Classification of Drilling Ships

January 2016

Rule Note
NR 569 DT R01 E

Marine & Offshore Division
92571 Neuilly sur Seine Cedex – France
Tel: + 33 (0)1 55 24 70 00 – Fax: + 33 (0)1 55 24 70 25
Website: http://www.veristar.com
Email: veristarinfo@bureauveritas.com

BUREAU VERITAS

MARINE & OFFSHORE DIVISION

GENERAL CONDITIONS

ARTICLE 1

1.1. - BUREAU VERITAS is a Society the purpose of whose Marine & Offshore Division (the "Society") is the classification (" Classification ") of any ship or vessel or offshore unit or structure of any type or part of it or system therein collectively hereinafter referred to as a "Unit" whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

The Society:

- "prepares and publishes Rules for classification, Guidance Notes and other documents (" Rules ");
- "issues Certificates, Attestations and Reports following its interventions (" Certificates ");
- "publishes Registers.

1.2. - The Society also participates in the application of National and International Regulations or Standards, in particular by delegation from different Governments. Those activities are hereafter collectively referred to as " Certification ".

1.3. - The Society can also provide services related to Classification and Certification such as ship and company safety management certification; ship and port security certification, training activities; all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board.

1.4. - The interventions mentioned in 1.1., 1.2. and 1.3. are referred to as " Services ". The party and/or its representative requesting the services is hereinafter referred to as the " Client ". **The Services are prepared and carried out on the assumption that the Clients are aware of the International Maritime and/or Offshore Industry (the "Industry") practices.**

1.5. - The Society is neither and may not be considered as an Underwriter, Broker in ship's sale or chartering, Expert in Unit's valuation, Consulting Engineer, Controller, Naval Architect, Manufacturer, Shipbuilder, Repair yard, Charterer or Shipowner who are not relieved of any of their expressed or implied obligations by the interventions of the Society.

ARTICLE 2

2.1. - Classification is the appraisement given by the Society for its Client, at a certain date, following surveys by its Surveyors along the lines specified in Articles 3 and 4 hereafter on the level of compliance of a Unit to its Rules or part of them. This appraisement is represented by a class entered on the Certificates and periodically transcribed in the Society's Register.

2.2. - Certification is carried out by the Society along the same lines as set out in Articles 3 and 4 hereafter and with reference to the applicable National and International Regulations or Standards.

2.3. - **It is incumbent upon the Client to maintain the condition of the Unit after surveys, to present the Unit for surveys and to inform the Society without delay of circumstances which may affect the given appraisement or cause to modify its scope.**

2.4. - The Client is to give to the Society all access and information necessary for the safe and efficient performance of the requested Services. The Client is the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out.

ARTICLE 3

3.1. - **The Rules, procedures and instructions of the Society take into account at the date of their preparation the state of currently available and proven technical knowledge of the Industry. They are a collection of minimum requirements but not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.**

Committees consisting of personalities from the Industry contribute to the development of those documents.

3.2. - **The Society only is qualified to apply its Rules and to interpret them. Any reference to them has no effect unless it involves the Society's intervention.**

3.3. - The Services of the Society are carried out by professional Surveyors according to the applicable Rules and to the Code of Ethics of the Society. Surveyors have authority to decide locally on matters related to classification and certification of the Units, unless the Rules provide otherwise.

3.4. - **The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not in any circumstances involve monitoring or exhaustive verification.**

ARTICLE 4

4.1. - The Society, acting by reference to its Rules:

- "reviews the construction arrangements of the Units as shown on the documents presented by the Client;
- "conducts surveys at the place of their construction;
- "classes Units and enters their class in its Register;
- "surveys periodically the Units in service to note that the requirements for the maintenance of class are met.

The Client is to inform the Society without delay of circumstances which may cause the date or the extent of the surveys to be changed.

ARTICLE 5

5.1. - **The Society acts as a provider of services. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty.**

5.2. - **The certificates issued by the Society pursuant to 5.1. here above are a statement on the level of compliance of the Unit to its Rules or to the documents of reference for the Services provided for.**

In particular, the Society does not engage in any work relating to the design, building, production or repair checks, neither in the operation of the Units or in their trade, neither in any advisory services, and cannot be held liable on those accounts. Its certificates cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.

5.3. - **The Society does not declare the acceptance or commissioning of a Unit, nor of its construction in conformity with its design, that being the exclusive responsibility of its owner or builder.**

5.4. - The Services of the Society cannot create any obligation bearing on the Society or constitute any warranty of proper operation, beyond any representation set forth in the Rules, of any Unit, equipment or machinery, computer software of any sort or other comparable concepts that has been subject to any survey by the Society.

ARTICLE 6

6.1. - The Society accepts no responsibility for the use of information related to its Services which was not provided for the purpose by the Society or with its assistance.

6.2. - **If the Services of the Society or their omission cause to the Client a damage which is proved to be the direct and reasonably foreseeable consequence of an error or omission of the Society, its liability towards the Client is limited to ten times the amount of fee paid for the Service having caused the damage, provided however that this limit shall be subject to a minimum of eight thousand (8,000) Euro, and to a maximum which is the greater of eight hundred thousand (800,000) Euro and one and a half times the above mentioned fee. These limits apply regardless of fault including breach of contract, breach of warranty, tort, strict liability, breach of statute, etc.**

The Society bears no liability for indirect or consequential loss whether arising naturally or not as a consequence of the Services or their omission such as loss of revenue, loss of profit, loss of production, loss relative to other contracts and indemnities for termination of other agreements.

6.3. - All claims are to be presented to the Society in writing within three months of the date when the Services were supplied or (if later) the date when the events which are relied on of were first known to the Client, and any claim which is not so presented shall be deemed waived and absolutely barred. Time is to be interrupted thereafter with the same periodicity.

ARTICLE 7

7.1. - Requests for Services are to be in writing.

7.2. - **Either the Client or the Society can terminate as of right the requested Services after giving the other party thirty days' written notice, for convenience, and without prejudice to the provisions in Article 8 hereunder.**

7.3. - The class granted to the concerned Units and the previously issued certificates remain valid until the date of effect of the notice issued according to 7.2. here above subject to compliance with 2.3. here above and Article 8 hereunder.

7.4. - The contract for classification and/or certification of a Unit cannot be transferred neither assigned.

ARTICLE 8

8.1. - The Services of the Society, whether completed or not, involve, for the part carried out, the payment of fee upon receipt of the invoice and the reimbursement of the expenses incurred.

8.2. - **Overdue amounts are increased as of right by interest in accordance with the applicable legislation.**

8.3. - **The class of a Unit may be suspended in the event of non-payment of fee after a first unfruitful notification to pay.**

ARTICLE 9

9.1. - The documents and data provided to or prepared by the Society for its Services, and the information available to the Society, are treated as confidential. However:

- "Clients have access to the data they have provided to the Society and, during the period of classification of the Unit for them, to the **classification file** consisting of survey reports and certificates which have been prepared at any time by the Society for the classification of the Unit ;
- "copy of the documents made available for the classification of the Unit and of available survey reports can be handed over to another Classification Society, where appropriate, in case of the Unit's transfer of class;
- "the data relative to the evolution of the Register, to the class suspension and to the survey status of the Units, as well as general technical information related to hull and equipment damages, may be passed on to IACS (International Association of Classification Societies) according to the association working rules;
- "the certificates, documents and information relative to the Units classed with the Society may be reviewed during certificating bodies audits and are disclosed upon order of the concerned governmental or inter-governmental authorities or of a Court having jurisdiction.

The documents and data are subject to a file management plan.

ARTICLE 10

10.1. - Any delay or shortcoming in the performance of its Services by the Society arising from an event not reasonably foreseeable by or beyond the control of the Society shall be deemed not to be a breach of contract.

ARTICLE 11

11.1. - In case of diverging opinions during surveys between the Client and the Society's surveyor, the Society may designate another of its surveyors at the request of the Client.

11.2. - Disagreements of a technical nature between the Client and the Society can be submitted by the Society to the advice of its Marine Advisory Committee.

ARTICLE 12

12.1. - Disputes over the Services carried out by delegation of Governments are assessed within the framework of the applicable agreements with the States, international Conventions and national rules.

12.2. - Disputes arising out of the payment of the Society's invoices by the Client are submitted to the Court of Nanterre, France, or to another Court as deemed fit by the Society.

12.3. - **Other disputes over the present General Conditions or over the Services of the Society are exclusively submitted to arbitration, by three arbitrators, in London according to the Arbitration Act 1996 or any statutory modification or re-enactment thereof. The contract between the Society and the Client shall be governed by English law.**

ARTICLE 13

13.1. - **These General Conditions constitute the sole contractual obligations binding together the Society and the Client, to the exclusion of all other representation, statements, terms, conditions whether express or implied. They may be varied in writing by mutual agreement. They are not varied by any purchase order or other document of the Client serving similar purpose.**

13.2. - The invalidity of one or more stipulations of the present General Conditions does not affect the validity of the remaining provisions.

13.3. - The definitions herein take precedence over any definitions serving the same purpose which may appear in other documents issued by the Society.

BV Mod. Ad. ME 545 L - 7 January 2013

RULE NOTE NR 569

NR 569
Classification of Drilling Ships

January 2016

Section 1 General

Section 2 Stability and Subdivision

Section 3 Structural Design Principles

Section 4 Design Loads

Section 5 Hull Assessment

Section 6 Offshore Areas and Other Structural Requirements

Section 7 Machinery Installations

SECTION 1 GENERAL

1 General

1.1 Application

1.1.1 This Note provides requirements for the classification of "ship-shaped" drilling vessels, as defined in [1.9].

1.1.2 The requirements of this Note apply only for units intended to be granted the class notations specified in [1.2].

1.1.3 The requirements of Part A, Part B and Part C of the Offshore Rules are to be applied to such units, as modified and/or completed by this Note.

1.2 Class notations

1.2.1 Structural type notation

The provisions of this Note apply to surface units intended to be granted one of the following structural type notations:

- **offshore service ships** - for surface units having a propulsion system and steering appliances
- **offshore service barge** - for non-propelled surface units unable to perform non-assisted voyages.

1.2.2 Service notations

The provisions of this note apply to surface units intended to be granted the service notation **drilling**, as defined in Pt A, Ch 1, Sec 2, [4.2] of the Offshore Rules.

1.2.3 Additional service features

The additional service features given in Tab 1, and defined in Pt A, Ch 1, Sec 2, [7] of the Offshore Rules are mandatory for units covered by this Note.

1.2.4 Additional class notations

Additional class notations may be granted to units covered by the present Note, as detailed in Pt A, Ch 1, Sec 2, [6] of the Offshore Rules and in Pt A, Ch 1, Sec 2, [6] of the Ship Rules.

1.2.5 Site, transit and navigation notations

Drilling vessels covered by this Note are surface units, for which the site and transit notations may be completed by one of the navigation notations stated in Pt A, Ch 1, Sec 2, [5.3] of the Offshore Rules. Site, transit and navigation notations are to be granted in accordance with the provisions of Pt A, Ch 1, Sec 2, [5] of the Offshore Rules.

Navigation notations will define rule loads corresponding to relevant transit conditions and survival conditions onsite. When no navigation notation is granted, the loads will be defined based on hydrodynamic analysis. Details are given in Sec 4.

1.3 Classification Society involvement

1.3.1 Scope of classification

The scope of classification for units listed above is based on an appraisal of the integrated unit covering in general:

a) Hull, accommodation, helideck and hull attachments and appurtenances including:
   - foundations for the support of topsides equipment and of the hull mounted equipment
   - support structure for life saving appliances
   - passive fire protection and cathodic protection.

b) Moonpool arrangement

c) Intact and damage stability

d) Marine equipment (with foundations) pertaining to the offloading facilities, if any

e) Accommodation quarters

f) Dynamic positioning system (in case of additional class notation **DYNAPOS**)

g) Station keeping system (as per additional service feature **POSA MU**, as stated in [1.5])

h) Lifting appliances (in case of the additional class notation **ALM**)

i) Drilling equipment and installations (in case of additional class notation **DRILL**, as stated in [1.4])

j) Equipment and systems necessary for the safe operation of the hull and to the safety of personnel on board, as defined in the Rules for the Classification of Offshore Units and related applicable Rules (taking into account the additional service features **AUTO** and **IG**, and the additional class notation **LSA**)

k) Equipment and systems installed in the hull, the failure of which may jeopardise the safety of the floating unit

l) The fire and gas detection system for the hull as well as the definition of the hazardous areas of the hull

m) The fire water and foam system for the protection of the hull

n) Propulsion plant, when relevant.

1.3.2 Detailed boundaries for classification

For each project, the detailed boundaries for the classification of units covered by this Note are defined by the Society on case-by-case basis and with reference to the requested structural type and service notations, additional class notations and additional service features.

Table 1 : Additional service features

Additional service feature	Items covered
AUTO	Automated installations enabling periodically unattended operations of machinery spaces
IG	Inerting gas system fitted onboard
VeriSTAR-Hull	Structural assessment through 3D partial finite element model

1.4 Additional class notation DRILL

1.4.1 General

The additional class notation **DRILL** covers the classification of drilling equipment and installations fitted onboard drilling vessels. Technical requirements for the additional class notation **DRILL** are given in NR570 Classification of Drilling Equipment.

1.4.2 Notation DRILL requested

When the additional class notation **DRILL** is requested, the equipment stated in Tab 2 is included in the scope of the classification, and is to comply with the requirements of NR570 Classification of Drilling Equipment.

Structural elements supporting or housing this equipment, and related facilities (topsides structures), are to be designed and built in accordance with the relevant requirements of Part B, Chapter 2 and Part B, Chapter 3 of the Offshore Rules and NR570 Classification of Drilling Equipment.

Subject to initial agreement, topsides structures may be designed following other recognized standards, provided due consideration is given to inertial loads, overall deformations of the unit, differential displacements of supports points and other relevant loadings, in accordance with the provisions of Part B, Chapter 2 of the Offshore Rules.

1.4.3 Notation DRILL not requested

When the additional class notation **DRILL** is not requested, the equipment stated in Tab 2 and the related topsides structures are not included in the scope of the classification. However, the Society will include in the scope of the classification items relating to drilling equipment and installations affecting the general safety of the unit, such as:

- structural safety and loads generated by drilling equipment on the hull or other classed parts of the unit
- definition of hazardous areas
- venting system
- interface to the fire fighting and fire prevention systems
- arrangement of emergency escapes.

The Society endeavours also to verify that the failure of equipment out of the scope of the classification does not impair significantly hull safety. Additional documentation may be requested.

Supports and foundations of drilling equipment which are welded to the hull or other classed part of the unit will be included in the scope of the classification. Classification limits will be defined on a case-by-case basis, after examination of submitted drawings and documentation.

1.5 Station keeping system

1.5.1 The additional service feature **POSA MU** is to be assigned to units fitted with passive station keeping system, which are to comply with the requirements of NR493 Classification of Mooring Systems for Permanent and Mobile Offshore Units.

1.6 Design Criteria Statement

1.6.1 Classification is based upon the design data or assumptions specified by the party applying for classification. A Design Criteria Statement is to list the services performed by the unit and the design conditions and other assumptions on the basis of which class is assigned to the unit.

The Design Criteria Statement is to be issued by the Society, based on the information provided by the party applying for classification.

1.6.2 The Design Criteria Statement is to be referred to on the unit's Classification Certificates.

1.6.3 The Design Criteria Statement is to be incorporated in the Operating Manual, as stated in Pt A, Ch 1, Sec 1, [3.4] of the Offshore Rules.

1.6.4 Additional details about the Design Criteria Statement are given in Pt A, Ch 1, Sec 1, [1.6] of the Offshore Rules.

1.7 Design life

1.7.1 The requirements about "Service Life", "Design life", unit modifications and unit re-assessment are given in Pt A, Ch 1, Sec 1, [1.7] of the Offshore Rules.

1.8 Statutory requirements

1.8.1 Project specification

Prior to the beginning of the review of drawings, the complete list of Rules, Codes and Statutory Requirements to be complied with is to be submitted for information. This list is to detail the requirements to be complied with:

- International Rules
- Flag state requirements
- Coastal state requirements
- Owner standards and procedures
- Industry standards
- Classification notations.

The project specification is also to specify the list of Owner requested statutory certificates.

1.8.2 Conflict of Rules

In case of conflict between the Society Rules and any Statutory Requirements as given by Flag state or Coastal State, the latter ones are to take precedence over the requirements of these Rules.

1.8.3 IMO MODU Code

Compliance with IMO MODU Code may be required by Owner, Flag and/or Coastal State.

The Society reserves the right to refer to the requirements in IMO MODU Code, when deemed necessary.

1.9 Definitions

1.9.1 Offshore Rules

Offshore Rules means Society Rules for the Classification of Offshore Units (NR445). When reference is made to the Offshore Rules, the latest version of these ones is applicable.

1.9.2 Ship Rules

Ship Rules means Society Rules for the Classification of Steel Ships (NR467). When reference is made to the Ship Rules, the latest version of these ones is applicable.

Table 2 : List of equipment covered by the additional notation DRILL

System	Equipment
Drilling structures	• derricks • masts • drilling towers • pipe racks or equivalent structures • other supporting structures (such as the drill floor)
Hoisting equipment	• crown block • travelling block • drawworks • drilling hook
Rotary equipment	• rotary table • master bushing • topdrive • rotary hose
BOP and pipe handling equipment	• horizontal to vertical pipe handling systems • BOP crane • winches
Dry bulk storage and transfer system	• pressurized tanks • piping for pressurized bulk transport • air compressor • air dryer • control valves • emergency compressor • purge air system • engines
Mud mixing and circulating facilities	• pumps • standpipe manifold • pulsation dampeners • mud hoses • safety valves • mud agitators • mud mixing equipment • degasser • desander • desilter • shale shakers • drill string
Cementing system	• cement pump • cement unit • piping and transfer lines • pulsation dampeners • cement hoses • additives system • control valves
Drill string heave compensation system (active or passive)	• accumulators • hydraulic cylinders • piping (including flexibles) • pressure vessels
Tensioning system	• accumulators • hydraulic cylinders • piping system • pressure vessels • tensioning arms
Marine riser system	• riser joints • telescopic joints and tensioner ring • ball and flexjoints • choke, kill and auxiliary lines • connectors
Well control system	• Blow-Out Preventer (BOP) - rams preventers - annular preventers - test stumps - wellhead connector - accumulators - control pods - acoustic BOP control • Koomey unit • Choke and kill system • Diverter system, including piping and valves
Well test system	• burners • flare booms • piping • pressure vessels • pumps
Other systems	• pressure containing equipment • pipings • electrical systems • control systems

1.9.3 Drilling vessel

Drilling vessels are offshore units used for drilling activities relating to exploration and/or exploitation of oil and gas. These units operate generally on an operation site for a limited period and perform transit from one site to another.

Drilling vessels are generally equipped with dynamic positioning systems (DP).

For the purpose of the application of referenced requirements of the Offshore Rules, drilling vessels are mobile offshore units, as defined in Pt A, Ch 1, Sec 1, [4.5.1] of the Offshore Rules.

1.9.4 BOP

BOP is the acronym of Blow-Out Preventer, which is a well control equipment used for sealing the well around a pipe (drill pipe, casing or other types of pipe, depending on the related operational phase). The sealing of the well is based on two types of equipment, which are parts of the BOP:

- annular devices
- sealing rams.

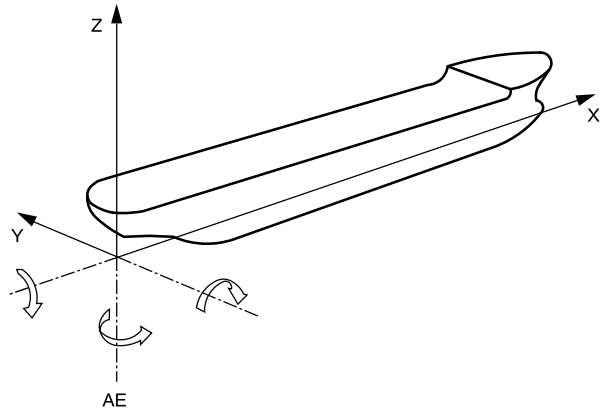
Technical requirements for the design, testing and inspection of the BOP are given in NR570 Classification of drilling equipment.

1.10 Reference co-ordinate system

1.10.1 The ship's geometry, motions, accelerations and loads are defined with respect to the following right-hand co-ordinate system (see Fig 1):

- Origin: at the intersection between the longitudinal plane of symmetry of ship, the aft end of L and the baseline

Figure 1 : Reference co-ordinate system



- X axis: longitudinal axis, positive forwards
- Y axis: transverse axis, positive towards portside
- Z axis: vertical axis, positive upwards.

Positive rotations are oriented in anti-clockwise direction about the X, Y and Z axes.

1.11 Documents to be submitted

1.11.1 The documentation to be submitted is specified in Part A, Chapter 1 of the Offshore Rules.

In addition, calculation reports, test reports, drawings and plans relevant for the application of requirements given in the present Note are to be submitted.

SECTION 2 STABILITY AND SUBDIVISION

1 General

1.1 Application

1.1.1 The requirements of this Section, including those related to damage stability, are applicable for all units covered by this Note, as defined in Sec 1, [1.1].

1.1.2 Unit stability, subdivision, watertightness and weathertightness are to comply with the applicable requirements of Partt B, Chapter 1 of the Offshore Rules, except when otherwise specified in this Section.

1.1.3 Attention is drawn to the International Regulations the unit may have to comply with such as IMO Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU code).

1.1.4 Specific criteria

If the Owner specifies criteria for intact and damage stability, more severe than those of this Section, these criteria are to be taken into account and stated in the Design Criteria Statement.

1.2 Documentation to be submitted

1.2.1 General

A stability file is to be submitted by the Owner or its representative. It has to include line plans, capacity plans, justification of lightweight characteristics, definition of loading conditions, trim and stability booklet, damage stability booklet, damage control plan, damage control booklet.

2 Stability

2.1 Trim and stability booklet

2.1.1 General

The trim and stability booklet of the unit, including the list of information defined in [2.1.2], is to be approved by the Society.

2.1.2 List of information

Relevant information defined in Pt B, Ch 3, App 2, [1.1.2] of Ship Rules is to be included in the trim and stability booklet. The booklet is to contain the standard loading conditions given in [2.1.3].

2.1.3 Standard loading conditions

The standard loading conditions to be included in the trim and stability booklet are:

- lightweight condition
- docking condition with 10% of consumable supplies
- transit arrival and departure conditions, anchors to be onboard and with maximum related deck loads
- towing condition, if relevant
- normal operation conditions, covering the full range of operating draughts and taking into account the maximum loading of materials and equipment in the most unfavourable position applicable. Normal operation conditions are to cover:
  - preliminary drilling operations, connexion of marine riser
  - installation of conductor pipe
  - BOP running
  - normal drilling operations
  - casing running operations
  - tripping and associated handling of drill string
  - cementing operations
  - BOP testing
  - fishing works
  - well testing operations, when relevant
  - well completion operations, when relevant, including handling of X-mass tree.
- inspection conditions consistent with the operational procedures
- severe storm conditions assuming the same weight distribution as for transit/towing, as relevant, except for the necessary ballast adjustments to bring the unit to the survival draught and for the possible dumping of variable deck load if such is specified in the operational procedures
- severe storm condition assuming the same weight distribution as for normal operation condition with the necessary ballast adjustments to place the unit in the survival draught configuration. In this condition:
  - equipment liable to be disconnected, such as marine risers or mooring lines (when relevant), is assumed disconnected
  - equipment liable to be disconnected and stored on deck, is assumed disconnected and secured on deck
  - equipment having a rest position, such as crane booms and handling equipment, is assumed in rest position
  - the maximum amount of loads is assumed to be stored on deck, such as drill pipe and casing stored in the pipe rack. Account may be taken of dumping of variable deck load if specified in the operational procedure.

2.2 Stability calculations

2.2.1 General

As a minimum, stability calculations for the standard loading conditions defined in [2.1.3] are to be carried out and submitted to the Society. The Society may require stability calculations for additional loading conditions, based on the investigation of the Loading Manual or on the information previously submitted. These additional loading conditions are to be stated in the Design Criteria Statement.

2.2.2 Snow and frost

Units covered by this Note and liable to operate in areas of snow and glazed frost, the verification of the stability, intact and damage, is to be performed taking into account the possible overloads due to ice and snow accumulation.

In order to perform the stability calculation, the following amount of ice may be considered on the fore third of the vessel's length from the exposed deck and the decks above, including the sides:

- 140 kg/m^2 for horizontal exposed areas
- 70 kg/m^2 for lateral or oblique exposed areas.

For the purpose of the calculation, the masts are excluded.

Different amount of ice corresponding to local regulations or areas where the units are operating may be used instead of the above values.

Table 1 : Permeability of spaces

Spaces	Permeabilities
Appropriated to stores	0,60
Occupied by accommodation	0,95
Occupied by machinery	0,85
Voids	0,95
Intended for consumable liquids	0 to 0,95 **(1)**
Intended for other liquids	0 to 0,95 **(1)**
(1) The permeability of partially filled compartments are to be consistent with the amount of liquid carried in the compartment	

2.2.3 Permeability of spaces assumed to be damaged

The permeability values of spaces assumed to be damaged are normally to be taken as given in Tab 1.

Other values may be used if adequately supported by calculations and if consistent with operating practices.

2.2.4 Moonpool

Applicable requirements for moonpool assessment are detailed in guidance note NI 621, Guidelines for Moonpool Assessment.

2.2.5 Displacement and KG values are to account for the vertical force maintained by marine riser tensioners. Vertical components of passive mooring forces are also to be taken into account, when relevant.

The necessary data are to be submitted for the range of applicable water depth.

SECTION 3 STRUCTURAL DESIGN PRINCIPLES

1 Unit's areas categorization

1.1 Principles

1.1.1 Definition of areas

Following analysis of the stress level in the structure and design environment, the Society may categorize structural elements of units covered by this Note as follows:

- elements belonging to "ship area", which are structural elements composing the hull of the ship and covered by the requirements of the Ship Rules, including the moonpool structure.
- elements belonging to "offshore area", which are structural elements welded to the hull structure providing an interface between the hull and equipment and installations onboard the drilling vessel. Structural elements reinforcing the hull for sustaining loads induced by topsides equipment are also to be included in the "offshore area". Typical examples of elements in offshore areas are given in Tab 1.

  The Society reserves its right, according to appropriate structural analysis, to declare other elements as belonging to offshore areas.

1.1.2 Requirements for "ship area"

Structural elements belonging to "ship area" are to comply with the requirements of Part B of the Ship Rules, except when otherwise specified in this Note. In case of conflict between the Ship Rules and this Note, the most severe requirement is to take precedence.

Table 1 : Typical examples of elements belonging to the "offshore area"

	Structural elements
Offshore area	Derrick fondation into hull
	Pipe rack supports
	Substructure of laydown areas
	Pedestals and foundations of deck appliances
	Drawworks foundation into hull
	Helideck supports
	Passing mooring supports, when relevant
	Handling cranes (for BOP, ROV, etc) pedestal and foundation into hull
	Flare boom supports, when relevant
	Foundations and supports of other non-permanent equipment
	Foundations and supports of silo for pouder products

1.1.3 Requirements for "offshore area"

Structural elements belonging to "offshore areas" are to comply with the requirements of Part B of the Offshore Rules, except when otherwise specified in the present Note.

When the additional class notation **DRILL** is granted to the unit, some elements from "offshore area" may be also covered by the requirements of NR570 Classification of drilling equipment. In such a case, the requirements of NR570 are to take precedence.

1.1.4 Extension of areas

Limits between "ship area" and "offshore area" may be adjusted by the Society as a result of engineering judgement based on knowledge of the load path and related stress level.

1.2 Structural categories for "offshore area"

1.2.1 Guidance for structural categorization

Structural categories specified in Tab 2 for various elements belonging to "offshore area" are given as guidance for the application of the Offshore Rules.

The categories definitions are given in Pt B, Ch 3, Sec 2, [2] of the Offshore Rules.

Additional guidance is to be found in Pt D, Ch 1, Sec 3, [1] of the Offshore Rules.

Table 2 : Guidance for structural categorization of "offshore area"

Category	Structural element
Second	• Substructure of laydown areas • Doubler plates, insert plates due to topsides structures • Outfitting features • Stair towers and their substructure • Rest support structures for handling equipment • Reinforcing stiffeners, girders or bulkheads sustaining a low or moderate level of stress and easily available for inspection
First	• In general, supports and stools of equipment designed with soft toe brackets • Drill floor support structure, including reinforcing stiffeners and girders • Helideck supporting structure • pipe racks supporting structure
Special	• Derrick supporting structure • In general, supports and stools of equipment designed without soft-toe brackets

2 Materials for construction

2.1 Design temperature

2.1.1 The design temperature of structural elements is to be defined in accordance with Pt B, Ch 2, Sec 2 of the Offshore Rules.

2.2 Material requirements for “ship area”

2.2.1 Structural elements belonging to “ship area” are to comply with the requirements relating to materials for construction given in Pt B, Ch 4, Sec 1 of the Ship Rules.

2.3 Material requirements for “offshore area”

2.3.1 Structural elements belonging to “offshore area” are to comply with the requirements relating to materials for construction given in Pt B, Ch 3, Sec 2 of the Offshore Rules, taking into consideration the structural categories defined in [1.2].

3 Inspections and checks

3.1 Inspection of “ship area”

3.1.1 For parts of the structure defined as “ship areas”, the requirements given in Part B, Chapter 12 of the Ship Rules are to be applied.

3.1.2 Prior to construction start, the constructing shipyard is to propose a recognized standard for approval.

3.1.3 The Society reserves the right to increase the number of non destructive examinations due to complexity of the structure and with particular attention to the intended service.

3.2 Inspection of “offshore area”

3.2.1 For parts of the structure defined as “offshore areas”, reference is to be made to NR426 Construction Survey of Steel Structures of Offshore Units and Installations.

3.2.2 The Society reserves the right to increase the number of non destructive examinations due to complexity of the structure and with particular attention to the intended service.

4 Subdivision arrangement

4.1 General

4.1.1 Subdivision arrangement of units covered by this Note is to comply with the relevant requirements of Pt B, Ch 2, Sec 1 of the Ship Rules. The list of detailed references is given in Tab 3.

Table 3 : List of references for subdivision arrangement

Item	Reference in Ship Rules
Number and arrangement of transverse watertight bulkheads	Pt B, Ch 2, Sec 1, [1]
Collision bulkhead	Pt B, Ch 2, Sec 1, [2]
Aft peak, machinery space bulkheads and stern tubes	Pt B, Ch 2, Sec 1, [3]
Height of transverse watertight bulkheads other than collision bulkheads and aft peak bulkhead	Pt B, Ch 2, Sec 1, [5]
Openings in watertight bulkheads and decks	Pt B, Ch 2, Sec 1, [6]

5 Compartment arrangement

5.1 General

5.1.1 Relevant requirements relating to compartment arrangement given in Pt B, Ch 2, Sec 2 of the Ship Rules are to be complied with. The detailed list of references is given in Tab 4.

Table 4 : List of references for compartment arrangements

Item	Reference in Ship Rules
Cofferdams	Pt B, Ch 2, Sec 2, [2]
Double bottoms	Pt B, Ch 2, Sec 2, [3]
Compartments forward of the collision bulkhead	Pt B, Ch 2, Sec 2, [4]
Minimum bow height	Pt B, Ch 2, Sec 2, [5]
Fuel oil tanks	Pt B, Ch 2, Sec 2, [8]

6 Access

6.1 General

6.1.1 As a rule, access arrangement is to comply with the relevant requirements of Pt B, Ch 2, Sec 3 of the Ship Rules, except when otherwise specified in the present Note.

6.2 Means of access

6.2.1 The requirements detailed in Pt B, Ch 3, Sec 1 of the Offshore Rules are to be applied.

6.3 Access manual

6.3.1 The requirements detailed in Pt B, Ch 3, Sec 1 of the Offshore Rules are to be applied.

7 Strength principles

7.1 General references

7.1.1 The requirements of Ship Rules, referenced in Tab 5 are to be complied with, as completed/modified by this Article.

Table 5 : List of references for strength principles

Item	Reference in Ship Rules
Connection with high strength steel	Pt B, Ch 4, Sec 3, [1.2]
Connections between steel and aluminium	Pt B, Ch 4, Sec 3, [1.3]
Plating	Pt B, Ch 4, Sec 3, [2]
Ordinary stiffeners	Pt B, Ch 4, Sec 3, [3]
Primary supporting members	Pt B, Ch 4, Sec 3, [4]
Bottom structure	Pt B, Ch 4, Sec 4
Side structure	Pt B, Ch 4, Sec 5
Deck structure	Pt B, Ch 4, Sec 6
Bulkhead structure	Pt B, Ch 4, Sec 7

7.2 Structural continuity

7.2.1 The variation in scantling between the midship region and the fore and aft parts is to be gradual.

Attention is to be paid to the structural continuity:

- in way of changes in the framing system
- at the connections of primary or ordinary stiffeners
- in way of moonpool
- in way of cellar decks and other arrangements for storage of heavy equipment (BOP, X-mass tree, etc)
- in way of ends of superstructures.

7.2.2 When necessary, the shape of openings is to be specially designed to reduce the stress concentration factors. Particular attention is to be paid to the passage of secondary stiffeners through web plating in the stress vicinity of heavy loads, i.e. drilling equipment loads on deck supports.

7.3 Moonpool

7.3.1 Applicable requirements for moonpool assessment are detailed in guidance note NI 621.

7.4 Concentrated loads

7.4.1 Structural parts in way of concentrated loads from derrick, pipe racks, drawworks, drilling mud equipment, cementing equipment, storage of heavy equipment such as BOP..., are to be reinforced, at the satisfaction of the Society.

7.4.2 When a positioning mooring system is fitted, the structural parts in way of fairleads, winches, etc, are to be designed so as to withstand forces equivalent to the breaking strength of the mooring line.

7.5 Insert plates and doublers

7.5.1 A local increase in plating thickness is generally to be achieved through insert plates. Insert plates are to be made of materials of a quality at least equal to that of the plates on which they are welded.

7.5.2 Plating under heavy concentrated loads shall be reinforced with doublers (only compression loads allowed) and/or stiffeners where necessary. Doublers in way of equipment and pipe rack supports are to be limited in size and avoided in areas of the deck with high stress. A detailed drawing showing location of the doublers is to be submitted to the Society for review.

7.6 Supporting structure for hull attachments

7.6.1 Generally, the supports for attachments and appurtenances are to be fitted in way of longitudinal and transversal bulkheads or in way of deck beams. Other supports are to be fitted in way of large primary supporting members.

7.6.2 When the supports are only located on transverse web beam, the longitudinal structure is to be adequately reinforced.

7.6.3 The cut out in the deck transverse for the passage of ordinary stiffeners are to be closed in way of supports.

7.6.4 Particular attention is to be paid to buckling below supports.

8 Net scantling approach

8.1 Principle

8.1.1 Except when otherwise specified, the scantlings obtained by applying the criteria specified in this Note and in applicable requirements of the Ship Rules are net scantlings (see Pt B, Ch 4, Sec 2, [1] and [2] of the Ship Rules).

8.1.2 Net thickness of plating is to be obtained by deducting the rule corrosion addition from the gross thickness indicated by the Designer. The requirement of [8.1.3] is to be considered.

8.1.3 For all finite element models, the net thickness of plating is to be obtained by deducting half of the rule corrosion addition from the gross thickness indicated by the Designer.

8.2 Corrosion addition

8.2.1 The values of rule corrosion additions are given in Pt B, Ch 4, Sec 2, [3] of the Ship Rules. If the party applying for classification specifies greater values of corrosion additions, these values are to be taken into account for calculations and stated in the Design Criteria Statement.

9 Corrosion protection

9.1 General reference

9.1.1 The requirements of Pt B, Ch 3, Sec 5, [1] and Pt B, Ch 3, Sec 5, [2] of the Offshore Rules, relating to corrosion protection methods and design of corrosion protection systems, are to be complied with. These requirements refer to NI 423 Corrosion Protection of Steel Offshore Units and Installations.

9.2 Thickness increments and additional class notation STI

9.2.1 A thickness increment of platings and, where relevant, of stiffeners may be added to the gross thickness in special areas subject to mechanical wastage due to abrasion or in areas of difficult maintenance.

$t_{net} = t_{gross} - t_c$

$t_{gross} = t_{as\text{-}built} - t_i$

where:

t_i : Thickness increment

t_c : Corrosion addition as defined in [8]

t_{net} : Net thickness

t_{gross} : Gross thickness.

The gross thickness plus the thickness increment is equal to the as-built thickness.

9.2.2 For the checking criteria specified in the present Note and in applicable requirements of the Ship Rules the thickness increments are not to be considered.

9.2.3 Notation STI requested

When the unit has the additional class notation **STI**, the thickness increments may be defined by the Owner or by the Society, as follows:

a) When the Owner specifies its own thickness increments, it is to be notified to the Society where thickness increments are provided. Thickness increments are to be stated in the Design Criteria Statement.

b) When the Owner does not provide its own thickness increments, the values to be generally considered are defined as follows:
   - 1 mm for all decks
   - 1 mm for the outer shell and bottom, except the splash zone
   - 1 mm for inner side, when relevant, and inner bottom
   - 2 mm for side shell located in the splash zone
   - 2 mm for moonpool plating.

Adequate indications (location, value of thickness increments) are to be given in the relevant structural drawings.

9.2.4 Notation STI not requested

When the additional class notation **STI** is not assigned to the unit, the thickness increments are to be taken equal to zero.

10 Welding and weld connections

10.1 Structural elements in “ship area”

10.1.1 The requirements stipulated in Pt B, Ch 12, Sec 1 of the Ship Rules are to be applied for welding of elements in the “ship area”.

10.2 Structural elements in “offshore area”

10.2.1 The requirements stipulated in NR426 Construction Survey of Steel Structure of Offshore Units and Installations are to be applied for welding of elements in the “offshore area”.

SECTION 4 DESIGN LOADS

1 General

1.1 Principles

1.1.1 Definition of loads

The principle of load definition for the checking of structural elements is different for "ship area" and for "offshore area", as defined in Sec 3.

For elements belonging to the "ship area", the loads are defined based on the principles Pt B of the Ship Rules, taking into account the requirements of this Section.

For elements belonging to the "offshore area", the loads are defined based on the principles of Pt B of the Offshore Rules, taking into account the requirements of this section.

1.1.2 Loading manual

A loading manual of the unit is to be submitted for approval. As a minimum, the loading manual is to comply with the relevant requirements of Pt B, Ch 10, Sec 2, [2] and Pt B, Ch 10, Sec 2, [3] of the Ship Rules.

The loading manual is to include the following types of loading conditions:

- harbour conditions, including dry docking conditions
- transit/towing conditions covering at least the following situations:
  - the vessel is sailing with 10% of consumable onboard (arrival condition)
  - the vessel is sailing with 100% of consumable onboard (departure condition)
- normal operation conditions including, generally, the items specified in Sec 2, [2.1.3] as a minimum, the following situations are to be covered:
  - the vessel is arrived on site and prepares for drilling operations
  - drilling without riser (top hole drilling), generally performed for the installation of conductor pipe
  - running BOP
  - normal drilling
  - the vessel is prepared for casing running
  - casing running
  - well completion operations, when relevant, including running of X-mas tree
  - in-field transit from one well to another, when relevant
  - stand-by conditions onsite due to stop of drilling operations, when limiting operational parameters are exceeded
- survival conditions onsite
- inspection conditions
- accidental loading conditions.

1.1.3 Direct calculations and model tests

Direct calculations are recommended for the evaluation of various load parameters stated in the present section. Hydrodynamic calculations may be calibrated based on model tests. In such a case, the testing procedures and methods used for the extrapolation of model tests to full scale data are to be at the satisfaction of the Society. Preferably, the procedure should be reviewed and agreed before the test is performed.

Attendence of a Surveyor to model test will be decided at the convenience of the Society.

1.1.4 Data to be submitted

The following information is to be submitted to the Society, in addition to the information requested in Sec 1:

- maximum water depth in which the unit can operate
- maximum drilling depth, measured from the rotary equipment
- limiting operational parameters for normal operations, as required in [1.1.5]
- limiting load parameters, as stated in [1.1.6].

1.1.5 Limiting operational parameters

The Owner is to define the limiting operational parameters for loading conditions covering normal operations on-site. Generally, these limiting operational parameters are expressed in terms of pitch/roll amplitudes and heave amplitudes.

Limiting operational parameters for each loading condition covering normal operations are to be stated in the Operating Manual.

1.1.6 Limiting load parameters for operating conditions and inspections

Based on the environmental data of the intended site and on station keeping capabilities of the unit, the Owner is to define the for each loading condition the following limiting load parameters:

- significant waive height
- wave period
- wind velocity
- current velocity at surface.

These parameters will be stated by the Society in the Design Criteria Statement.

1.2 Definitions

1.2.1 The definitions of the following terms are indicated in Pt B, Ch 5, Sec 1, [1] of the Ship Rules:

- still water loads
- wave loads
- dynamic loads
- local loads
- hull girder loads
- loading condition
- load case.

1.2.2 Other definitions are given in Part B, Chapter 2 of the Offshore Rules.

2 Loading conditions

2.1 Design loading conditions

2.1.1 Design loading conditions and associated draught and still water bending moments indicated in the loading manual (see [1.1.2]) are to be considered for structural checks required in Sec 5 and Sec 6.

2.1.2 At a preliminary stage, when the loading manual is not yet available, design loading conditions detailed in App 1 may be considered for guidance.

2.1.3 In addition to the conditions listed in [1.1.2], the Society may require to consider other conditions from the loading manual as design loading condition for structural check, when considered that these conditions are expected to be critical for structural elements. The selection will be done on a case-by-case basis, taking into account design and operational specificities of the unit.

2.1.4 During installation of pipe, casing or riser joints, suspended loads will be alternatively applied on the hook and on the drill floor. The worst situation is to be considered for the definition of design loading conditions.

2.1.5 In normal operation conditions, horizontal X-mas tree will not be considered onboard, because drilling operations are performed through the X-mas tree, which is installed on the wellhead before the BOP.

2.1.6 Inspection conditions are to be considered only when inspections on the intended operating site will be provided, and when the loading configuration is not covered by other loading conditions.

3 Categories of loads

3.1 General

3.1.1 The following categories of loads are considered:

- fixed loads
- operational loads
- environmental loads
- accidental loads
- testing loads
- temporary construction loads.

3.2 Fixed loads

3.2.1 Fixed load or lightweight is the weight of the complete unit with all permanently attached machineries, equipment and other items of outfit such as:

- piping
- deckings, walkways and stairways
- permanent drilling equipment
- outfittings
- spare parts
- furniture.

The light weight of the unit includes the weight, to their normal working level, of all permanent ballast and other liquids such as lubricating oil and water in the boilers, but excludes the weight of liquids or other fluids contained in supply, reserve or storage tanks.

3.2.2 Fixed loads are to comply with the applicable requirements of Pt B, Ch 2, Sec 3, [2] of the Offshore Rules.

3.3 Operational loads

3.3.1 Operational loads are loads associated with the operation of the unit and include:

- the weights of all moving equipment and machineries
- the weight of drill string and related pieces of equipment
- variable loads of consumable supplies weights such as:
  - casing
  - drilling and potable water
  - drilling mud
  - drilling brines
  - cement
  - oil products
  - chemical products
- storage of cuttings, when relevant
- seawage, dirty oil and water tanks
- other storage loads
- hydrostatic loads (buoyancy)
- liquids in tanks
- ballast loads
- riser tensioner forces
- heave compensator loads
- hook and rotary equipment loads
- loads resulting from lifting appliances in operation

Dynamic loads induced by equipment in operation are to be considered as operational loads.

3.3.2 Operational loads are to comply with the applicable requirements of Pt B, Ch 2, Sec 3, [2] of the Offshore Rules.

3.4 Environmental loads

3.4.1 General

Environmental loads are loads resulting from the action of the environment and include loads resulting from:

- wind
- waves
- current
- ice and snow where relevant.

Dynamic loads induced by unit's motions (inertia forces) or by dynamic response to environment action are to be considered as environmental loads.

3.4.2 Environmental data

Environmental data for the intended sites of operation are to be specified for the purpose of design load definition.

The environmental data are to comply with the requirements of Pt B, Ch 2, Sec 2 of the Offshore Rules.

3.4.3 Wave loads

Wave loads are to be defined in accordance with the requirements of Pt B, Ch 2, Sec 3, [3.3] of the Offshore Rules.

Design waves used for wave loads definition are to be described by wave energy spectra or deterministic waves having appropriate shape and size. Consideration is to be given to waves of lesser height, where, due to their period, the effect on structural elements may be greater.

3.4.4 Wind loads

Wind pressures and forces acting on structural elements are to be calculated based on sustained and gust wind velocities, as relevant, and using the method defined in Pt B, Ch 1, Sec 2, [4.2] of the Offshore Rules or other method to the satisfaction of the Society.

When no particular wind data are specified, the classification will be based on the wind velocity values given in Tab 1.

Table 1 : Wind velocity values

Loading condition	Wind speed (m/s) **(1)**
Loading conditions covering transit/towing phase	51,5
Loading conditions covering normal operations	36,0
Survival conditions on-site	51,5
Inspection conditions	36,0
(1) The values specified in the table correspond to 1 minute wind velocity at 10 m above the mean water level	

3.4.5 Current loads

Current loads are to be calculated in compliance with the requirements given in Pt B, Ch 2, Sec 2, [4] of the Offshore Rules and Pt B, Ch 2, Sec 3, [3.4] of the Offshore Rules.

3.4.6 Ice and snow

The requirements of Pt B, Ch 2, Sec 3, [3.7] of the Offshore Rules are to be complied with.

3.4.7 Vortex sheeding

The Society may require to consider the possibility of flutter of structural members due to vortex shedding.

3.5 Accidental loads

3.5.1 Accidental loads are loads that may be sustained during accidental events, such as:

- collisions by supply boats or other craft
- impact by dropped objects
- breaking of mooring lines.

Accidental loads also include loads resulting of such event (damaged situations) or of other exceptional conditions to be determined with regard to the activities of the unit in accordance with Pt B, Ch 2, Sec 1, [4.3] of the Offshore Rules and Pt B, Ch 2, Sec 3, [4] of the Offshore Rules.

3.6 Testing loads

3.6.1 Testing loads are loads sustained by the structure during testing phases of tanks or equipment.

3.7 Temporary construction loads

3.7.1 In accordance with the provisions of Pt A, Ch 1 of the Offshore Rules, temporary construction loads not resulting from the tests required to be performed by the applicable Rules requirements are not subject to review by the Society unless a specific request is made. The attention of the Builder is however called upon the provisions of Pt B, Ch 3 of the Offshore Rules concerning construction procedures liable to affect, for instance by prestressing, the strength of the unit.

4 Hydrodynamic analysis

4.1 Principles

4.1.1 General

Hydrodynamic analysis is mandatory when navigation notations are not granted to the unit (for transit and site conditions).

When navigation notations are granted, hydrodynamic analysis is recommended, in order to superimpose values of load parameters given by the navigation notations with the ones obtained by direct calculations or tests.

When hydrodynamic analysis is performed in order to assess the wave load parameters, as defined in [4.2], the requirements of the present article are to be taken into account.

4.1.2 Methodology

Hydrodynamic analysis will be performed based on the applicable requirements of Pt D, Ch 1, Sec 4 of the Offshore Rules, except when otherwise specified in this Note.

4.2 Wave load parameters

4.2.1 The hydrodynamic analysis is to result in the following wave load parameters:

- wave induced vertical bending moment
- wave induced horizontal bending moment
- wave induced vertical shear force
- accelerations in 3 directions including gravity
- relative wave elevation.

The values of these parameters are to be specified over the length of the unit. Units motions at centre of gravity are also to be calculated.

4.3 Moonpool effects

4.3.1 Applicable requirements for moonpool assessment are detailed in guidance note NI 621.

4.4 Considered environment

4.4.1 Loading conditions covering towing/transit phase

When hydrodynamic analysis is performed in order to compare the values of wave load parameters with the ones given by the navigation notation, the considered environment is to correspond return period of 25 years.

4.4.2 Loading conditions covering normal operations on-site

For loading conditions covering normal operations on-site, the hydrodynamic analysis will provide the maximum values of wave load parameters defined in [4.2], and corresponding to an environment defined by the limiting load parameters defined by the Owner for the investigated loading condition (see [1.1.6]).

4.4.3 Survival loading conditions on the intended operating site

For survival conditions, the environment on the operation site to be considered for hydrodynamic analysis is to correspond to a severe storm with return period of at least 50 years.

Higher return periods may be considered upon the request of the party applying for classification.

Maximum values of wave load parameters provided by hydrodynamic analysis are to be superimposed with the ones corresponding to the navigation notation covering onsite conditions, when relevant.

4.4.4 Accidental conditions

When hydrodynamic analysis is carried out in order to determine wave loads for accidental conditions, the environment to be considered is to correspond to a return period of at least 1 year.

5 Loads for elements in the “ship area”

5.1 General

5.1.1 Load cases applied for the assessment of structural elements belonging to “ship areas” combine fixed loads, operational loads and wave loads. Ice and snow loads are also to be considered, when relevant.

Current loads are not mandatory, but may be requested by the Society for hydrodynamic analysis, on a case-by-case basis.

5.2 Hull girder still water loads

5.2.1 Still water loads design values

The hull girder still water loads as per [5.2.2] and [5.2.3] are to be defined for both transit and normal operation conditions. For this purpose, two distinct sets of still water bending moments and shear forces are to be specified:

- one set of still water loads covering all the transit loading conditions of the loading manual
- one set of still water loads covering all the normal operation loading conditions of the loading manual

Additional sets of still water loads may be necessary to cover the survival, inspection and accidental conditions, if deemed necessary

5.2.2 Still water bending moment distribution

Design or allowable still water bending moment distribution is to be presented in a diagram or a table showing the values for bending moment at the position of centre of each compartment and at each transverse bulkhead.

Still water bending moment distribution indicated in Pt B, Ch 5, Sec 2, [2] of the Ship Rules is not applicable to units covered by this Note.

5.2.3 Still water shear force distribution

Design or allowable still water shear force distribution is to be presented in a diagram or a table showing the values for shear force at the position of each transverse bulkhead.

5.3 Rule hull girder wave loads

5.3.1 When hydrodynamic analysis is available, values of vertical wave bending moment, horizontal wave bending moment and vertical shear force are to be taken directly from the hydrodynamic analysis. However, longitudinal distributions from Pt D, Ch 1, Sec 5, [3.3] of the Offshore Rules, associated with maximum values from hydrodynamic analysis may be used, upon the acceptance of the Society.

When hydrodynamic analysis is not available, rules values for hull girder wave loads are to be taken, by default, as defined in Pt D, Ch 1, Sec 5, [3.3] of the Offshore Rules, taking into account the navigation notation completing the site notation of the unit.

5.4 Unit's motions and accelerations

5.4.1 Transit, towing and all onsite conditions but survival

For normal operation conditions and inspection conditions onsite, unit's motions and accelerations are to be taken directly from the hydrodynamic analysis, when available.

When hydrodynamic analysis is not available, unit's accelerations and motions will be taken as defined in Pt D, Ch 1, Sec 5, [3.4] of the Offshore Rules, taking into account the navigation notation completing the site notation of the unit.

5.4.2 Survival conditions onsite

For survival conditions onsite, unit's motions and accelerations are to be taken directly from the hydrodynamic analysis, when available, and calculated for an environment with a return period of at least 50 years.

When hydrodynamic analysis is not available, unit's accelerations and motions will be taken as defined in Pt D, Ch 1, Sec 5, [3.4] of the Offshore Rules, taking into account the navigation notation completing the site notation of the unit.

5.5 Load cases

5.5.1 General

For all loading conditions defined in [2], unit's hull is to be assessed under the load cases "a", "b", "c" and "d", as defined in Pt D, Ch 1, Sec 5, [4] of the Offshore Rules. These load cases combine hull girder loads, sea pressures and hull motions and accelerations.

For normal operation conditions and inspection conditions, main load parameters defining load cases "a", "b", "c" and "d" may be taken from hydrodynamic analysis, when available.

5.6 Sea pressures

5.6.1 General

Still water pressures, waves pressures in upright ship condition and inclined ship conditions are to be calculated as defined in Pt D, Ch 1, Sec 5, [5] of the Offshore Rules.

5.6.2 Moonpool pressures

Applicable requirements for moonpool assessment are detailed in guidance note NI 621.

5.7 Internal pressures

5.7.1 General

Internal pressures of liquid tanks are to be calculated based on the requirements of Pt D, Ch 1, Sec 5, [6] of the Offshore Rules, taking into account unit's motions and accelerations defined in the present Note.

5.8 Testing

5.8.1 Testing pressures are to be considered as required in Pt D, Ch 1, Sec 5, [6] of the Offshore Rules.

6 Loads for elements in the "offshore area"

6.1 General

6.1.1 Load induced by topsides - drilling equipment on elements belonging to the "offshore area" are to be specified by the Designer of drilling plant or other relevant equipment.

For units intended to be granted the additional notation **DRILL**, these loads are to be consistent with the loads for drilling structures defined in NR570 "Drilling Equipment".

6.1.2 As a minimum, structural element belonging to "offshore area" are to be assessed under the load cases "a", "b", "c", and "d", defined for "ship area", taking into account inertial forces induced by relevant acceleration components.

SECTION 5 HULL ASSESSMENT

1 Application

1.1 General

1.1.1 The requirements of this Section are applicable for all design loading conditions defined in Sec 4, [2], taking into account the corresponding loading, as defined in Sec 4.

2 Hull girder strength

2.1 General

2.1.1 Hull girder strength is to be evaluated independently for each type of design loading condition defined in Sec 4, [2].

2.2 Strength characteristics of the hull girder transverse sections

2.2.1 The strength characteristics of the hull girder transverse section are to comply with Pt D, Ch 1, Sec 6 of the Offshore Rules.

2.3 Yielding checks

2.3.1 Yielding checks cover:

- normal hull girder stresses
- shear stresses
- section modulus and moment of inertia.

2.3.2 The requirements of Pt D, Ch 1, Sec 6, [2] of the Offshore Rules are to be complied with.

2.4 Ultimate strength check

2.4.1 Ultimate strength checks are to be carried out in accordance with Pt B, Ch 6, Sec 3 of the Ship Rules.

3 Hull scantlings

3.1 Principle

3.1.1 General reference

Plating, ordinary stiffeners and primary supporting members are to comply with the requirements of Pt D, Ch 1, Sec 7 of the Offshore Rules, taking into account the requirements of the present Section.

The Society may also refer to Pt B, Ch 7 of the Ship Rules, when deemed necessary.

3.1.2 Corrosion addition

The corrosion additions to be considered are those specified in Sec 3.

3.2 Primary supporting members

3.2.1 General

All units covered by the present Note are to be granted the additional service feature **VeriSTAR-Hull**. This notation requires a partial three dimensional finite element model for the checking of primary supporting members.

This requirement may be waived for units having a length less than 170 m.

In addition, units intended to receive the additional notation **VeriSTAR-Hull FLM**, are to comply with the requirements of NR551 Structural Analysis of Offshore Surface Units through Full Length Finite Elements Models.

3.2.2 Number of models

Each typical hold of the ship is to be assessed through a partial finite element model.

A particular attention is to be given to:

- moonpool region
- derrick supporting region
- BOP hold
- X-mass tree hold.

3.2.3 Model extension

Partial models are to be sufficiently extended to provide accurate results within the targeted region of the ship, at the satisfaction of the Society.

Partial models including moonpool are to be extended at least 0,2 L aft and fore transversal bulkheads of the moonpool.

4 Moonpool area

4.1 General

4.1.1 Applicable requirements for moonpool assessment are detailed in guidance note NI 621.

5 Fatigue check of structural details

5.1 General

5.1.1 Fatigue check is to be carried out based on the methodology given in Pt D, Ch 1, Sec 7 of the Offshore Rules. The requirements of this section are to be taken into account.

5.1.2 The structural details to be checked are those defined in [5.2].

The Society may require other details to be checked, when deemed necessary on the basis of the detail geometry and stress level.

5.2 Structural details

5.2.1 The relevant structural details to be checked are to be selected from those defined in Pt B, Ch 11, App 2 of the Ship Rules.

5.2.2 In addition, the following structural details are also to be checked:

c) In general, topsides connection with the main deck

d) Drawworks and cranes pedestal

e) Passive Mooring integration structure with hull, if relevant

f) Derrick connection with hull

g) Connections of heavy silos with the hull

h) Moonpool corner brackets.

5.3 Spectral fatigue analysis

5.3.1 General

The requirements in [5.3.2] and [5.3.3] apply to ships assigned with the additional class notation **Spectral Fatigue** as defined in Pt A, Ch 1, Sec 2, [6.2.13] of the Offshore Rules.

5.3.2 At least 5 headings and 25 frequencies for onsite conditions are to be taken into account.

5.3.3 Checking criteria

For the spectral fatigue analysis, the fatigue damage ratio is to be not greater than those given in Tab 2.

5.4 Deterministic fatigue analysis

5.4.1 Deterministic fatigue calculations are to be carried out based on the methodology given in Pt B, Ch 7, Sec 4 of the Ship Rules.

5.4.2 Loading conditions

Without other detailed information, at least 4 design loading conditions, as defined in Sec 4, are to be taken into account, as follows:

- towing/transit condition with 10% of consumables - representing 1/6 of lifetime
- towing/transit condition with 100% of consumables - representing 1/6 of lifetime
- normal drilling /surface - representing 1/3 of lifetime
- normal drilling / deep - representing 1/3 of lifetime.

However, more than 4 loading conditions may be requested on a case by case basis, taking into account the specificities of the unit and its operations.

Wave loads are to be considered for a probability of 10-5.

5.4.3 Partial safety factors

For onsite conditions, when the loads are obtained through hydrodynamic analysis, partial safety factors are to be taken as defined inTab 1.

For towing/transit conditions, the partial safety factors to be taken into account are those given in Part B, Ch 7, Sec 4 of the Ship Rules.

5.4.4 Low cycle fatigue

The fatigue due to variable loads due to drilling operations are to be taken into account. The frequency of these loads is established on a case-by-case basis.

In this case the calculation should take into account the wave at a probability level not less than 10-4.

Table 1 : Fatigue check - Partial safety factors

Partial safety factors covering uncertainties regarding:	Symbol	Value	
		General	Details at ends of ordinary stiffeners
Still water hull girder loads	γ_{S1}	1,00	1,00
Wave hull girder loads	γ_{W1}	1,03	1,11
Still water pressure	γ_{S2}	1,00	1,00
Wave pressure	γ_{W2}	1,07	1,15
Resistance	γ_{R}	1,02	1,02

Table 2 : Damage ratio for spectral fatigue analysis

Consequence of failure	Degree of accessibility for inspection, maintenance and repair	
	Not accessible **(2)**	Accessible for dry inspection
Critical **(1)**	0,1	0,5
Non-critical	0,2	1,0

(1) Critical damage as per risk analysis including loss of life, uncontrolled pollution, collision, sinking, other major damage to the installations and major production losses. When risk analysis report categorizing structural elements as critical or non-critical is not available, all structural elements are to considered as critical.

(2) Includes areas that can be inspected in dry conditions but require heavy works for repair.

SECTION 6 OFFSHORE AREAS AND OTHER STRUCTURAL REQUIREMENTS

1 Structural elements in "offshore areas"

1.1 General

1.1.1 Structural elements belonging to "offshore area" are defined and categorized in Sec 3, [1].

1.1.2 Structural elements belonging to "offshore area" are to comply with the requirements of Pt B, Ch 3, Sec 3 of the Offshore Rules. Detailed calculations are to be submitted to the Society for review.

1.1.3 For the application of [1.1.2] and taking into account the design loading conditions defined in Sec 4, the following conditions are to be considered for the assessment of "offshore areas":

- static conditions, with $\alpha = 0,6$
- design conditions, which include normal operation, inspection and survival condition onsite (see Sec 4), with $\alpha = 0,8$
- towing/transit conditions, with $\alpha = 0,8$
- accidental conditions, with $\alpha = 1,0$

where:

α : Basic allowable stress factor defined in Pt B, Ch 3, Sec 3, [5.4] of the Offshore Rules.

1.1.4 Cut outs in local structure in way of hull attachments are to be closed by full collar plates.

1.2 Calculations

1.2.1 Finite element calculation

A three dimensional finite element model is to be submitted. A fine mesh of construction details is required.

The extension of the model is to be agreed by the Society.

1.2.2 Checking criteria

Allowable stress are those given in Pt B, Ch 3, Sec 3, [5] of the Offshore Rules.

Buckling is to be checked according to Pt D, Ch 1, Sec 7 of the Offshore Rules.

For fatigue analysis, the damage ratio is to be not greater than those given in Sec 5, Tab 2.

2 Fore and aft structures

2.1 General

2.1.1 Fore and aft structures are to comply with the following requirements:

- relevant requirements of Part B of the Ship Rules, for towing/transit conditions
- relevant requirements of Pt D, Ch 1, Sec 8 of the Offshore Rules for onsite conditions.

3 Superstructures and deckhouses

3.1 General

3.1.1 The requirements of Pt D, Ch 1, Sec 8, [5] of the Offshore Rules are to be complied with.

4 Explosions, minor collisions, dropped objects

4.1 General

4.1.1 Requirements and recommendations relating to protection to explosions, minor collision analysis and dropped objects analysis are given in Pt B, Ch 3, Sec 9 of the Offshore Rules.

SECTION 7 MACHINERY INSTALLATIONS

1 General

1.1 Introduction

1.1.1 This Section provides specific requirements for machinery installations. These requirements are to be considered in addition to those given in the Offshore Rules.

1.1.2 The requirements of this Section undertake the provisions of IMO MODU Code, giving some additional interpretations of the Society. The Society reserves the right to make reference to IMO MODU Code when deemed necessary.

1.2 Application

1.2.1 Drillships covered by this Note are to comply with the relevant requirements of Part C, Chapter 1 of the Offshore Rules, except when otherwise specified in this Section.

1.2.2 In addition, other codes and standards recognized by the Society and which have been proven to be effective by actual application by the offshore drilling industry may be applied. In case of conflict between these codes and the requirements of this Note, the Society is to be consulted for clarification and acceptance.

1.2.3 For machinery installations with alternative design, deviating from the prescriptive requirements of this Section, the Society will carry out the approval based on the provisions of SOLAS regulation II-1/55 and MSC.1/Circ.1212 "Guideline on alternative design and arrangements for SOLAS chapters II-1 and III". Additional engineering analysis will be requested, at the satisfaction of the Society.

1.3 Scope

1.3.1 The requirements of this Section concern all machinery installations, boilers and other pressure vessels, associated piping systems and fittings.

1.3.2 For machinery installations of the drilling plant, reference is made to the requirements of NR570 "Drilling equipment", which are coherent with the requirements of this Section.

2 Requirements for machinery

2.1 General requirements

2.1.1 Machinery, components and systems essential to the safety of the unit are to be designed to operate in static conditions from upright and in level trim under an angle of inclination of 15° either way and simultaneously trimmed up to 5° by the bow or stern.

Deviations from these angles may be accepted by the Society on a case-by-case basis, taking into account the type, size and service condition of the unit.

2.1.2 All installations, systems or part of systems and 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.

2.1.3 The arrangements of installations is to be such as to facilitate safe access, cleaning, inspection and maintenance of machinery including boilers and pressure vessels.

2.1.4 Machinery for which there is a risk of overspeeding is to be provided with appropriate means to ensure that the safe speed is not exceeded.

2.1.5 When applicable, machinery or parts of machinery which may be subjected to dangerous overpressure is to be provided with appropriate means of protection against such overpressure.

2.1.6 Gearing, shafts and coupling used for transmission of power to machinery are to be designed and constructed to 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.

2.1.7 Internal combustion engines of a cylinder diameter of 200 mm or crankcase volume of 0,6 m^3 or above are to be provided with crankcase explosion relief valves of an approved type with sufficient relief area. The relief valves will be arranged to ensure that the discharge is directed so as to minimize the risk of injury to personnel.

2.1.8 When the failure of machinery could lead rapidly to complete breakdown, damage or explosion, automatic shutoff arrangements or alarms are to be provided, at the satisfaction of the Society.

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

2.1.10 Machinery relating to normal operation of vital systems (ballast system, well control,...) is to be provided with appropriate means ensuring to sustain or restore the normal operation even when one of the essential auxiliaries is not available.

2.1.11 Arrangements for storage, distribution and utilization of oil fuel, lubricating oil and other flammable oils will be such as to ensure the safety of the unit and persons onboard.

2.2 Machinery controls

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

2.2.2 Machinery essential for the safety of the unit, when provided with automatic starting, operational and control systems, is generally provided 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 when the override is actuated.

2.3 Steam boilers

2.3.1 Steam boilers and unfired steam generators are to be provided with at least two safety valves of adequate capacity. The Society may accept steam boilers and unfired steam generators having only one safety valve, provided that adequate means of protection against overpressures are fitted, at the satisfaction of the Society.

2.3.2 Oil fired boilers which are intended to operate without manual supervision are to be fitted with safety devices for shut off the fuel supply and starting the alarm in the following situations:

- low water level
- air supply failure
- flame failure.

2.3.3 Steam generating systems which could be rendered dangerous by the failure of its feedwater supply are to be provided with at least two feedwater systems, including the feed pumps. However, a single penetration of the steam drum is acceptable. Any part of the feedwater system is to be provided with adequate means to prevent overpressure.

For steam generating systems which are non essential for the safety of the unit, only one feedwater system is acceptable, provided that automatic shutdown of the steam generating system upon loss of feedwater supply is fitted.

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

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

2.4 Steam pipe system

2.4.1 Pipes and other fitting conveying steam are to be designed, constructed and installed as to withstand the maximum working stress to which they may be subjected.

2.4.2 Means for draining steam pipes that may be subjected to water hammer effect are to be provided, at the satisfaction of the Society.

2.4.3 When a steam pipe of fitting may receive steam at a pressure higher than its design pressure, suitable reducing valve, relief valve and pressure gauge are to be fitted.

2.5 Air pressure systems

2.5.1 Adequate means to prevent excess pressure in any part of compressed air systems are to be provided.

2.5.2 For all systems, suitable pressure-relief arrangements are to be provided.

2.5.3 Starting air arrangements for internal combustion engines are to be protected against the effects of backfiring and internal explosions in the starting air pipes, at the satisfaction of the Society.

2.5.4 Starting air pipes from the air receivers to internal combustion engines are to be entirely separated from the compressor discharge pipe systems.

2.5.5 Staring air pressure systems are to be adequately drained. Provision is to be made to reduce to a minimum the entry of oil into such systems.

2.6 Arrangements for oil fuel, lubricating oil and other flammable oils

2.6.1 Fitting and valves conveying flammable oils in machinery space are to be of a material approved by the Society, with regard to the risk of fire.

2.6.2 The location and arrangement of vent pipes for fuel oil, 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.

2.6.3 For each type of fuel used onboard for propulsion and vital systems, two fuel oil service tanks are to be provided. The capacity of each tank is to be such as to ensure fuel supply for at least eight hours at the maximum continuous rating of the propulsion plant, when relevant, and normal operating load of the generator plant.

2.6.4 All surfaces of high pressure fuel delivery lines with temperatures above 220°C, which may be impinged as a result of fuel system failure, are to be properly insulated.

2.6.5 High pressure fuel delivery lines are to be screened or otherwise protected to avoid, as far as practicable, oil spray or oil leakages onto hot surfaces, into machinery air intakes or other sources of ignition.

2.6.6 The number of joints in high pressure fuel lines is to be reduced as much as practicable.

2.6.7 High pressure fuel delivery lines between high pressure pumps and fuel injectors are to be protected with a jacketed piping system capable to contain a high pressure line failure. The jacketed piping system is to include a means for collection of leakages and an alarm system in case of fuel line failure.

2.7 Bilge pumping arrangements

2.7.1 The requirements given under [2.7] are to be considered in addition to the requirements of Pt C, Ch 1, Sec 7, [6] of the Offshore Rules, relating to bilge systems.

2.7.2 Units covered by this Note are to be provided with an efficient bilge pumping system capable of pumping from and draining watertight compartments other than spaces permanently appropriated for fresh water, ballast water, oil fuel or other liquid products and for which other means of pumping are provided. The bilge pumping system is to be capable to operate under all practical conditions whether the unit is upright or inclined as per [2.1.1].

2.7.3 Additional suction systems may be requested by the Society to be provided in large compartments or compartments of unusual form. Arrangements directing the water to the suction pipes are also to be provided.

Compartments provided with bilge suctions may be drained to other spaces provided with bilge pumping capability.

2.7.4 Compartments with bilge pumping capability or bilge suctions, adjacent to the sea or to tanks containing liquids, or containing piping systems conveying liquids, are to be provided with means appropriate to detect the presence of water.

2.7.5 Bilge pumping arrangements and the means to detect the presence of water may be dispensed by the Society for particular compartments, when it is considered that the safety of the unit is not impaired by the absence of such arrangements.

2.7.6 Design, construction and installation of bilge pipes is to take into account the eventual effect of corrosion and other expected deterioration. Special consideration is to be given to bilge pipes passing through ballast tanks.

2.7.7 At least two self-priming power pumps connected to each bilge main are to be provided. 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.

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

2.7.9 Distribution boxes and manually operated valves in connection with the bilge pumping arrangements are to be placed in locations accessible under ordinary circumstances. When 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 operated from outside the space.

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

2.8 Protection against flooding

2.8.1 Seawater inlet and discharge in spaces below the assigned load line is to be provided with an appropriate valve. When this valve is located in normally unmanned spaces which are not provided with high bilge water level detection, it is to be operated from an accessible position outside the space.

3 Additional requirements for machinery of self-propelled units

3.1 General

3.1.1 The requirements of this Article are applicable only for units having the structural type notation **offshore service ship**, which are self-propelled units capable to perform non-assisted voyages. These requirements are to be applied in addition to those given in [2].

3.1.2 Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the unit are to be capable of operating in static conditions as defined in [2.1.1] and in dynamic conditions under 22,5° rolling and simultaneously pitching 7,5° by bow or stern.

Deviations from these angles may be accepted by the Society on a case-by-case basis, taking into account the type, size and service condition of the unit.

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

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

- generator set which serves as main source of electrical power
- sources of steam supply
- arrangements for boilers feedwater
- arrangements which supply fuel oil for boilers or engines
- sources of lubricating oil pressure
- sources of water pressure
- condensate pumps and the arrangements to maintain vacuum in condensers
- mechanical air supply for boilers
- air compressors and receivers for starting or control purposes
- hydraulic, pneumatic or electrical means for control in main propulsion machinery, including controllable-pitch propellers.

3.2 Means of going astern

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

3.2.2 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.

3.3 Steam boilers and boiler feed systems

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

3.3.2 Steam generating systems which provides services essential for the propulsion of the unit are to be provided with not less than two separate feedwater systems from and including the feed pumps. Single penetration of the steam drum is acceptable. Means to prevent overpressure are to be provided in any part of the system.

3.4 Machinery control

3.4.1 Main and auxiliary machinery essential for propulsion of the unit are to be provided with effective means for its operation control. Control systems essential for the propulsion, control and safety of the unit are to be independent or designed such that the 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.

3.4.2 Where remote control of propulsion machinery from the navigation bridge is provided and the machinery spaces are intended to be manned, the following requirements are to be complied with:

- the speed, direction of thrust and the pitch of the propeller, when relevant, are to be fully controllable from the navigating bridge under all sailing conditions including manoeuvring
- 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. If several propellers are designed to operate simultaneously, these propellers may be controlled by one control device
- the main propulsion machinery is to be provided with an emergency stopping device on the navigating bridge and independent from the bridge control system
- propulsion machinery orders from the navigating bridge will be indicated in the main machinery control station or at the manoeuvring platform, as relevant
- 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. At each station, an indicator showing which station is in control of propulsion machinery is to be provided. The transfer of control between navigating bridge and machinery spaces will be possible only in the machinery space of machinery control room.
- local control of propulsion machinery is to be possible even in the case of failure in any part of the remote control system
- the design of remote control system is to be such that in case of its failure, an alarm will be given and the preset speed and direction of thrust will be maintained until local control is in operation
- indicators are to be fitted on the navigating bridge for propeller speed and direction, in case of fixed pitch propellers, and for propeller speed and pitch position, in case of controllable pitch propeller
- 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 operation. If the remote control of 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.

SECTION 8 SAFETY FEATURES

1 General

1.1 Introduction

1.1.1 The requirements of this Section undertake the provisions of IMO MODU Code, giving some additional interpretations of the Society. The Society reserves the right to make reference to IMO MODU Code when deemed necessary.

1.2 Application

1.2.1 The requirements of this Section are to be considered in addition to those of Partt C, Chapter 4 of the Offshore Rules, which are applicable for Mobile Offshore Drilling Units. These referenced requirements are related to:

- arrangement of the unit
- hazardous areas
- structural fire protection
- detection, controls, communications, alarms
- fire fighting
- structural integrity
- escape
- fire plan
- safety features relating to helicopter facilities
- life saving appliances.

1.3 Definition of hazardous areas

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

1.3.2 Hazardous areas are divided into zones as follows:

Zone 0 : Zone in which an explosive gas/air mixture is continuously present or present for long periods

Zone 1 : Zone in which an explosive gas/air mixture is likely to occur in normal operation

Zone 2 : Zone in which an explosive gas/air mixture is not likely to occur, and if it occurs, it will only persist for a short time.

Non-hazardous areas are those which are not classified as hazardous according to the above definitions.

1.3.3 Further details relating to the definition and classification of hazardous areas are given in Pt C, Ch 4, Sec 3, [1] and [2] of the Offshore Rules.

2 Emergency conditions due to drilling operations

2.1 Disconnection or shutdown

2.1.1 General

In view of exceptional events during drilling operations in which the explosion hazard may extend outside the zones defined in [1.3], special arrangements are to be provided to facilitate the selective disconnection or shutdown of the following equipment:

- ventilation systems, except fans necessary for supplying combustion air to prime movers for the production of electrical power
- main generator prime movers, including the ventilation systems for these
- emergency generator prime movers.

2.1.2 Shutdown

Shutdown systems required in [2.1.1] are to be designed such that the risk of unintentional stoppage caused by malfunction in a shutdown system and the risk of inadvertent operation of a shutdown are minimized.

2.1.3 Dynamic positioning

In case of drillships for which the station keeping is ensured only through the dynamic positioning system, the selective disconnection or shutdown of machinery and equipment associated with maintaining the operability of dynamic positioning system is to be specially considered.

Additional studies of various scenarios relating to the dispersion of gas in case of exceptional event during drilling operations, may be requested by the Society, on a case-by-case basis.

It is to be checked that the eventual disconnection or shutdown of equipment maintaining the operability of dynamic positioning system, in zones affected under the worth scenario of gas dispersion, will preserve the efficiency of station keeping and the integrity of the well.

Findings of this checking are to be consistent with the Operation Manual of the unit. Eventual limitations based on these findings may be stated in an annex of Certificate of Classification.

2.1.4 Operability after emergency shutdown

At least the following facilities are to be operable after emergency shutdown:

- emergency lighting, for at least 30 minutes
- BOP control system - Koomey unit
- general alarm system
- public address system
- battery-supplied radiocommunication installations.

3 Machinery installations in hazardous area

3.1 Principles

3.1.1 Mechanical equipment and machinery in hazardous areas are to be constructed and installed so 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 exhaust or other emissions.

3.1.2 The installation of internal combustion machinery may be permitted in zone 1 and zone 2 hazardous areas, provided that the precautions taken against the risk of dangerous ignition are at the satisfaction of the Society.

3.1.3 The installation of fired equipment may be permitted in zone 2 hazardous areas, provided that the precautions taken against the risk of dangerous ignition are at the satisfaction of the Society.

4 Risk analysis

4.1 General

4.1.1 If deemed necessary by the Society, risk analysis is to be performed to validate various layouts and to determine the critical conditions that equipments are capable to withstand. A detailed report on risk analysis are to be submitted to the Society for information.

Note 1: Risk analysis reports are considered for information only, to ensure that findings and conclusions of the risk analysis are properly taken into account for the design of the unit.

4.1.2 When requested, the assessment through risk analysis is to be performed based on standards recognized by the Society, such as:

- API RP 14J "Recommended Practice for Design and Hazard Analysis for Offshore Production Facilities"
- EN ISO 17776 "Guidelines on tools and techniques for hazard identification and risk assessment"

4.1.3 The following principles are to be considered for risk assessment:

- a suitable level of safety is to be maintained and verified throughout the life of the unit
- suitable access is to be provided for the inspection and maintenance.

4.1.4 Detailed follow-up report of actions and mitigation measures taken in response to risk analysis findings is to be submitted to the Society for information.

APPENDIX 1 DESIGN LOADING CONDITIONS

1 General

1.1

1.1.1 Design loading conditions are defined in Tab 1.

Table 1 : Design loading conditions

Item	Loading condition	Type	Description **(1)**
LC1	Transit arrival	Transit / Towing	• this condition represents the vessel arriving in harbour from an operation site • 10% of drilling consumables and vessel consumables are onboard • 10% of casing and drill pipe are onboard, on its racks • all riser joints are stored at its specific location • no operational load is applied • BOP is onboard at its specific location • X-mas tree is not onboard • all mud tanks are empty • spaces for cuttings storage and tanks for seawage, dirty oil and water, are full or empty, as to maximize the effect of vertical bending moment and shear force
LC2	Transit departure	Transit / Towing	• this condition represents the vessel fully loaded, leaving the harbour for transit to the intended site • 100% of drilling consumable and vessel consumables are onboard • 100% of casing and drill pipe are onboard, on its specific locations on racks • all riser joints are stored at its specific location • no operational load is applied • BOP is onboard at its specific location • X-mas tree is onboard, at its specific location • all mud tanks are full • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC3	BOP running - re-installation	Normal operation	• this condition represents the handling of BOP and its re-installation on the well-head after a previous disconnection and retrieval on the unit; it is supposed that 90% of the casing is already in the hole • 10% of drilling consumables are onboard • the BOP is suspended on the hook through riser joints; the position of the BOP is on the wellhead, at maximum depth in which the unit can operate **(2)** • drill pipe is stored at its specific location, on racks • 10% of casing is stored at its specific location, on racks • 100% of riser joints are suspended on the hook **(2)** • X-mas tree is onboard, at its specific location **(3)** • active mud tanks are filled at 50% • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces

(1) For all loading conditions, the draughts and the filling of water ballast tanks are to be taken as indicated in the loading manual for relevant loading conditions; generally, the filling of water ballast tanks will compensate the trim and heel of the unit.

(2) During installation of pipe, casing or riser joints, suspended loads will be alternatively applied on the hook and on the drill floor. The worst situation is to be considered for the definition of design loading conditions.

(3) Horizontal X-mas tree will not be considered onboard, because drilling operations are performed through the X-mas tree, which is installed on the wellhead before the BOP.

(4) Inspection conditions are to be considered only when inspections on the intended operating site will be provided, and when the loading configuration is not covered by other loading conditions.

Item	Loading condition	Type	Description **(1)**
LC4	BOP running - first installation	Normal operation	• this condition represents the handling of BOP and its first installation on the well-head; the conductor pipe is already installed • 100% of drilling consumables are onboard • the BOP is suspended on the hook, as relevant, through riser joints; the position of the BOP is on the wellhead, at maximum depth in which the unit can operate **(2)** • drill pipe is stored at its specific location, on racks • 100% of casing is stored at its specific location, on racks • 100% of riser joints are suspended on the hook **(2)** • X-mas tree is onboard, at its specific location **(3)** • active mud tanks are full • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC5	Normal drilling - deep	Normal operation	• this condition represents normal drilling operations in deeper parts of the well (lowest casing, liner) • 10% of drilling and vessel consumables are onboard • 100% of drill pipe, the drill collar and drill bit are suspended on the hook **(2)** • forces and torque induced by rotary equipment are considered • 100% of riser joints are suspended on riser tensioning equipment, which is active • 10% of casing is stored at its specific locations, on racks or on the drill floor • BOP is not onboard • X-mas tree is onboard, at its specific location **(3)** • active mud tanks are filled at 50% • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC6	Normal drilling - surface	Normal operation	• this condition represents normal drilling operations in the upper part of the well (surface casing) • 100% of drilling and vessel consumables are onboard • 100% of drill pipe, the drill collar and drill bit are suspended on the hook **(2)** • forces and torque induced by rotary equipment are considered • 100% of riser joints are suspended on riser tensioning equipment, which is active • 100% of casing is stored at its specific locations, on racks or on the drill floor • BOP is not onboard • X-mas tree is onboard, at its specific location **(3)** • active mud tanks are full • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC7	Casing running 10%	Normal operation	• this condition represents casing running phase with 10% of drilling and vessel consumables onboard • the heaviest casing string is suspended on the hook **(2)**; remaining casing is stored at its specific locations, on racks • drill pipe is stored at its specific location, on racks • 100% of riser joints are suspended on riser tensioning equipment, which is active • BOP is not onboard • X-mas tree is onboard, at its specific location **(3)** • active mud tanks are filled at 50% • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces

(1) For all loading conditions, the draughts and the filling of water ballast tanks are to be taken as indicated in the loading manual for relevant loading conditions; generally, the filling of water ballast tanks will compensate the trim and heel of the unit.

(2) During installation of pipe, casing or riser joints, suspended loads will be alternatively applied on the hook and on the drill floor. The worst situation is to be considered for the definition of design loading conditions.

(3) Horizontal X-mas tree will not be considered onboard, because drilling operations are performed through the X-mas tree, which is installed on the wellhead before the BOP.

(4) Inspection conditions are to be considered only when inspections on the intended operating site will be provided, and when the loading configuration is not covered by other loading conditions.

Item	Loading condition	Type	Description **(1)**
LC8	Casing running 100%	Normal operation	• this condition represents casing running phase with 100% of drilling and vessel consumables onboard • the heaviest casing string is suspended on the hook **(2)**; remaining casing is stored at its specific locations, on racks • drill pipe is stored at its specific location, on racks • 100% of riser joints are suspended on riser tensioning equipment, which is active • BOP is not onboard • X-mas tree is onboard, at its specific location **(3)** • active mud tanks are filled at 50% • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC9	Stand-by onsite 10%	Normal operation	• this condition represents the vessel in stand-by condition on the intended operating site, with 10% of consumables; environmental conditions are such that it is expected to exceed the limiting operational parameters defined in Sec 4, [1.1.5] • 10% of drilling and vessel consumables are onboard • 100% of the drill pipe is stored on its specific locations, on racks • 10% of casing is stored on its specific locations, on racks • 100% of riser joints are suspended on riser tensioning equipment, which is active • no load is applied on the hook • X-mas tree is onboard, at its specific location **(3)** • BOP is not onboard • active mud tanks are filled at 50% • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC10	Stand-by onsite 100%	Normal operation	• this condition represents the vessel in stand-by condition on the intended operating site, with 100% of consumables; environmental conditions are such that it is expected to exceed the limiting operational parameters defined in Sec 4, [1.1.5] • 100% of drilling and vessel consumables are onboard • 100% of the drill pipe is stored on its specific locations, on racks • 100% of casing is stored on its specific locations, on racks • 100% of riser joints are suspended on riser tensioning equipment, which is active • no load is applied on the hook • X-mas tree is onboard, at its specific location **(3)** • BOP is not onboard • active mud tanks are full • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC11	Survival 10%	Survival onsite	• this condition represents the vessel in survival condition on the operating site, with 10% of consumables onboard; environmental conditions correspond to a severe storm with return period of at least 50 years, as defined in Sec 4, [4.4.3]. • 10% of drilling and vessel consumables are onboard • 100% drill pipe is stored at its specific location, on racks • 10% of casing is stored at its specific location, on racks • 100% of riser joints are stored at its specific locations • BOP and X-mas tree are onboard or on the wellhead, depending of the disconnection procedure • no load is applied on the hook or on riser tensioning system • active mud tanks are full • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces

(1) For all loading conditions, the draughts and the filling of water ballast tanks are to be taken as indicated in the loading manual for relevant loading conditions; generally, the filling of water ballast tanks will compensate the trim and heel of the unit.

(2) During installation of pipe, casing or riser joints, suspended loads will be alternatively applied on the hook and on the drill floor. The worst situation is to be considered for the definition of design loading conditions.

(3) Horizontal X-mas tree will not be considered onboard, because drilling operations are performed through the X-mas tree, which is installed on the wellhead before the BOP.

(4) Inspection conditions are to be considered only when inspections on the intended operating site will be provided, and when the loading configuration is not covered by other loading conditions.

Item	Loading condition	Type	Description **(1)**
LC12	Survival 100%	Survival onsite	• this condition represents the vessel in survival condition on the operating site, with 100% of consumables onboard; environmental conditions correspond to a severe storm with return period of at least 50 years, as defined in Sec 4, [4.4.3]. • 100% of drilling and vessel consumables are onboard • 100% drill pipe is stored at its specific location, on racks • 100% of casing is stored at its specific location, on racks • 100% of riser joints are stored at its specific locations • BOP and X-mas tree are onboard, at specific locations • no load is applied on the hook or on riser tensioning system • active mud tanks are full • spaces for cuttings storage, tanks for seawage, dirty oil and water are empty are empty or full, as to maximize the effect of bending moment and shear forces
LC13	Inspection **(4)**	Inspection	• this condition represents the vessel in inspection conditions, at the intended operating site • load distribution for this condition will be considered according to the loading manual
LC14	Accidental-transit	Accidental	• this condition represents the vessel in accidental situation, during transit/towing • the condition will be defined in accordance with Pt B, Ch 2, Sec 1, [4.3] of the Offshore Rules and Pt B, Ch 2, Sec 3, [4] of the Offshore Rules.
LC15	Accidental-operation	Accidental	• this condition represents the vessel in accidental situation, during operations onsite • the condition will be defined in accordance with Pt B, Ch 2, Sec 1, [4.3] of the Offshore Rules and Pt B, Ch 2, Sec 3, [4] of the Offshore Rules.

(1) For all loading conditions, the draughts and the filling of water ballast tanks are to be taken as indicated in the loading manual for relevant loading conditions; generally, the filling of water ballast tanks will compensate the trim and heel of the unit.

(2) During installation of pipe, casing or riser joints, suspended loads will be alternatively applied on the hook and on the drill floor. The worst situation is to be considered for the definition of design loading conditions.

(3) Horizontal X-mas tree will not be considered onboard, because drilling operations are performed through the X-mas tree, which is installed on the wellhead before the BOP.

(4) Inspection conditions are to be considered only when inspections on the intended operating site will be provided, and when the loading configuration is not covered by other loading conditions.