than 45 kg.

1.2 Back-up Extinguishers

CO_2 extinguishers of a total capacity of not less than 18 kg or equivalent, one of these extinguishers being so equipped as to enable it to reach the engine area of any helicopter using the deck. The back-up extinguishers are to be located so that they would not be vulnerable to the same damage as the primary extinguishers.

2 Fixed Fire Fighting Systems

2.1 Fire Water System

At least two approved nozzles of jet/spray type and hoses sufficient in length to reach any part of the helicopter deck.

2.2 Fixed Foam System

1. A suitable foam application system consisting of monitors or hose streams or both is to be installed. The system is to be capable of delivering foam solution at a rate of not less than 6 litres/min-m^2 (4.1 litres/min-m^2 for Aqueous Film Forming Foam or Film-Forming Fluoroprotein Foam) of the areas protected (the area of a circle of diameter "D" where "D" is the distance across the main rotor and tail rotor in the fore and aft line of a helicopter) for at least 5 minutes.

2. Foam delivery at the minimum application rate is to start within 30 s of system activation. The operation of the foam system is not to interfere with simultaneous operation of the fire main.

3. The principal agent shall be suitable for use with salt water and conform to performance standards not inferior to those acceptable to the IMO Organization (Refer to the International Civil Aviation Organization Airport Services Manual, part 1, Rescue and Fire Fighting, chapter 8, Extinguishing Agent Characteristics, paragraph 8.1.5, Foam Specifications table 8-1, level ‘B’).

4. In addition to the provisions of 13-7-4, two fire- fighter’s outfits; and

5. At least the following equipment are to be stored in a manner that provides for immediate use and protection from the elements:

   (a) adjustable wrench;
   (b) blanket, fire-resistant;
   (c) cutters, bolt 600 mm;
   (d) hook, grab or salving;
   (e) hacksaw, heavy duty complete with six spare blades;
   (f) ladder;
   (g) lift line 5 mm diameter and 30 m in length;
   (h) pliers, side-cutting;
   (i) set of assorted screwdrivers;
   (j) harness knife complete with sheath; and
   (k) crowbar.

6. Drainage facilities in way of helidecks are to be:

   (a) constructed of steel or other arrangements providing equivalent fire safety;
   (b) lead directly overboard independent of any other system; and
   (c) designed so that drainage does not fall onto any part of the unit.

SECTION 3 Additional Requirements for Helicopter Facilities with Refuelling Capabilities

1 General

1.1

Fire fighting systems as in 13-9-2 and so arranged as to adequately protect both the helicopter deck and fuel storage areas.

1.2

A designated area is to be provided for the storage of fuel tanks which is to be:

1. as remote as is practicable from accommodation spaces, escape routes and embarkation stations; and

2. isolated from areas containing a source of vapour ignition.

1.3

The fuel storage area is to be provided with arrangements whereby fuel spillage may be collected and drained to a safe location.

1.4

Tanks and associated equipment are to be protected against physical damage and from a fire in an adjacent space or area.

1.5

Where portable fuel storage tanks are used, special attention is to be given to:

1. design of the tank for its intended purpose;
2. mounting and securing arrangements;
3. electric bonding; and
4. inspection procedures.

1.6

Storage tank fuel pumps are to be provided with means which permit shutdown from a safe remote location in the event of a fire. Where a gravity-fuelling system is installed, equivalent closing arrangements are to be provided to isolate the fuel source.

1.7

The fuel pumping unit is to be connected to one tank at a time. The piping between the tank and the pumping unit is to be of steel or equivalent material, as short as possible, and protected against damage.

1.8

Electrical fuel pumping units and associated control equipment are to be of a type suitable for the location and potential hazards.

1.9

Fuel pumping units are to incorporate a device which will prevent over-pressurization of the delivery or filling hose.

1.10

Equipment used in refuelling operations is to be electrically bonded.

1.11

"NO SMOKING" signs are to be displayed at appropriate locations.

Chapter 10 Operational Readiness and Maintenance

SECTION 1 General

1 General

1.1

The following functional provisions are to be met:

1. gas detection systems, fire protection systems and fire-fighting systems and appliances are to be maintained ready for use; and
2. gas detection systems, fire protection systems and fire-fighting systems and appliances are to be properly tested and inspected.

1.2

At all times while the unit is in service, the provisions of 13-10-1 are to be complied with. A unit is not in service when:

1. it is in for repairs or lay up (either at anchor or in port) or in dry-dock;
2. it is declared not in service by the owner or the owner's representative.

SECTION 2 Operational Readiness

1 General

1.1

The following gas detection and fire protection systems are to be kept in good order so as to ensure their intended performance if a fire occurs:

1. structural fire protection including fire-resisting divisions and protection of openings and penetrations in these divisions;

2. fire detection and fire alarm systems;

3. gas detection and alarm systems; and

4. means of escape systems and appliances.

1.2

Fire-fighting systems and appliances and portable gas detection systems are to be kept in good working order and readily available for immediate use. Portable extinguishers which have been discharged are to be immediately recharged or replaced with an equivalent unit.

SECTION 3 Maintenance, Testing and Inspections

1 General

1.1

Maintenance, testing and inspections are to be carried out based on the guidelines developed by IMO (refer to the guidelines on maintenance and inspection of fire protection systems and appliances-MSC/Circ.850) and in a manner having due regard to ensuring the reliability of fire-fighting systems and appliances.

1.2

The maintenance plan is to be kept on board the unit and be available for inspection whenever required by ACS.

1.3

The maintenance plan is to include at least the following fire protection systems and fire-fighting systems and appliances, where installed:

1. fire mains, fire pumps and hydrants including hoses, nozzles and international shore connections;
2. fixed fire detection and fire alarm systems;
3. fixed fire-extinguishing systems and other fire- extinguishing appliances;
4. automatic sprinkler, fire detection and fire alarm systems;
5. ventilation systems including fire and smoke dampers, fans and their controls;
6. emergency shut down of fuel supply;
7. fire doors including their controls;
8. general emergency alarm systems;
9. emergency escape breathing devices;
10. portable fire extinguishers including spare charges or spare extinguishers;
11. portable hydrogen sulphide gas detection monitoring devices;
12. portable flammable gas and oxygen monitoring devices;
13. gas detection and alarm systems; and
14. fire-fighter’s outfits.

1.4

The maintenance program may be computer-based.

Chapter 11 Alarms

SECTION 1 General Alarms

1 General

1.1

A general alarm system is to be provided and so installed as to be clearly perceptible in all parts of the unit. Alarm signal devices are to be provided which will produce a distinctive and strong note.

The signals used should be limited to general emergency, toxic gas (hydrogen sulphide), combustible gas, fire alarm and abandon unit signals.

The signals given over the general alarm system should be supplemented by instructions over the public address system.

1.2

General alarm is to be capable of being operated at least in the following spaces:

(a) Main control station;
(b) Drilling console;
(c) Navigating bridge (if any); and
(d) Fire control station (if any).

SECTION 2 Mud System Level Alarms

1 General

1.1

A suitable audible and visual alarm to indicate significant increase or decrease in the level of the contents of the mud pit is to be provided at the control station for drilling operations and at the mud pit. Equivalent means to indicate possible abnormal conditions in the drilling system may be considered by ACS.

SECTION 3 Ventilation System Alarm

1 General

1.1

Ventilation system alarm is to be in accordance with the requirements in 10-2-2.

SECTION 4 Public Address

1 General

1.1

The public address system is to be a loudspeaker installation enabling the broadcast of messages into all spaces where personnel are normally present and muster stations. It is to allow for the broadcast of messages from navigation bridge, central control room, emergency response centre, engine control room, ballast control station, jacking control station and drilling console. It is to be installed taking into account any acoustically marginal conditions and not require any action from the addressee. It is to be protected against unauthorized use.

1.2

The minimum sound pressure levels for broadcasting emergency announcements are to be:

(a) In interior spaces 75 dB(A) and at least 20 dB(A) above the speech interference level; and

(b) In exterior spaces 80 dB(A) and at least 15 dB(A) above the speech interference level.

PART

14

Surveys

Chapter 1 General Requirements

SECTION 1 General

1 General

1.1

All drilling units are to be subjected to Periodical Surveys for the purpose of maintenance of class. Survey notations and Survey intervals are given in Table 14.1 for main class Surveys. Where additional class notations have been assigned, Surveys are to be carried out at intervals one year for Annual Survey and five years for Special Survey.

1.2

Units with additional class notations for which there are no specific Survey requirements defined in this Part are to have the equipment and/or construction related to this additional class notation examined to the Surveyor's satisfaction at each Special Survey. However, at the time of Annual Surveys the continued effectiveness, of operational features, safety devices and control systems are to be verified.

1.3 Definitions

- **Ballast Tank** is a tank which is used primarily for salt water ballast;
- **Spaces** are separated compartments;
- **Representative Spaces** are those which are expected to reflect the condition of other spaces of similar type and service and with similar corrosion protection systems; when selecting representative spaces account should be taken of the service and repair history on board and identifiable critical and/or suspect areas;
- **Suspect Areas** are locations considered by the Surveyor to be prone to rapid wastage;
- **Critical Areas** are locations which have been identified from calculations to require monitoring or from the service history of the subject unit or sister units (if available) to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the unit;

- **Anniversary Date** means the day and month of each year corresponding to the expiry date of the classification certificate.

Table 14.1 : Periodical Survey Intervals for Main Class Notations

(Any specific requirements of the flag Administration are also to be complied with)

Surveys	Main Class Notation	Survey Interval (years)
Hull: Special Survey	SSH	5
Hull: Continuous Survey	CSH	5
Machinery: Special Survey	SSM	5
Machinery: Continuous Survey	CSM	5
Annual Survey	AS	1 [1]
Docking Survey	DS	2.5 [2]
Tailshaft Survey:		
with Approved Oil Gland	TS(OG)	5 [3]
with Continuous Liner	TS(CL)	5 [3]
with Shaft of Corrosion Resistant Material	TS(NC)	5 [3]
with Condition Monitoring	TS(TCM)	See Note 5
other than above	TS	2.5 [3]
Main Boilers Survey	MBS	2.5 [4]
Auxiliary Boilers Survey	ABS	2.5 [4]
Exhaust Gas Steam Generators and Economisers	EGES	2.5 [4]
Steam Pipe Survey	SPS	
1st Survey		10
2nd and Subsequent Surveys		5

Notes:

1. Survey may be carried out within 3 months on either side of the due date.
2. At least 2 Surveys are to be carried out within any 5 years but the interval between two consecutive surveys is not to exceed 3 years, and one of these two docking surveys should coincide with the Special Survey. Proposals for alternative means for providing underwater inspections equivalent to drydocking survey would be considered by ACS as detailed in Chapter 3 of this Part.
3. Upon request, ACS may extend the survey period to harmonise with docking Survey.
4. At least 2 Surveys are to be carried out within any 5 years but the interval between two consecutive surveys is not to exceed 3 years.
5. Condition monitoring records are to be verified at the time of annual surveys and during docking survey. No specific time interval is required between complete tailshaft surveys.

SECTION 2 Survey Pre-planning and Record Keeping

1 General

1.1

Plans and procedures for Special Surveys, Special Continuous Surveys, and Drydocking Surveys are to be submitted for review in advance of the survey and made available on board. These should include drawings or forms for identifying the areas to be surveyed, the extent of hull cleaning, non-destructive testing locations (including NDT methods), nomenclature, and for the recording of any damage or deterioration found. Submitted data, after review by the Surveyor(s), will be subject to revision if found to be necessary in light of experience.

SECTION 3 Reactivation Surveys

1 General

1.1

In the case of units which have been out of service for an extended period, the requirements for reactivation surveys will be specially considered in each case with due regard given to the status of surveys at the time of the commencement of the lay-up period, the length of the period, and conditions under which the unit had been maintained during that period.

SECTION 4 Damage Survey

1 General

1.1

It is the responsibility of the owner/ operator of the unit to report to ACS without delay any damage, defect or breakdown, which could invalidate the conditions for which a classification has been assigned so that it may be examined at the earliest opportunity by ACS Surveyor(s). All repairs found necessary by the Surveyor are to be carried out to his satisfaction.

SECTION 5 Alterations

1 General

1.1

No alterations which may affect classification are to be made to the hull or machinery of a classed unit unless plans of proposed alterations are submitted and approved by ACS before the work of alterations is commenced.

Such work is to be carried out in accordance with approved plans and tested on completion as required by the Rules and to the satisfaction of the Surveyor(s).

SECTION 6 Unscheduled Surveys

1 General

1.1

In the event that ACS has reason to believe that its Rules and Regulations are not being complied with, ACS reserves the right to perform unscheduled surveys of the hull or machinery.

SECTION 7 Provisions for Hull Survey

1 General

1.1

The Surveyors are to be provided with necessary facilities for a safe execution of survey.

1.2

The surveys at sea or at anchorages may be carried out provided necessary precautions are taken while carrying out the survey and adequate assistance is provided.

1.3

Tanks and spaces are to be safe for access, i.e. gas freed, ventilated, etc. Tanks and spaces are to be reasonably clean and free from water, scale, dirt, oil residues, etc. to reveal significant corrosion, deformation, fractures, damages and other structural deterioration.

1.4

Adequate illumination is to be provided to reveal significant corrosion, deformation, fractures, damages or other structural deterioration.

1.5

Means are to be provided to enable the Surveyor to examine the structure in a safe and practical way.

1.6

Thickness measurement is normally to be carried out by means of ultrasonic test equipment. The accuracy of the equipment is to be proven to the Surveyor as required.

1.7

One or more of the following fracture detection procedures may be required if deemed necessary by the Surveyor:

- Radiographic Equipment
- Ultrasonic Equipment
- Magnetic Particle Equipment
- Dye Penetrant

SECTION 8 Welding and Replacement of Materials

1 General

1.1

Welding of steels, including high strength structural steel, is to be to the satisfaction of the Surveyor(s).

1.2

Welding of other fabrication performed on steels of special characteristics or repairs or renewals of such steel or in areas adjacent to such steel is to be accomplished with procedures approved by the Surveyors considering the special materials involved. Substitution of steels differing from those originally installed is not to be made without approval by ACS.

Chapter 2 Annual Surveys

SECTION 1 General

1 General

1.1

Annual Class Surveys are to be made within three months either way of each annual anniversary date of the crediting of the previous Special Survey of Hull, or of the original construction date. These should be held concurrently with statutory annual or other relevant statutory surveys, where practicable.

1.2

The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull structure, equipment and machinery are maintained in a satisfactory condition.

1.3

The Surveyors are to be satisfied at each Annual Survey that no material alterations have been made to the unit, its structural arrangements, subdivision, superstructure, fittings, and closing appliances upon which the stability calculations or the load line assignment is based.

SECTION 2 Survey Requirements – All Types of Drilling Units

1 General

1.1

At each Annual Survey the exposed parts of the hull, deck, deck house, structures attached to the deck, derrick substructure, including supporting structure, accessible internal spaces and the parts listed below, as applicable, are to be generally examined and placed in satisfactory condition as found necessary and :

a) Accessible hatchways, manholes and other openings;

b) Machinery casings and covers, companion ways, and deck houses protecting openings;

c) Portlights together with dead covers, cargo ports and similar openings in hull sides, ends, or in enclosed superstructures;

d) Ventilators, tank vent pipes together with flame screens, and overboard discharges from enclosed spaces;

e) Watertight bulkheads and end bulkheads of enclosed superstructures;

f) Closing appliances for all the above, including hatch covers, doors check valves, together with their respective securing devices, dogs, sill, coamings and supports;

g) Freeing ports together with bars, shutters and hinges;

h) Windlass and attachment of anchor racks and anchor cables;

i) Protection of the crew, guard rails, lifelines, gangways, and deck houses accommodating crew;

j) General examination of the machinery installation including boilers, steering gear, control systems, etc.

k) A general examination of the automatic and remote-control system is to be made to the Surveyor's satisfaction. The machinery space fire-detecting and bilge water-level alarms are to be checked for performance.

l) A general examination of electrical machinery, the emergency sources of electrical power, the switchgear and other electrical equipment, including their operation. The operation of the emergency sources of power, including their automatic operation is to be confirmed as far as practicable.

m) A general examination of hazardous areas, remote shutdown arrangements, fire fighting systems, piping systems and bilge systems.

SECTION 3 Survey Requirements – Surface Type Units

1 General

1.1

In addition to the requirements of 14-2-2, the following are to be examined:

- The hull and deck structure around the drilling well (moon-pool) and in vicinity of any other structural changes-in-section, slots, steps, or openings in the deck or hull and the back-up structure in way of structural members or sponsors connecting to the hull.

SECTION 4 Survey Requirements – Self-Elevating Units

1 General

1.1

In addition to the requirements of 14-2-2, the following are to be examined:

- Jack-house structures and attachments to upper hull or platform;
- Jacking or other elevating systems and leg guides, externally;
- Legs as accessible above the waterline, plating and supporting structure in way of leg wells.

1.2

At the first annual survey after construction, units may be subject to examination of major structural components including non-destructive testing, as deemed necessary by ACS. If ACS deems such survey to be necessary, the extent should be agreed to by the Surveyors and the owner or operator prior to commencement of the Survey.

SECTION 5 Survey Requirements – Column-Stabilized Units

1 General

1.1

In addition to the requirements of 14-2-2, the following are to be examined:

- Columns, diagonal and horizontal braces together with any other parts of the upper hull supporting structure as accessible above the waterline.

1.2

At the first annual survey after construction, units may be subject to examination of major structural components including non-destructive testing, as deemed necessary by ACS. If ACS deems such survey to be necessary, the extent should be agreed to by the Surveyors and the owner or operator prior to commencement of the Survey.

Chapter 3 Docking Surveys

SECTION 1 General

1 General

1.1

An examination of the underwater parts of each drilling unit is to be made at intervals within six months either side of the due date (normally every thirty months) provided that at least two docking surveys are carried out within any five years and one of these drydock survey (or underwater inspection in lieu of drydock surveys in accordance with 14-3-3) coincides with Special Survey. Proposals for alternative means of providing underwater inspection in lieu of Drydocking Survey will be considered provided they are in general agreement with the intent of 14-3-3. Consideration will be given to special circumstances justifying an extension of the intervals.

SECTION 2 Parts to be examined

1 Surface Type Units

1.1

External surfaces of the hull, keel, stem, stern frame, rudder, nozzles and sea strainers are to be selectively cleaned to the satisfaction of the attending Surveyor and examined together with appendages, the propeller, exposed parts of stern bearing assembly, rudder pintle and guide on securing arrangements, sea chest and strainers, and their fastenings.

1.2

Propeller shaft bearing, rudder bearing and steering nozzle clearances are to be ascertained and reported upon.

2 Self-Elevating Units

2.1

External surfaces of the upper hull or platform, spud cans, mat underwater areas of legs, together with their connections as applicable, are to be selectively cleaned to the satisfaction of the attending Surveyor and examined.

2.2

At each Drydocking Survey (or equivalent), after Special Survey No.2, the surveyor is to be satisfied with the condition of the internal structure of the mat or spud cans.

2.3

Leg connections to mat and spud cans are to be examined at each Drydock Survey. Non-destructive testing may be required of areas considered to be critical by the Surveyor or found to be suspect by the Surveyor.

3 Column-Stabilized Units

3.1

External surfaces of the upper hull or platform, footings, pontoons or lower hulls, underwater areas of columns, bracing and their connections, and propulsion units as applicable, are to be selectively cleansed and examined to the satisfaction of the attending Surveyor. Non-destructive testing may be required of areas considered to be critical by the Surveyor or found to be suspect by the Surveyor.

4 Ballast Tanks

4.1

In conjunction with Drydocking Surveys (or equivalent) after Special Survey No.1 and between subsequent Special Surveys, the following ballast spaces are to be internally examined, thickness gauged and placed in satisfactory condition, as found necessary, and reported upon. If such examination reveals no visible structural defects, the examination may be limited to verification that the corrosion control arrangements remain effective:

a) For Surface-type Units:
One peak tank and at least two other representative ballast tanks between the peak bulkheads used primarily for water ballast.

b) For Self-Elevating Units:
Representative ballast tanks or free-flooding compartments in mat or spud cans, if accessible and least two representative hull pre-load tanks.

c) For Column-Stabilized Units
Representative ballast tanks in footings, lower hulls, or free-flooding compartments as accessible, and at least two ballast tanks in columns or upper hull, if applicable.

5 Non-metallic Expansion Joints

5.1

Non-metallic expansion joints in piping systems, if located in a system which penetrates the unit's side and both the penetration and the non-metallic expansion joint are located below the deepest load waterline, are to be inspected and replaced as necessary, or at an interval recommended by the manufacturer.

SECTION 3 UnderWater Inspection in Lieu of Drydocking Survey (UWILD)

1 General

1.1

Where physical features as given in 14-3-3/1.2 are incorporated in units' design a properly conducted underwater inspection may be credited as equivalent to a Drydocking Survey, subject to compliance with the conditions and procedures given below in 14-3-3/1.3 and 1.4 respectively.

1.2 Physical Features

The following physical features are to be incorporated into the unit's design in order to facilitate the underwater inspection. When verified they will be noted in the unit's classification for reference at subsequent surveys.

(a) Stern Bearing:
For self-propelled units, means are to be provided for ascertaining that the seal assembly on oil-lubricated bearings is intact and for verifying that the clearance or wear- down of the stern bearing is not excessive. For use of the wear-down gauges, up-to-date records of the base depths are to be maintained on board. Whenever the stainless-steel seal sleeve is renewed or machined, the base readings for the wear- down gauge are to be re-established and noted in the vessel's records and in the survey report.

(b) Rudder bearing:
For self-propelled units with rudders, means and access are to be provided for determining the condition and clearance of the rudder bearings, and for verifying that all parts of the pintle and gudgeon assemblies are intact and secure. This may require bolted access plates and a measuring arrangement.

(c) Sea suction:
Means are to be provided to enable the diver to confirm that the sea suction openings are clear. Hinged sea suction grids would facilitate this operation.

(d) Sea valves:
For the Drydocking Survey (Underwater Inspection) associated with the Special Survey, means must be provided to examine any sea valve.

1.3 Conditions

(a) Limitation:
Underwater Inspection in lieu of Drydocking Survey may not be acceptable where there is record of abnormal deterioration or damage to the underwater structure; or where damage affecting the fitness of the unit is found during the course of the survey.

(b) Thickness Gauging and Non-Destructive Testing:
Underwater or internal thickness gaugings of suspect areas may be required in conjunction with the underwater inspection. Means for underwater non-destructive testing may also be required for fracture detection.

(c) Plans and Data
Plans and procedures for the Drydocking Survey (Underwater Inspection) are to be submitted for review in advance of the survey and made available on board. These should include drawings or forms for identifying the areas to be surveyed, the extent of underwater cleaning, non- destructive testing locations (including NDT methods), nomenclature, and for the recording of any damage or deterioration found. The approved plans and procedures are to be made available on board for the purpose of preplanning of the survey.

(d) Underwater Conditions
The areas to be surveyed are to be sufficiently clean and the sea water clear enough to permit meaningful examination and photography (if necessary) by diver. Overall or spot cleaning may be required.

1.4 Procedures

(a) Exposed Areas
An examination of the outside of the structure above the waterline is to be carried out by the Surveyor(s). Means and access are to be provided to enable the Surveyor to accomplish visual inspection and non- destructive testing as necessary.

(b) Underwater Areas
An examination of the entire unit below the waterline is to be carried out by a suitably qualified diver using closed-circuit television with two-way communication capable of being monitored by the Surveyor(s) as required, or photographic documentation, or both, depending on the age and type of unit. This is to be supplemented by the Diver's Report describing and attesting to the conditions found. A copy of this diver's report and pertinent photographs are to be submitted to the attending Surveyor for forwarding to ACS, together with his report. Copies are also to be retained onboard, together with any video tapes, reference.

(c) Damage Area
Damage areas are to be photographed. Internal examination, measurements, marking and thickness gauging of such locations may be necessary as determined by the attending Surveyor. Means are to be provided for location, orienting and identifying underwater surfaces in photographs or on video tapes.

1.5 Alternatives

Alternatives to the above guidelines including remotely operated vehicles may be accepted, provided the means and details for accomplishing results are no less effective.

Chapter 4 Special Surveys - Hull

SECTION 1 General

1 General

1.1

All mobile offshore drilling units are to be subject to special (renewal) surveys at five years intervals to renew the classification certificate.

The first Special Survey becomes due five years after the date of build or five years from the date of the initial classification survey. Subsequent Special Surveys become due five years after the crediting date of the previous Special Survey. However, an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances. In this case the next period of class will start from the expiry date of the Special Survey before the extension was granted. When considered necessary by ACS, the interval between Special Surveys may be reduced. Special survey requirements for units of unusual design, in lay-up or in unusual circumstances will be determined on an individual basis.

1.2

The interval between the Special Surveys may be reduced at the request of the parties concerned or by ACS if considered appropriate.

1.3

For surveys completed within 3 months before the expiry date of the Special Survey, the next period of class will start from the expiry date of the Special Survey. For surveys completed more than 3 months before the expiry date of the Special Survey, the period of class will start from the survey completion date.

1.4

The Special Survey may be commenced at the 4th Annual Survey and be progressed with a view to completion by the 5th anniversary date. When the special survey is commenced prior to the fourth annual survey, the entire survey is to be completed within 15 months if such work is to be credited to the special survey and in this case the next period of class will start from the survey completion date.

1.5

The special survey is to ensure that the hull, structure, equipment and machinery are in satisfactory condition and that the unit is fit for its intended purpose for the new period of class of 5 years to be assigned subject to proper maintenance and operation and surveys carried out at the due dates.

SECTION 2 Special Continuous Surveys

1 General

1.1

At the request of the Owner, a system of Continuous Survey may be accepted whereby the Special Survey requirements are carried out in regular rotation in accordance with the Rules to complete all the requirements of the particular Special Survey within a five year period. Any defects that may affect classification found during the survey, are to be reported upon and dealt with to the satisfaction of the Surveyor.

SECTION 3 Special Survey No.1

1 General

1.1

Special Survey No.1 of Hull is to include verification of compliance with the foregoing Annual Survey and Drydocking Survey (or equivalent) requirements. In addition, the following requirements as listed below are to be carried out as applicable, the parts examined, placed in satisfactory condition, and reported upon.

2 All Drilling Units

2.1

The hull or platform structure including tanks, watertight bulkheads and deck, cofferdams, void spaces, sponsons, chain lockers, duct keels, helicopter deck and its supporting structure, machinery spaces, peak spaces, steering gear spaces, and all other internal spaces are to be examined externally and internally for damage, fractures, or excessive wastage. Thickness gauging of plating and framing may be required where wastage is evident or suspected.

2.2

All tanks, compartments and free-flooding spaces throughout the drilling unit are to be examined externally and internally for excess wastage or damage. Sea chests, strainers and any underwater propulsion units and pipes are to be selectively cleaned and examined. Internal examinations of spud cans and mats are to be specially considered. Watertight integrity of tanks, bulkheads, hull, decks and other compartments is to be verified by visual inspection. Suspect areas may be required to be tested for rightness, non- destructive tested or thickness gauged. Tanks and other normally-closed compartments are to be ventilated, gas greed and cleaned as necessary to expose damages and allow meaningful examination and thickness gauged in case of excessive wastage. Internal examination and testing of void spaces, compartments filled with foam or corrosion inhibitors, and tanks used only for lube oil, light fuel oil, diesel oil, or other non-corrosion products may be waived provided that upon a general examination the Surveyor considers their condition to be satisfactory. External thickness gauging may be required to confirm corrosion control.

2.3

Anchors, cables and their respective handling means, attachments of anchor racks and anchor cable fairleads are to be examined.

2.4

Structures such as derrick substructure and supporting structure, jack-houses, deck houses, superstructures, helicopter landing areas and their respective attachments to the deck or hull are to be examined.

2.5

Foundations and supporting headers, brackets, and stiffeners for drilling related apparatus, where attached to hull, deck, superstructure or deck house.

2.6

Survey of parts of the unit which are underwater and inaccessible to the Surveyor may be accepted on the basis of an examination by a qualified diver carried out in the presence of the Surveyor. Alternative means, approved by ACS, may be considered. Video or photo records, non-destructive testing and thickness gauging may be required in addition to the diver's report.

2.7

At each Special Periodical Survey, thickness gaugings are to be carried out where wastage is evident or suspect.

2.8

The foundations of machinery are to be examined.

3 Surface Type Units

3.1

Structural appendages and ducts for positioning units are to be examined.

4 Self-Elevating Units

4.1

All legs, including chords, diagonal and horizontal braces, gussets, racks, joints, together with leg guides are to be examined. Tubular or similar type legs are to be examined externally and internally, together with internal stiffeners and pinholes as applicable.

4.2

Structure in, around and under jack- house and leg walls are to be examined. Non-destructive testing of suspect areas may be required.

4.3

Leg jacking or other elevating systems are to be externally examined.

4.4

Leg connections to bottom mats or spud cans are to be examined. Non-destructive testing of leg connections to mats or spud cans may be required.

4.5

Jetting piping systems or other external piping are to be examined.

4.6

Spud cans or mats are to be examined. Where the spud cans or mat are partly or entirely obscured below the mud line where the Special Survey is otherwise being completed, consideration will be given to postponement of the examinations until the next Rig move, subject to the agreement by ACS.

5 Column-Stabilized Units

5.1

In addition to the survey items in 14-4-3/2, the following are to be examined:

Connections of columns and diagonals to upper hull, structure of platform and lower hull, structure of pontoons, joints of supporting structure including diagonals, braces and horizontals together with gussets and brackets, and internal continuation or back-up structure for the above. Non-destructive examination may be required of suspect areas.

SECTION 4 Special Survey No.2 and Subsequent Special Surveys

1 General

1.1

These surveys are to be at least as comprehensive as special survey No.1, with special attention being given to the condition and thickness of material in high corrosion areas. Representative gaugings will be required. These will be specified in advance by ACS. Special attention will be paid to splash zones on hulls, legs or related structure, and in ballast tanks, pre-loaded tanks, free-flooding spaces, spud cans and mats.

Chapter 5 Special Surveys - Machinery

SECTION 1 General

1 General

1.1

Main and auxiliary machinery of all types of drilling units are to be subjected to Special Surveys at intervals similar to those for Special Surveys - Hull, in order that both are completed at approximately the same time.

1.2

The requirements for Special Surveys-Machinery given in ACS Rules for Classification of Vessels are to be complied with.

1.3

In addition, mobile offshore drilling units may have many items of machinery and electrical equipment not found on conventional vessels. Certain of these items are required for classification even if the unit is without propulsion machinery. These items to be especially examined and reported upon at all Special Surveys as follows:

(a) Hazardous Areas

Enclosed hazardous areas such as those containing open active mud tanks, shale shakers, degassers and desanders are to be examined and doors and closures in boundary bulkheads verified as effective.

Electric lighting, electrical fixtures, and instrumentation are to be examined, proven satisfactory and verified as explosion-proof or intrinsically safe. Ventilating systems including ductwork, fans, intake and exhaust locations for enclosed restricted areas are to be examined, tested and proven satisfactory. Ventilating-air alarm systems to be proven satisfactory. Electrical motors are to be examined including closed-loop ventilating systems for large DC motors. Automatic power disconnect to motors in case of loss of ventilating air to be proved satisfactory.

(b) Remote Shutdown Arrangements

Remote shutdown for fuel-oil transfer service pumps and ventilating equipment, together with oil tank outlet valves where required to be able of being remotely closed are to be provided satisfactory. Emergency switch(s) for all electrical equipment including main and emergency generators, except alarm and communication systems and lighting in vital areas such as escape routes and landing platforms are to be proved satisfactory.

(c) Fire Fighting Apparatus

A general examination of the fire detection and extinguishing apparatus is to be made in order that the Surveyor may be satisfied with its efficient state. The following items are to be especially examined:

- Fire hoses, nozzles and spanners at each fire station.
- Servicing of all portable soda-acid and foam extinguishers.
- Weighing and re-charging as necessary of all dry chemical and CO_2 extinguishers.
- Fire pumps and piping including operation and capacity.
- Alarm Systems.

(d) Self-Elevating Systems

On self-elevating type drilling units, the elevating systems are to be examined and reported on, Pinions and gears of the climbing pinion gear train of rack and pinion systems are to be examined, as far as practicable, to the Surveyor's satisfaction by an effective crack detection method.

(e) Piping Systems
Piping systems used solely for drilling operations and complying either with the requirements or a recognized standard are to be examined, as far as practical, operationally of hydrostatically tested to working pressure, to the satisfaction of the Surveyor.

(f) Miscellaneous

- Heat exchangers and other unfired pressure vessels within the scope of classification are to be examined, opened out or thickness gauged and pressure tested as considered necessary, and associated relief valves proved operable. Evaporators that operate with a vacuum on the shell need not be opened, but may be accepted on basis of satisfactory external examination and operational test or review of operating records.

- Propulsion-assist and dynamic positioning equipment is to be surveyed.

- All mechanical, hydraulic and pneumatic control actuators and their power systems for control systems are to be examined and tested as considered necessary.

- Control systems for unattended machinery spaces are to be subjected to dock trials at reduced power on the propulsion engine to ensure the proper performance of all automatic functions, alarms, and safety systems.

- Bilge alarm systems, if fitted to be tested and proven satisfactory.

Chapter 6 Surveys of Screw Shafts, Tube Shafts and Propellers

SECTION 1 General

1 General

1.1

The requirements for Surveys of Screw Shafts, Tube Shafts and Propellers given in ACS Rules for Classification of Vessels are to be complied with.

1.2

Due to low running hours on tailshafts in case of drilling units, extended intervals between tailshaft surveys may be considered based on:

(a) Satisfactory diver's external examination of stern bearing and outboard seal area including weardown check as far as is possible;

(b) Internal examination of the shaft area (inboard seals) in propulsion room(s);

(c) Confirmation of satisfactory lubricating oil records (oil loss rate, contamination);

(d) Shaft seal elements are examined/replaced in accordance with seal manufacture's recommendations.

Chapter 7 Boiler Surveys

SECTION 1 General

1 General

1.1

The requirements for Boiler Surveys given in ACS Rules for Classification of Vessels are to be complied with.

Chapter 8 Surveys during Construction

SECTION 1 General Provision

1 General

1.1

When applying for surveys during construction of a unit by ACS, the applicant is to submit a written application to the Headquarters or a branch of ACS, prior to the commencement of construction.

1.2

When a builder, for the first time, applies to build a unit to be classed with ACS or when a novel unit to be classed with ACS, the ACS surveyors are to carry out evaluation for the production capacity of the builder, including production locations and facilities and quality assurance system of builder, general qualification of construction personnel and subcontractors, and to carry out assessment for the fitness and effectiveness of the unit to be built.

1.3

When it is intended to build a unit for classification with ACS, constructional plans and all necessary particulars relevant to the hull/structure, equipment and machinery, as detailed in ACS MODU Rules, are to be submitted for the approval of ACS before the work is commenced. Any subsequent modifications or additions to the scantlings, arrangements or equipment shown on the approved plans are also to be submitted for approval.

1.4

Where the proposed construction of any part of the hull/structure or machinery is of novel design, or involves the use of unusual material, or where experience, in the opinion of ACS, has not sufficiently justified the principle or mode of application involved, special tests or examinations before and during service may be required. In such cases a suitable notation may be assigned.

1.5

The materials used in the construction of the hull/structure and machinery intended for classification are to be of good quality and free from defects and are to be tested in accordance with the requirements of Part 2 of ACS Rules for Classification of Vessels. The steel is to be manufactured by an approved process at an approved works. Alternatively, tests will be required to demonstrate the suitability of the steel.

1.6

New units intended for classification are to be built under ACS Special Survey. From the commencement of work until the completion of the unit, the Surveyors are to be satisfied that the materials, workmanship and arrangements are satisfactory and in accordance with ACS MODU Rules. Any items found not to be in accordance with the ACS MODU Rules or the approved plans, or any material, workmanship or arrangements found to be unsatisfactory, are to be rectified.

1.7

For compliance with 14-8-1/1.6, ACS is prepared to consider methods of survey and inspection for hull construction which formally include procedures involving the shipyard management, organisation and quality systems.

1.8

Copies of approved plans (showing the unit as built), essential certificates and records, the Operating Manual and loading and other instruction manuals are to be readily available for use when required by the attending Surveyors, and may be required to be kept on board.

1.9

When the machinery of a unit are constructed under ACS Special Survey, this survey is to relate to the period from the commencement of the work until the final test under working conditions. Any items found not to be in accordance with ACS MODU Rules or the approved plans, or any material, workmanship or arrangements found to be unsatisfactory, are to be rectified.

1.10

When remote and/or automatic control equipment, alarms and safeguards are fitted to the machinery, the equipment is to be arranged, installed and tested in accordance with ACS Rules for Classification of Vessels, as applicable.

Chapter 9 Surveys of Units not Built under Survey

SECTION 1 General

1 General

1.1

Units which have not been built under survey of the ACS, but which are submitted for classification will be subject to a special classification survey (Initial Survey). Where found satisfactory and thereafter approved by the Committee, they will be classed.

1.2

The initial survey consists of thorough examination, inspections, tests and measurements, which scope is determined depending on the age of units, their technical conditions, as well as technical documentation and certificates of previous classification society being available. Initial survey is assigned in the scope of special survey subject to the age of the unit including dry dock survey. Data for assessment of effectiveness of protection and results of underwater surveys shall be submitted.

1.3

If the classification certificate of previous classification society is available, the scope of the initial survey may be reduced to the scope of the intermediate survey while the term of the next special survey is fixed in accordance with the validity of the existing classification certificate.
The validity of the periodical surveys is assigned keeping due note of the validity of the existing classification certificate.