rules for classification

offshore units


floating LNG/LPG production, storage and loading units
FOREWORD

DNV GL rules for classification contain procedural and technical requirements related to obtaining and retaining a class certificate. The rules represent all requirements adopted by the Society as basis for classification.

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CHANGES – CURRENT

This document supersedes DNVGL-RU-OU-0103, July 2015. Changes in this document are highlighted in red colour. However, if the changes involve a whole chapter, section or sub-section, normally only the title will be in red colour.

Main changes April 2016, entering into force 1 October 2016

- **General**
  - Clarification of the status of (top-side) modules and other subcontracted parts for new builds from a class service point of view
  - Further development of the unit specific In-service Inspection programme, defining three levels with possibilities of further inspection scope depending on available documentation/ performed analysis
  - Correction of some minor issues improving efficiency and quality of iO-surveys
  - The in-service requirements as part of the POSMOOR notation are updated for incorporating Mooring Integrity Management programs and addressing experienced failure mechanisms
  - Introducing the new notation Crane-offshore replacing the earlier notation CRANE together with specific descriptions on new build and in operation survey requirements.
  - Introducing the new notation COMF-MOU replacing the earlier COMF
  - Further development of alternative survey schemes for machinery, including among other a description for a reliability centred maintenance approach
  - Further clarified the class requirements for bottom surveys.
  - Restructured and updated Ch.3 to bring this rule book in line with DNVGL-RU-OU-0101 and DNVGL-RU-OU-0102.

- **Ch.1 Sec.1 Introduction**
  - [2.2]: Updated definition on CMC
  - Tables 3, Table 6 and Table 7 further completed.

- **Ch.1 Sec.3 Classification scope and notations**
  - Table 3 and Table 6 updated with new notations

- **Ch.1 Sec.4 Assignment of class**
  - [1.5.1]: Updated guidance note.

- **Ch.1 Sec.6 Certification of materials and components**
  - [1.1.2]: Included new guidance note.

- **Ch.2 Sec.1 Design and construction requirements for 1A MOU main class**
  - [5.1]: Included new clause to clarify use of rules for ships with regards to fabrication standards
  - [7.1]: Removed former clause [7.1.2]
  - [8.1]: Removed anchoring and mooring equipment from listing since already covered in [7].

- **Ch.2 Sec.2 Design and construction requirements for OI Floating offshore installation main class**
  - [5.1]: Included new clause to clarify use of rules for ships with regards to fabrication standards
  - [8.1]: Removed anchoring and mooring equipment from listing since already covered in [7].
• Ch.2 Sec.6 Optional class notations
  — [10]: Updated section in line with new *Crane-offshore* notation and completing requirement descriptions
  — [16]: Updated in line with the introduction of the new notation *COMF-MOU*
  — Updated [Table 15] in line with notation updates.

• Ch.3 Sec.1 General provisions
  — [1.1.5]: Clause updated with added explanation
  — [1.2.1]: Updated clause
  — [2.4.5]: Bottom survey requirement and plan modified
  — [Table 1]: updated in line with notation changes.

• Ch.3 Sec.2 General requirements for structure and machinery surveys
  — Replaced former clause [2.2.4] by updated present clause [2.2.4]
  — Updated clauses [2.2.6] and [2.2.7].

• Ch.3 Sec.3 Periodical survey extent for main class
  — Content previous in Sec.4 [1] to [5] and updated as follows:
    — [1.2]: Updated descriptions on in-service inspection programme by including new clause [1.2.2] and guidance note, and removing former clauses [1.2.3] and [1.2.4] on basis scope
    — Table 3: modified with regards to scope of Leg & spudcan survey
    — [2.2]: Removed former clause [2.2.5] on deck house examination
    — [2.2]: Completed descriptions by adding clauses [2.2.7], [2.2.9], [2.2.10] and [2.2.11] and updated clauses [2.2.5] and [2.2.18]
    — [2.4.6] and [2.4.7] updated clauses
    — [2.4.12]: Completed listed items
    — Removed former clauses [2.2.12], [3.2.1], [4.2.11] and [4.2.12] on mooring systems as covered under Sec.4 [8] and Sec.6
    — Included new clauses [3.2.1] and [3.2.2]
    — [4.2.3]: Updated clause and moved former Table 5 to guidance note
    — [4.2.4]: Rewritten clause
    — [4.2.9]: Updated clause and moved former Table 7 to guidance note
    — [4.4.4]: Updated guidance note.

• Ch.3 Sec.4 Miscellaneous main class surveys
  — Content from previous Sec.4 [6] to [12] and updated as follows:
    — [7]: Section re-written. Bottom survey split between MODU req. and Main Class survey req.
    — [8]: Section updated to include only temporary mooring and towing systems. Earlier clauses on position mooring systems deleted since covered by the *POSMOOR* notation.
    — [8.2.2]: New guidance note clarifying the requirements to temporary mooring for long term moored units.

• Ch.3 Sec.6 Optional class notation surveys
  — [2]: Updated and restructured in-service requirements as part of the *POSMOOR* notation including:
    — specific requirements for reporting by owners
    — new clause [2.2.5] on mooring integrity management
    — new sub-section [2.3] with an overview of all available survey schemes
— Including former content from Sec.3 and Sec.4 [8]
— Included several new survey requirements
— [9]: Updated section including definition of survey requirements following new in line with new Crane-offshore notation
— [12]: Updated section in line with introduction of COMF-MOU.

• Ch.3 Sec.7 Survey arrangement
— Content from previous Sec.3 [1] and Sec.7 merged and updated as follows:
  — [1]: Updated clause and restructured together with [2]
  — [2.2]: Restructured sub-section and added new guidance note on competence responsible person
  — [2.3]: Brought in line with changes made in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 and added new guidance note on competence responsible person in [2.3.2]
  — [2.4]: Rewritten sub-section including:
    — Added requirement for spare part management
    — More detailed requirements for continuous improvement
    — Replaced "Reliability Centred Maintenance" with "maintenance" analysis
    — More focus on maintenance supportability in the organisation
    — Options specified to use OEM maintenance recommendations, operational experience and/or RCM (IEC 60300-3-11 only as guidance)
    — More detailed requirements for implementation and functionalities in CMMS
    — More detailed survey requirements in general
  — [2.5]: Updated sub-section with more detailed requirements for the CM programme, including
    — Guidance note on recommended competence level for oil laboratories added
    — Requirement for approved MPMS/DPMS removed, only approved CMMS will be applicable
    — Specified requirements for documentation related to the implementation of the arrangement
    — Removed case by case approval of thrusters for propulsion/positioning.
  — [3.4]: Updated subsection including
    — Updated qualifications requirements according to NS 415-1 to guidance note
    — Specified requirement for tutored inspection training with DNV GL.

• Ch.3 Sec.8 Surveys by approved companies or service suppliers
— Content from previous Sec.3 [2].

Editorial corrections

In addition to the above stated changes, editorial corrections may have been made.
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Floating LNG/LPG production, storage and loading units

DNV GL AS
CHAPTER 1 PRINCIPLES AND PROCEDURES FOR CLASSIFICATION

SECTION 1 INTRODUCTION

1 General

1.1 General

This publication presents DNV GL's rules for classification of floating LNG/LPG production and storage units or installations, stating the terms and procedures for assigning and maintaining classification, including listing of the applicable technical references to be applied for classification.

1.2 Document structure

This document divided into three main chapters as follows:

- Ch.1: providing general information about classification principles and procedures
- Ch.2: providing design and construction requirements for the newbuilding phase
- Ch.3: providing requirements for maintenance of class in the operational phase.

1.3 Objects covered

These rules cover classification of floating offshore objects for the following services:

- LNG/LPG production
- LNG/LPG storage and offloading
- LNG/LPG loading (buoy).

Although this document refers primarily to liquefied natural gas (LNG) and liquefied petroleum gas (LPG), the principles herein may also be used for other offshore gas installations such as those involving primarily compressed natural gas (CNG), and gas to liquid (GTL) products.

A floating offshore installation which processes hydrocarbons and refrigerates gas to produce LNG will be termed here an LNG FPSO (LNG floating production, storage and offloading unit). LNG FPSOs are also commonly termed FLNG. The installation may be fed gas directly from a gas well or a gas network or may process associated gas in conjunction with oil production. Such units may also produce, store and offload quantities of LPG and condensate.

A floating offshore installation which processes hydrocarbons and refrigerates gas to produce LPG will be termed here an LPG FPSO (LPG floating production, storage and offloading unit). The installation may be fed gas directly from a gas well or a gas network or may process associated gas in conjunction with oil production. Such units may also produce, store and offload quantities of condensate.

An offshore installation which receives and regasifies LNG is termed an FSRU (floating storage and regasification unit). The storage and hull may generally follow the requirements to a storage unit described in Ch.2 Sec.4. The regasification plant and safety systems may follow the requirements in DNV rules for ships Pt.6 Ch.30 on regasification vessels. FSRUs which follow a ship class regime may refer to DNV rules for Ships Pt.5 Ch.5 and Pt.6 Ch.30.

Note: This document addresses floating steel structures. Concrete structures, both floating and bottom fixed have also been proposed for offshore gas applications. For such designs reference is also made to DNV Offshore Standard DNV-OS-C503, Concrete LNG Terminal Structures and Containment Systems. Where such units are classified, the principles in this document may be applied.
2 Definitions

2.1 Verbal forms

Table 1 Verbal forms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>shall</td>
<td>verbal form used to indicate requirements strictly to be followed in order to conform to the document</td>
</tr>
<tr>
<td>should</td>
<td>verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.</td>
</tr>
<tr>
<td>may</td>
<td>verbal form used to indicate a course of action permissible within the limits of the document.</td>
</tr>
</tbody>
</table>

2.2 Definitions

Table 2 Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>approval or approved</td>
<td>denotes acceptance by DNV GL of documentation showing design solutions, arrangements and equipment that complies with the rules</td>
</tr>
<tr>
<td>assessment</td>
<td>an act of assessing, appraising or evaluating a condition of a product, process or system</td>
</tr>
<tr>
<td>assigning class</td>
<td>originally signified designation of one of several classes to a unit based on its condition, ranging from good to bad. Today only the highest class is assigned, comprising the main class 1A for mobile offshore units and OI for permanently placed installations, together with an obligatory additional class notation, e.g. LNG Production Unit, where applicable. Voluntary additional class notations may also be assigned covering special service, equipment or systems, e.g. PROD(LNG) denoting a classed LNG production plant.</td>
</tr>
<tr>
<td>builder</td>
<td>signifies the party contracted to build a vessel in compliance with the Society’s rules</td>
</tr>
<tr>
<td>certificate</td>
<td>a document confirming compliance with the Society’s rules or with other rules and regulations for which the Society has been authorized to act</td>
</tr>
<tr>
<td>certification</td>
<td>a service confirming compliance with applicable requirements on the date that the survey was completed</td>
</tr>
<tr>
<td>certification of materials and components (CMC)</td>
<td>the activity of ensuring that materials, components and systems used in vessels to be classed by the Society comply with the rule requirements</td>
</tr>
</tbody>
</table>

Guidance note:
The scope of classification requires that specified materials, components and systems intended for the vessel are certified. Depending on the categorisation, certification may include both plan approval and survey during production and/or of the final product. Fabrication of topside modules are not considered as CMC but are part of the Newbuilding or conversion and are covered by the applicable Newbuilding or conversion rules. The subcontractor should comply with all rules as applicable for newbuildings.

---end---of---g-u-i-d-a-n-c-e---n-o-t-e---
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>class</td>
<td>class is assigned to and will be retained by vessels complying with applicable requirements of the Society's rules</td>
</tr>
<tr>
<td>classification</td>
<td>a service which comprises the development of independent technical standards for vessels – class rules and standards, and to verify compliance with the rules and standards throughout the vessels' life</td>
</tr>
<tr>
<td>close-up examination</td>
<td>an examination where the details of structural components are within the close visual inspection range of the surveyor, i.e. preferably within reach of hand</td>
</tr>
</tbody>
</table>
| coating conditions                             | — "GOOD": Condition with only minor spot rusting.  
|                                               | — "FAIR": Condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.  
|                                               | — "POOR": Condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration. |
| commissioning                                  | a process of assuring that components, equipment and the systems are functioning in accordance with the functional requirements          |
| concurrent surveys                             | surveys required to be concurrently completed shall have the same date of completion  
|                                               | A survey required to be carried out in conjunction with or carried out as part of another survey shall be completed on or before the completion of the other survey, however, within the time window for that survey. |
| condition of class (CC)                        | constitutes a requirement that specific measures, repairs or surveys shall be carried out within a specific time limit in order to retain class |
| condition on behalf of the flag administration (CA) | constitutes specific measures, repairs or surveys that shall be carried out within a specific time limit in order to retain the statutory certificate  
|                                               | A CA will be issued only when the Society has been authorised to carry out statutory surveys on behalf of the flag administration. |
| contract                                       | the specific agreement between DNV GL and the customer  
|                                               | It defines the extent of services requested by the customer, and is concerned with:  
|                                               | — the classification of vessels or installations, both new buildings and in operation  
|                                               | — statutory work carried out on behalf of national maritime authorities  
<p>|                                               | — equipment and materials. |
| critical structural areas                      | areas that have been identified from calculations to require monitoring or from the service history of the subject vessel or from similar or sister vessels to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the vessel |
| customer                                       | signifies the party who has requested the Society's service                                                                           |
| designer                                       | signifies a party who creates documentation submitted to the Society for approval or information                                        |
| emergency towing                               | towing related to an emergency situation normally caused by failure of the units own propulsion (compare with normal towing as defined in (normal) towing) |
| exceptional circumstances                    | means unavailability of dry-docking facilities; unavailability of repair facilities; unavailability of essential materials, equipment or spare parts; or delays incurred by action taken to avoid severe weather conditions |
| flag administration                           | the maritime administration of a vessel's country of registry                                                                            |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>floating offshore installation</td>
<td>a buoyant construction engaged in offshore operations including drilling, production, storage or support functions, and which is designed and built for installation at a particular offshore location</td>
</tr>
<tr>
<td>guidance note</td>
<td>contain advice which is not mandatory for the assignment or retention of class, but with which the Society, in light of general experience, advises compliance</td>
</tr>
<tr>
<td>IACS member society</td>
<td>a classification society being a member of IACS</td>
</tr>
<tr>
<td>independent tank</td>
<td>self-supporting tank which does not form part of the vessel’s hull and does not contribute to the hull strength</td>
</tr>
</tbody>
</table>
|                       | *Independent gravity tank* is a tank with design vapour pressure not exceeding 0.7 bar.  
|                       | *Pressure vessel* is a tank with design gas or vapour pressure exceeding 0.7 bar.                                                          |
| interpretation                   | norms for fulfilling the associated principle requirements as defined by other regulatory bodies on matters which are left to the satisfaction of the flag administration or are vaguely worded  
|                       | These do not preclude the use of other alternative solutions but these shall be documented and approved for compliance to the principal requirement equivalent to the original interpretation. |
| lay-up                               | a terminology used for vessels that are out of commission                                                                                   |
|                       | In this state the offshore vessel may be at anchorage or permanently moored in a safe harbour.                                              |
| LRFD methodology                  | load and resistance factor design methodology                                                                                               |
| manufacturer                   | signifies the entity that manufactures the material or product, or carries out part production that determines the quality of the material or product, or does the final assembly of the product |
| mechanical completion (MC)         | verification that the components, equipment and the systems are constructed, installed and tested in accordance with applicable drawings and specifications and are ready for testing and commissioning in a safe manner |
| memorandum to owner (MO)           | constitutes information related to the ship, its machinery and equipment or to rule requirements  
<p>|                       | A MO will be issued in relation to information that does not require any corrective action or survey.                                        |
| mobile offshore unit (MOU)          | a buoyant construction engaged in offshore operations including drilling, production, storage or support functions, not intended for service at one particular offshore location, and which can be relocated without major dismantling or modification |
| offshore installation             | a buoyant or non-buoyant construction engaged in offshore operations including drilling, production, storage or support functions, and which is designed and intended for use at a location for an extended period |
| overall examination                | an examination intended to report on the overall condition of the structure                                                                |
| owner                               | signifies the registered owner or manager of the vessel or any other organization or person who has assumed the responsibility for operation of the vessel and who on assuming such responsibility has agreed to take over all the duties and responsibilities |
| position mooring                   | anchoring system for position keeping at the unit’s working location                                                                       |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>plan approval</td>
<td>signifies a systematic and independent examination of drawings, design documents or records in order to verify compliance with the rules or statutory requirements</td>
</tr>
<tr>
<td></td>
<td>Plan approval will be carried out at the discretion of the Society, which also decides the extent and method of examination.</td>
</tr>
<tr>
<td>plan approval staff</td>
<td>personnel authorized to carry out plan approval and to conclude whether or not compliance has been met</td>
</tr>
<tr>
<td>prompt and thorough repair</td>
<td>a permanent repair completed at the time of survey to the satisfaction of the surveyor, therein removing the need for the imposition of any associated condition of class</td>
</tr>
<tr>
<td>quality audit</td>
<td>a systematic and independent examination to determine whether established work processes and quality systems are adhered to</td>
</tr>
<tr>
<td>quality system</td>
<td>signifies both the quality management system and established production and control procedures</td>
</tr>
<tr>
<td>quality survey plan (QSP)</td>
<td>a plan that systematically identifies activities related to the classification project (e.g., construction, installation, testing, mechanical completion, pre-commissioning, testing and commissioning) and the extent of involvement each party (i.e., Yard’s QC, Yards’ QA, DNV GL and Owners [if desired]) will undertake</td>
</tr>
<tr>
<td></td>
<td>Such a plan needs to be submitted to the Society for approval prior to commencement of classification projects.</td>
</tr>
<tr>
<td>recognised classification society</td>
<td>a classification society which is a full or associate member of IACS</td>
</tr>
<tr>
<td>reliability</td>
<td>the ability of a component or a system to perform its required function under given conditions for a given time interval</td>
</tr>
<tr>
<td>representative tanks</td>
<td>those tanks which are expected to reflect the condition of other tanks of similar type and service and with similar corrosion protection systems</td>
</tr>
<tr>
<td></td>
<td>When selecting representative tanks account shall be taken of the service and repair history on board and identifiable critical and/or suspect areas.</td>
</tr>
<tr>
<td>retroactive requirement (RR)</td>
<td>constitutes a class or statutory requirement that will enter into force for certain vessel’s in operation and under construction at a given date or an upcoming survey</td>
</tr>
<tr>
<td></td>
<td>The RR will specify the required actions to be taken in order to retain class or statutory certification. RR related to statutory certification will be issued only if the Society has been authorised to carry out statutory certification on behalf of the flag administration.</td>
</tr>
<tr>
<td>review</td>
<td>signifies a systematic examination of drawings, design documents or records in order to evaluate their ability to meet requirements, to identify any problems and to pro-pose necessary actions</td>
</tr>
<tr>
<td>rope access personnel</td>
<td>specialized trained personnel who use climbing techniques to reach places not reachable by other workers</td>
</tr>
<tr>
<td>the rules</td>
<td>all rule requirements accepted by the appropriate approval body as basis for classification</td>
</tr>
<tr>
<td>sighting survey</td>
<td>a survey to confirm that the relevant construction or the equipment is in a satisfactory condition and, as far as can be judged, will remain so until the postponed survey has been carried out</td>
</tr>
<tr>
<td>significant repair</td>
<td>a repair where machinery is completely dismantled and re-assembled</td>
</tr>
<tr>
<td></td>
<td>Significant repairs will, furthermore, be cases of repairs after serious damage to machinery.</td>
</tr>
<tr>
<td>the Society</td>
<td>signifies DNV GL</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>safety systems</td>
<td>systems, including required utilities, which are provided to prevent, detect/ warn of an accidental event/abnormal conditions and/or mitigate its effects</td>
</tr>
<tr>
<td></td>
<td><strong>Interpretation:</strong></td>
</tr>
<tr>
<td></td>
<td>1) The following should be considered as safety systems:</td>
</tr>
<tr>
<td></td>
<td>— ESD, including blowdown where relevant</td>
</tr>
<tr>
<td></td>
<td>— PSD</td>
</tr>
<tr>
<td></td>
<td>— fire &amp; gas (F&amp;G) detection</td>
</tr>
<tr>
<td></td>
<td>— PA/GA</td>
</tr>
<tr>
<td></td>
<td>— fire-fighting systems</td>
</tr>
<tr>
<td></td>
<td>— BOP incl. control system</td>
</tr>
<tr>
<td></td>
<td>— safety systems for essential or important services</td>
</tr>
<tr>
<td></td>
<td>2) RuleSafety systems are normally considered as “on-demand” functions.</td>
</tr>
<tr>
<td>spaces</td>
<td>separate compartments including holds and tanks</td>
</tr>
<tr>
<td>statement of compliance</td>
<td>a document confirming compliance with specified requirements Such documents may be issued by the Society in cases where it has not been authorised to certify compliance.</td>
</tr>
<tr>
<td>statutory certificates</td>
<td>IMO convention certificates issued on behalf of, or by, national authorities</td>
</tr>
<tr>
<td>statutory survey</td>
<td>survey carried out by or on behalf of a flag administration</td>
</tr>
<tr>
<td>substantial corrosion</td>
<td>extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75% of allowable margins, but within acceptable limits</td>
</tr>
<tr>
<td>survey</td>
<td>signifies a systematic and independent examination of a vessel, materials, components or systems in order to verify compliance with the rules and/or statutory requirements Surveys will be carried out on the vessel, at the construction or repair site as well as at sub-suppliers and other locations at the discretion of the Society, which also decides the extent and method of control.</td>
</tr>
<tr>
<td>survey staff</td>
<td>personnel authorized to carry out surveys and to conclude whether or not compliance has been met</td>
</tr>
<tr>
<td>suspect areas</td>
<td>areas showing substantial corrosion and/or are considered by the surveyor to be prone to rapid wastage</td>
</tr>
<tr>
<td>temporary conditions</td>
<td>design conditions not covered by operating conditions, e.g. conditions during fabrication, mating and installation phases, dry transit phases</td>
</tr>
<tr>
<td>temporary equipment</td>
<td>equipment intended for use on installations and which is covered by class, requires hook-up to systems covered by class and/or is a significant deck load and/or may pose a risk for fire, explosion and escape routes</td>
</tr>
<tr>
<td>temporary mooring</td>
<td>anchoring in sheltered waters or harbours exposed to moderate environmental loads</td>
</tr>
<tr>
<td>tentative rules and standards</td>
<td>apply to new fields to which DNV GL reserves the right to make adjustments during a period in order to obtain the purpose intended</td>
</tr>
<tr>
<td>(normal) towing</td>
<td>drawing or pulling the unit by a chain or line using a tug boat Normally towing is performed for units without any propulsion for (re-)location (compare with emergency towing as defined in emergency towing).</td>
</tr>
<tr>
<td>transit conditions</td>
<td>all wet vessel movements from one geographical location to another</td>
</tr>
</tbody>
</table>
### Term | Definition
--- | ---
transverse section | section which includes all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom and hopper side plating, longitudinal bulkhead and bottom plating in top wing tanks, as applicable. For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections.
  
  **Guidance note:**
  Adjacent frames include the frames located just forward and aft of the transverse section.

verification | a service that signifies a confirmation through the provision of objective evidence (analysis, observation, measurement, test, records or other evidence) that specified requirements have been met.

vertical contract audit | an IACS audit which assesses the correct application of the quality system through audit of the process for a specific contract. The IACS QSCS (Quality System Certification Scheme) audit team is responsible for carrying out these audits.

vessel | in the context of these rules mean a mobile offshore unit (MOU).

witnessing | signifies attending tests or measurements where the surveyor verify compliance with agreed test or measurement procedures.

WSD methodology | working stress design methodology.

### 3 Normative references

#### 3.1 General
These rules include references to other DNV GL and DNV documents and recognised codes and standards which shall be used in conjunction with the requirements given in this document for assignment of class.

#### 3.2 DNV GL and DNV reference documents
Applicable DNV GL and DNV reference documents are listed in Table 3. See Sec.2 [1.2] for applicable editions.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNVGL-OS-A101</td>
<td>Safety principles and arrangement</td>
</tr>
<tr>
<td>DNVGL-OS-B101</td>
<td>Metallic materials</td>
</tr>
<tr>
<td>DNVGL-OS-C101</td>
<td>Design of offshore steel structures, general</td>
</tr>
<tr>
<td>DNVGL-OS-C102</td>
<td>Structural design of offshore ships</td>
</tr>
<tr>
<td>DNVGL-OS-C103</td>
<td>Structural design of column-stabilised units (LRFD method)</td>
</tr>
<tr>
<td>DNVGL-OS-C104</td>
<td>Structural design of self-elevating units (LRFD method)</td>
</tr>
<tr>
<td>DNVGL-OS-C105</td>
<td>Structural design of TLPs (LRFD method)</td>
</tr>
<tr>
<td>DNVGL-OS-C106</td>
<td>Structural design of deep draught floating units (LRFD method)</td>
</tr>
</tbody>
</table>
### 3.3 Other references

Other normative reference documents are listed in Table 4. See Sec.2 [1.2] for applicable editions.

**Table 4 Non-DNV normative reference documents**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>API RP 2SK</td>
<td>Design and Analysis of Station keeping Systems for Floating Structures</td>
</tr>
<tr>
<td>IACS</td>
<td>Shipbuilding and Repair Quality Standard ref. <a href="http://www.iacs.org.uk">www.iacs.org.uk</a></td>
</tr>
</tbody>
</table>

---

DNVGL-OS-C201  | Structural design of offshore units (WSD method)  
DNVGL-OS-C301  | Stability and watertight integrity  
DNVGL-OS-C401  | Fabrication and testing of offshore structures  
DNVGL-OS-D101  | Marine and machinery systems and equipment  
DNVGL-OS-D201  | Electrical installations  
DNVGL-OS-D202  | Automation, safety, and telecommunication systems  
DNVGL-OS-D301  | Fire protection  
DNVGL-OS-E201  | Hydrocarbon production plant  
DNVGL-OS-E301  | Position mooring  
DNVGL-OS-E401  | Helicopter decks  
DNVGL-OS-E403  | Offshore loading buoys.  
DNV rules for ships Pt.5 Ch.5 | Liquefied Gas Carriers  
DNV rules for ships Pt.5 Ch.15 | Compressed Natural Gas Carriers  
DNVGL-CG-0172 | Allowable thickness diminution for hull structure  
DNVGL-ST-0378 | Standard for offshore and platform lifting appliances  
DNV rules for ships | DNV Rules for Classification of Ships  
DNVGL-RU-SHIP | DNVGL Rules for classification of ships
4 Informative references

4.1 DNV GL informative references

The publications listed in Table 5 are referenced in the text of this document, and may be used as a source of supplementary services and information. See Sec.2 [1.2] for applicable editions.

Table 5 DNV GL informative references

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNVGL-RU-OU-0102</td>
<td>Floating production, storage and loading units</td>
</tr>
<tr>
<td>DNVGL-RU-OU-0103</td>
<td>Floating LNG/LPG production, storage and loading units</td>
</tr>
<tr>
<td>DNVGL-RU-OU-0104</td>
<td>Self-elevating units</td>
</tr>
<tr>
<td>DNVGL-RP-C210</td>
<td>Probabilistic methods for planning of inspection for fatigue cracks in offshore structures</td>
</tr>
<tr>
<td>DNVGL-RP-C302</td>
<td>Risk based corrosion management</td>
</tr>
<tr>
<td>DNVGL-SI-0166</td>
<td>Verification for compliance with Norwegian shelf regulations</td>
</tr>
<tr>
<td>DNVGL-SI-0167</td>
<td>Verification for compliance with UK shelf regulations</td>
</tr>
<tr>
<td>DNVGL-SI-0003</td>
<td>Verification for compliance with US coastal shelf regulations</td>
</tr>
<tr>
<td>DNVGL-CP-0338</td>
<td>DNV GL type approval scheme</td>
</tr>
</tbody>
</table>

4.2 Other references

Other references are given in Table 6. See Sec.2 [1.2] for applicable editions.

Table 6 Other references

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>API RP 2I</td>
<td>In-service inspection of mooring hardware for floating drilling units</td>
</tr>
<tr>
<td>API RP 8B</td>
<td>Inspection, maintenance, repair, and re-manufacture of hoisting equipment</td>
</tr>
<tr>
<td>BS 5430-1</td>
<td>Periodic inspection, testing and maintenance of transportable gas containers (excluding dissolved acetylene containers). Specification for seamless steel containers of water capacity 0.5 litres and above</td>
</tr>
<tr>
<td>EN 13306</td>
<td>Maintenance terminology</td>
</tr>
<tr>
<td>EN 15341</td>
<td>Maintenance key performance indicators (KPI)</td>
</tr>
<tr>
<td>EN 15628</td>
<td>Qualification of maintenance personnel</td>
</tr>
<tr>
<td>IEC 60300-3-10</td>
<td>Dependability management Part 3-10: Application guide maintainability</td>
</tr>
<tr>
<td>IEC 60300-3-11</td>
<td>Dependability management Part 3-11: Application guide reliability centred maintenance (RCM)</td>
</tr>
<tr>
<td>IEC 60300-3-14</td>
<td>Dependability management Part 3-14: Application guide maintenance and maintenance support</td>
</tr>
</tbody>
</table>
### 5 Abbreviations

The abbreviations given in Table 7 are used in this standard.

#### Table 7 Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>availability</td>
</tr>
<tr>
<td>API</td>
<td>American Petroleum Institute</td>
</tr>
<tr>
<td>BOP</td>
<td>blow out preventer</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard (issued by British Standard Institution)</td>
</tr>
<tr>
<td>CG</td>
<td>DNV GL class guideline</td>
</tr>
<tr>
<td>CMC</td>
<td>certification of materials and components</td>
</tr>
<tr>
<td>CMMS</td>
<td>computerised maintenance management system</td>
</tr>
<tr>
<td>CC</td>
<td>condition of class</td>
</tr>
<tr>
<td>CA</td>
<td>condition on behalf of the flag administration</td>
</tr>
<tr>
<td>CM</td>
<td>condition monitoring</td>
</tr>
<tr>
<td>CBM</td>
<td>condition based maintenance</td>
</tr>
<tr>
<td>DFF</td>
<td>design fatigue factors</td>
</tr>
<tr>
<td>EDP</td>
<td>emergency disconnect package</td>
</tr>
<tr>
<td>ERP</td>
<td>enterprise resources planning tool</td>
</tr>
<tr>
<td>DPMS</td>
<td>drilling equipment planned maintenance system</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>ESD</td>
<td>emergency shut down</td>
</tr>
<tr>
<td>DP</td>
<td>design pressure</td>
</tr>
<tr>
<td>FFA</td>
<td>functional failure analysis</td>
</tr>
<tr>
<td>FMECA</td>
<td>failure mode, effects and criticality analysis</td>
</tr>
<tr>
<td>FMEA</td>
<td>failure mode and effects analysis</td>
</tr>
<tr>
<td>FUI</td>
<td>fatigue utilisation index</td>
</tr>
<tr>
<td>HAZOP</td>
<td>hazard and operability study</td>
</tr>
</tbody>
</table>
| IACS  | International Association of Classification Societies  
Unified rules, interpretations, guidelines and recommendations may be found on [www.iacs.org.uk](http://www.iacs.org.uk). |
<p>| IC    | inspection category |
| IEC   | International Electrotechnical Commission |
| IIP   | in service inspection program |
| IMO   | International Maritime Organization |
| ISO   | International Organisation for Standardization |
| HP    | high pressure |
| HT    | high temperature |
| KPI   | key performance indicator |
| LRFD  | load and resistance factor design |
| MC    | mechanical completion |
| MO    | memorandum to owner |
| MPI   | magnetic particle inspection |
| MDT   | mean down time |
| MTTF  | mean time to failure (effective failure rate with or without maintenance carried out) |
| MTBF  | mean time between failure (MTBF = MTTF + MDT) |
| NDT   | non-destructive testing |
| OEM   | original equipment manufacturer |
| OS    | DNV GL offshore standard |
| OTG   | DNV GL offshore technical guide |
| QSP   | quality survey plan |
| RBI   | risk based inspection |
| RCM   | reliability centered maintenance |
| RCA   | root cause analysis |
| RBM   | risk based maintenance |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP</td>
<td>DNV GL recommended practice</td>
</tr>
<tr>
<td>RR</td>
<td>retroactive requirement</td>
</tr>
<tr>
<td>SAE</td>
<td>Society of Automotive Engineers</td>
</tr>
<tr>
<td>SCF</td>
<td>stress concentration factor</td>
</tr>
<tr>
<td>SWL</td>
<td>safe working load</td>
</tr>
<tr>
<td>U</td>
<td>unavailability (U = MDT/MTBF)</td>
</tr>
<tr>
<td>UT</td>
<td>ultrasonic testing</td>
</tr>
<tr>
<td>WSD</td>
<td>working stress design</td>
</tr>
</tbody>
</table>
SECTION 2 CLASSIFICATION PRINCIPLES

1 The classification concept

1.1 Introduction

1.1.1 Classification is a comprehensive verification service providing assurance that a set of requirements laid down in rules established by DNV GL are met during design and construction, and maintained during operation of an offshore unit or installation. Classification has gained world-wide recognition as representing an adequate level of safety and quality.

1.1.2 Classification implies an activity, in which an offshore unit or installation is surveyed during construction on the basis of design approval, tested before being taken into service, and surveyed regularly during its whole operational life. The aim is to verify that the required safety standard is built-in, observed and maintained.

1.1.3 Having assigned class, DNV GL will issue a classification certificate and enter the main particulars and details of class in the “Register of vessels classed with DNV GL”.

1.2 Applicable rules

1.2.1 Rules and amendments accepted by the appropriate approval body will come into force when decided by the appropriate approval body. Unless stated otherwise, the coming into force date shall be six (6) months after the date of publication. Unless stated otherwise, the coming into force date for documents referenced by these rules as technical basis for classification shall be six (6) months after the date of publication.

1.2.2 The applicable rules for assignment of class to a new unit are those in force at the date (as given to the Society by the customer) when the contract between the owner and the yard is signed. Subsequent amendments not made mandatory according to [1.2.4] may be applied to objects under construction provided both builder and owner agree to such application.

1.2.3 In exceptional cases, where unacceptable service experience and/or theoretical findings clearly show that safety hazards may arise in connection with items covered by the existing rules, DNV GL may lay down supplementary requirements to maintain the overall safety standard reflected by the rules.

1.2.4 DNV GL will consider alternatives found to represent an overall safety standard equivalent to that of the rules. The alternative solution shall be adequately documented and will be reviewed for acceptance on the basis of relevant references set forth by DNV GL. Approval may be revoked if subsequent information indicates that the chosen alternative is not satisfactory. In cases where detailed requirements are not given in the rules, specific solutions or decisions approved by DNV GL and its surveyors shall be based on the principles of the rules, and shall give a safety standard equivalent to that of the rules.

1.2.5 The approval as required in [1.2.4] shall be based on an agreed scheme of analysis that is separately worked out and approved.

Guidance note:
For new technology, Recommended Practice DNV-RP-A203 can be a suitable basis for such scheme.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
1.2.6 Upon request by the customer, DNV GL may consider the use of other recognised codes and standards as part of the basis for classification. Such agreed alternative arrangements shall be specified in the class agreement.

1.2.7 The Society may propose an approach to resolve the issue if detailed requirements are not given in the rules.

1.2.8 Exceptionally, if for some reason, it is impossible to comply with a rule requirement or to find a fully equivalent solution, then other solutions may be accepted by DNV GL, provided the parties to the classification contract all agree and always provided that the overall safety level is not jeopardised. The alternative solution shall be adequately documented and will be reviewed for acceptance on the basis of relevant references set forth by DNV GL. The solution shall be recorded in the appendix to the classification certificate”.

1.2.9 In accordance with [1.2.4], DNV GL may consider the use of reliability methods as a means of documenting compliance to class requirements.

1.2.10 The Society reserves the exclusive right to interpret, decide equivalence or make exemptions to the rules.

1.2.11 The rules are an integral part of the Society’s classification service. The safety objectives inherent in the rules are achieved through the service. Using the rules without the corresponding classification services may have the result that safety objectives are not met.

1.2.12 Periodical survey regulations for retaining class in the operational phase shall always be according to the current rules in force at the time of survey (given in Ch.3).

1.3 Basis for assignment of class

1.3.1 Having assigned a specific class implies that DNV GL:
— has been satisfied that the object meets the Rule requirements for the particular class
— will verify, through a system of surveys, that the requirements stipulated for retention of class are complied with.

1.3.2 Prior to assigning class to an existing offshore object, it is in general to undergo all periodical surveys pertaining to the age and type of object.

1.3.3 When assigning class to an offshore unit or installation which has not been built under supervision of DNV GL, but by another recognised classification society, DNV GL may on the basis of an overall safety consideration in connection with a design review and survey, give exemptions from rule requirements.

1.3.4 When assigning class to offshore units of a series under construction to the classification of, or a design previously accepted by, a recognised classification society, DNV GL may on the basis of an overall safety consideration in connection with a design review give exemptions from DNV GL rule requirements, and base the survey on the design approval done by the other recognised society. A note to this effect may be included in the appendix to the classification certificate.
1.3.5 When assigning class to an offshore unit or installation registered in a flag state that undertakes approval and surveys of items covered by the rules, DNV GL may accept their decisions as basis for assigning class.

1.3.6 DNV GL may also accept decisions by the national authority with jurisdiction over the waters in which the unit or installation is to operate (shelf state) as basis for assigning class.

1.3.7 When other recognised codes or standards are used as basis for assignment of class, an overall comparison with rules shall be carried out to ensure that all aspects of safety are covered by a defined code or standard.

1.4 Basis for maintenance of class
The requirements for retention of class are found in Sec.4 [2]. In addition, classification is based on the following:

Valid statutory certificates
For flagged units and installations the statutory certificates of the applicable international conventions shall be valid at all times, and the surveys prescribed in the conventions shall be carried out within the time windows prescribed.

Maintenance of the unit or installation and its equipment
It is assumed that the unit, machinery installations and equipment are maintained at a standard complying with the requirements of the rules.
Installed systems or equipment carried on board in excess of the rule requirements, but otherwise covered by the rules, shall either be maintained in accordance with the rules, or be removed or disconnected in such a way as to ensure that the installed system or equipment cannot be used.

Handling of the unit or installation
It is assumed that the unit, machinery installations and equipment are adequately manned and competently handled. Class conditions regarding the use of the unit shall be observed.

Recording of lightweight and centre of gravity
The data for lightweight and centre of gravity (C.o.G.) shall be continuously recorded and adjusted by the master for any items taken onboard or ashore during operation.

1.5 Documentation

1.5.1 All information which may influence the judgement, decisions and requirements of DNV GL for the purpose of classification, shall be made available to DNV GL. It is the customer's responsibility to document or demonstrate compliance with the Society's rules. Information may be made available by submitting documents to the Society or by permitting surveys performed by the Society at the customer's premises, onboard the vessel or at the premises of the customer's sub-contractors.

1.5.2 The documentation forming the basis for classification is, at all times, to reflect the true conditions. Revisions of documents are therefore to be submitted to DNV GL to the extent such revisions may influence decisions and requirements relating to class.

1.5.3 The submitted documentation shall use SI-units (International System of Units) unless otherwise agreed.
1.6 Disclosure of information

1.6.1 DNV GL will not disclose any information received or reports made in connection with classification to any other than those entitled thereto or those having been given the right to receive information by legislation, court decision or by written permission by the owner.

Guidance note:
Table 1 indicates which parties will be entitled to various kinds of information.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

1.6.2 DNV GL will not disclose information that can be considered as the property of another party except when this party’s permission is given in writing.

1.6.3 Internal communication, notes, calculations etc. produced within DNV GL in connection with classification will not be disclosed to other parties.

1.6.4 Notwithstanding [1.6.1] to [1.6.3], the following parties will have access to such information:
— authorised representatives of the flag administration
— authorised audit teams performing audits in connection with certification of the Society.

1.6.5 Notwithstanding [1.6.1] to [1.6.3], the Society may disclose information requested by a court order, governmental body (including regional bodies) or other public investigation bodies that are authorised by a decree.

1.6.6 Information recorded in the Society's "Register of Vessels", will be published and/or released to any interested party.

1.6.7 The Society may at its discretion release to other classification societies information concerning relevant technical information on serious hull structural, ship machinery and system failures for the purpose of improving ship safety and protection of the marine environment. The owners will be informed accordingly.

Table 1 Disclosure of information

<table>
<thead>
<tr>
<th>Information in question</th>
<th>Owner</th>
<th>Flag administration</th>
<th>Port state authority/Coastal state authority</th>
<th>Insurance company*</th>
<th>Builder or supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newbuildings:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approved structure related drawings</td>
<td>Yes 1)</td>
<td>Upon request</td>
<td>No</td>
<td>No</td>
<td>Yes 1)</td>
</tr>
<tr>
<td>Approved system and component drawings</td>
<td>Yes 1)</td>
<td>Yes 1)</td>
<td>No</td>
<td>No</td>
<td>Yes 1)</td>
</tr>
<tr>
<td><strong>Vessels in operation:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class and statutory certificates issued by the Society</td>
<td>Yes</td>
<td>Yes</td>
<td>Upon request 3)</td>
<td>Yes 2)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Not applicable to vessels in operation.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
<table>
<thead>
<tr>
<th>Information in question</th>
<th>Owner</th>
<th>Flag administration</th>
<th>Port state authority/Coastal state authority</th>
<th>Insurance company*</th>
<th>Builder or supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition on behalf of the flag administration (CA)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes 2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Text of Conditions of Class (CC)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes 4)</td>
<td>N/A</td>
</tr>
<tr>
<td>Text of condition on behalf of the flag administration (CA)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes 4)</td>
<td>N/A</td>
</tr>
<tr>
<td>Survey reports</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes 1)</td>
<td>Yes 2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Memorandum to owner (MO)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes 1)</td>
<td>Yes 2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Retroactive Requirement (RR)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes 1)</td>
<td>Yes 2)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Other information:**

<table>
<thead>
<tr>
<th>Correspondence with Builder or owner</th>
<th>Yes 1)</th>
<th>Yes 1)</th>
<th>No</th>
<th>Yes 1)</th>
<th>Yes 1)</th>
</tr>
</thead>
</table>

1) When accepted in writing by owner, builder or copyright holder, as applicable
2) When accepted in writing by owner or through special clause in insurance contract
3) Survey reports pertaining to a port state control (PSC) rectification survey can be given upon request from the PSC authority
4) Overdue conditions of class only
*) Insurance company means P&I Clubs and Hull and Machinery Underwriters
N/A Not applicable. However, certificates with possible related CC and MO will normally be received by the builder upon class assignment.

1.7 Access

1.7.1 For the purpose of verifying compliance with the rules, the customer shall whenever necessary provide the Society’s surveyors with safe access to the vessel and/or to their premises. The premises and objects to be inspected shall as agreed be cleaned and prepared for inspection.

1.7.2 The customer shall provide flag authorities and authorised audit teams with safe access to the vessel and/or to their premises in order to audit the Society's compliance with applicable rules, regulations and quality standards.

1.7.3 The Society reserves the right to decline to perform a requested service when inadequate access is provided or the safety of its surveyors may be compromised.
1.8 Calibration of equipment
Measuring and test equipment used by customers, the result of which may form the basis for the surveyor's decisions, shall have a calibration status to an appropriate accuracy according to the rules or as accepted by the surveyor.

1.9 Service suppliers
Suppliers providing services on behalf of the customer, such as measurements, tests and maintenance of safety systems and equipment, the result of which may form the basis for the surveyor's decisions, shall be approved by the Society, according to criteria established by the Society.

1.10 Limitation of DNV GL's responsibility
The classification service is performed on the basic assumption that other parties involved (building yard, designers, manufacturers, sub-contractors, owners, etc.) fulfil their individual obligations. The classification service is not performed in substitution of other parties' role or obligations. Surveyors will not substitute the essential role of Yard or Subcontractors Quality Control / Quality Assurance inspectors/officers or other relevant personnel. Nothing contained herein or in any certificate, report or document issued in connection with or pursuant to these rules, shall relieve any designer, engineer, builder, manufacturer, yard, seller, supplier, owner, operator or other parties from any obligations or consequences of default whatsoever. In particular, compliance with the rules does not imply acceptance or commissioning of an offshore unit or installation. This is the exclusive responsibility of the owner.

Any document issued by DNV GL in relation to surveys performed reflects the condition of the unit or installation at the time of survey. It is the responsibility of the owner to maintain the condition of the unit or installation as required by the rules between surveys.

2 Appeals

2.1 Decisions taken by the Society
The customer may request in writing that a decision made by the Society shall be taken up for reconsideration. The expenses incurred shall be paid by the customer. However, if the earlier decision is revoked, the Society's expenses will be covered by the Society.

3 Statutory certification

3.1 General

3.1.1 The Society undertakes statutory certification on behalf of flag administrations when and to the extent the Society has been authorised to do so by the individual flag administration.
Statutory certification includes inter alia approval, survey and the issuance of statutory certificates.
When the Society acts on behalf of a flag administration, the Society follows international statutory instruments, IACS Unified Interpretations and DNV GL Statutory Interpretations, and generally follows guidance issued by IMO in Circulars etc. unless the flag administration has instructed the Society otherwise.

3.1.2 It is assumed by the Society that required statutory surveys for ships classed by the Society will be carried out by the Society or by officers of the flag administration itself and that statutory certificates will be issued by the Society or by the flag administration with the exceptions mentioned in [3.1.3] to [3.1.6].

3.1.3 The Society assume the right to withdraw class if statutory certificates are not issued as above.
3.1.4 The Society may accept that Safety Management Certificates (ISM Code) are issued by a third party that has been authorised by the flag administration and complies with IMO Resolution A.739(18) and A.789(19).

3.1.5 The Society may accept that International Ship Security Certificates (ISPS Code) are issued by a third party that has been authorised by the flag administration and complies with MSC/Circ.1074.

3.1.6 The Society may accept that Cargo Ship Safety Radio Certificates (SOLAS) are issued by a third party that has been authorised by the flag administration.

3.1.7 For a dually classed vessel, where the Society has not been authorised by the flag administration to issue statutory certificates, the Society may accept that such certificates are issued by the dual class society and provided the other class society is authorised by the flag administration.

3.2 Service suppliers
Where surveyors use the services of service suppliers in making decisions affecting statutory requirements, the suppliers shall be approved by either:
— the relevant flag administration
— duly authorised organisations acting on behalf of the flag administration
— an equipment supplier when explicitly described by IMO conventions, resolutions or circulars, or
— the Society.
SECTION 3 CLASSIFICATION SCOPE AND NOTATIONS

1 Scope of classification

1.1 General
The rules and referred standards define acceptance criteria for design, construction, survey and testing of offshore units and installations, their marine, machinery and utility installations, systems and equipment, applicable to the newbuilding and operational phase.

1.2 Rule parts

1.2.1 The present offshore service specification states terms and procedures for assigning and maintaining class for LNG/ LPG production and storage units, as well as listing the applicable technical reference documents stipulating technical requirements for classification. These may be DNV GL offshore standards, other DNV GL standards and internationally recognised codes.

1.2.2 Ad hoc combination of codes or standards, different as described in the rules, should only be made after proper consideration of the compatibility of the documents, and only where safety and sound engineering practice can be justified. Such selective (piecemeal) application of a code or standard shall be verified.

1.3 Rule particulars
These rules with reference standards give requirements in the following areas:

Hull, containment system, and main structure
- strength
- materials and welding
- corrosion protection
- constructional fire protection
- weathertight and watertight integrity
- stability and floatability
- containment tank arrangement

Marine, machinery and utility installations and equipment
System installations and equipment, including their related auxiliary functions, with respect to strength and performance as applicable to the following functions:
- power generation
- propulsion (as applicable)
- positioning keeping
- steering (as applicable)
- fire and gas protection, detection and fire extinguishing
- drainage and bilge pumping
- ballasting
- emergency shutdown (as applicable).

Other machinery installations, regardless of their contribution to the main functions stated above, when located in enclosed hull compartments below the damage water line.
Other installations stated in the rules.
2 Class notations

2.1 General
Classed units and installations will be given a class designation consisting of:
— construction symbol
— main character of class
— basic design notation
— service notation
— special equipment and systems notations (as applicable)
— special feature notations (as applicable).

2.2 Construction symbols

2.2.1 The symbol ☑ will be given to units and installations built under the supervision of DNV GL.

2.2.2 The symbol ☑ will be given to units and installations built under the supervision of a recognised classification society and later assigned class with DNV GL.

2.3 Main character of class

2.3.1 The notation 1A will be given to mobile offshore units with hull and marine machinery and equipment found to be in compliance with the basic (common) requirements of the applicable DNV GL offshore standards referred to in the rules.

2.3.2 The notation OI will be given to non self-propelled offshore installations intended for long term service at one offshore location with main structure, utility and safety systems found to be in compliance with the basic (common) requirements of the applicable DNV GL offshore standards referred to in the rules.

2.3.3 For OI main class there may be cases where the customer wishes to limit the scope of classification to selected areas and items only. Such special class arrangements may be acceptable provided it can be demonstrated that areas and items not covered by classification have, or will be, designed, constructed and maintained to an appropriate recognised standard. The involvement by DNV GL will be specified in the class agreement and reflected in the class notations for the installation.

2.4 Structural design notations

2.4.1 The structural design notation indicates the type of structure. The notations currently in use are given in Table 1.

Table 1 Class notations related to structural design

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Design requirements</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column-stabilised</td>
<td>A structure dependent on the buoyancy of widely spaced columns for floatation and stability in all modes of operation.</td>
<td>Ch.2 Sec.1 and Ch.2 Sec.2</td>
<td>Ch.3</td>
</tr>
</tbody>
</table>
2.4.2
For types of objects not properly characterised by the listed notations, the basic notations:

1A Mobile Offshore Unit
OI Floating Offshore Installation
may be used.

2.5 Service notations

2.5.1 Units or installations constructed according to DNV GL rules for offshore classification, arranged for a particular service and found to be in accordance with the relevant requirements for such service, will be given a corresponding service notation.

2.5.2 Service notations currently in use are defined in Table 2.

Table 2 Class notations related to service

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
<th>Design requirements</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNG production</td>
<td>Vessel purpose production of LNG</td>
<td>Installation</td>
<td>Permanently placed installation</td>
<td>Ch.2 Sec.3</td>
<td>Ch.3 Sec.5 [2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit</td>
<td>Mobile offshore unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPG production</td>
<td>Vessel purpose production of LPG</td>
<td>Installation</td>
<td>Permanently placed installation</td>
<td>Ch.2 Sec.3</td>
<td>Ch.3 Sec.5 [2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit</td>
<td>Mobile offshore unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNG storage</td>
<td>Vessel purpose storage of LNG</td>
<td>Installation</td>
<td>Permanently placed installation</td>
<td>Ch.2 Sec.4</td>
<td>Ch.3 Sec.5 [2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit</td>
<td>Mobile offshore unit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.5.3 The service notations in shall be considered mandatory for the relevant types of units or installations.

2.6 Additional class; special equipment and systems notations

Units or installations having special facilities, systems or equipment found to satisfy specified class requirements will be given a corresponding class notation. Notations currently in use are given in Table 3.

### Table 3 Class notations related to equipment and systems

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Design requirements</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bow Loading</strong></td>
<td>Bow loading system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>BWM</strong></td>
<td>Ballast water management</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>Clean/ Clean design</strong></td>
<td>Arrangements for controlling and limiting operational emissions and discharges</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>COMF-MOU</strong></td>
<td>Comfort class</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>Crane-offshore</strong></td>
<td>Onboard crane</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>DPS</strong></td>
<td>Dynamic positioning system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>DYNPOS</strong></td>
<td>Dynamic positioning system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>E0</strong></td>
<td>Periodically unattended machinery space</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>ECO</strong></td>
<td>Machinery centralised operated</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>ESV</strong></td>
<td>Enhanced system verification</td>
<td>Ch.2 Sec.6</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Additional fire protection</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>FMS</strong></td>
<td>Fatigue methodology for ship-shaped units</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>HELDK</strong></td>
<td>Helicopter deck</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>HMON</strong></td>
<td>Hull monitoring system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>ISDS</strong></td>
<td>Integrated software dependent system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td><strong>LCS</strong></td>
<td>Loading computer system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
</tbody>
</table>
### Class notations and design requirements

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Design requirements</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPP-F</td>
<td>Oil pollution prevention – fuel systems</td>
<td>Ch.2 Sec.6</td>
<td>N/A</td>
</tr>
<tr>
<td>POSMOOR</td>
<td>Position mooring system</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td>PROD</td>
<td>Production plant</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td>Recyclable</td>
<td>Inventory of hazardous materials Part 1</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td>REGAS</td>
<td>Regasification plants</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td>SPM</td>
<td>Single point mooring</td>
<td>Ch.2 Sec.6</td>
<td>N/A</td>
</tr>
<tr>
<td>STL</td>
<td>Submerged turret loading</td>
<td>Ch.2 Sec.6</td>
<td>N/A</td>
</tr>
<tr>
<td>VCS</td>
<td>Vapour control systems</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
<tr>
<td>VIBR</td>
<td>Vibration level criteria for machinery, components, equipment and structure</td>
<td>Ch.2 Sec.6</td>
<td>Ch.3 Sec.6</td>
</tr>
</tbody>
</table>

#### 2.7 Optional class notations related to cold climate operation

2.7.1 Units designed or strengthened for operation within particular geographical or environmental areas found to be in accordance with relevant class rule requirements may be assigned a corresponding optional class notation.

2.7.2 Optional class notations related to cold climate service are given in Table 4.

2.7.3 Further details on notation qualifiers and application for different vessel types is given in Ch.2 Sec.6 [17].

#### Table 4 Class notations related to cold climate

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Design requirements</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAT</td>
<td>Design ambient air temperature for material selection suitable for regular service during winter to Arctic or Antarctic waters</td>
<td>Ch.2 Sec.6 [17]</td>
<td>N/A</td>
</tr>
<tr>
<td>Ice</td>
<td>Structural strength for navigation in ice</td>
<td>Ch.2 Sec.6 [17]</td>
<td>N/A</td>
</tr>
<tr>
<td>PC</td>
<td>Polar class – structural strength for navigation in ice-infested polar waters</td>
<td>Ch.2 Sec.6 [17]</td>
<td>N/A</td>
</tr>
<tr>
<td>Winterized</td>
<td>Systems designed for operation in cold climate</td>
<td>Ch.2 Sec.6 [17]</td>
<td>Ch.3 Sec.6 [13]</td>
</tr>
</tbody>
</table>

#### 2.8 Special feature notations

2.8.1 Special feature notations provide information regarding special design assumptions, arrangements or equipment which is not covered by other class notations.

2.8.2 Special feature notations currently in use are listed in Table 5.
Table 5 Class notations related to special features

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Design requirements</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIS</td>
<td>Built for in-water survey</td>
<td>Ch.2 Sec.6 [21]</td>
<td>N/A</td>
</tr>
<tr>
<td>INERT</td>
<td>Inert gas system</td>
<td>DNV rules for ships Pt.5 Ch.3 Sec.11</td>
<td>N/A</td>
</tr>
<tr>
<td>Non-self-propelled</td>
<td>Towing assistance will be required during transit</td>
<td>Ch.2 Sec.6 [21]</td>
<td>Ch.3 Sec.6 [16]</td>
</tr>
<tr>
<td>Self-propelled</td>
<td>Units with propulsion (applicable for self-elevating units only)</td>
<td>Ch.2 Sec.6 [21]</td>
<td>Ch.3 Sec.6 [16]</td>
</tr>
<tr>
<td>TMON</td>
<td>Tailshaft monitoring</td>
<td>Ch.2 Sec.6 [21]</td>
<td>Ch.3 Sec.6 [16]</td>
</tr>
</tbody>
</table>

2.8.3 Self-elevating units are considered to be non self-propelled unless specified with the special feature notation Self-propelled.

2.9 Notations related to restrictions

2.9.1 Limitations of scope
When, under [2.3.3], the customer for an OI classed installation wishes to limit the scope of classification to selected areas and items only, the parts of the installation which are covered by classification will be indicated in the classification certificate. The purpose of the notation Limitation of Class is to indicate such limitations, if applicable.

Example: Structure: Classification is limited to cover main structure.

2.9.2 Service restrictions
Service restrictions or operational limits included in the design assumptions of a unit will be stated in the “Appendix to the classification certificate”, and/or on special signboards onboard.

2.9.3 Service restrictions and deviations from the rule requirements shall be addressed in a memo for owners (MO) informing them about the assumption for the class notation if the unit shall be operated outside the geographical areas or other boundaries agreed in the classification contract.

2.10 Area specific notations

2.10.1 Field specific design
Units designed for one specific location will be given the notation FIELD (.....). The specific field is to be given in brackets. The notation is a confirmation that the design parameters for the environmental loads, used during design approval of the hull structure, are equal or above the actual values for the specified field of operation given in brackets.

*Guidance note:*
- The notation is equally applicable to new builds and conversions.
- Transits to the field should take into account the limitations of the applied design environmental loads.

2.10.2 Compliance with coastal state legislation
When DNV GL is requested to carry out verification in accordance with coastal state regulations for the complete unit or parts of the unit, an additional notation may be assigned to the relevant class designations,
consisting of the relevant coastal state code and the issue of coastal state regulations used as basis for verification in brackets, e.g. PROD(N).

2.10.3 Coastal state code notations currently in use, are listed in Table 6.

Table 6 Notations for coastal state verification

<table>
<thead>
<tr>
<th>Notation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production unit or installation(N)</td>
<td>Verified for compliance with DNV GL’s interpretation of relevant Norwegian shelf state requirements.</td>
</tr>
<tr>
<td>Storage unit or installation(N)</td>
<td>Verified for compliance with DNV GL’s interpretation of relevant Norwegian coastal state requirements.</td>
</tr>
<tr>
<td>PROD(N)</td>
<td></td>
</tr>
<tr>
<td>HELDK-SH(N) / HELDK-SHF(N)</td>
<td></td>
</tr>
<tr>
<td>Crane-offshore(N)</td>
<td></td>
</tr>
<tr>
<td>COMF-MOU(N)</td>
<td></td>
</tr>
<tr>
<td>Production unit or installation(US)</td>
<td>Verified for compliance to US Coast Guard requirements for Gulf Of Mexico Outer Continental Shelf.</td>
</tr>
<tr>
<td>Storage unit or installation(US)</td>
<td></td>
</tr>
<tr>
<td>UKVS</td>
<td>Verified for compliance with DNV GL’s interpretation of relevant UK coastal state requirements.</td>
</tr>
</tbody>
</table>

2.10.4 For further information on procedures and scope of verification for coastal state requirements, see DNV GL Statutory Interpretations for coastal state compliance services listed in Sec.1 Table 5.

2.11 Combination of notations

2.11.1 Class notations shall be combined as follows:

\[
1A \text{ <limitation of class, if any>} <\text{basic design notation}> <\text{service notation}> \text{ Unit} <\text{Special equipment and systems notations}> <\text{special feature notations}>
\]

Example: \[
1A \text{ Ship shaped LNG production unit POSMOOR TMON}
\]

2.11.2 Ship-shaped units may also be assigned relevant class notations given in the DNV rules for ships
SECTION 4 ASSIGNMENT OF CLASS

1 Assignment of class – new vessels

1.1 General
A request for classification of a new vessel shall be submitted in writing by the customer. The Society reserves the right to decline a request for classification.

1.2 Requirements for builder or designer

1.2.1 Builders or designers unfamiliar to the Society shall provide the Society with evidence of their capability to successfully manage classification projects.

Guidance note:
Evidence may incorporate successful outcome of classification projects carried out for another IACS member society or successful outcome of design projects of similar nature.

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1.2.2 Builders or designers shall instruct their subcontractors and suppliers of materials, components and systems that the Society’s rules apply and that the Society’s certificates shall be provided as and when required by the rules.

1.2.3 Welding of important structures, machinery installations and equipment shall be carried out by approved welders, with approved welding consumables and at welding shops approved by the Society. Requirements for approval of welding shops, welders, manufacturers of welding consumables, welding consumables and welding procedures are given in DNVGL-OS-C401 and by a series of detailed approval programmes.

1.2.4 The following documentation from the builder or designer (workshop and yard) and from subcontractors shall be submitted when requested by the Society:
— information related to the builder’s or designer’s quality control and quality management system
— information related to the builder’s procedures for managing materials that are excluded from use on board by class and/or statutory requirements (e.g. asbestos).
— list of relevant subcontractors to the building yard
— list of relevant subcontractors to the manufacturer of systems and components to be delivered for the product, if applicable.

1.2.5 To assess compliance with the rules the Society may require additional documentation and carry out an assessment of yard’s processes, systems and personnel related to classification projects. The results of the assessment should be used as a basis to decide on the extent of the involvement of surveyors of the Society. The extent of verification should be clearly reflected in the Quality Survey Plan (QSP).

Guidance note:
A generic version of Quality Survey Plan (QSP) issued by the Society can be used as a model to develop an appropriate Quality Survey Plan for specific classification projects that should be submitted to the Society for approval before commencing activities in the project.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
1.3 Applicable rules

1.3.1 The rules that apply for assignment of class to a new unit are generally those in force at the date of “contract for construction”. The term date of “contract for construction” shall be construed as follows:

1) The date of “contract for construction” of a unit is the date on which the contract to build the unit is signed between the prospective owner and the builder. This date and the construction numbers (i.e. hull numbers) of all the units included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2) The date of “contract for construction” of a series of units, including specified optional units for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the builder.

Units built under a single contract for construction are considered a “series of units” if they are built to the same approved plans for classification purposes. However, units within a series may have design alterations from the original design provided:

   — such alterations do not affect matters related to classification, or
   — if the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the builder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional units will be considered part of the same series of units if the option is exercised not later than 1 year after the contract to build the series was signed.

3) If a contract for construction is later amended to include additional units or additional options, the date of “contract for construction” for such units is the date on which the amendment to the contract, is signed between the prospective owner and the builder. The amendment to the contract is to be considered as a “new contract” to which 1 and 2 above apply.

4) If a contract for construction is amended to change the unit type, the date of “contract for construction” of this modified unit, or units, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the builder. (IACS PR 29 Rev.4)

The Society may upon consideration and in agreement with the parties involved decide on the rules to be applied.

1.3.2 For a unit in a series of identical units under construction to the class of, or of a design previously approved by another IACS member society, the Society may accept the design approved by that IACS member society provided a review by the Society has demonstrated that the design in principle meets the safety and reliability level of the Society’s rule requirements for main class.

1.3.3 Where requirements from international maritime conventions have been adopted in the Society’s rules, compliance with these requirements is mandatory.

1.3.4 For a unit where the flag administration undertakes approval and surveys of items covered by the rules, the Society may accept their decisions as basis for assigning class, provided the Society’s requirements for main class are complied with.

Necessary documentation, such as copies of approved plans, reports and other particulars approved by the flag administration shall be submitted.

1.3.5 Deviations from the rule requirements will not be accepted for:

   — requirements for structural strength, intact stability, machinery installations, steering appliances and electrical systems and equipment covered by main class
optional class notations.

1.3.6 For a unit intended to be permanently moored on location for production and/or storage of LNG/LPG, the Society may accept decisions by the national administration with jurisdiction over the waters in which the vessel shall operate (the coastal or shelf state) as basis for assigning class.

1.3.7 When class is assigned on the basis of a design approved by another IACS member society, the flag administration or according to flag administration requirements or decisions by national authorities according to [1.3.4], [1.3.5] or [1.3.6], information to this effect shall be included in the “Appendix to the Class Certificate” (see [3.1.6]).

In case of class being assigned on the basis of flag administration requirements according to [3.1.6] an Memorandum to Owner shall also be issued (see Sec.5 [2.3.7]).

1.4 Plan approval

1.4.1 Documentation for classification shall be in accordance with the Nauticus Production System (NPS) DocReq. The DocReq is a compilation of all DNV GL's documentation requirements related to plan approval. The purpose of the DocReq is to provide a basis to verify that selected, safety critical parts of the requirements of the applicable rules and standards are complied with in the design of the vessel. A satisfactory document review is a prerequisite for assignment of DNV GL class and issue of statutory certificates. The document review shall be complemented by a review of the customer's quality system and by surveys by the Society. The documentation requirements are based on standardized documentation types, which are defined in DNVGL-RU-SHIP Pt.1 Ch.3.

1.4.2 Where subcontractors and suppliers are involved, the customer shall co-ordinate the submission of required plans and documents, as well as co-ordinate any approval comments given by the Society.

1.4.3 Documents subject to approval will be examined by the Society. The results of the examination will be stated in a letter of approval. Comments, conditions and limitations may be stated on the plans returned or in an accompanying letter.

1.4.4 The plan approval may be revoked at any time if subsequent information indicates that the solution was contrary to the rules.

1.5 Survey during construction

1.5.1 When a unit is built under the supervision of the Society, the Society will survey:

— that the construction and scantlings comply with the rule requirements and the approved plans, and that the required materials are used,
— that the materials, components and systems have been certified in accordance with the rules
— that the work is carried out in compliance with the applicable rules and acceptable standards
— that satisfactory tests are carried out to the extent and in the manner prescribed by the rules.

Guidance note:


The survey scope covers all relevant parts of the built including (top-side) modules and/or other major subcontracted parts like legs, pontoons etc. This is irrespective of the locations where these parts may be constructed.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
1.5.2 The survey carried out at the construction site and/or at the sub-suppliers will be at the discretion of the Society and not intended to replace or substitute the essential activities by yards/manufacturers' QA/QC. The scope of survey will be decided as specified in [1.2]. The survey at the customer's premises may consist of a combination of visual inspections, tests, measurements and review of records.

1.5.3 The Society may base its methods and extent of examination on the quality system as implemented in the customer's fabrication processes and as accepted by the Society and, if applicable, in combination with an agreed manufacturing survey arrangement.

1.5.4 The customer shall submit to the Society certificates for materials, components and systems installed in the unit and as required by the rules.

1.6 Installation of systems and equipment

1.6.1 Systems and equipment to be installed on newbuildings, which serves as a part of the main functions, shall in general be new.

Guidance note:
If second hand equipment complies with applicable rules for the newbuilding, it may upon special consideration be installed on newbuildings, provided the owner has given a written acceptance.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

1.6.2 The extent of participation in the mechanical completion activities by the Society should be clearly identified in the Quality Survey Plan (QSP) submitted by the customer and accepted by the Society. The extent of participation shall be limited to ensuring compliance with the requirement of classification rules and applicable statutory requirements.

1.7 Testing and commissioning

1.7.1 Where specified by the rules, testing shall be carried out in the presence of a surveyor, and related requirements for test programmes shall be observed.

1.7.2 A test programme for harbour and sea trials shall be prepared by the customer and accepted by the Society. The programme shall specify systems and components to be tested, and the testing procedure. The Society may, in order to verify rule compliance, request additional tests and/or data to be recorded.

1.7.3 Procedures for pre-commissioning, testing and commissioning for all the systems onboard that are covered by the scope of classification shall be prepared by the customer and accepted by the Society.

1.7.4 The tests shall give evidence as to satisfactory operation and performance in accordance with the rules. When testing control and safety systems, failure modes shall be simulated as realistically as possible.

1.7.5 The extent of participation by the Society should be clearly identified in the Quality Survey Plan (QSP) submitted by the customer and accepted by the Society only to ensure compliance with the requirement of classification rules and applicable statutory requirements.
2 Assignment of class – existing vessels

2.1 General
A request for class entry of an existing unit shall be submitted in writing by the customer. The Society reserves the right to accept or decline an application for class entry.

2.2 Applicable rules
Applicable rules for units at class entry are given in [1.3].

2.3 Design approval

2.3.1 Before a vessel, which has not been built under the supervision of the Society, is surveyed for assignment of class, the information required in [1.4.1] shall, in general, be submitted for plan approval. For a vessel classed with another IACS member society, the submitted information may be reduced to plans showing the main scantlings and arrangements of the actual hull and machinery installations.

2.3.2 The extent of plan approval for a vessel, which has been classed, or which was previously classed with a non-IACS member society, will be specified in each case.

2.3.3 For a vessel that has been built under the supervision of another IACS member society, the Society may on the basis of an overall consideration and survey, exempt the vessel from rule requirements.

2.4 Class entry survey

2.4.1 Prior to assigning class to an existing unit, that unit shall, as a minimum, undergo the surveys pertaining to the age and type of the unit.

The scope of survey will in each separate case be decided by the Society.

2.4.2 Before assigning class, the flag administration will be notified about the class entry. The flag administration may decide that an extended scope of surveys has to be carried out.

3 The class certificate

3.1 General

3.1.1 When satisfied that all requirements corresponding to the class in question have been met, the surveyor will recommend that class is assigned and issue an interim class certificate or the class certificate.

3.1.2 Class may be assigned with conditions of class.

3.1.3 The interim certificate will be replaced by a full term class certificate when the Society has confirmed that applicable requirements have been met.

3.1.4 The class certificate is valid provided conditions for retention of class are complied with, as follows:
— for a new unit: to a date not exceeding 5 years from the date of class assignment
— for an existing unit: to a date not exceeding 5 years from the ISSUE date of the existing certificate
3.1.5 Upon request, declarations confirming compliance with the rules may be issued for hull, machinery or specific class notations provided the Society's main class has been assigned.

3.1.6 An appendix to the class certificate will be issued stating assumptions for the assignment of class and restrictions regarding the use of the vessel which were established or assumed at the time of assignment of class.

3.1.7 In case of classification of an existing unit not built under the supervision of the Society, or classification of an existing unit previously classed by the Society, the surveyor will issue the certificate of interim class when he is satisfied that the applicable survey requirements have been met.

3.1.8 When the administration of the Society has examined the surveyor's report and submitted documentation, and is satisfied that the requirements corresponding to the class in question have been met, the class will be assigned and a classification certificate will be issued. Provided the conditions for retention of class are fulfilled and unless the class has been withdrawn in writing at an earlier stage, the class certificate will be valid for 5 years.

3.2 Late commissioning
If the unit is not immediately commissioned upon completion of the construction, but is laid up for a period, the unit may be accepted for entry into service upon application by the owner. The unit may be subject to a condition survey before entering into service. The extent and scope of survey will depend on the time period laid up and conservation measures taken. Provided the hull and machinery is found in all respects free from deterioration, subsequent periodical surveys will date from the time of the condition survey.

4 The register of vessels

4.1 General

4.1.1 When a unit has been assigned class, its main particulars and details of the class assigned, will be entered in the Society’s “Register of Vessels”. In addition to the class notations, appropriate data related to identification, flag, ownership and other particulars will also be entered.

4.1.2 The class assignment date is entered in the “Register of Vessels”. For units built under the supervision of the Society, the due date for the periodical surveys will be calculated from this date. For units built under the supervision of an other classification society, the due date for the periodical surveys will depend upon the existing periodical survey schedule defined by the previous classification society.
SECTION 5 RETENTION OF CLASS

1 Conditions for retention of class

1.1 General requirements

1.1.1 The vessel shall be adequately manned, and the hull, machinery, systems and equipment shall be competently handled at all times.

1.1.2 Operation of the vessel shall comply with the assumptions and conditions stated in the appendix to the classification certificate and in applicable operating manuals.

1.1.3 The vessel, its hull structure, machinery, systems and equipment shall be maintained at a standard complying with the requirements of the rules (see also [1.3]).

1.1.4 Installed systems and equipment carried onboard in excess of the minimum required for main class shall either be maintained to applicable standards, or be removed or disconnected in such a way as to ensure that the installed system or equipment cannot be used.

Installed diving systems are subject to special provisions as given in DNV rules for ships Pt.6 Ch.1 Sec.4 and DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [9]. These provisions include transferable diving systems installed temporarily.

1.1.5 Temporary systems and equipment shall comply with relevant requirements in accordance with the assigned class notations of the unit.

1.1.6 The statutory certificates required by applicable international conventions and/or national legislation shall be valid at all times and shall be issued by the Society, the flag administration itself, or by a third party approved by the flag administration, within the limitations set out in Sec.2 [3].

1.2 The customer’s obligations

1.2.1 In order to retain a unit’s class with the Society, the customer shall:

— at all times, ensure that the unit is maintained to the rule standard
— submit complete and correct information related to the Unit and its use, which is of significance to the Society for its assessment of the condition of the unit in relation to the rules
— ensure that the unit is competently handled
— subject the unit to unscheduled surveys when deemed necessary by the Society
— rectify deficiencies and carry out any conditions of class or retroactive requirement specified by the Society
— subject the unit to surveys as required by the rules, and provide the necessary facilities for safe execution of surveys
— submit complete and correct information on the ownership and management of the unit, addresses and corresponding administrative information pertinent to the register of vessels
— submit correct information on the registration of the unit
— keep onboard and ashore a set of as-built drawings/documentation including subsequent alterations/conversions
— pay all fees and expenses due to the Society. The owner has, together with managers, charterers and operators, a joint and several liability for any such fees and expenses. If a request for services is made by
any other party than the owner, that party will, in addition to the owner, be responsible for the payment of the relevant fees
— notify the Society when the unit is laid up or otherwise taken out of service for a period of more than 3 months.

1.2.2 If the hull structure, machinery, systems or equipment covered by classification sustain damage to such an extent that it may be presumed to lead to a CC, the Society shall immediately be informed. The unit shall be surveyed at first opportunity or according to instructions from the Society. The survey shall be of an extent considered necessary by the attending surveyor for ascertaining the extent of the damage.

1.2.3 In case inspections by port or flag authorities reveal deficiencies related to certificates issued by DNV, the customer shall immediately notify the Society.

1.3 Maintenance

1.3.1 The customer shall ensure that the unit, its hull structure, machinery, systems and equipment at all times is properly maintained.

Guidance note:
Maintenance of the hull structure, machinery, systems and equipment is normally to be in accordance with applicable recognised standards in the industry or in accordance with procedures recommended by the manufacturer.

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1.3.2 The unit shall have implemented a maintenance system. The maintenance system shall ensure that:
— inspections and maintenance are carried out at defined intervals
— any defect is reported with its possible cause, if known
— appropriate correction or repair action is taken
— records of these activities are maintained.

1.3.3 Replacement components and systems shall be delivered with certificates and documentation as required by the rules for the original component or system.

2 Classification society involvement

2.1 Applicable rules

2.1.1 Vessels built under the supervision of the Society shall in general be maintained and repaired in compliance with the rules to which it was constructed, except in cases mentioned in [2.6.2].

2.1.2 For vessels built under the supervision of another IACS member society, the Society’s rules in force at the same date as those enforced by the other society will be applied. If such date is not known the Society’s rules in force at the “date of build” will be applied.

2.1.3 For vessels other than those covered by [2.1.1] and [2.1.2], the Society’s rules for new vessels in force at the time of entry into class will be applied.

2.1.4 Amendments to the rules may be made retroactive.
2.1.5 In cases where rule amendments are made applicable to existing vessels at the first annual, intermediate or renewal survey after a specified date, or after the vessel reaches a specified age, the expiry date of the related survey time window shall determine when the rule amendments become effective.

2.2 Surveys

2.2.1 The objective of a survey shall be to ascertain that the unit, its hull structure, machinery, systems and equipment are in compliance with the rules and suitable for continued safe and reliable operation.

2.2.2 A survey may consist of a combination of visual inspections, audits, measurements, functional testing, non-destructive testing and review of maintenance and other relevant records.

2.2.3 The minimum extent of prescribed periodical surveys are given in Ch.3. The Society may increase the extent of a survey when deemed necessary in order to ascertain the condition of the unit.

2.3 Conditions and memoranda

2.3.1 A condition of class (CC) will be imposed for the following:
— repairs and/or renewals related to damage, defect or breakdown that are sufficiently serious to affect classification (e.g. grounding, structural damages, machinery damages, wastage over the allowable limits etc.)
— supplementary survey requirements
— temporary repairs.

**Guidance note:**
When the Society has been authorised to carry out a statutory survey, a Condition on behalf of the flag Administration (CA) will be imposed for specific measures, repairs or surveys that should be carried out within a specific time limit in order to retain the statutory certificate.

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2.3.2 The Society will issue a CC when deemed necessary to carry out examinations in order to ascertain whether damage, a defect or a deficiency has been sustained or is imminent.

2.3.3 A CC may contain the following:
— a description of the deficiency, defect, damage or the examination required
— required action
— due date for the required action to be completed
— possible temporary requirements imposed until the required action has been completed.

Alternatively the CC may refer to a survey report for above details. An approved repair method may be recommended as part of the required action.

2.3.4 If a CC seriously affects the unit’s safety and reliability, immediate action will be required. Otherwise a time limit will be given for the action to be completed.

2.3.5 A CC will be deleted when the Society, through a survey or received information, has been satisfied that requested action has been satisfactory completed.

2.3.6 For information related to the unit, its machinery and equipment or to rule requirements, the Society may issue a memorandum to owner (MO). An MO may supplement information given otherwise, e.g. in the Appendix to the class certificate or the Society’s "Register of Vessels".
2.3.7 An MO may be used in the following cases:
— exemptions from rule requirements
— accepted deviations from rule requirements
— limitations on the use of the unit or its equipment
— defects or deficiencies of no concern to class
— deleted class notations
— equipment in excess of class requirements disused
— information related to agreed survey arrangements.

2.3.8 Outstanding findings may be recorded as a CC or MO. They will be given in writing at completion of surveys. Findings may also be communicated verbally during the course of surveys. Findings that have been corrected before the survey has been completed will not be recorded as CC.

2.3.9 The Society may at any time modify a CC or MO if considered appropriate. The owner will be notified accordingly.

2.3.10 CC’s or MO’s are recorded in the unit’s class status from where they will be deleted when no longer valid. The owner will be notified accordingly.

2.3.11 The owner will be informed of Retroactive Requirements.

2.4 Survey reports and survey status

2.4.1 The surveyor will prepare to the customer reports on surveys carried out.

2.4.2 Survey reports may contain the following information, to the extent applicable in each case:
— types of surveys carried out
— certificates issued, endorsed or extended
— damage, defects and/or deficiencies observed
— confirmation that repairs have been completed and accepted by the surveyor
— CC issued or deleted
— MO issued or deleted
— Retroactive Requirements (RR) issued or deleted.

2.4.3 The Society will make class status reports available to customers on the Society’s Internet website. It is the customer's responsibility to obtain this information from the Society’s Internet website. Survey and certificate status reports, on paper, may be distributed upon request.

2.4.4 Any document issued by the Society in relation to surveys performed reflects the condition of the unit at the time of the survey only.

2.5 Damage and repairs

2.5.1 Repairs shall in general be carried out in such a way that the original design and scantlings are restored. Possible design modifications or reduced scantlings based on current rules which are less stringent than those originally enforced, shall be approved by the Society before the repairs are carried out.
2.5.2 Repairs to the hull structure, machinery, systems or equipment covered by the rules shall be carried out by qualified personnel and in compliance with applicable rules, with good engineering practice and under the supervision of a surveyor.

Guidance note:
Guidelines for hull repairs can be found in DNVGL-CG-0172.

---end---of---guidance---note---

2.5.3 Repairs as stipulated in [2.5.2] may be carried out without the attendance of a surveyor (e.g. during voyage) provided a repair plan is accepted by the Society in advance. A surveyor shall be called for acceptance of such repairs when completed.

2.6 Conversions and alterations

2.6.1 Conversions or alterations of units shall in general comply with the rules applicable at the time of class assignment. If current rules are less stringent than those originally in force, then the current rules may be applied.

2.6.2 When conversion or alteration involves modification which:
— substantially alters the dimensions or carrying capacity of the unit (e.g. ≥ 5% change in the unit’s displacement), or
— changes the type of unit, or
— changes the main class of the unit,
the Society will decide on the rules to be applied.

2.6.3 If the hull structure, machinery, systems or equipment shall be converted or altered, the changes shall be documented and be approved in the same manner as for new unit.

Guidance note:
Alterations to the hull structure, machinery, systems and equipment made possible by amendments of the applicable rules may be undertaken provided the general safety and reliability level required for retention of class will be maintained.

---end---of---guidance---note---

2.6.4 Conversion or alterations shall take place under the supervision of a surveyor.

2.7 Temporary equipment

2.7.1 The Society shall be informed before the installation of temporary equipment as defined in Sec.2. [2].

2.7.2 Temporary equipment covered by class scope shall be approved and certified in line with [1.1.5].

2.7.3 For temporary equipment outside class scope, it shall be confirmed that placement of this equipment on board does not negatively affect the safety of the unit.

Guidance note:
For the consideration, the following is typically to be considered:
— escape ways shall not been blocked
— the fire and gas system covers the temporary equipment
— the equipment is covered by the ESD logic
— the equipment's load is within deck load limits
— the definition of hazardous areas takes into account the temp. equipment
3 Endorsement and renewal of the class certificate

3.1 Endorsement of the class certificate

3.1.1 The class certificate will be endorsed upon satisfactory completion of annual, intermediate and renewal surveys for main class. The class certificate will not be endorsed unless the following has been dealt with and accepted by the Society:

— overdue periodical class surveys
— overdue continuous survey items
— overdue conditions of class
— overdue Retroactive Requirement.

Guidance note:
In the case where an overdue survey is related to an optional class notation, the class certificate may be endorsed provided the relevant optional class notation is suspended.

3.1.2 When the class certificate is endorsed at completion of renewal surveys, the surveyor may extend its validity as necessary but not more than to a date 5 months after the completion date, or after the expiry date of the class certificate, whichever comes first.

3.1.3 In the case where postponement of the renewal survey has been granted upon the customer’s written request, the surveyor will endorse the class certificate and extend its validity, but not more than 3 months beyond the expiry date of the class certificate.

3.1.4 In the case where the main class annual survey is commenced prior to the defined time window, the survey must be completed not more than 6 months after the date of commencement. In such cases the certificate will be endorsed for advancement of anniversary date (due date) for the subsequent annual surveys.

Guidance note:
Expiry date of the class certificate may remain unchanged, but additional surveys may be required so that the prescribed survey intervals are not exceeded.

3.2 Renewal of the class certificate

3.2.1 A new class certificate will replace the existing class certificate when renewal survey has been satisfactory completed and the Society is satisfied that the requirements for retention of class have been met.

3.2.2 The new class certificate will be valid to a date not exceeding 5 years from:

— the expiry date of the existing certificate when the renewal survey has been completed within 3 months before the expiry date of the existing certificate, or
— the expiry date of the existing certificate when the renewal survey has been completed after the expiry date of the existing certificate, or
— the completion date of the renewal survey when the renewal survey has been completed more than 3 months before the expiry date of the existing certificate, or
— the completion date of the renewal survey when the renewal survey has been commenced more than 15 months before the expiry date of the existing certificate.

3.2.3 In cases where postponement of a renewal survey has been granted, the new class certificate will be valid to a date not exceeding 5 years from the expiry date of the existing certificate before the extension was granted.

3.2.4 In cases where the renewal survey is carried out concurrently with a conversion as defined in [2.6.2], the validity of the new certificate will be 5 years from the date of completion of the conversion, if so decided by the Society.

3.2.5 For certain vessels the certificate validity and survey intervals may be reduced by the Society.

4 Suspension and withdrawal of class

4.1 General

4.1.1 Class may be withdrawn at any time if the Society finds it justified.

4.1.2 The Society may suspend or withdraw a vessel’s class where the conditions for retention of class, have been violated (see [1]).

4.1.3 The decision to suspend or withdraw a vessel's class is made by the Society. However, in cases of automatic suspension, see [4.2.1] and [4.2.2], no individual evaluation is made.

Suspension or withdrawal of class may take effect immediately or after a specified period of time. In special cases, the suspension or withdrawal of class may be made with retroactive effect (see [4.2.5]).

4.1.4 If the violation only affects requirements related to optional class notations, the suspension or withdrawal may be limited to these class notations only.

4.1.5 When class is suspended or withdrawn the Society will:
— notify the customer in writing
— notify the flag administration
— make an entry to this effect in the Society’s “Register of Vessels”
— make the information publicly available.

In the cases of class suspension, a time limit will be given for when the class will be withdrawn.

4.2 Suspension of class

4.2.1 The class will automatically be suspended with immediate effect if the renewal surveys for hull, machinery, systems and equipment related to main class are not completed before the expiry date of the class certificate, and no postponement has been granted or unless the vessel is under attendance for completion of the survey.

4.2.2 If the annual or intermediate surveys for main class are not completed within 3 months from the anniversary date of the class certificate, the class is automatically suspended with immediate effect, unless the vessel is under attendance for completion of the survey.
4.2.3 The Society may decide to suspend a vessel’s class if the vessel is deemed to be unable to continue safe and reliable operation, e.g. as a result of a major casualty.

4.2.4 If any outstanding debt owed to the Society is not paid within a notified date, the Society may suspend the vessel’s class with immediate effect.

4.2.5 In addition to the conditions laid down in [4.2.1], [4.2.2] and [4.2.3], a vessel's class may be suspended with immediate effect in cases where:
— repair of deficiencies has not been carried out or otherwise dealt with in an appropriate manner, or
— repair of deficiencies has not been surveyed and accepted by the surveyor,
— other requirements imposed by the Society.

4.2.6 Class will not be automatically suspended according to [4.2.1] or [4.2.2] whilst a vessel is laid up, provided the requirements in Ch.3 Sec.1 [2.3] for lay-up surveys are complied with.

4.2.7 If a ship has been detained as a result of port state inspections twice in a two year period and the deficiencies are found to be serious, the Society may decide to suspend or delete class.

4.3 Reinstatement following class suspension

4.3.1 If the overdue surveys leading to class suspension as given in [4.2.1], [4.2.2] and [4.2.3] or requirements as given in [4.2.5] are carried out within the specified time, the class will be reinstated provided the following is met:
   a) The result of the survey is such that all observed deficiencies are satisfactory rectified. The Society may after consideration accept that minor deficiencies are pending to be carried out.
   b) No overdue periodical surveys or overdue conditions of class at that time.

4.3.2 The Society reserves the right to decline an application for reinstatement of class.

4.3.3 When the class is reinstated, the Society will confirm this in writing to the customer and to the flag administration.

4.4 Withdrawal of class

4.4.1 The class will be withdrawn at the customer's request.

4.4.2 If the overdue surveys specified in [4.2.1], [4.2.2] and [4.2.3] or required repairs as given in [4.2.5] are not carried out within the specified time after the class suspension, the Society will withdraw the vessel's class.

4.4.3 When a vessel proceeds to sea without having rectified a condition of class which was required to be dealt with before leaving port, the class will be withdrawn with immediate effect.

4.4.4 If the Society becomes aware that a vessel continues operation with serious damage or defects in violation of class requirements, the class may be withdrawn with effect from the time this became known to the Society. The class withdrawal may be made retroactive.
4.4.5 When it is considered that a customer's failure to comply with rule requirements is sufficiently serious or fraudulent the withdrawal of class may, at the discretion of the Society, be extended to include other vessels controlled or operated by the same customer.

4.4.6 If the outstanding debt owed to the Society is not paid within a notified date, the Society may withdraw the vessel's class with one month's written notice. This also applies when the obligation to pay rests with a yard or with the vessel's previous owners. In special cases a shorter notice may be given.

4.4.7 If the customer makes a general assignment for the benefit of his creditors or if any proceedings are commenced in court or any order or judgement is given by any court for liquidation, winding up of the customer, the Society may withdraw the class with immediate effect.

4.4.8 For vessels having statutory certificates issued by third parties, except in those cases defined in Sec.2 [3.1], the class may be withdrawn.

4.5 Re-assignment of class following class withdrawal

4.5.1 In all other cases than that given in [4.4.1], and if the circumstances leading to withdrawal of class no longer exist, a vessel's may be re-assigned class upon written request. The extent of survey will in such instances be decided by the Society.

4.5.2 The Society reserves the right to decline an application for re-assignment of class.

4.5.3 A new class certificate will be issued when the survey has been satisfactory completed and the Society is satisfied that the requirements for retention of class have been met.

4.5.4 When the vessel is re-assigned class, the Society will confirm this in writing to the customer and to the flag administration and make the information publicly available.

5 Change of owner or manager

5.1 General

5.1.1 A unit shall retain class when transferred to another owner or manager. The previous customer shall give the Society immediate notice, in writing, of such transfers. Obligations according to the rules shall remain with the previous customer until the Society is in receipt of such notice, in writing. See [1.2].

5.1.2 Class notations and survey arrangements based on certification of the management of operations will be deleted automatically when the management of a unit is transferred.

6 Force majeure

If due to force majeure, the unit is not in port or in sheltered waters when surveys become overdue the Society may allow the unit to transit, in class, directly to an agreed discharge location and then, if necessary, in ballast to an agreed repair facility at which the survey can be completed. In this context the “Force Majeure” means damage to the unit, unforeseen inability of surveyors to attend the unit due to governmental restrictions on right of access or movement of personnel, unforeseen delays in port or inability to relocate due to unusually lengthy periods of severe weather, strikes, civil strife, acts of war or other force majeure.
SECTION 6 CERTIFICATION OF MATERIALS, COMPONENTS AND SYSTEMS

1 General

1.1 General

1.1.1 The scope of classification requires that specified materials, components and systems intended for the vessel are certified according to the rules. The objective of certification shall ensure that materials, components and systems used in vessels to be classed by the Society comply with the rule requirements. Certification normally includes both plan approval and survey during production and/or of the final product (see [2.2] and [2.3]).

1.1.2 The applicable chapters of the rules define the extent of the certification that is required for classification.

Guidance note:
The mentioned systems may be installed in (top-side) modules, or other subcontracted parts like legs, pontoons etc. Notwithstanding, the modules/parts are not part of the material, component and system certification as described in this section, but are considered as part of the new-building process as described in Sec.4.

1.2 Requirements for manufacturer

1.2.1 Manufacturers of materials, components and systems of categories not covered by Sec.4 [1.2] shall be considered for approval according to criteria established by the Society, as applicable.

1.2.2 Quality control of materials, components and systems, shall be traceable and documented in writing. Further, quality control shall be carried out by qualified personnel at facilities and with equipment suitable for that control.

2 The classification involvement

2.1 General

2.1.1 Certification of materials, components and systems will be documented by the following types of documents:

1) DNV GL product certificate (VL):
   A document signed by a surveyor of the Society stating:
   — conformity with rule requirements
   — that tests are carried out on the certified product itself
   — that tests are made on samples taken from the certified product itself
   — that tests are performed in presence of the surveyor or in accordance with special agreements.

2) DNV GL approval certificate (TA):
   A document validated and signed by a surveyor of the Society stating:
   — conformity with rule design requirements.

3) EU Mutual Recognition Type Approval Certificate:
   A document validated and signed by a surveyor of a recognised organisation (RO) within EU stating:
— conformity with the commonly agreed design requirements for Mutual Recognition as laid down in the individual RO’s governing documents.

**Guidance note:**
These certificates are normally mutually accepted by all EU RO’s.
Covers only agreed components. These are at any time listed in the overview of type approval for Mutual Recognition on the DNV GL internet.

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4) **Works certificate (W)**
A document signed by the manufacturer stating:
— conformity with rule requirements
— that tests are carried out on the certified product itself
— that tests are made on samples taken from the certified product itself
— that tests are witnessed and signed by a qualified department of the manufacturers.

5) **Test report (TR)**
A document signed by the manufacturer stating:
— conformity with rule requirements
— that tests are carried out on samples from the current production.

The applicable chapters and sections of the rules specify which of the above mentioned documents are required.

**2.1.2** Where the rules require works certificate or test report, the surveyor may at any time require the tests to be carried out in his presence and/or that the surveyor check elements of the production control.

**2.1.3** For identification and traceability, certified products shall be marked in accordance with the description given in the product certificate and as specified by the applicable chapters of the rules.

**2.1.4** For certain components and systems the certification will be based on defined internationally acceptable standards and certification schemes as defined in applicable chapters of the rules. Compliance with the requirements of the standard shall be documented as required by that standard.

**2.1.5** To ensure an efficient, cost effective and correct certification process, a certification agreement shall normally be established between the Society and the manufacturer of NV certified products. Such agreement may be part of a manufacturing survey arrangement (see [2.5]) and shall include information on the procedures for plan approval and survey and to specify information that shall be transferred between the customer and the Society.

**2.2 Plan approval**

**2.2.1** The plan approval of materials, components and systems shall either be on a case by case basis or follow the procedure for type approval, see [2.3].

**2.2.2** When the case by case procedure is used, documentation of the design shall be submitted for approval for each application as required in the applicable chapters of the rules.

**2.2.3** A plan approval letter or design verification report will be issued by the Society when compliance with the requirements for the design has been confirmed.
2.3 Type approval

2.3.1 Type approval is a procedure for plan approval. Type approval can be applied to:
   — products
   — groups of products
   — systems
   — retention survey.
This procedure should normally be used for approval of standard designs.

2.3.2 The type approval procedure may consist of the following elements:
   — plan approval
   — initial survey
   — type testing
   — issue of a type approval certificate.
The type approval procedure used by the Society is described in DNVGL-CP-0338.

2.3.3 When the type approval procedure is used, the following shall be submitted for approval as required in type approval programmes and the applicable chapters of the rules:
   — documentation of the design
   — results of type testing normally witnessed by a surveyor.
A type approval certificate will be issued by the Society when compliance with the design requirements is confirmed. The type approval certificate has a validity of 2 or 4 years depending on type of material, component or system for which the certificate is issued.

2.3.4 For certain products and systems as defined in applicable chapters of the rules, only type approval is required. For these products and systems no survey is required, i.e. no product certificate is required.

2.3.5 For certain products and systems as defined in the applicable chapters of the rules, type approval is a mandatory procedure for plan approval.

2.3.6 Products and systems manufactured for stock shall normally be type approved.

2.3.7 For type approved products, where the basis for approval is the rules of the Society, plans and technical descriptions of the product need not be submitted for approval for each vessel unless otherwise stated as a condition on the type approval certificate. In such cases only the arrangement or system plans, interface plans and those plans mentioned on the type approval certificate shall be submitted for approval.

2.4 Survey

2.4.1 The survey of materials, components and systems shall either be on a case by case basis or on the basis of an established manufacturing survey arrangement (MSA), see [2.5].

2.4.2 When the case by case procedure is used, the survey shall be performed on the basis of approved design documentation for the actual application and as required in the applicable chapters of the rules. Compliance with the approved design documentation and applicable requirements will be documented by certificates as required in the applicable chapters of the rules.
2.4.3 When the survey is based on an MSA, the survey shall be performed on the basis of approved design documentation, applicable rule requirements and in accordance with requirements and procedures laid down in the MSA. Compliance with the approved design documentation and applicable requirements shall be documented by certificates as specified in the MSA and/or as required in the applicable chapters of the rules.

2.5 Manufacturing survey arrangement

2.5.1 When the procedures and processes of a manufacturer’s quality system meet the requirements of the rules, a manufacturing survey arrangement (MSA) may be established with the manufacturer as an alternative to the survey described in the applicable rule chapters.

2.5.2 The MSA shall be described in a document stating the requirements, scope, acceptance criteria, documentation and the roles of the Society and the manufacturer in connection with the survey.

2.5.3 When it is agreed through an MSA that the majority of the required surveys and test are completed without the presence of a surveyor, it required that the manufacturer has in operation a quality system certified by an accredited certification body to ISO 9001, or equivalent.

2.5.4 When establishing an MSA, an initial assessment of the manufacturer’s ability to control product quality and to comply with the scope, requirements and criteria laid down in the MSA will be performed. The extent and frequency of periodical assessments of the manufacturer will be included in the MSA.

2.5.5 A MSA is normally given a validity of 4 years. When the MSA is based on a certified quality system, the MSA automatically becomes invalid if the quality system certificate no longer is valid.

3 Suspension and withdrawal of certificates

3.1 General

3.1.1 A product certificate, type approval certificate or approval of manufacturer certificate may be suspended or withdrawn at any time if the Society finds it justified.

3.1.2 The decision to suspend or withdraw a certificate is made by the Society. Suspension or withdrawal of a certificate may take effect immediately or after a specified period of time. In special cases, the withdrawal of a certificate may be made with retroactive effect.

3.1.3 When a certificate is suspended or withdrawn the Society will:
   — notify the customer in writing
   — make the information publicly available.

In the cases of suspension, a time limit will be given for when the certificate will be withdrawn.
SECTION 7 LEGAL PROVISIONS

1 Liability and jurisdiction

1.1 Limited liability

1.1.1 If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million.

1.1.2 The above limitation of liability shall also apply to the relevant Flag administration, for any services provided hereunder on behalf of such Flag administration, to the same extent as it applies to the Society.

1.1.3 A person relying on any work subject to the rules cannot bring any claims in excess of the above limitation of liability against the Society and/or the Flag Administration and nothing herein shall be construed as granting a party the right to cumulate or aggregate this limitation of liability. Further, said person undertakes to pay to the Society any sums awarded against the Flag Administration in respect of claims, losses, damages, costs, expenses and liabilities, and shall save, indemnify, defend and hold harmless the Society in every respect, if a claim is brought against the Flag Administration in breach of this obligation.

1.1.4 In this provision the "Society" shall mean the DNV GL as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of DNV GL.

1.2 Use by other parties

These rules are under the sole ownership rights and copyrights of the Society. It is prohibited by anyone else than the Society to offer and/or perform classification or other services, wholly or partly, on the basis of and/or pursuant to these rules. The Society is not responsible for the consequences arising from the possible unauthorised use of the rules by others.

1.3 Governing law

These rules, the classification of the object and the relationship between DNV GL and other parties shall be governed by Norwegian law.

1.4 Venue

Any dispute arising in relation to or as a consequence of these rules shall only be resolved by the courts of Norway, the Municipal Court of Oslo being the proper venue.
CHAPTER 2 DESIGN AND CONSTRUCTION PROVISIONS

SECTION 1 DESIGN AND CONSTRUCTION REQUIREMENTS FOR 1A MOU MAIN CLASS

1 General

1.1 Introduction

1.1.1 This section identifies design and construction requirements common to all types of mobile offshore units. Units complying with these requirements will be assigned a main character of class 1A followed by a description of the basic design concept of the unit, e.g. column-stabilised unit.

1.1.2 The following discipline areas are covered within main class:

— safety principles and arrangement
— materials
— hull design and fabrication
— mooring and towing
— stability, watertight and weathertight integrity
— marine and machinery systems and equipment
— electrical systems and equipment
— instrumentation and telecommunication systems
— fire protection.

1.1.3 Systems and structures will be certified or classified based on the following main activities:

— design approval
— certification of materials and components
— survey during construction and installation
— survey during commissioning.

Further description of activity procedures are given in Ch.1 Sec.4.

1.1.4 The requirements of this section are given as:

— references to standards, codes and rules containing technical requirements which shall be complied with for assignment of main class
— supplementary requirements which shall be applied in conjunction with the technical reference documents for assignment of class
— requirements for certification of materials and components.

1.2 Technical reference documents

1.2.1 Technical requirements are given by reference to selected:

— DNV GL offshore standards
— DNV GL class guidelines
— DNV GL recommended practices
— other DNV rules and standards
— internationally recognised codes and standards.
1.2.2 The technical reference documents which shall be applied are given in the following subsections and are summarised in Table 2.

1.3 General assumptions

1.3.1 Any deviations, exceptions and modifications to the design codes and standards given as reference documents shall be documented and approved by DNV GL.

1.3.2 Where referred codes and standards call for the extent of inspections and tests to be agreed between contractor, manufacturer and customer, the resulting extent is to be agreed with DNV GL. DNV GL may accept alternative solutions found to represent an overall safety level equivalent to that stated in the requirements of this document or the referred standards.

2 Safety principles and arrangement

2.1 General
Safety principles and arrangement include the following discipline areas:
— design principles, including generic accidental loads
— arrangement; including segregation of areas and location of plants and equipment
— escape and evacuation.

2.2 Design principles
The requirements given in DNVGL-OS-A101 Ch.2 Sec.1, shall be complied with.

2.3 Arrangement
Arrangement of the unit shall be in accordance with the requirements of DNVGL-OS-A101 Ch.2 Sec.2.

2.4 Escape and evacuation
Escape and evacuation shall be in accordance with DNVGL-OS-A101 Ch.2 Sec.5.

3 Materials

3.1 Technical requirements
Materials for:
— rolled steel for structural applications, boilers and pressure vessels
— steel tubes, pipes and fittings
— steel forgings
— steel castings
— aluminium alloys
shall comply with the requirements given by DNVGL-OS-B101 unless otherwise stated in the relevant technical reference documents.

3.2 Supplementary classification requirements

3.2.1 Certification requirements for materials are given in DNVGL-OS-B101 Ch.3.
3.2.2 Rolled, forged or cast elements of steel and aluminium for structural application shall be supplied with DNV GL's material certificates in compliance with the requirements given in DNVGL-OS-B101.

4 Structural design

4.1 Scope

4.1.1 Class scope on structural design common to all type of mobile offshore units and all services covers the following aspects:
— hull incl. superstructure
— crane pedestals (pedestal below slewing ring)
— attachment of helideck support structure
— foundation and support for heavy equipment (equipment where the static forces exceed 50 kN or resulting static bending moments at deck exceed 100 kNm).

Additional elements relevant for specific service are listed in the subsequent sections.

4.1.2 Excluded from the scope are
— ice and soil conditions
— earthquake and other environmental events defined by an annual probability equal or lower than to $10^{-4}$.

4.1.3 Transit conditions are included in the structural design scope of work. Temporary conditions are not included unless specifically specified. See definitions in Ch.1 Sec.1 [2].

4.2 Technical requirements

4.2.1 Structural design shall comply with the following design codes and approved either on the principles of the working stress design (WSD) method or the load and resistance factor design (LRFD) methodology depending on hull shape as listed in Table 1.

<table>
<thead>
<tr>
<th>Hull Shape</th>
<th>WSD</th>
<th>LRFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship shaped</td>
<td>DNVGL-OS-C102</td>
<td>DNVGL-OS-C102 Sec.13</td>
</tr>
<tr>
<td>Column stab</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C103</td>
</tr>
<tr>
<td>Self-elevating</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C104</td>
</tr>
<tr>
<td>Cylindrical</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C101</td>
</tr>
<tr>
<td>Tension leg</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C105</td>
</tr>
<tr>
<td>Deep draught</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C106</td>
</tr>
</tbody>
</table>

5 Fabrication and testing of offshore structures

5.1 Technical requirements

Requirements for:
— welding procedures and qualification of welders
— fabrication and tolerances
— testing
— corrosion protection systems
shall be in accordance with DNVGL-OS-C401.

For ship shaped units designed for benign waters, the requirements for fabrication and testing of the may be in accordance with DNVGL-RU-SHIP Pt.2 Ch.3 Sec.7 with the exemption of specific structural elements (e.g. topside structures, topside support, etc.). The application is subject to a case-by-case approval.

Guidance note:
The term "Purchaser" in the DNVGL-OS-C401 should be understood as DNV GL.

---end---of---guidance---note---

5.2 Supplementary classification requirements
Classification procedures specifically related to fabrication and testing of offshore structures are given in DNVGL-OS-C401 Ch.3.

6 Stability and watertight/weathertight integrity

6.1 Technical requirements

6.1.1 Requirements for:
— intact and damaged stability
— watertight integrity
— freeboard
— weathertight closing appliances
shall be in accordance with DNVGL-OS-C301.

6.1.2 If onboard computers for stability calculations are installed, these systems shall be approved in accordance with requirements in DNV rules for ships Pt.6 Ch.9.

7 Position keeping and towing

7.1 General

7.1.1 Depending on type of unit, main class stipulates requirements for:
— Position keeping
— temporary mooring
— towing.

Guidance note:
The above includes both normal and emergency towing. For the definitions of these and temporary mooring (as opposed to positioning mooring) see Ch.1 Sec.1 [2.2].

---end---of---guidance---note---

7.2 Position keeping

7.2.1 For ship-shaped and column-stabilised units, the additional class notation POSMOOR or DYNPOS-AUTR is mandatory.
7.2.2 For deep draught types, the additional class notation POSMOOR is mandatory.

7.2.3 Certification requirements for equipment shall be as given in DNVGL-OS-E301 Ch.3.

7.3 Temporary mooring

7.3.1 Self propelled units shall have an arrangement for temporary mooring. Ship-shaped units shall have an arrangement complying with the DNV rules for ships, Pt.3 Ch.3 Sec.3, other structural designs shall have an arrangement complying with DNVGL-OS-E301 Ch.3.

Guidance note:
Exemptions for equipment as described in [7.3.1] may be granted upon special consideration on a case by case basis; typically for units under single voyage certificates in transit between yard and an offshore location. Consideration may be given to arrangement with a single anchor subject to satisfactory submittal of a risk assessment to address conditions under which the installation may proceed toward shore. Such arrangement shall be in agreement with the flag and coastal states in advance.

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7.3.2 For units with the additional class notations DYNPOS-AUTR and DYNPOS-AUTRO and for non-self propelled units, the installation of temporary mooring arrangement is not required as a condition for classification.

7.4 Towing

7.4.1 Ship shaped units with propulsion shall have towing arrangement according to DNV rules for ships Pt.3 Ch.3 Sec.5, other structural designs shall have an arrangement according DNVGL-OS-E301 Ch.2.

7.4.2 The fittings for normal towing may also be used for emergency towing.

7.4.3 For units with the additional class notations DYNPOS-AUTR and DYNPOS-AUTRO, towing arrangements may take into account the specific thrust capabilities of the units as described in DNVGL-OS-E301 Ch.2 Sec.4 [16].

7.5 Supplementary classification requirements

7.5.1 Classification procedures specifically related to mooring and towing are given in DNVGL-OS-E301 Ch.3.

7.5.2 Certification requirements for equipment are given in DNVGL-OS-E301 Ch.3.

8 Marine and machinery systems and equipment

8.1 Technical requirements

8.1.1 Requirements for marine and machinery systems and equipment include:
— general piping design, fabrication and testing
— pumps, valves and pipe connections
— ballast, bilge and drainage systems
— air, overflow and sounding pipes
— cooling, feed water and condensation systems
— lubricating oil, fuel oil and thermal oil systems
— hydraulic, steam and pneumatic systems
— heating, ventilation and air conditioning systems
— propulsion and auxiliary machinery including thrusters
— boilers, pressure vessels and incinerators
— steering, jacking gear and turret machinery
and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D101.

8.2 Supplementary classification requirements

8.2.1 Classification procedures specifically related to marine and machinery systems and equipment are given in DNVGL-OS-D101 Ch.3.

8.2.2 Certification requirements for equipment are given in DNVGL-OS-D101 Ch.3.

9 Electrical systems and equipment

9.1 Technical requirements
Electrical systems and equipment include:
— system design
— switchgear and control gear assemblies
— rotating machinery
— static converters
— cables
— miscellaneous equipment
— installation and testing
— A.C. supply systems
— electric propulsion
and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D201.

9.2 Supplementary classification requirements

9.2.1 Classification procedures specifically related to electrical systems and equipment are given in DNVGL-OS-D201 Ch. 3.

9.2.2 Certification requirements for equipment are given in DNVGL-OS-D201 Ch.3.

10 Automation, safety and telecommunication systems

10.1 Technical requirements
Instrumentation and telecommunication systems and equipment include:
— design principles and system design
— computer based systems
— component design and installation
— environmental conditions
— user interface
and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D202.
10.2 Supplementary classification requirements

10.2.1 Classification procedures specifically related to instrumentation and telecommunication systems are given in DNVGL-OS-D202 Ch.3.

10.2.2 Certification requirements for equipment are given in DNVGL-OS-D202 Ch.3.

11 Fire protection

11.1 Technical requirements
Fire protection includes:
— passive fire protection
— active fire protection
— fire fighting systems
— fire and gas detection systems
and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D301 Ch.2 Sec.1 to DNVGL-OS-D301 Ch.2 Sec.5.

11.2 Supplementary classification requirements

11.2.1 Classification procedures specifically related to fire protection are given in DNVGL-OS-D301 Ch.3.

11.2.2 Certification requirements for equipment are given in DNVGL-OS-D301 Ch.3.

12 Preparation for surveys and inspections on location

12.1 General

12.1.1 It is advised that operational survey and inspection aspects are taken into consideration at the design and construction stages.

12.1.2 The following matters will be taken into consideration for acceptance of surveys to be carried out on location:
— arrangement for underwater inspection of hull, propellers, thrusters, rudders and openings affecting seaworthiness
— marking of the hull
— means for blanking off all openings including side thrusters
— use of corrosion resistant materials for shafts
— use of glands for propeller and rudder
— accessibility of all tanks and spaces for inspection
— corrosion protection of hull or structure
— maintenance and inspection of thrusters
— measurement of wear in the propulsion shaft and rudder bearings
— testing facilities of all important machinery.
Guidance note:
The underwater body should be marked in such a way that the surveyor can identify the location of any damages found. One acceptable way of preparing ship-shaped hulls for underwater inspection is described in the following.
Transverse and longitudinal reference lines of minimum length 300 mm and minimum width 25 mm should be applied as marking. The marks should be made permanent by welding or otherwise and painted in contrast colour.
Markings should normally be placed as follows:
— at flat bottom in way of intersections of tank bulkheads or watertight floors and girders
— at unit’s sides in way of the positions of transverse bulkheads (the marking need not be extended more than 1 m above the bilge plating)
— the intersection between tank top and watertight floors in way of the unit’s sides
— all openings for sea suctions and discharges
— letter/number codes may conveniently be applied on the shell for identification of tanks, sea suctions and discharges.
Markings should be adequately documented.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

12.1.3 In addition to the above ship shaped units can apply for the class notation BIS for in water survey of the bottom (see DNV rules for ships Pt.3 Ch.1 Sec.1 D).

13 Summary of technical reference standards
Technical standards which shall be applied for assignment of main character of class for floating production and storage units are summarised in Table 2.

Table 2 Technical reference standards for main character of class (1A MOU)

<table>
<thead>
<tr>
<th>Technical item</th>
<th>Reference standard</th>
<th>Applicable parts or comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY PRINCIPLES AND ARRANGEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design principles</td>
<td></td>
<td>Ch.2 Sec.1: Design Principles and Accidental loads</td>
</tr>
<tr>
<td>Arrangement</td>
<td>DNVGL-OS-A101</td>
<td>Ch.2 Sec.2: Arrangement</td>
</tr>
<tr>
<td>Escape and evacuation</td>
<td></td>
<td>Ch.2 Sec.5: Escape and Communication</td>
</tr>
<tr>
<td>MATERIALS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metallic materials</td>
<td>DNVGL-OS-B101</td>
<td></td>
</tr>
<tr>
<td>STRUCTURAL DESIGN (select type as appropriate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ship-shape structure</td>
<td>DNVGL-OS-C102</td>
<td>LRFD and WSD methodology</td>
</tr>
<tr>
<td>Column-stabilised type structure</td>
<td>DNVGL-OS-C103</td>
<td>LRFD methodology</td>
</tr>
<tr>
<td></td>
<td>DNVGL-OS-C201</td>
<td>WSD methodology</td>
</tr>
<tr>
<td>Self-elevating type structure</td>
<td>DNVGL-OS-C104</td>
<td>LRFD methodology</td>
</tr>
<tr>
<td></td>
<td>DNVGL-OS-C201</td>
<td>WSD methodology</td>
</tr>
<tr>
<td>HULL FABRICATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabrication, including welding and NDT</td>
<td>DNVGL-RU-SHIP</td>
<td>For ship-shaped units</td>
</tr>
<tr>
<td></td>
<td>Pt.2 Ch.3 Sec.7</td>
<td></td>
</tr>
<tr>
<td>Technical item</td>
<td>Reference standard</td>
<td>Applicable parts or comments</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>Fabrication, including welding and NDT (cont.)</td>
<td>DNVGL-OS-C401</td>
<td>For self-elevating and semi-submersible units</td>
</tr>
<tr>
<td><strong>STABILITY AND WATERTIGHT INTEGRITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability, watertight integrity, freeboard and weathertight closing appliances</td>
<td>DNVGL-OS-C301</td>
<td>Covers all types of structures</td>
</tr>
<tr>
<td><strong>POSITION KEEPING AND TOWING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary mooring, towing</td>
<td>DNV rules for ships Pt.3 Ch.3 Sec.3</td>
<td>Ship-shaped units</td>
</tr>
<tr>
<td></td>
<td>DNVGL-OS-E301</td>
<td>All other types of units</td>
</tr>
<tr>
<td><strong>MARINE AND MACHINERY SYSTEMS AND EQUIPMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piping design, manufacturing and testing; platform piping systems; machinery piping systems; machinery and mechanical equipment</td>
<td>DNVGL-OS-D101</td>
<td>All sections</td>
</tr>
<tr>
<td><strong>ELECTRICAL SYSTEM EQUIPMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical systems including switchgear and controlgear assemblies, rotating machinery, static convertors, cables, installation, testing, and electric propulsion</td>
<td>DNVGL-OS-D201</td>
<td>All sections</td>
</tr>
<tr>
<td><strong>AUTOMATION, SAFETY AND TELECOMMUNICATION SYSTEMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrumentation systems including design principles, system design, computer based systems, component design and installation, and user interface</td>
<td>DNVGL-OS-D202</td>
<td>Ch.2: Design principles&lt;br&gt;Sec.1: Design principles&lt;br&gt;Sec.2: System design&lt;br&gt;Sec.3: Additional requirements for computer based systems&lt;br&gt;Sec.4: Component design and installation&lt;br&gt;Sec.5: User Interface</td>
</tr>
<tr>
<td><strong>FIRE PROTECTION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire protection including passive fire protection, active fire protection, fire and gas detection systems</td>
<td>DNVGL-OS-D301</td>
<td>Ch.2: Passive Fire Protection&lt;br&gt;Sec.2: Active Fire Protection of Specific Areas&lt;br&gt;Sec.3: Fire Fighting Systems&lt;br&gt;Sec.4: Fire and Gas Detection Systems&lt;br&gt;Sec.5: Miscellaneous Items</td>
</tr>
</tbody>
</table>
SECTION 2 DESIGN AND CONSTRUCTION REQUIREMENTS FOR OI FLOATING OFFSHORE INSTALLATION MAIN CLASS

1 General

1.1 Introduction

1.1.1 Permanently placed non self-propelled floating offshore installations may be classed as offshore installations according to OI main class as an alternative to 1A MOU main class given in Sec.1.

1.1.2 All types of floating offshore installations complying with the requirements of this section may be assigned a main character of class OI followed by a description of the basic design concept of the installations, for example column-stabilised offshore installation.

1.1.3 The following discipline areas are covered within main class:
— safety principles and arrangement
— materials
— hull design and construction
— mooring
— stability, watertight and weathertight integrity
— utility systems and equipment related to marine and safety functions
— electrical systems and equipment related to marine and safety functions
— instrumentation and telecommunication systems related to marine and safety functions
— fire protection.

1.1.4 Systems and structures will be certified or classified based on the following main activities:
— design approval
— certification of materials and components
— survey during construction and installation
— survey during commissioning and start-up.
Further description of activity procedures are given in Ch.1 Sec.4.

1.1.5 The requirements of this section are given as:
— references to standards, codes and rules containing technical requirements which shall be complied with for assignment of main class
— supplementary requirements which shall be applied in conjunction with the technical reference documents for assignment of class
— requirements for certification of materials and components.

1.2 Technical reference documents

1.2.1 Technical requirements are given by reference to selected:
— DNV GL offshore standards
— DNV GL class guidelines
— DNV GL recommended practices
— other DNV GL rules and standards
— internationally recognised codes and standards.
1.2.2 The technical reference documents which shall be applied are given in the following subsections and are summarised in Table 2.

1.2.3 If the customer for specific reasons should desire to employ codes and standards other than those referred to and recommended by DNV GL, DNV GL is prepared to accept such alternatives based on fitness for purpose. When agreed such codes and standards shall be specified in the class agreement, with reference to the relevant revision of the codes and standards that shall apply.

1.3 General assumptions

1.3.1 Any deviations, exemptions and modifications to the design codes and standards given as reference documents shall be documented and approved by DNV GL.

1.3.2 Where referred codes and standards call for the extent of inspections and tests to be agreed between contractor, manufacturer and customer, the resulting extent is to be agreed with DNV GL.

1.4 Certification of materials and components

1.4.1 Materials and components shall be certified according to their safety criticality. Detailed requirements are given in Ch.3 of the relevant DNV GL offshore standards.

1.4.2 Alternatively, DNV GL is prepared to accept materials and components for ☑ OI main class based on review and audits of documented verification schemes according to national authority regulations or recognised codes and standards covering the areas of classification.

2 Safety principles and arrangement

2.1 General
Safety principles and arrangement include the following discipline areas:
— design principles, including generic accidental loads
— arrangement; including segregation of areas and location of plants and equipment
— escape and evacuation.

2.2 Design principles
The requirements given in DNVGL-OS-A101 Ch.2 Sec.1, shall be complied with.

2.3 Arrangement
Arrangement of the unit shall be in accordance with the requirements of DNVGL-OS-A101 Ch.2 Sec.2.

2.4 Escape and evacuation
Escape and evacuation shall be in accordance with DNVGL-OS-A101 Ch.2 Sec.5.
3 Materials

3.1 Technical requirements

Materials for:
— rolled steel for structural applications, boilers and pressure vessels
— steel tubes, pipes and fittings
— steel forgings
— steel castings
— aluminium alloys.

shall comply with the requirements given by DNVGL-OS-B101 unless otherwise stated in the relevant technical reference documents or specially agreed according to [1.2.3].

3.2 Supplementary classification requirements

3.2.1 Certification requirements for materials are given in DNVGL-OS-B101 Ch.3.

3.2.2 Rolled, forged or cast elements of steel and aluminium for structural application shall be supplied with DNV GL's material certificates in compliance with the requirements given in DNVGL-OS-B101.

4 Structural design

4.1 Scope

4.1.1 Class scope on structural design common to all type of mobile offshore units and all services covers the following aspects:
— hull incl. superstructure
— crane pedestals (pedestal below slewing ring)
— attachment of helideck support structure
— foundation and support for heavy equipment (equipment where the static forces exceed 50 kN or resulting static bending moments at deck exceed 100 kNm).

Additional elements relevant for specific service are listed in the subsequent sections.

4.1.2 Excluded from the scope are
— ice and soil conditions
— earthquake and other environmental events defined by an annual probability equal or lower than to 10^{-4}.

4.1.3 Transit conditions are included in the structural design scope of work. Temporary conditions are not included unless specifically specified. See definitions in Ch.1 Sec.1 [2].

4.2 Technical requirements

4.2.1 Structural design shall comply with the following design codes and approved either on the principles of the working stress design (WSD) method or the LRFD methodology depending on hull shape as listed in Table 1.
Table 1 Overview of structural design requirements and methods

<table>
<thead>
<tr>
<th></th>
<th>WSD</th>
<th>LRFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship shaped</td>
<td>DNVGL-OS-C102</td>
<td>DNVGL-OS-C102 Sec.13</td>
</tr>
<tr>
<td>Column stab</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C103</td>
</tr>
<tr>
<td>Self-elevating</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C104</td>
</tr>
<tr>
<td>Cylindrical</td>
<td>DNVGL-OS-C101</td>
<td>DNVGL-OS-C101</td>
</tr>
<tr>
<td>Tension leg</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C105</td>
</tr>
<tr>
<td>Deep draught</td>
<td>DNVGL-OS-C201</td>
<td>DNVGL-OS-C106</td>
</tr>
</tbody>
</table>

5 Fabrication and testing of offshore structures

5.1 Technical requirements

Requirements for:
— welding procedures and qualification of welders
— fabrication and tolerances
— testing
— corrosion protection systems

shall be in accordance with DNVGL-OS-C401.

For ship shaped units designed for benign waters, the requirements for fabrication and testing of the may be in accordance with the DNVGL-RU-SHIP Pt.2 Ch.3 Sec.7 with the exemption of specific structural elements (e.g. topside structures, topside support, etc). The application is subject to a case-by-case approval.

Guidance note:
The term “Purchaser” in the OS-C401 standard should be understood as DNV GL.

Application of coating, steel surface preparation with respect to application of coating and fabrication, installation of sacrificial anodes and impressed current systems are not included in the Society's scope of work unless upon special agreement.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

5.2 Supplementary classification requirements

Classification procedures specifically related to fabrication and testing of offshore structures are given in DNVGL-OS-C401 Ch.3.

6 Stability and watertight integrity

6.1 Technical requirements

6.1.1 Requirements for:
— intact and damaged stability
— watertight integrity
— freeboard
— weathertight closing appliances

shall be in accordance with DNVGL-OS-C301.
6.1.2 If onboard computers for stability calculations are installed, these systems shall be approved in accordance with requirements in DNV rules for ships Pt.6 Ch.9.

7 Position keeping and towing

7.1 General
For floating offshore installations of the ship-shaped, column-stabilised and deep draught types, the additional class notation POSMOOR is mandatory.

7.2 Supplementary classification requirements
Certification requirements for equipment shall be as given in DNVGL-OS-E301 Ch.3.

8 Utility systems and equipment

8.1 Technical requirements
Requirements for utility systems and equipment include:
— general piping design, fabrication and testing
— pumps, valves and pipe connections
— ballast, bilge and drainage systems
— air, overflow and sounding pipes
— hydraulic, steam and pneumatic systems
— heating, ventilation and air conditioning systems
— pressure vessels and incinerators
— turret machinery, as applicable

and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D101.

Guidance note:
Recognised codes and standards which can be applied for piping and equipment are listed in DNVGL-OS-D101.

8.2 Supplementary classification requirements

8.2.1 Classification procedures specifically related to utility systems and equipment are given in DNVGL-OS-D101 Ch.3.

8.2.2 Certification requirements for equipment are given in DNVGL-OS-D101 Ch.3.

9 Electrical systems and equipment

9.1 Technical requirements

9.1.1 Electrical systems and equipment include:
— system design
— switchgear and controlgear assemblies
— rotating machinery
— static converters
— cables
— miscellaneous equipment  
— installation and testing  
— A.C. supply systems  
as far as relevant for supplying marine (e.g. ballasting, bilge, mooring), fire fighting and emergency services.

9.1.2 The electrical systems shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D201 Ch. 3.

9.2 Supplementary classification requirements

9.2.1 Classification procedures specifically related to electrical systems and equipment are given in DNVGL-OS-D201 Ch. 3.

9.2.2 Certification requirements for equipment are given in DNVGL-OS-D201.

10 Automation, safety and telecommunication systems

10.1 Technical requirements
Instrumentation and telecommunication systems and equipment include:
— design principles and system design  
— computer based systems  
— component design and installation  
— environmental conditions  
— user interface
and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D202 Ch.2 Sec.1 to DNVGL-OS-D202 Ch.2 Sec.5.

10.2 Supplementary classification requirements
Classification procedures specifically related to instrumentation and telecommunication systems are given in DNVGL-OS-D202 Ch.3.
Certification requirements for equipment are given in DNVGL-OS-D202 Ch.3.

11 Fire protection

11.1 Technical requirements
Fire protection includes:
— passive fire protection  
— active fire protection  
— fire fighting systems  
— fire and gas detection systems
and shall be designed, manufactured, tested and installed in accordance with DNVGL-OS-D301 Ch.2 Sec.1 to DNVGL-OS-D301 Ch.2 Sec.5.
11.2 Supplementary classification requirements

11.2.1 Classification procedures specifically related to fire protection are given in DNVGL-OS-D301 Ch.3.

11.2.2 Certification requirements for equipment are given in DNVGL-OS-D301 Ch.3.

12 Preparation for surveys and inspections on location
For preparations for surveys and inspections on locations see Sec.1 [12].

13 Summary of technical reference standards
Technical standards which shall be applied for assignment of main character of class for floating offshore installations are summarised in Table 2.

Table 2 Technical reference standards for OI main class (Floating Offshore Installation)

<table>
<thead>
<tr>
<th>Technical item</th>
<th>Reference standard</th>
<th>Applicable parts or comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY PRINCIPLES AND ARRANGEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design principles</td>
<td>DNVGL-OS-A101</td>
<td>Ch.2 Sec.1: Design Principles and Accidental loads</td>
</tr>
<tr>
<td>Arrangement</td>
<td></td>
<td>Ch.2 Sec.3: Arrangement</td>
</tr>
<tr>
<td>Escape and evacuation</td>
<td></td>
<td>Ch.2 Sec.5: Escape and Evacuation</td>
</tr>
<tr>
<td>MATERIALS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metallic materials</td>
<td>DNVGL-OS-B101</td>
<td></td>
</tr>
<tr>
<td>STRUCTURAL DESIGN (select type as appropriate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ship-shape structure</td>
<td>DNVGL-OS-C101</td>
<td></td>
</tr>
<tr>
<td>Column-stabilised type structure</td>
<td>DNVGL-OS-C101</td>
<td>LRFD methodology</td>
</tr>
<tr>
<td>Self-elevating type structure</td>
<td>DNVGL-OS-C201</td>
<td>WSD methodology</td>
</tr>
<tr>
<td>HULL FABRICATION</td>
<td>DNVGL-OS-C102</td>
<td></td>
</tr>
<tr>
<td>Fabrication, including welding and NDT</td>
<td>DNVGL-RU-SHIP</td>
<td>For ship-shaped units</td>
</tr>
<tr>
<td></td>
<td>Pt.2 Ch.3 Sec.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DNVGL-OS-C401</td>
<td>Covers all types of structures</td>
</tr>
<tr>
<td>STABILITY AND WATERTIGHT INTEGRITY</td>
<td>DNVGL-OS-C301</td>
<td>Covers all types of structures</td>
</tr>
<tr>
<td>Stability, watertight integrity, freeboard and weather-tight closing appliances</td>
<td>DNVGL-OS-C104</td>
<td></td>
</tr>
<tr>
<td>POSITION KEEPING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical item</td>
<td>Reference standard</td>
<td>Applicable parts or comments</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>Offshore mooring system</td>
<td>DNVGL-OS-E301 or API RP 2SK</td>
<td>Ship-shaped, column-stabilised and deep-draught units or installations</td>
</tr>
<tr>
<td><strong>ELECTRICAL SYSTEM EQUIPMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical systems including switchgear and controlgear assemblies, rotating machinery, static convertors, cables, installation, testing, and electric propulsion</td>
<td>DNVGL-OS-D201</td>
<td>All sections</td>
</tr>
<tr>
<td><strong>AUTOMATION, SAFETY AND TELECOMMUNICATION SYSTEMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrumentation systems including design principles, system design, computer based systems, component design and installation, and user interface</td>
<td>DNVGL-OS-D202</td>
<td>Ch.2: Sec.1: Design principles Sec.2: System design Sec.3: Additional requirements for computer based systems Sec.4: Component design and installation Sec.5: User Interface</td>
</tr>
<tr>
<td><strong>FIRE PROTECTION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire protection including passive fire protection, active fire protection, fire fighting systems, fire and gas detection systems</td>
<td>DNVGL-OS-D301</td>
<td>Ch.2: Sec.1: Passive Fire Protection Sec.2: Active Fire Protection of Specific Areas Sec.3: Fire Fighting Systems Sec.4: Fire and Gas Detection Systems Sec.5: Miscellaneous Items</td>
</tr>
</tbody>
</table>
SECTION 3 SUPPLEMENTARY REQUIREMENTS FOR SERVICE NOTATION LNG (OR LPG) PRODUCTION UNIT OR INSTALLATION

1 General

1.1 Introduction

1.1.1 This section identifies design and construction requirements for assignment of service notation LNG Production Unit or LNG Production Installation. It also identifies design and construction requirements for assignment of service notation LPG Production Unit or LPG Production Installation.

1.1.2 The requirements in this section are supplementary to those for main class 1A as stated in Sec.1 for notation LNG (or LPG) Production Unit and OI in Sec.2 for notation LNG (or LPG) Production Installation.

2 Safety principles and arrangement

2.1 General

Service notation LNG (or LPG) Production Unit and LNG (or LPG) Production Installation specify additional requirements for:
— arrangement
— area classification
— shutdown
— escape, evacuation and communication.

2.2 Arrangement

Production units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.7 and DNVGL-OS-A101 Ch.2 Sec.9.

2.3 Area classification

Production units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.7 and DNVGL-OS-A101 Ch.2 Sec.9.

2.4 Emergency shutdown

Production units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.9.

2.5 Escape, evacuation and communication

Production units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.7 and DNVGL-OS-A101 Ch.2 Sec.9.
3 Structural design

3.1 General
Service notation LNG (or LPG) Production Unit and LNG (or LPG) Production Installation specify additional requirements for:
— process area foundations
— riser balcony foundation, turret or submerged turret structures, as applicable.
The structural strength shall be as required for the main class taking into account necessary strengthening of supporting structures for equipment applied in and forces introduced by the production facilities and operation.

3.2 Supplementary technical requirements
The items listed in [3.1] shall comply with the relevant sections of DNVGL-OS-C101 and:
— DNVGL-OS-C102 for ship-shaped units or installations
— DNVGL-OS-C103 for column-stabilised units or installations
— DNVGL-OS-C104 for self-elevating units or installations
— DNVGL-OS-C106 for deep draught units or installations.

4 Marine and machinery and utility systems

4.1 General
Service notation LNG (or LPG) Production Unit and LNG (or LPG) Production Installation specify additional requirements for:
— piping arrangements
— ventilation in hazardous areas
— turret machinery
— use of gas for auxiliary boilers and turbines.

4.2 Supplementary technical requirements

4.2.1 The items listed in [4.1] shall comply with the relevant sections of DNVGL-OS-D101.

4.2.2 Piping systems in connection with LNG/LPG storage and distribution may be designed and constructed in accordance with DNV rules for ships Pt.5 Ch.5, provided that the actual operational modes and any additional accidental loads are also taken into account.

Guidance note:
Where rules call for a stress analysis, such should consider the actual operation and motions of the unit. Design Accidental Loads (e.g. fire, explosion, dropped object) should be considered in the design where such is relevant for the overall safety.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

5 Instrumentation and telecommunication systems

5.1 Supplementary technical requirements
Production units and installations shall comply with DNVGL-OS-D202 Ch.2 Sec7.
6 Fire protection

6.1 General

Service notations LNG (or LPG) Production Unit and LNG (or LPG) Production Installation specify additional requirements for:

— passive fire protection
— fire water systems
— fire water distribution
— active fire protection of specific areas including LNG/LPG processing
— fire detection and alarm systems
— gas detection.

6.2 Supplementary technical requirements

Production units or installations shall comply with DNVGL-OS-D301 Ch.2 Sec.7 and DNVGL-OS-D301 Ch.2 Sec.9.

7 Position keeping

7.1 General

7.1.1 For production units of the ship-shaped, column-stabilised and deep draught types, the additional class notation POSMOOR is mandatory.

7.1.2 The design of the mooring system shall be in accordance with DNVGL-OS-E301 Ch.2. Alternatively the design may be based on compliance with API RP 2SK.

7.1.3 Certification requirements for equipment shall be as given in DNVGL-OS-E301 Ch.3.

8 Industrial equipment

8.1 General

8.1.1 Production related systems and equipment which are installed in enclosed hull compartments below the damage water line shall be included in the scope of classification.

8.1.2 The items specified in [8.1.1] shall comply with relevant requirements given in DNVGL-OS-E201.

9 Hydrocarbon import and export

9.1 General

Service notation LNG (or LPG) Production Unit and LNG (or LPG) Production Installation specify additional requirements for:

— Hydrocarbon import systems
— LNG-/LPG-/Condensate- export systems

9.2 Hydrocarbon import

The hydrocarbon import system shall comply with relevant parts of DNVGL-OS-A101 and DNVGL-OS-E201.
9.3 Hydrocarbon Offloading

9.3.1 Systems for export of LNG/LPG are generally to comply with DNV rules for ships Pt.5 Ch.5 Sec.6 and with DNVGL-OS-E201 Ch.2 Sec.11.

9.3.2 Systems for export of condensate are to comply with DNVGL-OS-E201 Ch.2 Sec.12 as for crude oil offloading systems.

9.3.3 Where the given references above refer to bow or stern loading, the general principles will be applicable to export/import arrangements located anywhere on the vessel.
SECTION 4 SUPPLEMENTARY REQUIREMENTS FOR SERVICE NOTATION LNG (OR LPG) STORAGE UNIT OR INSTALLATION

1 General

1.1 Introduction

1.1.1 This section identifies design and construction requirements for assignment of service notations LNG (or LPG) Storage Unit or LNG (or LPG) Storage Installation.

1.1.2 The requirements in this section are supplementary to those for main class 1A as stated in Sec.1 for notation LNG (or LPG) Storage Unit and OI in Sec.2 for notation LNG (or LPG) Storage Installation.

1.1.3 Storage units also intended for transportation of liquefied gas shall also comply with the DNV rules for ships, Pt.5 Ch.5.

1.1.4 Units intended to act as offshore regasification units must in addition comply with the additional class notation REGAS and will be given the notation 1A (or OI) LNG Storage Unit/Installation REGAS.

2 Safety principles and arrangement

2.1 General
Service notations LNG (or LPG) Storage Unit and LNG (or LPG) Storage Installation specify additional requirements for:
— arrangement
— area classification
— shutdown
— escape, evacuation and communication
— containment tanks.

2.2 Arrangement
Storage units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.8 and DNVGL-OS-A101 Ch.2 Sec.9, applicable parts.

2.3 Area classification
Storage units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.9.

2.4 Emergency shutdown
Storage units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.9.

2.5 Escape, evacuation and communication
Storage units or installations shall comply with DNVGL-OS-A101 Ch.2 Sec.9.
3 Structural design

3.1 General
Service notations LNG (or LPG) Storage Unit and LNG (or LPG) Storage Installation specify additional requirements for:
— riser balcony foundation, turret or submerged turret structures, as applicable
— LNG/LPG export/import system
— condensate import/export system
— containment system.

3.2 Supplementary technical requirements
3.2.1 The items listed in [3.1] shall comply with the relevant sections of DNVGL-OS-C101 and DNVGL-OS-C102 for ship-shaped units.

3.2.2 Containment systems may in general be designed using the methodology described in DNV rules for ships Pt.5 Ch.5, Gas Carriers, provided the loading conditions and operational modes for an offshore application are taken into account.

Guidance note:
Aspects such as the actual site-specific environmental conditions, partial filling modes, project-specific accidental loads, provision for in-situ inspection for units not intending to drydock will need to be specially assessed.

3.2.3 A loading instrument suitable for the intended service shall be installed on ship-shaped storage units/installations.
The instrument shall be approved in accordance with requirements in DNV rules for ships Pt.6 Ch.9.

3.2.4 Loading from any installed import/export system and shuttle tanker mooring and fendering loads are to be taken into account.

4 Marine and machinery or utility systems and equipment

4.1 General
Service notations LNG (or LPG) Storage Unit and LNG (or LPG) Storage Installation specify additional requirements for:
— cargo transfer and loading
— cargo storing, segregation and treatment
— venting, inerting, gas freeing and vapour emission control
— ventilation in hazardous areas
— turret machinery.

4.2 Supplementary technical requirements
4.2.1 The items listed in [4.1] shall comply with the relevant sections of DNVGL-OS-D101.
4.2.2 For ship-shaped storage units/installations design and fabrication may be in accordance with DNV rules for ships Pt.4 and Pt.5 Ch.5. Operational mode and maintenance philosophy should be accounted for in the design.

Guidance note:
Increased commercial consequence of failure compared to maritime applications and ability to inspect and repair offshore should be taken into account in the design.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

5 Instrumentation and telecommunication systems

5.1 Supplementary technical requirements
Storage units or installations shall comply with DNVGL-OS-D202 Ch.2 Sec.8.

6 Fire protection

6.1 General
Service notations LNG (or LPG) Storage Unit and LNG (or LPG) Storage Installation specify additional requirements for:
— passive fire protection
— fire water systems
— active fire protection of specific areas including those for treatment and storage of liquefied gas
— fire detection and alarm systems
— gas detection.

6.2 Supplementary technical requirements
Storage units shall comply with DNVGL-OS-D301 Ch.2 Sec.8.

7 Position keeping

7.1 General

7.1.1 For storage units of the ship-shaped, column-stabilised and deep draught types, the additional class notation POSMOOR is mandatory.

7.1.2 The design of the mooring system shall be in accordance with DNVGL-OS-E301 Ch.2. Alternatively the design may be based on compliance with API RP 2SK.

7.1.3 Certification requirements for equipment shall be as given in DNVGL-OS-E301 Ch.3.

8 Export/import of LNG/LPG/condensate

8.1 General

8.1.1 Systems for export/import of LNG/LPG are generally to comply with DNV rules for ships Pt.5 Ch.5 Sec.6 and with DNVGL-OS-E201 Ch.2 Sec.11.
8.1.2 Systems for import/export of condensate are to comply with DNVGL-OS-E201 Ch.2 Sec.12 as for crude oil offloading systems.

8.1.3 Where the given references above refer to Bow or Stern loading, the general principles will be applicable to export/import arrangements located anywhere on the vessel.

9 Preparation for surveys and inspections on location

It is advised that operational survey and inspection aspects are taken into consideration at the design and construction stages. See Sec.1 [12] for details.
SECTION 5 SUPPLEMENTARY REQUIREMENTS FOR SERVICE NOTATION LNG (OR LPG) LOADING UNIT OR INSTALLATION

1 General

1.1 Introduction

1.1.1 This section identifies design and construction requirements for assignment of service notations LNG (or LPG) Loading Unit or LNG (or LPG) Loading Installation.

1.1.2 The requirements in this section are supplementary to those for main class 1A as stated in Sec. 1 for notation LNG (or LPG) Loading Unit and OI in Sec. 2 for notation LNG (or LPG) Loading Installation.

1.2 Design requirements

To achieve the service notation LNG (or LPG) Loading Unit or LNG (or LPG) Loading Installation, the unit has to be designed, constructed and documented according to DNVGL-OS-E403, Offshore loading units.
SECTION 6 ADDITIONAL CLASS NOTATIONS: DESIGN AND CONSTRUCTION REQUIREMENTS FOR SPECIAL EQUIPMENT AND SYSTEMS

1 Introduction

1.1 General

1.1.1 This section identifies design and construction requirements for assignment of additional class notations relating to system, equipment and special facility installations.

1.1.2 Units fitted with systems and/or special features complying with relevant requirements of this section may be assigned class notations as described.

1.2 Technical reference documents

1.2.1 Technical requirements are given by reference to selected:
— DNV GL offshore standards
— DNV GL recommended practices
— other DNV GL rules and standards
— DNV GL class guidelines
— internationally recognised codes and standards.

1.2.2 The technical reference documents which shall be applied are given in the following subsections and summarised in Table 15.

1.3 General assumptions

1.3.1 DNV GL may accept alternative solutions found to represent an overall safety level equivalent to that stated in the requirements of this document or referred standards.

1.3.2 The requirements stated in this section for additional class notations shall be regarded as supplementary to those given for assignment of main class and relevant service notations.
2 Position mooring system

2.1 General

2.1.1 POSMOOR notation may be assigned to units fitted with single or spread point mooring systems in accordance with the requirements of this section.

2.1.2 Objective
The notations aim to cover the reliability of the mooring system and equipment, for the purpose of ensuring safe position mooring.

2.1.3 Scope
The notation covers the following aspects:
— environmental conditions and loads
— mooring system analysis
— thruster assisted mooring
— mooring equipment
— tests.

2.2 Application

2.2.1 The notation is complemented with the qualifiers as described in Table 1.

Table 1 POSMOOR class notations

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSMOOR</td>
<td>Position mooring system</td>
<td>&lt;none&gt;</td>
<td>Passive position mooring system according the technical requirements of DNVGL-OS-E301 Ch.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A)</td>
<td>Mooring system designed according to API 2SK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V)</td>
<td>Mooring system designed for positioning in vicinity of other structures</td>
</tr>
<tr>
<td>(TA)</td>
<td>Thruster assisted mooring system dependent on manual remote thrust control system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ATA)</td>
<td>Thruster assisted mooring system dependent on automatic remote thrust control system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R)</td>
<td>Remaining thruster capacity after loss of most significant redundancy group</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2.2 The qualifiers (A) or (V) can be combined with the other qualifiers.

2.2.3 The qualifier R can be combined with TA and ATA (to resp. TAR and ATAR).
2.3 Technical requirements

2.3.1 The technical requirements of DNVGL-OS-E301 shall be complied with for assignment of the **POSMOOR** notations.

2.3.2 The technical requirements of API 2SK shall be complied for the qualifier *(A)*.

2.4 Certification of materials and components

Certification of equipment shall be in accordance with DNVGL-OS-E301 Ch.3.

3 Dynamic positioning systems

3.1 General

3.1.1 The following notations may be assigned to units with dynamic positioning systems:

**Table 2 Dynamic position class notations**

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DPS</strong></td>
<td>Dynamic positioning system</td>
<td><em>(A)</em></td>
<td>Annual survey required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Without redundancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>With an independent joystick back-up and a position reference back-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>With redundancy in technical design and with an independent joystick back-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>With redundancy in technical design and with an independent joystick back-up, plus a back-up DP-control system in an emergency DP-control centre, designed with physical separation for components that provide redundancy</td>
</tr>
<tr>
<td><strong>DYNPOS</strong></td>
<td>Dynamic positioning system</td>
<td><em>(A)</em></td>
<td>Annual survey required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUT</td>
<td>With an independent joystick back-up and a position reference back-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUTR</td>
<td>With redundancy in technical design and with an independent joystick back-up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUTRO</td>
<td>With redundancy in technical design and with an independent joystick back-up, plus a back-up DP-control system in an emergency DP-control centre, designed with physical separation for components that provide redundancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AUTS</td>
<td>Without redundancy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ER</td>
<td>Redundancy in technical design</td>
</tr>
</tbody>
</table>

3.1.2 Objective

The objective of the notations is to ensure the availability of dynamic positioning with various grades of redundancy in line with the IMO MSC/Circ.645 Guidelines for vessels with dynamic positioning systems.
3.1.3 The two notation series differ in their specific requirements and in general the DYNPOS- series notations are requiring a higher degree of availability and robustness as compared to the DPS- series notations. The detailed differences are outlined in the specific requirements given in this chapter.

3.1.4 Scope
The dynamic positioning system includes requirements for the following subsystems, control panels and back-up systems which are necessary to dynamically position the unit:
- power system
- controller
- measuring system
- thruster system
- remote thrust control
- control panels.

3.1.5 These rules do not include requirements or recommendations in regard to the vessels operation or other characteristics.

3.2 Technical requirements

3.2.1 Technical requirements for the dynamic positioning notations shall be in accordance with the DNV rules for ships Pt.6 Ch.7.

3.2.2 Technical requirements for DYNPOS-ER are given in DNV rules for ships Pt.6 Ch.26.

3.2.3 For DPS notations granted through class entries, see DNV rules for ships Pt.6 Ch.7.

3.3 Certification of materials and components
The certification of equipment shall be in accordance with DNV rules for ships Pt.6 Ch.7.

4 Single point mooring (SPM)

4.1 General

4.1.1 General
The additional class notation SPM applies to units fitted with equipment enabling them to be moored to single point moorings.

4.1.2 Objective
The objective of the notation is to document that the vessel is equipped for single point mooring.

4.1.3 Scope
The notation covers the following elements:
- bow chain stoppers and fairleads
- position of pedestal rollers
- winches
- materials.
4.1.4 Application
The requirements cover the parts of OCIMF's Recommendations for equipment employed in the mooring of ships at single point moorings, applicable for ship-shaped offshore units or installations.

4.2 Technical requirements
The requirements of the DNV rules for ships, Pt.5 Ch.3 Sec.15, shall be complied with.

4.3 Certification of materials and components
A DNV GL product certificate shall be provided for the bow chain stopper and bow fairlead

4.3.1 Wich and capstand and pedestal roller (if fitted) shall be provided with documentation of max. SWL from manufacturer (works certificate):

5 Bow loading

5.1 General

5.1.1 General
The additional notation Bow loading applies to units having a bow loading arrangement satisfying the requirements of [6.2].

5.1.2 Objective
The notation's objective is to ensure safe and reliable bow loading arrangements.

5.1.3 Scope
The notation covers requirements for:
   — materials
   — arrangement
The requirements cover the parts of OCIMF's Recommendations for equipment
   — control and monitoring
   — safety installations
   — operation manual.

5.1.4 Application
The notation is applicable for all different units as covered by these rules.

5.2 Technical requirements
The requirements of the DNV rules for ships, Pt.5 Ch.3 Sec.14, shall be complied with as applicable.

5.3 Certification of materials and components
The requirements of the DNV rules for ships, Pt.5 Ch.3 Sec.14, shall be complied with as applicable.
6 Submerged turret loading

6.1 General

6.1.1 General
The additional notation STL applies to units or installations having a submerged turret loading arrangement satisfying the requirements of [7.2].

6.1.2 Objective
The notation's objective is to ensure safe and reliable submerged turret loading arrangements.

6.1.3 Scope
The notation covers requirements for:
— materials
— arrangement
— control and monitoring
— safety installations
— operation manual.

6.1.4 Application
The notation is applicable for all different units as covered by this rule book.

6.2 Technical requirements
The requirements of the DNV rules for ships, Pt.5 Ch.3 Sec.14, shall be complied with as applicable.

6.3 Certification of Materials and components
The requirements of the DNV rules for ships, Pt.5 Ch.3 Sec.14, shall be complied with as applicable.

7 Hydrocarbon production plant

7.1 General

7.1.1 Units or installations fitted with offshore hydrocarbon production facilities in compliance with DNV requirements may be assigned class notation PROD.

7.1.2 Where the principle product is LNG the class notation PROD(LNG) may be assigned.

7.1.3 Where the principle product is LPG the class notation PROD(LPG) may be assigned.

7.1.4 Where the plant is intended for vaporisation of LNG, the class notation REGAS may be assigned.

7.2 Technical requirements
The requirements for production plants are stated in DNVGL-OS-E201. Regasification plant may be designed in accordance with DNV rules for ships Pt.6 Ch.30 and relevant parts of DNVGL-OS-E201.
7.3 Certification of materials and components

7.3.1 Procedures and requirements for classification including certification of equipment shall be in accordance with DNVGL-OS-E201 Ch.3.

7.3.2 Manufacturers of materials, components and equipment for PROD class shall, prior to construction is started, provide the Society with evidence of their capability to successfully carry out fabrication with adequate quality.

   Guidance note:
   Evidence may incorporate successful outcome of construction projects of similar nature.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

8 Regasification

8.1 General

8.1.1 Objective
The requirements in this chapter apply to vessels having regasification equipment used for LNG vaporizing and gas export, through a submerged turret buoy offshore or through dedicated gas unloading manifolds.

8.1.2 Scope
The requirements as specified in this sub-section cover safety, loading and offloading, certification, and testing of regasification units.

8.1.3 Application
Vessels built according to these rules may be assigned the class notation REGAS.

8.2 Technical requirements
The requirements of the DNV rules for ships, Pt.6 Ch.30, shall be complied with as applicable.

8.3 Certification of materials and components
The requirements of the DNV rules for ships, Pt.6 Ch.30 Sec.1C, shall be complied with as applicable.

9 Helicopter decks

9.1 General

9.1.1 Units fitted with erected landing platforms for helicopters or landing areas arranged directly on decks or top of deckhouses may be given the class notation HELDK together with qualifiers as defined in Table 4.

9.1.2 Objective
The objective of the HELDK notation is to ensure the safety and reliability of helicopter deck structure and ship safety in relation with helicopter operations and hangar facilities.

9.1.3 Scope
The scope of the notations is dependent on the qualifiers as listed in Table 3.
### Table 3 HELDK class notation

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HELDK</td>
<td>Helicopter deck</td>
<td>&lt;none&gt;</td>
<td>Structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
<td>Additional requirements to ship safety.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>Additional requirements to helicopter safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>Additional requirements to helicopter facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(N)</td>
<td>Evaluated with respect to requirements for operation on the Norwegian Continental Shelf (NCS)</td>
</tr>
</tbody>
</table>

#### 9.1.4 Application
The application of the different qualifiers is restricted as follows:
- The qualifier **H** can only be applied together with the qualifier **S**.
- The qualifier **F** can only be applied together with the qualifiers **SH**.
- The qualifier **(N)** can only be applied together with qualifiers **SH** or **SHF**.

#### 9.2 Technical requirements
Technical requirements for **HELDK** shall comply with DNVGL-OS-E401 Ch.2, as applicable:
- Sec.1 to Sec.4 for notation **HELDK**
- Sec.5 Additional requirements for qualifier **S**
- Sec.6 Additional requirements for qualifier **H**
- Sec.7 Additional requirements for qualifier **F**.
For additional requirements for qualifier **(N)** see DNVGL-SI-0166 Ch.2 Sec.9.

#### 9.3 Certification of materials and components
There are no additional requirements regarding certification.

### 10 Crane installations

#### 10.1 General

**10.1.1 Objective**
The additional optional class notation **Crane-offshore** sets requirements for a design standard for on-board permanently installed cranes.

**10.1.2 Scope**
The scope for **Crane-offshore** provides requirements for cranes with respect to: safety and functionality, devices for locking the crane in a parked position and for supporting the crane structure.

Two terms are used in this section to describe the intended use of the crane, these are: Offshore crane – for cargo handling outside the unit while at sea: Platform crane – for cargo handling on the unit.

**10.1.3 Application**
**Crane-offshore** applies to the selected cranes installed on units.
Reference is given to the applicable structural standard (i.e. DNVGL-OS-C101 to DNVGL-OS-C201) concerning supporting structure (e.g. pedestal), DNVGL-OS-C301 concerning stability and DNVGL-OS-A101 concerning ESD if applicable.

An unit found to be in compliance with the requirements in this section may be assigned **Crane-offshore**.

**10.1.4** For units intended for lifting as main service reference is also made to the service notation **Crane Unit** described in DNVGL-RU-OU Ch.2 Sec.5.

**10.1.5 Definitions**

**Table 4 Definitions and abbreviation**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition or abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>offshore crane</td>
<td>a lifting appliance on board a vessel intended for handling of loads outside the vessel while at open sea.</td>
</tr>
<tr>
<td>platform crane</td>
<td>a lifting appliance on board an offshore unit intended for handling loads within and outside the vessel while in harbour and within the vessel while at sea.</td>
</tr>
</tbody>
</table>

**10.1.6 Documentation**

The builder shall submit the documentation required by **Table 5**.

**Table 5 Documentation requirements – builder**

<table>
<thead>
<tr>
<th>Object</th>
<th>Documentation type</th>
<th>Additional description</th>
<th>Info</th>
</tr>
</thead>
</table>
| Cranes  | Z030 – Arrangement plan | Including:  
— main dimensions  
— limiting positions of movable parts  
— location onboard during operation and in parked position. | FI   |

**Guidance note:**

Documentation requirements to hull support of the cranes are covered in DNVGL-OS-C101 to DNVGL-OS-C104.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

**10.2 Technical requirements**

**10.2.1 Design loads**

In addition to the specific design loads given in DNVGL-ST-0378, *Standard for certification of offshore and platform lifting appliances*, loads due to unit motions shall be considered. Design values of linear and angular accelerations are given in DNVGL-OS-C101.

**10.2.2 Parking and overturning**

Devices shall be provided for all cranes in parked position (at sea) to be anchored to the hull structure. The anchoring devices shall be designed to withstand inertia forces due to ship motions and loads due to «out of service» winds. The strength calculations shall be based on accepted principles of statics and strength of materials, applying the safety factors as stipulated for load case III in the DNVGL-ST-0378.
10.2.3 Sliding
In parked position (for a unit at sea) sliding is preferably to be prevented by means of anchoring devices. See [3.1]. If sliding is intended to be prevented by friction between rail and wheels only, the coefficient of friction shall not be taken greater than 0.15.

10.2.4 For a crane in operation, sliding shall not to take place unless the forces parallel to rails exceed 1.3 times the values for load case II in the DNVGL-ST-0378. When this is not satisfied, sliding shall be prevented by a device locking the crane in position. The strength of this device shall be based on the safety factors for load case II/load combination II, as referred above.

10.3 Certification
For cranes that class notation Crane-offshore shall be applied to, the builder shall request the manufacturers to order certification as described in Table 6.

Table 6 Certification requirements

<table>
<thead>
<tr>
<th>Object</th>
<th>Certificate Type</th>
<th>Issued by</th>
<th>Certification Standard*</th>
<th>Additional Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore Crane</td>
<td>PC</td>
<td>Society</td>
<td>DNVGL-ST-0378</td>
<td>Product Certificate OLA0101, see DNVGL-ST-0378</td>
</tr>
<tr>
<td>Platform crane</td>
<td>PC</td>
<td>Society</td>
<td>DNVGL-ST-0378</td>
<td>Product Certificate OLA0101, see DNVGL-ST-0378</td>
</tr>
</tbody>
</table>

*Unless otherwise specified the certification standard is the rules.

10.4 Testing
After completed installation onboard, functional testing and load testing of the crane shall be carried out as specified in the DNVGL-ST-0378.

11 Additional fire protection

11.1 General

11.1.1 Units with additional fire safety measures in accommodation spaces and machinery spaces may be assigned class notation F. The various qualifiers are related to areas subjected to additional fire protection as given in Table 7.

Table 7 Class notations for additional fire protection

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Additional fire protection</td>
<td>A</td>
<td>Accommodation space</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>Machinery space</td>
</tr>
</tbody>
</table>

11.1.2 Objective
The F notation aims at increased fire protection through preventive measures as well as measures for reducing the consequences of fire.
11.1.3 Scope
The scope of the notation covers arrangement, structural and active fire protection, fire fighting systems and firefighter’s outfit.

11.1.4 Application
The qualifiers can be applied individual or in combination.

11.2 Technical requirements
The requirements as stated in the DNV rules for ships, Pt.6 Ch.4, shall be complied with for assignment of the class notations.

11.3 Certification of materials and components
There are no additional certification requirements.

12 Loading computer

12.1 General

12.1.1 Units having installed a system integrated systems developed to assist the master as a decision aid when the ship has been subjected to damage and consequent flooding may be given the class notation LCS-DC.

The letters are denoting Loading Computer System-Damage Control.

12.1.2 Objective
The objective of the notation is to ensure the correct calculating of damage stability following a collision, grounding or other incidents causing flooding.

12.1.3 Scope
A loading computer system designed for this purpose is assumed to consist of the following main parts:
— level sensors in all spaces which enables sounding of flooded compartments
— draught readings sensors to read draughts of the ship fore, midship (port and starboard) and aft
— a loading computer system, located on the navigation bridge (and safety centre, if located in a separate space from the navigation bridge), able to calculate the stability based on the input provided by the sensors.

12.2 Technical requirements
The requirements of the DNV rules for ships Pt.6 Ch.9 Sec.4 shall be complied with as applicable.

12.3 Certification of materials and components
The certification covers the loading computer system and the software installed.
13 Periodically unattended machinery space

13.1 General

13.1.1 Units where all machinery in the engine room necessary for performance of main functions have been fitted with instrumentation and automation systems in compliance with this sub-section, may be assigned class notation **E0** or **ECO**.

13.1.2 Objective
The class notation **E0** denotes that the safety of the ship in all sailing conditions, including when manoeuvring and alongside, is equivalent to that of a ship whose machinery spaces are attended. The class notation **ECO** denotes that the ship is equipped with instrumentation and automation equipment and systems enabling the continuous supervision of its machinery from a centralised control station.

13.1.3 Scope
The scope of the notation covers:
— engine control system
— alarm system
— safety system
— fire detection and alarm system.

13.2 Technical requirements

13.2.1 Assignment of class notations **E0** and **ECO** is based on compliance with the DNV rules for ships, Pt.6 Ch.3, with qualifications given in [13.2.2].

13.2.2 References to the DNV rules for ships, Pt.4 Ch.10 (fire protection) shall be replaced with DNVGL-OS-D301 for unit application.

13.3 Certification of materials and components
Certification requirements are given in the DNV rules for ships.
14 Hull monitoring system

14.1 General

14.1.1 Units equipped with instrumentation system for monitoring hull behaviour in accordance with the requirements of this section may be assigned class notation HMON as given in the DNV rules for ships, Pt.6 Ch.11.

14.1.2 Objective
The system will give warning when stress levels and the frequency and magnitude of accelerations approach levels which require corrective action.

14.1.3 Scope
The owner shall decide how the hull monitoring system should be configured, i.e. which features to be included and how the measured and processed data shall be used.

14.1.4 Application
See DNV rules for ships, Pt.6 Ch.11 for qualifier definitions.

14.2 Technical requirements
Assignment of HMON class notations is based on compliance with the DNV rules for ships, Pt.6 Ch.11.

15 Fatigue methodology for ship-shaped units

15.1 General

15.1.1 Ship-shaped units may be assigned class notation FMS.

15.1.2 The requirement for FMS notation is an addition to the fatigue strength requirements for classification. The FMS notation has been introduced for owners or operators who require additional fatigue safety by using a detailed fatigue methodology for the structures, with increased focus of fatigue critical details during new building phase. The increased safety level will reduce the risk of disruption during production due to repair of fatigue damage.

15.1.3 FMS notation is based on minimum 20 year design fatigue life as default. If the design fatigue life is specified differently, the specified design fatigue life will be included in brackets, e.g. FMS(30). The environmental data for the transit and offshore sites, which form the basis for the design, will be specified in the appendix to the classification certificate.

15.1.4 The FMS notation covers design, fabrication and operation of the unit. The specific methodology for design and fabrication are included in the DNV-RP-C206, Fatigue Methodology for Offshore Ships. Inspection in the operational phase will be included in the in-service inspection program (IIP) as described in Ch.3 Sec.3 [1,2]. The IIP can be based on a risk based approach.

15.2 Technical requirements
Assignment of class notation FMS is based on compliance with requirements in DNV-RP-C206.
16 Noise, vibration and comfort rating notations

16.1 General

16.1.1 Units arranged and equipped with the aim to reduce the impact of noise or vibration may be assigned for the following additional class notations as given below.

Table 8 Class notations related to noise and vibration

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMF-MOU</td>
<td>requirements for noise, vibration, illumination and indoor climate on board</td>
<td>(N)</td>
<td>As below, demonstrates compliance with NORSOK-S002</td>
</tr>
<tr>
<td></td>
<td>offshore facilities</td>
<td>(1)</td>
<td>Highest level of comfort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2)</td>
<td>Intermediate level of comfort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)</td>
<td>Acceptable level of comfort</td>
</tr>
<tr>
<td>VIBR</td>
<td>Vibration level criteria for machinery, components, equipment and structure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16.1.2 Objective
The objective of **COMF-MOU** is to reduce the impact of noise and vibration related to comfort on board may be assigned for the following additional class notations

16.1.3 The objective of **VIBR** is to reduce the risk of failure in machinery, components and structures onboard units, caused by excessive vibration.

16.1.4 Scope
The scope of **COMF-MOU** covers noise, vibration, illumination and indoor climate as reflected by the qualifiers listed in Table 12.

16.1.5 The scope of **VIBR** covers:
— machinery components and equipment
— structure in compartments where machinery, components and equipment are situated close to the propeller(s).

16.1.6 Application
Units arranged and equipped with the aim to reduce the impact of noise and vibration, illumination and indoor climate related to comfort on board may be assigned for the additional class notations as listed in Table 12.

16.2 Technical requirements

16.2.1 The requirements of **DNVGL-OS-A301** shall be complied with as applicable for the notation **COMF-MOU**.

16.2.2 The requirements of the DNV rules for ships Pt.6 Ch.15 shall be complied with as applicable for the notation **VIBR**.
16.3 Certification requirements
The measurement equipment used for demonstrating the compliance with the limits of COMF-MOU shall be certified or type approved as detailed in DNVGL-OS-A301 Ch.3 Sec.3.

17 Cold climate notations

17.1 General

17.1.1 Units designed or strengthened for operation within particular geographical or environmental areas found to be in accordance with relevant class rule requirements may be assigned corresponding optional class notation as specified in detail in the remaining of this sub-section.

17.1.2 Objective
The objective of the notations Ice and PC is to ensure enough strength for navigation and operation in ice infested waters.
The objective of the notation Winterized is to ensure operational availability of marine systems in cold climate conditions.

17.1.3 Scope
The notations Ice and PC cover requirements related to structural strength and tare further detailed in [18.2].
The notation Winterized include additional requirements for systems as further detailed in [18.3].

17.1.4 Application
The different notations and their related qualifiers are further detailed in Table 13 and Table 14.

17.2 Structural strength

17.2.1 Column-stabilised units
Column-stabilised units strengthened for navigation and/or operation in defined ice conditions in accordance with this sub-section may be assigned class notations as described in Table 9.

Table 9 Ice class notations for column-stabilised units

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice-T</td>
<td>Navigation in Ice with the assistance of icebreakers when necessary</td>
<td>(1A)</td>
<td>Intended for navigating in difficult ice conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1B)</td>
<td>Intended for navigating in moderate ice conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1C)</td>
<td>Intended for navigating in light ice conditions</td>
</tr>
<tr>
<td>Ice-L</td>
<td>Operation in ice</td>
<td></td>
<td>Intended for operation in ice determined based on defined ice-conditions, ice detection and ice management systems, operational and emergency procedures</td>
</tr>
</tbody>
</table>

17.2.2 Technical requirements for Ice-T are given in DNVGL-OS-C103 App.E or DNVGL-OS-C201 App.E.
17.2.3 Technical requirements for Ice-L shall as far as relevant and practicable be based on DNV rules for ships, Pt.5 Ch.1 Sec.3 Ice Strengthening for the Northern Baltic and Pt.5 Ch.1 Sec.8, Polar Class notations PC-6 and PC-7.

17.2.4 These rules do not consider aspects related to the operation of onboard equipment in cold climate. It is recommended that column-stabilised units intended to navigate and operate in cold climate environments for longer periods comply with the requirements as given in DNVGL-OS-A201 on cold climate (see [19.3]).

17.2.5 Ship-shaped units
Ship-shaped units strengthened for navigation in defined ice conditions in accordance with this sub-section may be assigned class notations as described in Table 10.

Table 10 Ice class notations for ship-shaped units.

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice</td>
<td>Navigation in ice – baltic ice classes</td>
<td>1A*</td>
<td>Normally capable of navigating in difficult ice conditions without the assistance of icebreakers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1A</td>
<td>Capable of navigating in difficult ice conditions, with the assistance of icebreakers when necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1B</td>
<td>Capable of navigating in moderate ice conditions, with the assistance of icebreakers when necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1C</td>
<td>Capable of navigating in light ice conditions, with the assistance of icebreakers when necessary</td>
</tr>
<tr>
<td>PC</td>
<td>Polar Class – navigation in ice-infested polar waters</td>
<td>1</td>
<td>Year-round operation in all polar waters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Year-round operation in moderate multi-year ice conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Year-round operation in second-year ice which may include multi-year ice inclusions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Year-round operation in thick first-year ice which may include old ice inclusions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Year-round operation in medium first-year ice which may include old ice inclusions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Summer / autumn operation in medium first-year ice which may include old ice inclusions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>Summer / autumn operation in thin first-year ice which may include old ice inclusions</td>
</tr>
</tbody>
</table>

17.2.6 Technical requirements for DAT are given in DNV rules for ships Pt.5 Ch.1 Sec.7.

17.2.7 Technical requirements for ICE are given in DNV rules for ships Pt.5 Ch.1 Sec.4.

17.2.8 Technical requirements for PC are given in DNV rules for ships Pt.5 Ch.1 Sec.8.

17.3 Winterized

17.3.1 The table below list the different qualifiers for the Winterized notation.
### Table 11 Class notation Winterized

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Basic</td>
<td>Operation occasionally in cold climate for short periods</td>
</tr>
<tr>
<td>Winterized</td>
<td>Operation in cold climate</td>
<td>Cold</td>
<td>Operation in cold climate regularly or for an extended period of time, though not necessarily in ice-infested waters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polar</td>
<td>Operation in extreme cold climate of the polar regions year-round, typically in ice-infested waters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(t_w)</td>
<td>Extreme low ambient air temperature in °C</td>
</tr>
</tbody>
</table>

#### 17.3.2 Application

For qualifier Basic, a relevant Ice notation is mandatory if intended to operate in ice-infested waters.

#### 17.3.3 For qualifier Cold, a relevant Ice notation is mandatory if intended to operate in ice-infested waters.

#### 17.3.4 For qualifier Polar, a relevant Ice notation and the class notation Clean or Clean design are mandatory.

#### 17.3.5 Additional details are given in DNVGL-OS-A201 Ch.3.

#### 17.3.6 Technical requirements

The technical requirements are given in DNVGL-OS-A201 Ch.2.

#### 17.3.7 Certification requirements

The certification requirements are given in DNVGL-OS-A201 Ch.3 Sec.2.

### 18 Environmental notations

#### 18.1 General

Table 12 provides an overview of the environmental related notations.

### Table 12 Class notations related to environment

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWM</td>
<td>Ballast water management</td>
<td>E</td>
<td>Ballast water management system based on Exchange</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T</td>
<td>Ballast water management system on Treatment</td>
</tr>
<tr>
<td>Clean</td>
<td>Arrangements for controlling and limiting operational emissions and discharges</td>
<td>&lt;none&gt;</td>
<td>Basic operational requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design</td>
<td>Additional operational requirements. Design requirements for protection against accidents and for limiting their consequences.</td>
</tr>
<tr>
<td>OPP</td>
<td>Oil Pollution Preventive system</td>
<td>F</td>
<td>Fuel oil system</td>
</tr>
<tr>
<td>Class notation</td>
<td>Description</td>
<td>Qualifier</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>Recyclable</td>
<td>Safe and environmentally sound recycling of ships</td>
<td></td>
<td>Covering the development of Inventory of Hazardous Materials Part 1</td>
</tr>
<tr>
<td>VCS</td>
<td>Vapour control systems</td>
<td>1</td>
<td>Basic installation (meeting IMO MSC/Circ.585)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>VCS-1 + overfill alarm (meeting USCG CFR 46 part 39)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>VCS-2 + installation for onboard vapour processing</td>
</tr>
</tbody>
</table>

18.2 Objective

18.2.1 The class notation BWM describes a ballast water management system in line with the International Convention for the Control and Management of Ship’s Ballast Water and Sediments as adopted by IMO 13 February 2004.

18.2.2 The class notation Clean identifies the basic requirements for controlling and limiting operational emissions and discharges. The class notation Clean Design identifies additional requirements for controlling and limiting operational emissions and discharges. In addition, this notation specifies design requirements for protection against accidents and for limiting their consequences.

18.2.3 The objective of OPP-F is to prevent oil pollution by specifying additional preventive measures for the fuel oil system.

18.2.4 The objective of RECYCLABLE is to document early compliance with the requirements for IHM set forth by the IMO Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships.

18.2.5 The objective of VCS is to define criteria which apply to shipboard systems for control of vapour emissions from liquid cargoes.

18.3 Technical requirements

18.3.1 BWM
The requirements given in the DNV rules for ships, Pt.6 Ch.18, shall be complied with for assignment of the class notation BWM following the different qualifiers as specified.

18.3.2 Clean Design
The requirements given in the DNV rules for ships, Pt.6 Ch.12, shall be complied with for assignment of the class notations Clean/Clean Design with the deviations as given in [18.3.3].

18.3.3 For the application of Clean Design for offshore units, the requirement for NAUT-AW or NAUT-OSV(A) can generally be waived based on an assumption of the lower navigational risk due to the operational pattern of the unit (i.e. most of time in a fixed location). The requirement to oil tank protection as a distance to bottom shell plating may also be waived under certain conditions but shall be evaluated on a case by case basis.
18.3.4 OPP-F
For OPP-F The requirements given in the DNV rules for ships, Pt.6 Ch.1 Sec.5, shall be complied with for assignment of the class notations.

18.3.5 RECYCLABLE
The requirements given in the DNV rules for ships, Pt.6 Ch.27, shall be complied with for assignment of the class notation RECYCLABLE

18.3.6 VCS
The requirements given in the DNV rules for ships, Pt.6 Ch.10, shall be complied with for assignment of the class notation VCS.

19 Enhanced system verification

19.1 General

19.1.1 The notation ESV indicates that specified onboard system have been subject to enhance system verification.

19.1.2 Objective
The objective is to analyse the specified target system by use of one or more verification methods as described in these rules in order to provide objective evidence of acceptable functionality and quality according to stated requirements.

Guidance note:
Application of any enhanced system verification should provide an additional broader and/or deeper and/or earlier verification of the applicable requirements when compared to normal classification test activities required for the target system(s).

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

19.1.3 Scope
The requirements apply to marine and offshore systems and cover test and verification methods that may be utilized to assist in verification of functionality and performance of such systems.

19.1.4 Application
The target systems available for enhanced system verification methods in the ESV notation are specified in Table A1 of the DNV rules for ships Pt.6 Ch.22 Sec.1.
Any combination of selected systems can be made.

19.1.5 The ESV notation can only be applied for systems covered by classification through main class and additional class notation assigned the unit.

19.1.6 The applied verification method is showed in the notation string as listed in Table 13.

19.1.7 The verification methods are aligned to be applied in conjunction with classification activities of systems at e.g. type approval, manufacturing survey, onboard testing, and on sea trial in order to provide additional evidence of expected and required functionality.
**Table 13 Class notations related to environment**

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESV</td>
<td>Enhanced System verification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIL-IS</td>
<td>Hardware in the loop, test package incl simulator provided by independent supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIL-DS</td>
<td>As above, simulator provided by supplier target system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**19.2 Technical requirements**
There are not additional technical requirements to the target system.

**19.3 Certification requirements**
There are not additional certification requirements to the target system.

**20 Integrated software dependent systems**

**20.1 General**

**20.1.1** Units built and tested in compliance with the requirements of DNVGL-OS-D203 may be assigned one of the optional class notations for integrated software-dependent systems shown in **Table 14**.

**Table 14 ISDS Class notations**

<table>
<thead>
<tr>
<th>Notation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISDS [system1,...,system n]</td>
<td>Units having undergone enhanced software-dependent system integration for the system(s) according to DNVGL-OS-D203</td>
</tr>
</tbody>
</table>

**20.1.2 Objective**
The objective of **ISDS** is to reduce the risk for delays in new-build projects and modification projects, as well as for downtime and accidents caused by software in the operation phase.

**20.1.3 Scope**
The systems covered by the notation shall be specified and are as shown by the given qualifiers. The selection of systems is listed in **DNVGL-OS-D203 Ch.3 Sec.1 Table 1**.
The scope of DNV GL's involvement depends on the confidence level specified.

**20.1.4 Application**
Any combination of selected systems can be made.

**20.1.5 ISDS** can only be applied for systems as covered by classification through main class and other additional class notations.

**20.1.6** Unless otherwise agreed the confidence levels of **DNVGL-OS-D203 Ch.3 Sec.1 Table 1** apply.
20.2 Technical requirements
There are no additional technical product requirements.

20.3 Certification requirements
There are no additional certification requirements.

21 Special feature notations

21.1 General
Special feature notations provide information regarding special design assumptions, arrangements or equipment which is not covered by other class notations. Requirements related to special feature notations currently in use are described in this sub-section.

21.2 Propulsion

21.2.1 Objective
To indicate the specific propulsion and steering arrangements for independent transits.

21.2.2 Scope
For **Non-self-propelled** units the design scope for steering gear, tailshaft and thrusters for propulsion may be adjusted in accordance with the intended use (e.g. for DYNPOS-AUTS, POSMOOR, as auxiliary installation, or not used at all).
For **Self-propelled** units the design scope includes steering gear, tailshaft and thrusters for propulsion.

21.2.3 Application
The **Non-self-propelled** notation can be applied for any vessel type and for any service objective exempt self-elevating units and for any service objective.
The **Self-propelled** notation is applicable for self-elevating units with propulsion and steering.

21.3 Tailshaft monitoring – TMON

21.3.1 Objective
The objective of TMON is to extend the sterntube and propeller shaft survey interval

21.3.2 Scope
The notation describes the monitoring of the sterntube in order to give sufficient information to evaluate the operation conditions for bearings, seals and shaft.

21.3.3 Application
TMON is applicable for conventional propulsion shafts with oil lubricated sterntube bearing.

21.3.4 Technical requirements
The technical requirements from DNV rules for ships Pt. 4 Ch.4 Sec.1 E300 apply.

21.3.5 Certification requirements
There are no specific certification requirements.
21.4 Special feature notation BIS

21.4.1 Objective
The BIS notation indicates that the ship is prepared for in-water survey.

21.4.2 Scope
The BIS notation covers:
— on board documentation
— marking of ship’s side and bottom
— rudder, tailshaft and thrusters.

21.4.3 Application
Units prepared for in-water survey during building may be given the notation BIS.

21.4.4 Technical requirements
The technical requirements in the DNV rules for ships, Pt.3 Ch.1 Sec.1 D, shall be complied with.

21.4.5 Certification requirements
There are no additional certification requirements.

22 Summary of reference documents for additional class notations

22.1 General
Rules and standards which shall be applied for assignment of system and special facility class notations are summarised in Table 15.

Table 15 Summary of reference documents for system and special facility notations

<table>
<thead>
<tr>
<th>Notation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bow loading</td>
<td>DNV rules for ships, Pt.5 Ch.3 Sec.14</td>
</tr>
<tr>
<td>BWM</td>
<td>DNV rules for ships, Pt.6 Ch.18</td>
</tr>
<tr>
<td>Clean / Clean Design</td>
<td>DNV rules for ships, Pt.6 Ch.12 Sec.1</td>
</tr>
<tr>
<td>COMF-MOU</td>
<td>DNVGL-OS-A301</td>
</tr>
<tr>
<td>Crane-offshore</td>
<td>DNVGL-ST-0378</td>
</tr>
<tr>
<td>DYNPOS</td>
<td>DNV rules for ships Pt.6 Ch.7</td>
</tr>
<tr>
<td>DYNPOS-ER</td>
<td>DNV rules for ships Pt.6 Ch.26</td>
</tr>
<tr>
<td>DPS</td>
<td>DNV rules for ships Pt.6 Ch.7</td>
</tr>
<tr>
<td>ESV</td>
<td>DNV rules for ships Pt.6 Ch.22</td>
</tr>
<tr>
<td>E0</td>
<td>DNV rules for ships Pt.6 Ch.3</td>
</tr>
<tr>
<td>ECO</td>
<td>DNV rules for ships Pt.6 Ch.4</td>
</tr>
<tr>
<td>F</td>
<td>DNV rules for ships Pt.6 Ch.4</td>
</tr>
<tr>
<td>FMS</td>
<td>DNV-RP-C206</td>
</tr>
<tr>
<td>Notation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>HELDK</td>
<td>DNVGL-OS-E401</td>
</tr>
<tr>
<td>HMON (...)</td>
<td>DNV rules for ships Pt.6 Ch.11</td>
</tr>
<tr>
<td>Ice</td>
<td>DNV rules for ships Pt.5 Ch.1 Sec.3</td>
</tr>
<tr>
<td>ISDS</td>
<td>DNVGL-OS-D203</td>
</tr>
<tr>
<td>LCS-DC</td>
<td>DNV rules for ships Pt.6 Ch.9 Sec.4</td>
</tr>
<tr>
<td>OFFLOADING</td>
<td>DNVGL-OS-E201 Ch.12</td>
</tr>
<tr>
<td>OPP-F</td>
<td>DNV rules for ships Pt.6 Ch.1 Sec.5</td>
</tr>
<tr>
<td>POSMOOR</td>
<td>DNVGL-OS-E301</td>
</tr>
<tr>
<td>PROD</td>
<td>DNVGL-OS-E201</td>
</tr>
<tr>
<td>RECYCLABLE</td>
<td>DNV rules for ships Pt.6 Ch.27</td>
</tr>
<tr>
<td>REGAS</td>
<td>DNV rules for ships Pt.6 Ch.30 and DNVGL-OS-E201</td>
</tr>
<tr>
<td>SPM</td>
<td>DNV rules for ships Pt.5 Ch.3 Sec.15</td>
</tr>
<tr>
<td>STL</td>
<td>DNV rules for ships Pt.5 Ch.3 Sec.14</td>
</tr>
<tr>
<td>VCS</td>
<td>DNV rules for ships, Pt.6 Ch.10 Sec.1</td>
</tr>
<tr>
<td>VIBR</td>
<td>DNV rules for ships Pt.6 Ch.15 Sec.1</td>
</tr>
<tr>
<td>Winterized</td>
<td>DNVGL-OS-A201</td>
</tr>
</tbody>
</table>
CHAPTER 3 CLASSIFICATION IN OPERATION

SECTION 1 GENERAL PROVISIONS FOR PERIODICAL SURVEYS

1 Introduction

1.1 General

1.1.1 This chapter states the principles and requirements for retention of class to units covered by the provisions of these rules. Requirements are applicable to main class, service notations and additional class notations unless otherwise stated.

1.1.2 The extent of periodical surveying is presented in Sec.3 and Sec.4 for main class Sec.5 for additional service notations and Sec.6 for additional system and facility notations.

1.1.3 Self-elevating units are to be surveyed as described in DNVGL-RU-OU0104 Ch.8. For those being self-propelled, the survey of the propulsion systems is as given in this chapter.

1.1.4 A Memo to Owner (MO) shall be issued stating approved changes to survey procedures and acceptance criteria, if any. Technical basis for approved changes shall be stated.

1.1.5 DNV GL will develop and maintain an In-service Inspection Program (IIP) which will contain the structural items to be surveyed to satisfy the minimum requirements for retention class, as based on main class (1A) and the mandatory requirements related to service notations.

The IIP excludes any additional class notations (e.g. special equipment and systems notations and special feature notations)
The IIP constitutes the formal basis for surveying structural items under main class and shall be completed to the satisfaction of attending surveyor before the survey can be credited.

1.2 Survey pre-planning and record keeping

1.2.1 A specific survey program for renewal surveys and continuous surveys must be worked out in advance of the renewal survey by the owner in cooperation with the classification society. The survey program is prepared in the Nauticus Production System (NPS) as a SiO survey job and IIP-job for the survey to be performed. The IIP is the structural part of the program (ref. Sec.3 [1.2]).

1.2.2 Plans and procedures for underwater surveys (or underwater inspection in lieu of dry-docking survey) shall be submitted for review in advance of the survey and made available on board. These should include drawings or forms for identifying the areas to be surveyed, the extent of hull cleaning, non-destructive testing locations (including NDT methods), nomenclature, and for the recording of any damage or deterioration found. Submitted data, after review by the Society, will be subject to revision if found to be necessary in light of experience.

1.2.3 Accessibility and facilities for surveys on location

Annual and special surveys may be carried out on location based on approved procedures outlined in a maintenance system and survey arrangement, without interrupting the function of the unit or installation.
See Ch.2 Sec.1 [12] for matters which will be taken into consideration for acceptance of surveys to be carried out on location.
1.3 Asbestos free declaration

1.3.1 For vessels that shall comply with SOLAS Reg. II-1/3-5/ MODU Code 2.10.3 the surveyor will carry out a review of asbestos-free declarations documenting that new installations of materials do not contain asbestos.

1.3.2 For non- SOLAS vessels, a Master's declaration that asbestos has not been installed on board the vessel since last survey shall be given.

1.4 Alternative survey arrangements
Alternative survey arrangements may be accepted as an option to applicable periodical surveys for main class. More details are given in Sec.7.

1.5 Surveys performed by approved companies
Parts of the periodical surveys may be carried out by companies approved by DNV GL. More details are given in Sec.8.

2 Periodical surveys

2.1 General

2.1.1 All units shall be subjected to periodical surveys in accordance with requirements of this chapter in order to confirm that the hull, machinery, equipment and systems remain in satisfactory condition and in compliance with approval or accepted standards.

2.1.2 Periodical surveys will belong to one of the following categories according to the level of survey requirements:
— annual survey
— intermediate survey
— complete survey.
The survey required in conjunction with issuance of a new class certificate is denoted:
— renewal survey.
The following specific surveys may be scheduled according to one or more of the above categories:
— bottom survey
— propulsion/positioning thruster survey
— boiler survey (including steam generator survey)
— thermal oil heater survey
— survey of optional class notations (voluntary class notations).

2.1.3 Periodical surveys shall be carried out at prescribed intervals and within applicable time windows. A survey may be split in different parts, commenced and progressed within the time window provided all the requirements of the survey are completed by the end of the time window. The main class intermediate survey cannot serve as commencement of the next renewal survey. For concurrent surveys (see Table 1) the time window may be limited by that of the other survey.

2.1.4 The due date of a periodical survey will be established depending upon the survey interval, measured from one of the following events, whichever is relevant:
2.1.5 For certain units the survey intervals may be reduced, e.g. for units with new or novel design or with systems or items exposed to abnormal rate of wear or failure.

2.1.6 The scope of survey may be extended when compliance with applicable rules cannot be satisfactorily confirmed based on extent of surveys as given, or when the surveyor suspects that the unit is not maintained or handled in accordance with the basis for retention of class.

2.2 Postponement of periodical surveys

2.2.1 Except for annual and intermediate surveys for main class, the Society may accept to postpone periodical surveys upon special consideration in each separate case. Postponement of main class renewal survey may be considered only in exceptional circumstances.

2.2.2 Postponement of main class renewal survey shall not exceed 3 months. Postponement of periodical surveys will not affect the surveys next due date.

2.2.3 Postponement of the renewal survey may be granted only upon the owner’s written request. Such a request shall be received by the Society well in advance of the expiry date of the classification certificate. A postponement of the renewal survey shall normally be based on satisfactory result from a sighting survey.

2.3 Survey of units out of commission

2.3.1 Units which have been out of commission, e.g. laid up, for a period of at least 12 months, shall be surveyed and tested before re-entering service. The extent of the surveys and tests will be considered in each case depending upon:

— the time the unit has been out of commission
— the maintenance and preservative measures taken during lay-up
— the extent of surveys carried out during the time out of commission.

As a minimum, function testing to confirm the satisfactory operation of the machinery installation shall be carried out. All overdue surveys shall be completed prior to re-entering service.

2.3.2 During lay-up, units shall be subjected to annual survey.

The extent of the annual survey will be reduced compared to main class annual survey, but shall cover watertight integrity, bilge system, fire hazard and equipment in use.

2.4 Survey Schedules

2.4.1 Annual survey schedule is as follows:

— The due date in general corresponds to the anniversary date of the class assignment or the expiry of the previous classification certificate if different.
— The survey shall normally be carried out within a time window of 3 months on either side of the due date.
— In case a main class annual survey is commenced prior to the defined time window, the survey must be completed not more than 6 months after the date of the survey commencement. In such cases the anniversary dates for the subsequent annual surveys will be advanced, corresponding to a date not later than 3 months after the completion date of the commencement survey just carried out.
— An additional main class annual survey may be required when the anniversary date has been advanced

Annual surveys shall be performed each year, also those years where an intermediate, complete or renewal survey is performed. Survey requirements applicable for annual surveys are therefore not repeated for corresponding intermediate, complete or renewal surveys.

2.4.2 Intermediate survey schedule is as follows:
— The due date shall normally correspond to the date 2.5 years after the expiry date of the previous class certificate.
— The survey shall normally be carried out within a time window of 9 months on either side of the due date.
— The main class intermediate survey shall be completed concurrently with the second or third main class annual survey in each period of the classification certificate.
— The same surveys and thickness measurements of tanks or spaces cannot be credited towards both intermediate and renewal survey. Units that are re-commissioned after being laid-up may be specially considered.

2.4.3 Complete surveys are denoted:
— Complete survey (2.5 years), or
— Complete survey (5 years), or
— Complete survey (15 years).
Complete survey schedule is as follows:
— The due date corresponds to 2.5 years, 5 years or 15 years interval.
— The survey shall normally be carried out within a time window of 9 months before and 6 months after the due date.
— Survey required to be concurrent with the renewal survey shall be completed no later than at the completion of the renewal survey.

2.4.4 Renewal survey schedule is as follows:
— The due date is set at 5 years interval and corresponds to the expiry date of the classification certificate.
— The survey shall normally be completed within a time window of 3 months before the due date.
— The survey may be commenced at the fourth annual survey or between the fourth and fifth annual surveys.
— In case the survey is commenced more than 15 months before the expiry date of the classification certificate, the due date of the survey will be advanced to a date not later than 15 months after the completion date of the commencement survey.
— The renewal survey shall be completed concurrently with the last main class annual survey in each period of the classification certificate.
— The same surveys and thickness measurements of tanks or spaces cannot be credited towards both intermediate and renewal survey. Units that are re-commissioned after being laid-up may be specially considered.

2.4.5 Bottom survey schedule is as follows:
a) The due date is set at intervals in accordance with the following:
— two bottom surveys are required during each five-year period of the classification certificate
— the interval between any two successive bottom surveys is in no case to exceed 36 months.
b) The survey shall be carried out on or before the due date. 
Time window is not applicable.
(See MODU Code 1.6.1.5)

2.4.6 Survey of geared and podded thrusters for propulsion or dynamic positioning are scheduled according to complete survey (5 year). Podded thrusters shall also have an annual survey.

2.4.7 Boiler and steam drum/steam separator survey schedule is as follows:
— The due date is set at intervals in accordance with the following:
— Two boiler surveys are required during each five-year period of the classification certificate.
— The interval between any two successive boiler surveys is in no case to exceed 36 months.
During each boiler internal survey, the adjustment of the safety valves will be assessed by a DNV GL surveyor.
(see IACS UR Z18)
— The survey shall be carried out on or before the due date. Time window is not applicable.
— One boiler survey shall be carried out in conjunction with the renewal survey, i.e. not more than 15 months prior to the expiry date of the classification certificate.
Units more than 8 years old and retaining the original fitting of a single unit, the main boiler shall be surveyed annually (full scope) and within the annual survey schedule.

2.4.8 Thermal oil heater survey schedule as in [2.4.7].

2.5 Class notations

2.5.1 Optional class notations where specific surveys have been defined are listed in Table 1.

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Survey type</th>
<th>Conjunction with main class survey</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean</td>
<td>Arrangements for controlling and limiting operational emissions and discharges</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [14]</td>
</tr>
<tr>
<td>COMF-MOU</td>
<td>Noise, vibration, illumination and indoor climate</td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td>Sec.6 [12]</td>
</tr>
<tr>
<td>Crane-offshore</td>
<td>On board crane</td>
<td>Annual</td>
<td>N/A</td>
<td>Sec.6 [8]</td>
</tr>
<tr>
<td>Crane-offshore</td>
<td>On board crane</td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>DPS</td>
<td>Dynamic positioning system</td>
<td>Annual</td>
<td>N/A</td>
<td>Sec.6 [3]</td>
</tr>
<tr>
<td>DPR</td>
<td>Dynamic positioning system</td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td>Sec.6 [3]</td>
</tr>
<tr>
<td>Class notation</td>
<td>Description</td>
<td>Survey type</td>
<td>Conjunction with main class survey</td>
<td>Survey requirements</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>------------</td>
<td>-----------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>E0</td>
<td>Periodically unattended machinery space</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [10]</td>
</tr>
<tr>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECO</td>
<td>Machinery centralised operation</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [10]</td>
</tr>
<tr>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>Renewal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Additional fire protection</td>
<td>Complete (2.5 years)</td>
<td>Intermediate and renewal</td>
<td>Sec.6 [9]</td>
</tr>
<tr>
<td>HELDK</td>
<td>Helicopter deck</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Sec.6 [7]</td>
</tr>
<tr>
<td>HMON</td>
<td>Hull monitoring system</td>
<td>Annual</td>
<td>Renewal</td>
<td>Sec.6 [11]</td>
</tr>
<tr>
<td>ISDS</td>
<td>Integrated software dependent systems</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [15]</td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>Renewal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCS-DC</td>
<td>Loading computer system</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [4]</td>
</tr>
<tr>
<td>POSMOOR</td>
<td>Position mooring system</td>
<td>Annual</td>
<td>N/A</td>
<td>Sec.6 [2]</td>
</tr>
<tr>
<td></td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROD</td>
<td>Production system</td>
<td>Annual</td>
<td>N/A</td>
<td>Sec.6 [5]</td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recyclable</td>
<td>Inventory of hazardous materials Part 1</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Sec.6 [14]</td>
</tr>
<tr>
<td>REGAS</td>
<td>Regasification plants</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [6]</td>
</tr>
<tr>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMON</td>
<td>Tailshaft monitoring</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [16]</td>
</tr>
<tr>
<td>VCS</td>
<td>Vapour control system</td>
<td>Complete</td>
<td>Renewal</td>
<td>Sec.6 [14]</td>
</tr>
<tr>
<td>VIBR</td>
<td>Vibration level limitation</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Sec.6 [12]</td>
</tr>
<tr>
<td>Winterized</td>
<td>Operation in cold climate</td>
<td>Annual</td>
<td>Annual</td>
<td>Sec.6 [13]</td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>Renewal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.5.2 Class notations for which no survey requirement is defined, e.g. because the class notation is design related only, are listed in Table 2.
### Table 2 Class notations without survey requirements

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIS</td>
<td>Built for In-water Survey</td>
</tr>
<tr>
<td>DAT</td>
<td>Design ambient air temperature suitable for regular service during winter to Arctic or Antarctic waters</td>
</tr>
<tr>
<td>FMS</td>
<td>Fatigue methodology for ship-shaped units</td>
</tr>
<tr>
<td>Ice</td>
<td>Navigation in ice</td>
</tr>
<tr>
<td>OPP-F</td>
<td>Oil pollution prevention – fuel systems</td>
</tr>
<tr>
<td>PC</td>
<td>Polar Class – navigation in ice-infested polar water</td>
</tr>
<tr>
<td>POLAR</td>
<td>Arctic ice rules</td>
</tr>
<tr>
<td>SPM</td>
<td>Single point mooring</td>
</tr>
<tr>
<td>STL</td>
<td>Submerged turret loading</td>
</tr>
</tbody>
</table>
SECTION 2 GENERAL REQUIREMENTS FOR STRUCTURE AND MACHINERY SURVEYS

1 General

1.1 Preparation for survey

1.1.1 The owner shall provide the necessary facilities for safe execution of surveys.

1.1.2 For overall and close-up examination, means shall be provided to enable the surveyor to examine the structure in a safe and practical way, see [2.1].

2 Structure and equipment

2.1 Conditions for survey and access to structures

2.1.1 In preparation for survey and to allow for a thorough examination, all spaces shall be cleaned including removal from surfaces of all loose accumulated corrosion scale. In tanks where soft or semi-hard coatings have been applied, representative areas and those areas where it is obvious that further close-up examination is required shall be cleaned for inspection.

Guidance note:
Spaces should be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damage, or other structural deterioration. However, those areas of structure whose renewal has already been decided need only be cleaned and descaled to the extent necessary to determine the limits of the renewed areas. For more detailed information with regard to a tank where soft coatings have been applied, see IACS recommendation No. 44.

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2.1.2 Casings, ceilings or linings, and loose insulation, where fitted, shall be removed, as required by the surveyor, for examination of plating and framing. Compositions on plating shall be examined and sounded, but need not be disturbed if found adhering satisfactorily to the plating.

2.1.3 All spaces shall be made safe for access, i.e. gas freed, ventilated and illuminated, and prepared for the surveyor to examine the structure in a safe and practical way. One or more of the following means for access, acceptable to the surveyor, shall be provided:

— permanent staging and passages through structures
— temporary staging and passages through structures
— lifts and moveable platforms
— hydraulic arm vehicles such as conventional cherry pickers
— boats or rafts
— portable ladder
— other equivalent means.

2.1.4 Rafts or boats alone may be allowed for survey of the under deck areas for tanks or spaces, if the depth of the webs is 1.5 m or less.
If the depth of the webs is more than 1.5 m, rafts or boats alone may be allowed only:

a) when the coating of the under deck structure is in GOOD condition and there is no evidence of wastage, or
b) if a permanent means of access is provided in each bay to allow safe entry and exit. This means:
— access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below
the deck in each bay or
— access to deck from a longitudinal permanent platform having ladders to deck in each end of the
tank. The platform shall, for the full length of the tank, be arranged in level with, or above, the
maximum water level needed for rafting of under deck structure. For this purpose, the ullage
(corresponding to the maximum water level shall be assumed not more than 3 m from the deck plate
measured at the midspan of deck transverses and in the middle length of the tank.

If neither of the above conditions are met, then staging or “other equivalent means” of access shall be
provided for the survey of the under deck areas.

The use of rafts or boats alone does not preclude the use of boats or rafts to move about within a tank during
a survey.

**Guidance note:**
Reference is made to IACS Recommendation No. 39 – Guidelines for the use of Boats or Rafts for Close-up surveys.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

**Guidance note:**
Use of remote inspection technique methods to facilitate the required internal examinations, including close-up examinations and
thickness measurements, may be specially considered by the Society. The methods applied shall provide the information normally
obtained from a survey carried out by the surveyor.

In order to verify the results, confirmatory close-up examinations and thickness measurements at selected locations should be
carried out by the surveyor, not using the remote inspection technique method.

Proposals for use of remote inspection technique methods should be submitted to the Society for acceptance in advance of the
survey.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

### 2.1.5
A survey planning meeting shall be held prior to the commencement of any renewal and intermediate
surveys between the attending surveyor(s), the owner’s representative in attendance and the thickness
measurement / NDT company representative, where involved.

### 2.2 Survey extent

#### 2.2.1
The survey consists of examination, measurements and testing as required for different survey
categories with the aim to ensure that the hull structure, hull equipment and piping are in satisfactory
condition with respect to corrosion, deformation, fractures, damage or other structural deterioration.

#### 2.2.2
When examination or overall examination is required the structure or object is visually examined
from a significant distance. In such cases the general maintenance, the condition of protective coating, rust
deposits, leakages and structural detachments and damage may be observed and the surveyor may extend
the survey as considered necessary.

#### 2.2.3
When close-up examination is specified by the rules or required by the surveyor the structure or object
is visually examined from a distance normally within reach of hand. The surveyor may extend the close-
up examination as deemed necessary taking into account the maintenance of the spaces under survey, the
condition of the corrosion protection system and where spaces have structural arrangements or details which
have suffered defects in similar spaces or on similar units according to available information.

#### 2.2.4 Thickness measurements

The surveyor may require thickness measurements in any portion of the structure where signs of wastage
are evident or in areas where wastage is normally found. The surveyor may extend the scope of the
thickness measurements if considered necessary.
The minimum requirements for thickness measurements are presented in Ch.3 Sec.3 [4.3] Table 8 through Ch.3 Sec.3 [4.3] Table 10 for the respective unit types.

2.2.5 When thickness measurements are specified by the rules or required by the surveyor the measurements shall be carried out to an extent sufficient to determine both general and local corrosion levels.

Thickness measurements shall be carried out by a qualified company approved by the Society and witnessed by a surveyor (see also Sec.8 on Services by approved companies). This requires the surveyor to be on board, while the measurements are taken, to the extent necessary to control the process.

Where it is required to carry out thickness measurements of structures subject to close-up examination, these measurements shall be carried out simultaneously with the close-up examination.

The surveyor shall review the final thickness measurement report and countersign the cover page.

2.2.6 Where substantial corrosion, as defined in Ch.1 Sec.1 [2] is found, additional thickness measurements shall be taken to confirm the extent of substantial corrosion.

Areas found with substantial corrosion, which are not repaired, shall be recorded for thickness measurements at subsequent annual surveys.

2.2.7 The examination may be extended also in cases when:

— information is available of defects suffered on similar structure or details in similar tanks/compartments on similar units
— the structure under survey has been approved with reduced scantlings due to an approved corrosion control system
— suspect areas identified shall be recorded for examination at subsequent annual surveys.

Guidance note:
The requirements in [2.2.6] and [2.2.7] are not applicable to cargo tanks of FSOs or FPSOs.

2.2.8 The owner shall keep a complete record of all the thickness measurements and prepare a thickness measurement report including:

— locations of the measurements
— thickness measured and corresponding original thickness
— the date when the measurements were carried out
— type of measuring equipment
— personnel performing the measuring and their qualifications
— the report shall be signed by the operator.

These additional thickness measurements shall be carried out before the survey is considered as completed.

2.2.9 Corrosion allowance

In the design of column-stabilised and jack-up units corrosion allowance is normally not included as the structure is considered adequately protected against corrosion, e.g. by sacrificial anodes, impressed current and coating.

For ship-shape units, corrosion addition is included as part of the DNV GL rules for ships, but in addition combined with a corrosion protection system similar for column-stabilised and jack-up units.

The corrosion diminution criteria as given in DNVGL-CG-0172, shall be applied. Alternative methods may be accepted in agreement with the Society.
2.2.10 Conditions of protective coating
Where provided, the condition of protective coating of cargo holds, cargo tanks and ballast tanks shall be examined.
The condition will be rated GOOD, FAIR or POOR as defined in Table 1.

Table 1 Conditions of protective coating

<table>
<thead>
<tr>
<th>Corrosion prevention system</th>
<th>Normally a full hard coating, usually to be epoxy coating or equivalent. Other coating systems, which are neither soft nor semi-hard coatings, may be accepted provided they are applied and maintained in compliance with the manufacturer's specification. (Ref. IACS UR Z87/MSC.1/Circ 1330) However, soft and semi hard coatings, if already applied, may be accepted as result of a condition based assessment including a review of the organizational set-up to maintain adequate corrosion protection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coating condition “GOOD”</td>
<td>Condition with only minor spot rusting.</td>
</tr>
<tr>
<td>Coating condition “FAIR”</td>
<td>Condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.</td>
</tr>
<tr>
<td>Coating condition “POOR”</td>
<td>Condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.</td>
</tr>
</tbody>
</table>

2.2.11 For structures where original protective coatings are in GOOD condition, the extent of close-up examination and thickness measurements may be specially considered.
Special consideration as used in this context is taken to mean, as a minimum, that sufficient close-up examination and thickness measurements are carried out to confirm the actual average condition of the structure under the protective coating.
For areas with general breakdown of the protective coating, close-up examination and thickness measurements shall be carried out to an extent sufficient to determine both average and local corrosion levels.

2.2.12 The above also applies to tanks of stainless steel. If not otherwise specified, the same applies for re-coated structures (by epoxy coating or equivalent, alternatively a type approved coating, e.g. semi-hard), provided that the condition of the protective coating is in GOOD condition and that documentation is available stating that:
— the scantlings were assessed and found satisfactory by a surveyor prior to re-coating
— the coating was applied according to the manufacturer's recommendations.

2.3 Repair of structural damage or deterioration

2.3.1 A prompt and thorough repair is a permanent repair completed at the time of survey to the satisfaction of the surveyor, therein removing the need for the imposition of any associated condition of class.

Guidance note:
There are situations that composite repairs can be accepted on a case by case basis. For the procedure to be followed we refer to RP-0177. Class is involved before the application.
2.3.2 Any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the surveyor, will affect the unit's structural, watertight or weathertight integrity, shall be promptly and thoroughly repaired.

2.3.3 For locations where adequate repair facilities are not available, consideration may be given to allow the unit to proceed directly to a repair facility.

2.3.4 Additionally, when a survey results in the identification of significant corrosion or structural defects, either of which, in the opinion of the surveyor, will impair the unit's fitness for continued service, remedial measures shall be implemented before the unit continues in service.

3 Machinery and systems

3.1 Maintenance and preparation for survey

3.1.1 Every unit shall have implemented a maintenance system including machinery system and equipment subject to class (see Table 1).

The maintenance system shall ensure that:

— inspections and maintenance are carried out at defined intervals
— any non-conformity is reported with its possible cause, if known
— appropriate corrective action is taken
— records of these activities are maintained.

The machinery and systems subject to class shall be maintained in accordance with the maintenance system implemented.

Guidance note:
The maintenance system may be paper based or in a electronic format.

3.1.2 In preparation for survey and to allow for a thorough examination, machinery components and related spaces shall be cleaned, including removal from surfaces of loose accumulated corrosion scale, mud and oil-residues. The spaces and components of attention shall have proper access including dismantling as necessary.

3.2 Machinery verification

3.2.1 If significant repairs are carried out to main or auxiliary machinery, a dock and/or sea trial shall be carried out as required by the attending surveyor.

3.2.2 For propulsion systems where shaft alignment calculations have been required, the alignment shall be confirmed by suitable measurements when the system has been dismantled and or when external forces (e.g. grounding, welding work) may have influenced the alignment.

The measurements shall be carried out with the ship afloat and be presented to the attending surveyor.

Systems which require shaft alignment are specified in DNV rules for ships Pt.4 Ch.4 Sec.1 A403 and F400.

Guidance note:
For installation and testing refer to DNV rules for ships Pt.4 Ch.4 Sec.1 H300 and I100.
3.2.3 As an alternative to opening up for inspection, measurements may be carried on certain components such as vibration dampers, elastic couplings, speed governor and quick passing through device.

4 Special provisions for ageing offshore units

4.1 General

4.1.1 Mobile Offshore Units with age exceeding their initial design life (in many cases 20 years) shall be subject to evaluation for special provisions, both with respect to fatigue and coating/corrosion degradation.

4.1.2 The special provisions for maintaining required safety level is related to fatigue and corrosion condition of the hull and supporting structure. Degradation mechanisms due to ageing effects related to other aspects such as marine systems have also to be given due consideration by owner through maintenance, and by DNV GL surveyors through regular surveys.

4.2 Corrosion measurements and condition of protective coating

The special provisions with regard to condition of protection coating system and minimum measurements are included in the descriptions for the renewal survey as specified in Sec.3 [4]. In addition is referred to [2.2] with regard to thickness measurements and inspection of protective coatings in general.

4.3 Fatigue utilization index (FUI)

4.3.1 The FUI is defined as the ratio between the effective operational time and the initially documented fatigue life.

4.3.2 When the actual age of the unit exceeds the documented fatigue life, the fatigue utilisation index (FUI) shall be calculated for the following type of units:
— column-stabilised
— self-elevating.

4.3.3 FUI calculation is not required for ship-shaped units. These units have a more robust fatigue redundancy and are considered adequately covered by standard survey arrangements.

4.3.4 If fatigue cracks have been found in a unit prior to the FUI reaching 1.0, and the findings are located within fatigue sensitive areas of the unit, the owner shall assess structural details in these areas at latest prior to the renewal survey for the 5-year period.

4.3.5 Calculation of effective operational time shall be based on the recorded operation history. For the purpose of calculating the FUI, the following may be assumed:
— contribution from operation in harsh environment, e.g. North Sea, North Atlantic and Canada, equals actual operating time in such environment
— contribution from operation in other environments equals one third (1/3) of actual operating time in such environments
— periods of lay-up and yard stay may be disregarded
— for self-elevating units; contribution from transit operation.

4.3.6 The owner shall submit FUI as part of the planning process prior to renewal survey, see [4.3.2] above.

4.3.7 Operation of the unit may continue when FUI > 1.0 provided:
the required safety level of the vessel is maintained
— no fatigue cracks have been found in critical areas of the unit
— the inspection program is extended.

4.3.8 When the FUI > 1.0, the following measures will in general be taken:
— The Society will issue a MO (Memo to Owner) stating the actual FUI.
— The installed leak detection system for column stabilized units shall be examined for leakage two times each month and shall be confirmed at each annual survey.

Guidance note:
For additional inspections to self-elevating units, see RU-OU-0104 Pt.7 Ch.2 Sec.3

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4.3.9 For a unit with FUI > 1.0 and where cracks have been detected in fatigue sensitive areas, the required safety level is in general considered satisfied either by:
— increasing the inspection frequency (i.e. NDT scope with 2 1/2 year interval) or
— by performing a condition based assessment for the vessel.

Guidance note:
For additional inspections to self-elevating units, see rules for self-elevating units RU-OU-0104 Pt.7 Ch.2 Sec.3.

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Where a condition based assessment for the unit is performed, the procedure and method are to be approved prior to the renewal survey for the next 5-year period.

Guidance note:
A condition based inspection planning is performed by judging the vessel based on the actual condition rather than on age in order to maintain the required safety level. In this context a scope implementing all or parts of the following procedure can/should be performed:
— Apply the results from a fatigue analysis. The detail level of the analysis will influence the results. Higher detail level reduces the uncertainties and increases the confidence in the results and hence reduces the inspection frequency.
— Mapping of critical connections with regard to fatigue capacity, i.e. ranking of fatigue sensitive details.
— Identify details to be modified/upgraded with regard to fatigue strength.
— Determine required safety level – dependent on consequence and access for inspection.
— Apply the fatigue results in a risk based analysis (RBI) including historical data from inspections/findings and inspection quality for preparing the inspection program.
— Evaluate the result from inspections (findings) and/or analysis and perform modifications/improvements ensuring that the associated risks are adequately controlled.
— Perform a continuous updating of the inspection plan based on inspection results.

The inspection plan obtained from a condition based approach depends on the method and procedure applied, including the confidence level of the parameters considered. Less confidence increases the probability of failure (PoF) and hence the inspection frequency will increase.

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4.3.10 Previous cracks located in fatigue sensitive areas shall be subject to additional NDE at intermediate surveys corresponding to the extent of the NDE inspection required for the renewal surveys

4.3.11 Associated plans and procedures, i.e. condition based inspection plans applying risk based approach, shall be approved by the Society. The scope of the improvement program will depend on the initial assessment and owner's plans for further use of the unit. Units which have undergone an assessment and improvement program to the Society's satisfaction will be surveyed based on the modified inspection program.
SECTION 3 PERIODICAL SURVEY EXTENT FOR MAIN CLASS

1 General

1.1 Introduction

1.1.1 This section and Sec.4 presents the standard extent of surveys for retention of main class for mobile offshore units and for floating offshore installations as applicable for all service notations. The descriptions for the different surveys cover first requirements relevant for all vessel types followed by vessel type specific descriptions for subsequently ship-shaped, column-stabilised and self-elevating units.

1.1.2 Main class periodical survey scope includes the applicable service notation survey requirements as given in Sec.5.

1.1.3 Additional system and special facility covered by main class are given in Sec.4. Subsections for tailshaft (Sec.4 [1]) and thrusters for propulsion (Sec.4 [3]) are not applicable for OI class.

1.1.4 For units and installations with special feature notation Non-Self-propelled the survey scopes for steering gear, tailshaft and thrusters for propulsion may be adjusted to be in accordance with the intended use (e.g. for DYNPOS-AUTS, POSMOOR, as auxiliary installation, or not used).

1.1.5 The extent of the periodical survey on the unit’s structure is further detailed by the In-service Inspection Program (IIP) as described in [1.2].

1.2 In-service inspection program

1.2.1 IIP is developed on the basis of a general, experience-based scope in combination with design and fabrication particulars for the actual unit as well as experience from in-service surveys of units of similar type.

Guidance note:
Ship-shaped offshore units are not subject to Extended Hull Survey Requirements (EHSR) or Enhanced Survey Programs (as shown by the ESP class notation) as defined in the DNV rules for ships.

1.2.2 The default basic scope for development of IIP for MOU is given in Table 1 through Table 3. Depending on the level of the design documentation, the basic scope might be altered.

If the design documents the structural fatigue utilisation with considerable margins or if the unit has FMS notation (ref. Ch.2 Sec.6 [15]), the basic requirements for NDT inspection can be modified / reduced compared to the basic scope.

When the unit is operating in other environmental conditions than considered in the design, the inspection scope might as well be modified / changed, accounting for the actual application of the unit.

The owner/operator has the responsibility to provide the necessary documentation for class approval, when modification of the basic in-service inspection program is requested.

Guidance note:
The standard In-service Inspection Program (IIP) is a generic based program based on gained experience and accumulated knowledge from years of MOUs (and ships) surveys.

This inspection plan - level 1 - development, is a simple version of RBI (risk based inspection – where Risk = probability of failure × consequence of failure. This is denoted "basic RBI". This way of preparing the inspection program is mainly used where the design and fabrication information is limited (e.g. class transfer).
The second level, qualitative RBI, is based on the above “basic RBI” with the addition of design and fabrication particulars for the specific vessel. This might be detailed fatigue results, ultimate strength utilization, coating system applied etc. which will be combined as basis for preparing the in-service inspection plan. This approach is applied for units built according to DNV GL Rules and standards where experience from construction yard and approval centre are applied in preparing the inspection plan.

The third level is to prepare the in-service inspection program using a quantitative, refined probabilistic approach where uncertainties with different parameters affecting degradation; i.e. related to fatigue, coating, corrosion and wear and tear are analysed for determination of inspection intervals which secure the necessary safety level to be maintained.

The quantitative approach is performed as an advisory service as requested by owner/operator and the modified inspection plan is to be approved by class before being applied as the in-service inspection class plan.

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1.2.3 The extent of examination specified in the referred tables may be modified based on design documentation evaluation, inspection results / crack history and experience with similar units / details (defined as level 2 for the IIP)

1.2.4 The extent of examination specified in the referred tables may be refined by use of RBI methodologies (defined as level 3 for the IIP).

**Guidance note:**

At the 1st annual or intermediate survey after construction, column-stabilised and self-elevating units may be subject to examination of major structural components including non-destructive testing, as deemed necessary by the Society. If the Society deems such survey to be necessary, the extent should be agreed to by the Society and the owner or customer prior to commencement of the Survey.

For further guidance on RBI see also DNVGL-RP-C210 *Probabilistic methods for planning of inspection for fatigue cracks in offshore structures* and DNVGL-RP-C302 *Risk based corrosion management*.

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1.2.5 Detailed locations for thickness gauging will be prepared based on the condition of the unit and following the applicable tables in Sec.3 [4]. Measurements shall be recorded and stored in DNV GL’s structure integrity management (SIM) tool.
### Table 1 Basis scope for development of IIP for ship-shaped units

<table>
<thead>
<tr>
<th>Special areas for inspection 1) (SP) – connections:</th>
<th>TYPE OF SURVEY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>AS</strong></td>
</tr>
<tr>
<td></td>
<td><strong>INT</strong></td>
</tr>
<tr>
<td></td>
<td><strong>V</strong></td>
</tr>
<tr>
<td>SP1 Moonpool openings</td>
<td>C</td>
</tr>
<tr>
<td>SP2 Turret</td>
<td>A</td>
</tr>
</tbody>
</table>

**Attachments of:**

| SP5 Crane pedestals and top flange           | A      | A      | A      | X      | A      | X      | A      | A      | A      | A      |
| SP6 Anchor windlasses                        | X      | A      | X      | A      | A      | A      | A      |
| SP7 Anchor chain fairleads                   | C      | B      | C      | A      | A      | C      |
| SP8 Helideck, derrick and drill-floor support | X      | X      | X      | C      | A      | A      | A      | C      |
| SP9 Other attachment/support connections e.g. sponsons, life-boat support structure | X      | X      | X      | X      | A      | A      | X      |

**Primary areas for inspection (PR): 2)**

| PR4 Deck structure and turret                | X      | X      | X      | X      | X      | A      | A      |
| PR5 Drill floor with substructure            | X      | X      | X      | X      | X      | A      | A      |
| PR6 Crane/ gangway pedestal                  | X      | A      | A      | A      | A      | A      | A      |
| PR7 Lifeboat platforms support               | A      | A      | A      | A      | A      | A      |
| PR8 Helideck and flare support structure     | X      | X      | X      | A      | A      | A      | A      |
| PR9 Other support structures                 | X      | X      | X      | X      | A      | A      |

| A = 100% 4) | B = 50% 3) | C = 25% 3) |
| X = Spot check 2–5% 3) |
| V = Visual inspection including close visual inspection of special areas. |
| NDT = Non-destructive testing, normally Magnetic Particle Inspection (MPI) and/or Eddy Current (ECI) of selected stress concentrations and fatigue sensitive details. |

Notes:

1) Special areas for inspection (SP) are those sections of the structure which are in way of critical load transfer point, stress concentrations, often special steel selection etc. see listing in [4.3.2]

2) Primary areas for inspection (PR) are elements which are essential to the overall structural integrity of the unit.

3) See listing in [4.3.2]

4) - of the total number of these parts.

5) The inspection extent might be reduced (be less than 100%) if based on design documentation, see [1.2.2].
Table 2 Basis scope for development of IIP for column-stabilised units

<table>
<thead>
<tr>
<th>Special areas for inspection ¹) (SP) – Connections;</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1 Horizontal bracing</td>
<td>A</td>
</tr>
<tr>
<td>Pontoon to pontoon</td>
<td>A</td>
</tr>
<tr>
<td>SP2 Vertical diagonal bracing</td>
<td>B</td>
</tr>
<tr>
<td>SP3 Columns to pontoon</td>
<td>X</td>
</tr>
<tr>
<td>Column to deck</td>
<td>X</td>
</tr>
<tr>
<td>SP4 Main Barge girder/bulkhead.</td>
<td>X</td>
</tr>
</tbody>
</table>

Attachments of:

| SP5 Crane pedestals and top flange            | A | A | A | X | A | X | A | A | A |
| SP6 Anchor windlasses                         | X | A | X | A | A | A | C | ⁴ |
| SP7 Anchor chain fairleads and anchor bolsters| C | X | B | C | A | A | C | ⁴ |
| SP8 Helideck, derrick and drill-floor support | X | X | X | C | A | A | X |
| SP9 Other attachment/support connections, e.g. flare and life boat support structures | X | X | X | X | A | A | X | ⁸ |

Primary areas for inspection (PR); ²)

<p>| PR1 Horizontal bracings                       | A | A | A | A | A |
| PR2 Vertical diagonal bracings                | C | C | A | A |
| PR3 Column and pontoon shell                  | X | C | A | A |
| PR4 Upper hull girders/bulkheads              | X | X | X | X | A | A |
| PR5 Drill floor with substructure             | X | X | X | X | A | A |
| PR6 Crane/gangway pedestal                    | X | A | A | A | A | A |
| PR7 Lifeboat platforms support                | A | A | A |
| PR8 Helideck support structure                | X | X | X | A | A | A |
| PR9 Other support structures                  | X | X | X | X | A | A |</p>
<table>
<thead>
<tr>
<th>TYPE OF SURVEY</th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INT</td>
<td>EXT</td>
<td>INT</td>
</tr>
<tr>
<td>V</td>
<td>NDT</td>
<td>V</td>
<td>NDT</td>
</tr>
</tbody>
</table>

A = 100% 6)
B = 50% 5)
C = 25% 5)
X = Spot check 2-5% 5)

V = Visual inspection including close visual inspection of special areas
NDT = Non-destructive testing, normally Magnetic Particle Inspection (MPI) and/or Eddy Current (ECI) of selected stress concentrations and fatigue sensitive details

Notes:
1) Special area for inspection (SP) is those sections of the structure which are in way of critical load transfer point, stress concentrations, often special steel selection etc. see listing in [4.4.2].
2) Primary area for inspection (PR) are elements which are essential to the overall structural integrity of the unit. See listing in [4.4.2].
3) As a minimum centre bulkheads and corners to be covered.
4) May be waived if unit operating on DP.
5) - of the total number of these parts.
6) The inspection extent might be reduced (be less than 100%) if based on design documentation, see [1.2.2].
7) External NDT may be waived at IS if the unit has an approved leakage detection system according to guidelines issued by the Society.
8) Area adjacent to column connection to deck.
Table 3 Basic scope for development of IIP for self-elevating units

<table>
<thead>
<tr>
<th>TYPE OF SURVEY</th>
<th>AS (see IACS z15 3.3.5)</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INT</td>
<td>EXT</td>
<td>INT</td>
</tr>
<tr>
<td>V</td>
<td>NDT</td>
<td>V</td>
<td>NDT</td>
</tr>
</tbody>
</table>

Special areas for inspection 1) (SP) – connections:

| SP1 | Leg to spudcan 6) | X | X | A | A | A | A |
| SP2 | Leg nodes and splices above the waterline | X | A | A | X | A | A x 3, 9) |
| SP3 | Connections of primary members in jack house | A | A | A | X | A | A |
|     | Leg guides (IACS Z15 3.6) | X | A | A |
| SP4 | Main barge girder/bulkhead connections | X | X | X | X | A | A | X |
|     | Plating in way of leg well (IACS Z15 3.3.6) | A | A |

Attachments of:

| SP5 | Crane/gangway pedestals and top flange | A | A | A | X | A | X | A | A | A |
| SP6 | Support of drill floor and cantilever | A | A | A | A |
| SP7 | Windlass and anchor chain/wire fairleads | C | B | C | A | A | A | C 8) |
| SP8 | Helideck support | X | X | X | C | A | X | A | C |
| SP9 | Other attachment/support connections, e.g. flare and life boat support structures. | X | X | X | X | A | X | A | X |

Primary areas for inspection (PR): 2)

| PR1 | Spudcans | A | A | A |
| PR2 | Legs | X | A | A 7) | A |
| PR3 | Jack Houses | A | A | A |
| PR4 | Main Barge (deck structure) girders/bulkheads | X | X | A | A |
| PR5 | Drill floor with substructure and cantilever | X | X | X | X | A | A |
| PR6 | Crane/gangway pedestal | X | A | A | A | A | A |
| PR7 | Lifeboat platform structure | A | A | A |

Floating LNG/LPG production, storage and loading units

DNV GL AS
### TYPE OF SURVEY

<table>
<thead>
<tr>
<th></th>
<th>AS (see IACS z15 3.3.5)</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INT</td>
<td>EXT</td>
<td>INT</td>
</tr>
<tr>
<td>V  NDT  V  NDT  V  NDT  V  NDT  V  NDT  V  NDT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR8 Helideck and flare support structure</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PR9 Other support structures</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

A = 100%  
B = 50%  
C = 25%  
X = Spot check 2-5%  
V = Visual inspection including close visual inspection of special areas.  
NDT = Non-destructive testing, normally Magnetic Particle Inspection (MPI) and/or Eddy Current (ET) of selected stress concentrations and fatigue sensitive details.

**Notes:**

1) Special areas for inspection (SP) are those sections of the structure which are in way of critical load transfer point, stress concentrations, often special steel selection etc. see listing in [4.5.2]
2) Primary areas for inspection (PR) are elements which are essential to the overall structural integrity of the unit. See listing in [4.5.2]
3) At levels which have been in way of lower guided in operation, upper guides in transit and in way of spudcans.
4) - of the total number of these parts.
5) The inspection extent might be reduced (be less than 100%) if based on design documentation, see [1.2.2].
6) As part of the ‘spudcan and leg’ survey as defined in rules for self-elevating units, DNVGL-RU-OU 0104 Ch.8 Sec.5
7) For plate type legs, square or circular. examine also the pin holes IACS Z15 2.3.3).
8) May be waived if unit permanently operating on the field.
9) Only for leg nodes above the waterline. Leg nodes below the waterline are part of the ‘lower leg & spudcan’ survey.
2 Annual survey

2.1 Survey extent

2.1.1 Annual survey is a general survey of the hull and equipment, machinery and systems to confirm that the unit complies with the relevant rule requirements and is in satisfactorily maintained condition.

The survey will normally cover systems and parts for:
— structure and equipment
— machinery and safety systems
— temporary equipment as defined in Ch.1 Sec.1 [2.2].

The survey for the temporary equipment shall only confirm class involvement as specified in Ch.1 Sec.5 [2.7].

Guidance note:
The survey extent with regard to structure should follow the unit specific IIP as described in [1.2].

Survey requirements on towing and temporary mooring systems are covered by the separate survey scheme as described in Sec.4 [8]. Survey requirements on position mooring equipment and systems are covered by the voluntary notation POSMOOR as described in Sec.6.

2.1.2 The survey may be performed on location provided that the structure, including submerged parts, can be thoroughly inspected as specified in the in-service inspection programme. If required, underwater inspection shall be in accordance with an approved procedure, and using approved personnel and equipment.

2.2 Structure and equipment, general

2.2.1 The following requirements are applicable for all types of structural design. Specific type requirements, e.g. self-elevating, ship-shaped, column stabilized, are given in [2.3].

2.2.2 Any material alterations to the unit (its structural arrangements, subdivision, superstructure, fittings, and closing appliances upon which the stability calculations or the load line assignment is based) shall be surveyed and the relevant documentation to be reviewed.

(see IACS Z15 3.3.2)

2.2.3 If a loading instrument or loading computer system is available onboard it shall be verified that the system has a valid certificate.

It shall be documented that an annual check of the loading instrument/computer by running one of the test conditions has been carried out. If not, the surveyor shall verify the running of the test condition onboard.

Approved loading and stability information shall be verified available onboard. This information shall be the same as required when the unit was assigned class with the Society or at a later conversion of the unit, in accordance with the rule requirements applicable in each case.

2.2.4 The system for recording changes to the lightweight of the unit shall be examined.

(Ref. MODU code 3.1.4)

Guidance note:
For more information and guidance with regards to lightweight control is referred to DNVGL-OTG-12 Lightweight monitoring and control during the operational life-cycle.
2.2.5 Items which are important for the reserve buoyancy in connection with stability of the unit shall be surveyed. The survey shall include inspection of external and internal closing appliances, ventilators, air pipes and flame screens, side scuttles, windows including deadlights, freeing ports, shutters, windows including deadlights, etc., as well as an external inspection of scupper valves and sanitary valves. The closing devices for all air intakes and openings into accommodation spaces, service spaces, machinery spaces, control stations and approved openings in superstructures and deckhouses shall be examined. (see IACS Z15 3.3.3)

2.2.6 External and internal weather and watertight doors, hatches and dampers shall be examined and function tested. Tightness test to be carried out if found necessary.

2.2.7 Sea water inlets and discharges shall be examined from the internal side of the unit.

2.2.8 Remote control system for valves in bilge including emergency, ballast and cooling water systems shall be surveyed and tested.

2.2.9 It shall be checked as far as practically possible that draught marks are legible. Functionality and proper working of draught measurement gauges shall be confirmed.

2.2.10 Manual and automatic fire doors and dampers shall be examined and function tested.

2.2.11 Ventilation ducts and operation of ventilation including emergency stop for engine and boiler rooms to be verified.

2.2.12 Emergency escape breathing device (EEBD) shall be verified in order.

2.2.13 Means of protection of the crew, such as guard rails, bulwarks, walkways and lifelines to be examined.

Guidance note:
For units or installations subjected to annual load line survey by DNVGL, the requirements in [2.2.8] and [2.2.13] are covered by this survey. (see IACS Z15 3.3.3)

2.2.14 The appendix to the classification certificate and the documents referred to therein, shall be verified and kept available onboard the unit.

2.2.15 It shall be confirmed that the unit is operating within its approved design envelope as included in the appendix to classification certificate”.

2.2.16 Where the unit has an impressed current cathodic protection system, the annual overview readings from the system shall be examined.

2.2.17 Condition of protective coating shall be reported on according Sec.2 [2.2.8]. For areas with general breakdown of the protective coating, close-up examination and thickness measurements shall be carried out to an extent sufficient to determine both general and local corrosion levels.
2.2.18 Suspect areas (substantial corrosion previously defined) or areas where substantial corrosion is found at the survey being carried out, shall have thickness measurements extended following Table 4 as guidance.

**Table 4 Thickness measurements, extent and pattern in way of areas with substantial corrosion**

<table>
<thead>
<tr>
<th>Area/ Structural Member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating</td>
<td>Suspect area and adjacent plates</td>
<td>5 points over 1 m²</td>
</tr>
<tr>
<td>Stiffeners</td>
<td>Suspect area</td>
<td>3 points in line across web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 points in line across flange</td>
</tr>
</tbody>
</table>

Ref: IACS UR Z7 Table 2

**Guidance note:**

See Sec.2 [2.2] for the extend of thickness measurements.
See Sec.2 [4] for special provisions for ageing units.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

2.2.19 Means of escape

Means of escape from working and accommodation spaces to muster location, helideck and lifeboat embarkation deck shall be verified in order.

2.2.20 For units with bow or stern loading arrangement emergency escape routes from the associated control station shall be verified in order.

2.2.21 Safety management certificate

For units that shall comply with SOLAS Reg. IX/2, irrespective of the issuing authority for the Safety Management Certificate (SMC), the surveyor will complete a list of evidence of possible safety management system failures recorded on the occasion of the annual survey. The list will be submitted with the annual survey report.

2.3 Structure and equipment, type specific

2.3.1 Additional requirements for ship-shaped units

There are no additional requirements.

2.3.2 Additional requirements for column-stabilised units

Units or installations with submerged primary structural members allowing internal access for inspection may be omitted from external survey, subject to satisfactory results from the internal survey.

2.3.3 Primary structural members which are flooded shall be subject to external survey unless otherwise agreed. The extent of survey is given in the in-service inspection program, and will comprise visual inspection of vital parts and may include non-destructive testing of highly stressed areas.

2.3.4 The means for leakage detection of dry bracings shall be function tested. Records of owner’s routine testing and inspection of the area shall be reviewed. If owners routines are not duly followed up, external NDT of the column to brace connections may be required to be carried out.

2.3.5 Additional requirements for self-elevating units

A complete overview of the requirements is given in rules for self-elevating units, DNVGL-RU-OU 0104 Ch.8.
2.3.6 Additional requirements for units of other shape
The requirements for ship-shaped units shall be applied as far as practical.

2.4 Machinery and safety systems

2.4.1 All units
The survey shall include examination of spaces for machinery, boilers and incinerators, and equipment located therein, with particular attention to general cleanliness and maintenance with special attention to fire/explosion hazards.

2.4.2 The main and auxiliary steering gear arrangement (including azimuth arrangements of thrusters) shall be tested for proper functioning including test of alarm and safety functions.

2.4.3 As the surveyor deems necessary, running tests and/or opening of machinery, tests of safety devices and equipment with verification of integrity/ function of:
- jacketed high pressure fuel injection piping system
- shielding of flammable oil piping system
- insulation of hot surfaces exceeding 220ºC
- oil burning equipment on boilers, hot water heaters, incinerators and inert gas generators.

2.4.4 Remote shutdown for fuel-oil transfer service pumps and ventilating equipment, together with oil tank outlet valves where required to be capable of being remotely closed shall be proved satisfactory (quick closing valves).
(ref IACS UR Z15, 2.8.2)

2.4.5 Helifuel systems shall be examined with attention to general cleanliness, maintenance and fire/ explosion hazards.

2.4.6 Survey of boilers (oil/gas fired, exhaust heated, composite, electric heated and steam generators) shall be carried out according to DNVGL-RU-SHIP Pt.7 Ch.1 Sec.2.
These requirements are also applicable to steam/thermal oil heated steam generators.

2.4.7 The bilge and ballasting system and related subsystems, such as remote operation of pumps, valves and tank level indication shall be visually surveyed and tested.

2.4.8 For fire extinguishing systems the survey shall include:
- testing of the water fire fighting system i.e. fire pumps, fire mains, hydrants and hoses as deemed necessary
- verification of the international shore connection
- verification of the non-portable and portable fire extinguishers and portable foam applicators
- examination of the fire fighter’s outfit
- examination of the fixed fire extinguishing systems.

2.4.9 The following systems shall be surveyed and tested for correct functioning:
- fire detection and alarm system
- fixed gas detection and alarm system, both flammable and toxic
- general alarm system and communication between control stations.
(see IACS UR Z15 3.5 and 3.7)
2.4.10 For electrical installations the survey shall include:

— examination of main source of electrical power with respect to general condition, fire hazard and personnel safety, i.e. generators, main switchboards, distribution boards, control gear, consumers, chargers and battery/UPS systems
— test of automatic start and connection to the switchboard of the stand-by generator set by initiating shutdown of the running diesel generator causing black-out.

**Guidance note:**
During this test, the emergency generator should be disabled. The test is applicable for all **E0/ECO** vessels (built at any time) and all vessels constructed on or after 1 July 1998, where electricity is necessary for propulsion and steering.
For DP3 rigs with independent engine rooms and switchboard rooms, a total blackout is not required for this test, but a test of individual engine rooms is acceptable.
Applicable test records may replace the required testing.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
— inspection of insulation monitoring devices for all distribution systems. If in doubt of correct reading (ex. if the reading is infinity), the device shall be tested
— examination of cable installations with respect to general condition, support and physical protection
— examination of emergency source of electrical power with respect to general condition, fire hazard, personnel safety and function, i.e. generator, emergency switchboard, emergency distribution boards, control gear, chargers, emergency consumers and battery/UPS systems
— check if any modifications are done in the electrical system
— test of emergency power system, i.e. manual and automatic connection of generator/batteries to emergency switchboards, alternative start methods
— it shall be verified that records of inspections and maintenance of Ex- installations in accordance with the implemented maintenance system are kept available onboard
— verify that the document *Schedule of batteries* is kept up to date.

2.4.11 In hazardous area the following equipment and systems shall be surveyed and tested:

— ventilation systems shall be function tested. The tests shall include emergency stop systems and alarms for lost ventilation
— self-closing gastight doors and airlocks including other openings or accesses
— alarms or shutdown of pressurised equipment
— electrical equipment and cables
— devices for monitoring of insulation resistance or earth leak monitoring including alarms
— protection devices for combustion engines.
(see IACS UR Z15 3.5 and 3.7)

2.4.12 Control and monitoring systems for main and auxiliary machinery shall be surveyed including:

— propulsion machinery
— electric power generation and distribution
— steam generation
— thermal oil heating
— oil or gas burning equipment on incinerators, inert gas generators and hot water heaters.

The survey shall include:

— alarm functions
— safety functions
— remote control functions
— automatic control and shutdown functions
— remote back-up means of operation
— manual override
— electrical and mechanical condition, labels, signboards etc.
— control panels and local indicating instruments
— emergency lighting in engine room
— communication systems
— fire alarm and fire protection systems.
— verification of the change handling process for control and monitoring systems, see DNVGL-OS-D202 Ch.2 Sec.3.

Guidance note:
For units with notation E0 or ECO, see Sec.6 [10].

2.4.13 Emergency shutdown facilities shall be surveyed and tested.

Guidance note:
If operations make it difficult to carry out testing, a low level ESD is sufficient to comply to the above. As an alternative, a review of ESD test records can be done.

2.4.14 Additional requirements ship-shaped units
No additional requirements.

2.4.15 Additional requirements for column-stabilised units
No additional requirements.

2.4.16 Additional requirements for self-elevating units
A total overview of all relevant requirements is given in DNVGL-RU-OU 0104 Ch.8 Sec.4.

2.4.17 Additional requirements for units of other shape
No additional requirements.

3 Intermediate survey

3.1 General

3.1.1 Intermediate survey is a survey including visual examinations, measurements and testing as applicable, of the hull and equipment, machinery and systems, in order to confirm that the offshore unit complies with the relevant rule requirements and is in satisfactorily maintained condition. The required examinations, measurements and testing shall be carried out before the intermediate survey is regarded as completed.

3.1.2 The survey shall, in general, be carried out as the annual survey, but with extended visual inspection and non-destructive testing of the structure as given in relevant rules and in-service inspection programme (where relevant), see [1.2].

3.1.3 The survey may be performed on location provided that the structure, including submerged parts, can be thoroughly inspected as specified in the in-service inspection programme. If required, underwater inspection shall be in accordance with an approved procedure, and using approved personnel and equipment. (Ref. IACS Z15 4.1.3)
3.2 Structure and equipment

3.2.1 All units
Particular attention is to be given to corrosion prevention systems in ballast spaces, free flooding areas and other locations subjected to sea water from both sides.

3.2.2 Suspect areas identified shall be recorded for examination at subsequent annual surveys. Areas found with substantial corrosion, which are not repaired, shall also be recorded for thickness measurements at subsequent annual surveys.

3.2.3 For units over 5 years of age, the unit ballast tanks as specified in [3.2.5] to [3.2.7] respectively shall be internally examined, thickness gauged, placed in satisfactory condition as found necessary, and reported upon.
If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective.
(Ref IACS Z15 4.3)

3.2.4 For units over 10 years of age, the survey of sewage (black water) tanks and wastewater (grey water) tanks shall include:
— for integral tanks internal examination.
— Tanks with hard coating of internal structures recorded in GOOD condition at the previous renewal survey may be specially considered based on a satisfactory external examination.
The internal examination of tanks used in association with sewage treatment may be specially considered based on a satisfactory external examination and provided that an internal inspection has been carried out in accordance with onboard maintenance system during the last 12 months and relevant records are provided and confirmed.
— for independent tanks external examination including the tank supporting structures.
— thickness measurements shall be carried out as deemed necessary.

3.2.5 Additional requirements for ship-shaped units
The specific areas as mentioned in [3.2.3], are one peak tank and at least two other representative ballast tanks between the peak bulkheads used primarily for water ballast.
(see IACS Z15 4.3.2)

3.2.6 Additional requirements for column-stabilised units
The specific areas as mentioned in [3.2.3] are representative ballast tanks in footings, lower hull, or free-flooding compartments as accessible, and at least two ballast tanks in columns or pontoons.
(see IACS Z15 4.3.4)

3.2.7 Additional requirements for self-elevating units
A complete overview is given in RU-OU-0104 Ch.8 Sec.4.

3.2.8 Additional requirements for units of other shape
Requirements for ship-shaped units shall be applied as far as practical.

3.3 Machinery and safety systems – all units
There are no additional survey requirements.
4 Renewal survey, structure and equipment

4.1 General

4.1.1 Renewal survey is a major survey including visual examinations, measurements and testing of the hull and equipment, machinery and systems, in order to confirm that the unit complies with the relevant rule requirements and is in satisfactorily maintained condition.

The required examinations, measurements and tests shall be carried out before the renewal survey is regarded as completed.

Guidance note:
Survey requirements on towing and temporary mooring systems are covered by the separate survey scheme as described in Sec. 4 [8]. Survey requirements on position mooring equipment and systems are covered by the POSMOOR notation as described in Sec. 6[2].

4.1.2 Possible deficiencies shall normally be rectified before the renewal survey is regarded as completed. The Society may accept that minor deficiencies, recorded as condition of class, are rectified within a specified time limit, normally not exceeding 3 months after the survey completion date.

4.1.3 Surveys on location
Renewal surveys may be carried out on location without interrupting the function of the unit, provided that they are based on approved procedures outlined in a maintenance system and survey arrangement.

4.1.4 See also Ch. 2 Sec. 1 [12] for matters that will be taken into consideration for acceptance of surveys on location.

4.1.5 Provisions regarding fatigue safety factors and corrosion protection shall be in accordance with the following requirements:
— DNVGL-OS-C102 for ship-shaped units
— DNVGL-OS-C103 App.A for column-stabilised units

4.2 All units

4.2.1 An annual survey (ref [2]) shall be carried out as part of the renewal survey.
The extent of the survey on the structure is given in the IIP as described in [1.2], and will additionally include the requirements given in the remaining of this section.

4.2.2 Thickness measurements shall as a minimum be carried as specified in [4.3], [4.4] and [4.5] for respectively ship-shaped, column stabilized and self-elevating units.
Additional thickness measurements may be required where wastage is evident or suspect as evaluated during surveys.
4.2.3 Air pipe heads on exposed decks shall be externally and internally examined following the guidance note below. According to the results of the examination, the surveyor may require examination of other air pipe heads.

Guidance note:

<table>
<thead>
<tr>
<th>Vessel type</th>
<th>1st renewal survey</th>
<th>2nd renewal survey</th>
<th>3rd renewal survey</th>
</tr>
</thead>
</table>
| Ship-shaped | Preferably serving ballast tanks as follows:  
— one port and one starboard, forward  
— one port and one starboard, serving spaces aft.  
— all within 0.25 L from the forward end  
— at least 20% of those serving spaces aft, preferably serving ballast tanks | — all air pipe heads. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years. |
| All other units | Four randomly chosen, preferably serving ballast tanks | 25% of all the air pipes randomly chosen |

---end---of---g-u-i-d-a-n-c-e---n-o-t-e---

4.2.4 All tanks, compartments and free-flooding spaces throughout the unit are to be examined externally and internally for excess wastage or damage.

The survey shall include all structures, piping systems outside machinery area, i.e. plating and framing, valves, coupling, anodes, equipment for level indication, bilges and drain wells, sounding, venting, pumping and drainage arrangements.

Suspect and/or critical structural areas should be examined and may be required to be tested for tightness, non-destructive tested or thickness gauged.

4.2.5 For sewage (black water) tanks and wastewater (grey water) tanks the survey shall include:

— For integral tanks internal examination.

For units not exceeding 10 years of age the internal examination of tanks used in association with sewage treatment may be specially considered based on a satisfactory external examination and provided that an internal inspection has been carried out in accordance with onboard maintenance system during the last 12 months and relevant records are provided and confirmed.

— For independent tanks external examination including the tank supporting structures. Thickness measurements shall be carried out as deemed necessary.

4.2.6 Where provided, the condition of the corrosion prevention system of cargo oil tanks shall be examined.
### 4.2.7 Examination of fuel oil, lube oil and fresh water tanks shall be in accordance with Table 5.

Independent tanks in machinery spaces shall be externally examined including the tank supporting structures.

**Table 5 Minimum requirements for internal examination of service tanks**

<table>
<thead>
<tr>
<th>Tank</th>
<th>Age of unit, years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 5</td>
</tr>
<tr>
<td>Fuel oil/ diesel oil</td>
<td></td>
</tr>
<tr>
<td>— engine room/machinery space</td>
<td>None</td>
</tr>
<tr>
<td>— area outside engine room/machinery space</td>
<td>None</td>
</tr>
<tr>
<td>Lube oil</td>
<td>None</td>
</tr>
<tr>
<td>Fresh water 5)</td>
<td>None</td>
</tr>
</tbody>
</table>

**Notes:**

1) Tanks of integral (structural) type.
2) If a selection of tanks are accepted to be examined, then different tanks shall, as far as practicable, be examined at each renewal survey, on a rotational basis.
3) Peak tanks (all uses) are subject to internal examination at each renewal survey.
4) At renewal surveys no 3 and subsequent surveys, one deep tank for fuel oil outside engine room shall be included, if fitted.
5) Tanks for clean fresh water, i.e. potable water, boiler water and other holding tanks for clean fresh water. Tanks for mainly contaminated fresh water as waste water (grey water) and sewage (black water) shall be subject to internal examination as given in [4.2.5].

(see IACS UR Z7)

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

### 4.2.8 The watertight integrity of internal tanks, bulkheads, decks and other compartments shall be verified by visual inspection.

Special arrangements related to stability such as watertight closing appliances for openings in internal bulkheads and decks, cross-flooding, counter-flooding etc., shall be examined and tested if necessary.

Bulkhead shaft seals shall be verified. Dismantling shall be carried out where necessary to examine condition of the bulkhead seal.

**Guidance note:**

Documented maintenance may be considered as a base for extent of dismantling.
4.2.9 Pressure vessels, compartments and/or critical structural areas may be required pressure tested for tightness if found necessary due to actual suspect status condition as evaluated at survey. Testing of structures forming boundaries of double bottom, deep tanks, peak tanks and other tanks, including holds adapted for the carriage of water ballast, shall be performed as given in the guidance note below. The surveyor may require further testing. Testing of double bottoms and other spaces not designed for the carriage of liquid may be omitted, provided a satisfactory internal examination together with an examination of the tank top is carried out. Independent tanks in machinery spaces shall be tested as deemed necessary.

Guidance note:

<table>
<thead>
<tr>
<th>Tanks 1) to be tested</th>
<th>Test head or pressure</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballast tanks</td>
<td>Top of air pipe</td>
<td></td>
</tr>
<tr>
<td>Cargo holds adapted for carriage of ballast</td>
<td>Near the top of cargo hatch coaming</td>
<td>3)</td>
</tr>
<tr>
<td>Bilge water holding tanks</td>
<td>Top of air pipe</td>
<td>2) alternatively as for fuel oil tanks</td>
</tr>
<tr>
<td>Fuel oil tanks</td>
<td>Head of liquid to the highest point that liquid will rise under service conditions</td>
<td>2), 3)</td>
</tr>
<tr>
<td>Lub. Oil tanks</td>
<td>Head of liquid to the highest point that liquid will rise under service conditions</td>
<td>2)</td>
</tr>
<tr>
<td>Fresh water tanks</td>
<td>Head of liquid to the highest point that liquid will rise under service conditions</td>
<td>2), 3)</td>
</tr>
<tr>
<td>Sewage (black and grey water) tanks</td>
<td>Top of air pipe</td>
<td>As deemed necessary by the surveyor</td>
</tr>
<tr>
<td>Tanks containing other liquids</td>
<td>Head of liquid to the highest point that liquid will rise under service conditions</td>
<td>As deemed necessary by the surveyor</td>
</tr>
</tbody>
</table>

Notes:
1) Gravity tanks of integral type
2) Tanks within machinery spaces may be specially considered based on external examination of the tank boundaries and a confirmation from the master stating that no leakages or other defects have been observed during operation of the vessel.
3) Tanks within the cargo area may be specially considered based on a satisfactory external examination of the tank boundaries and a confirmation from the master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

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4.2.10 Remote level indicating systems for ballast tanks shall be surveyed and function tested.

4.2.11 Bottom survey
A bottom survey shall be carried out in accordance with Sec.4 [7] as part of the renewal survey. (Ref. IACS Z15 2.2.1)

4.2.12 Other underwater items
Sea chests and other sea inlets and discharges (above and below the waterline) with valves, including sanitary valves and scupper valves, shall be opened for survey. Alternative survey methods may be accepted upon special consideration provided equivalency to opening up is achieved.
4.2.13 Signboards
The presence of required signboards shall be verified.

4.2.14 Corrosion protection
The cathodic protection system of the submerged zone shall be surveyed by visual inspection. The efficiency of the system for the forthcoming 5-year period shall be confirmed. Corrosion in welds of vital parts which may be subject to fatigue shall be particularly considered. Potential measurements to be performed if deemed necessary.

4.2.15 Major appurtenances
Fixation of major appurtenances to the main structure shall be surveyed. These may typically include derrick structure, crane pedestals, helicopter decks, lifeboat platforms and heavy deck modules or skids.
### 4.3 Specific requirements for ship-shaped units

#### 4.3.1 Thickness measurements shall as a minimum be carried out as shown in Table 6.

**Table 6 Minimum Requirements for Thickness Measurements for Ship-shaped Units at Renewal survey**

<table>
<thead>
<tr>
<th>Renewal survey No.1</th>
<th>Renewal survey No.2</th>
<th>Renewal survey No.3</th>
<th>Renewal survey No.4 and subsequent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 0-5 years</td>
<td>Age 5-10 years</td>
<td>Age 10-15 years</td>
<td>Age &gt;15 years</td>
</tr>
<tr>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
<td>1) Suspect areas throughout the unit.</td>
</tr>
<tr>
<td>2) One transverse section of deck plating abreast the moon pool opening within the amidships 0.6L, together with internals in way as deemed necessary. Where the unit is configured with side ballast tanks, the plating and internals of the tanks are also to be gauged in way of the section chosen.</td>
<td>2) Two Transverse Sections (Girth Belts) of deck, bottom and side plating abreast the moon pool and one hatch opening within the amidships 0.6L together with internals in way as deemed necessary. Where unit is configured with side ballast tanks, the plating and internals of the tanks to be gauged in way of the required belts, Remaining internals in ballast tanks to be gauged as deemed necessary.</td>
<td>2) A minimum of three transverse sections (Girth Belts) of deck, bottom, side, and longitudinal-bulkhead plating in way of the moon pool and other areas within the amidships 0.6L, together with internals in way (including in perimeter ballast tanks, where fitted in way of belts).</td>
<td>2) A minimum of three transverse sections (Girth Belts) of deck, bottom, side, and longitudinal-bulkhead plating in way of the moon pool and other areas within the amidships 0.6L, together with internals in way (including in perimeter ballast tanks, where fitted in way of belts).</td>
</tr>
<tr>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>3) Moon pool boundary bulkhead plating.</td>
<td>3) Moon pool boundary bulkhead plating.</td>
</tr>
<tr>
<td>4) Internal in forepeak tank as deemed necessary.</td>
<td>4) Internal in forepeak tank as deemed necessary.</td>
<td>4) Internal in forepeak tank as deemed necessary.</td>
<td>4) Internal in forepeak tank as deemed necessary.</td>
</tr>
<tr>
<td>5) Selected air pipes and ventilator coamings on exposed main deck.</td>
<td>5) Selected air pipes and ventilator coamings on exposed main deck.</td>
<td>5) Selected air pipes and ventilator coamings on exposed main deck.</td>
<td>5) Selected air pipes and ventilator coamings on exposed main deck.</td>
</tr>
</tbody>
</table>

**Notes:**
1) if considered necessary by the attending surveyor.
2) to 10) mandatory thickness measurements, number and extent of thickness measurement requirements may be modified by the surveyor considering the corrosion protection condition and arrangements.
4.3.2 Inspection area categorisation

Application categories for structural components to be inspected as referred in Table 6, are defined in Table 1.

Special areas for inspection:
- Connections of bulkheads, stiffeners, flats or decks in the moonpool area. Moonpool corners and attachments.
- Turret – connections within structure at support.
- External brackets, portions of bulkheads, and frames which are designed to receive concentrated loads at intersections of major structural members.
- Support connections for helideck, derrick and drill-floor etc.
- Highly utilised areas supporting anchor line fairleads and winches, crane pedestals, flare towers/booms etc.
- Other support areas – lifeboat platform supports etc.

Primary areas for inspection:
- Structural members of bulkheads, stiffeners, flats or decks and girders in deck structure and turret.
- Deck plating, heavy flanges, and bulkheads within the upper hull or platform which form “box” or “I” type supporting structure.
- Bulkheads, decks, stiffeners and girders which provide local reinforcement or continuity of structure in way of intersections, except areas where the structure is considered for special application.
- Main support structure of heavy sub-structures and equipment, e.g. anchor line fairleads, cranes, drill-floor substructure, lifeboat platform, thruster foundation and helicopter deck.

Other areas for inspection:
- Upper platform decks, or decks of upper hulls except areas where the structure is considered primary or special areas for inspection.
- Deckhouses.
- Other structures not categorised as special or primary.
4.4 Specific requirements for column-stabilised units

4.4.1 Thickness measurements shall be carried out as shown in Table 7.

**Table 7 Minimum requirements for thickness measurements – column-stabilised units**

<table>
<thead>
<tr>
<th>Id.</th>
<th>Area</th>
<th>Renewal survey No.1 Age 0-5 years</th>
<th>Renewal survey No.2 Age 5-10 years</th>
<th>Renewal survey No.3 Age 10-15 years</th>
<th>Renewal survey No.4 and subsequent Age &gt;15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
</tr>
<tr>
<td>2</td>
<td>Structural components of Special and Primary areas for inspection</td>
<td>Areas with indication of wastage.</td>
<td>Areas with indication of wastage.</td>
<td>Areas with indication of wastage.</td>
<td>Areas with indication of wastage.</td>
</tr>
<tr>
<td>3</td>
<td>Bracings</td>
<td>Representative plates in splash zone. Internals as deemed necessary.</td>
<td>Representative plates and internals in splash zone. Representative plates and stiffeners at the connection to column/pontoon and bracings (k-nodes).</td>
<td>Representative plates and internals in splash zone. Representative plates and stiffeners at the connection to column/pontoon and bracings (k-nodes).</td>
<td>Representative plates and interns in splash zone. Representative plates and stiffeners at the connection to column/pontoon and bracings (k-nodes).</td>
</tr>
<tr>
<td>4</td>
<td>Columns</td>
<td>Representative plates in splash zone. Internals as deemed necessary.</td>
<td>Representative plates and internals in splash zone. Selective plates and stiffeners of selective seawater tanks.</td>
<td>Representative plates and internals in splash zone. Selective plates and stiffeners of selective seawater tanks.</td>
<td>Representative plates and internals in splash zone. Selective plates and stiffeners of selective seawater tanks.</td>
</tr>
<tr>
<td>5</td>
<td>Pontoons</td>
<td></td>
<td>One girth belt of each pontoon. Selective tank top plates of selective seawater tanks.</td>
<td>Two girth belts of each pontoon. Selective tank top plates of all seawater tanks.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Column and/or Pontoon seawater tanks used for trimming the vessel</td>
<td></td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Chain lockers</td>
<td></td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exposed upper hull where “box” or “I” beams receive major concentrated loads</td>
<td></td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
</tr>
</tbody>
</table>


Floating LNG/LPG production, storage and loading units
<table>
<thead>
<tr>
<th>Id.</th>
<th>Area</th>
<th>Renewal survey No.1 Age 0-5 years</th>
<th>Renewal survey No.2 Age 5-10 years</th>
<th>Renewal survey No.3 Age 10-15 years</th>
<th>Renewal survey No.4 and subsequent Age &gt;15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Main supporting structure of heavy substructures and equipment. e.g. crane pedestal, drill floor substructure, lifeboat platform and helicopter deck</td>
<td></td>
<td></td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
</tr>
<tr>
<td>10.</td>
<td>Structural components of Special category other than under 3-9 above. (These areas are normally identified in the IIP)</td>
<td></td>
<td></td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
</tr>
<tr>
<td>11</td>
<td>Air pipes and ventilators</td>
<td>Selected air pipes and ventilator coamings on exposed main deck.</td>
<td>All air pipes and ventilator coamings on exposed main deck.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1) and 2) if considered necessary by the attending surveyor
3) to 11) mandatory thickness measurements, number and extent of thickness measurement requirements may be modified by the surveyor considering the corrosion protection condition and arrangements.

**Guidance note:**
Sample of structures prone to rapid wastage:
- Areas of columns and bracings without an efficient/intact hard epoxy coating system in way of the splash zone.
- Column and pontoon seawater tanks without an efficient/intact hard epoxy coating system.
- Chain lockers.

---end---of---guide---note---

**4.4.2 Inspection area categorisation**
Application categories for structural components to be inspected as referred in Table 7, are defined in Table 2. **Special areas for inspection:**
- Connections of bulkheads, stiffeners, flats or decks and girders in vertical columns, decks, lower hulls diagonals.
- Portions of deck plating, heavy flanges, and bulkheads within the upper hull or platform which form “box” or “I” type supporting structure which receive major concentrated loads.
- External shell structure in way of intersections of vertical columns, decks and lower hulls.
- Major intersections of bracing members.
- “Through” material used at connections of vertical columns, upper platform decks and upper or lower hulls which are designed to provide proper alignment and adequate load transfer.
— External brackets, portions of bulkheads, and frames which are designed to receive concentrated loads at intersections of major structural members.
— Highly utilised areas supporting anchor line fairleads and winches, crane pedestals, flare etc.

Primary areas for inspection:
— Bulkheads, stiffeners, flats or decks and girders in vertical columns, decks, lower hulls diagonals.
— Deck plating, heavy flanges, and bulkheads within the upper hull or platform which form “box” or “I” type supporting structure which do not receive major concentrated loads.
— External shell structure of vertical columns, lower and upper hulls, and diagonal and horizontal braces.
— Bulkheads, decks, stiffeners and girders which provide local reinforcement or continuity of structure in way of intersections, except areas where the structure is considered for special application.
— Main support structure of heavy substructures and equipment, e.g. anchor line fairleads, cranes, drillfloor substructure, life boat platform, thruster foundation and helicopter deck.

Other areas for inspection:
— Upper platform decks, or decks of upper hulls except areas where the structure is considered as primary or special areas for inspection.
— Bulkheads, stiffeners, flats or decks and girders in vertical columns, decks, lower hulls, diagonal and horizontal bracing, which are not considered as primary or special application.
— Deckhouses.
— Other structures not categorised as special or primary.

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

(See MODU code 3.1.5.1)

Interpretation:
A lightweight survey or inclining test, in accordance with an approved procedure, should be carried out in protected waters, and in presence of and to the satisfaction of the attending surveyor. The report, endorsed by the surveyor, shall be submitted for approval immediately after the test.

An indisputably conservative vertical centre of gravity will normally be at the drill floor level.

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4.4.4 If the survey or test at the first renewal survey demonstrated that the unit was maintaining an effective weight control programme, and at succeeding renewal surveys this is confirmed by the records under paragraph [2.2.4], light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the actual displacement based upon draught readings exceed 1% of the operating displacement, a lightweight survey shall be completed in accordance with paragraph [4.4.3].

(See MODU code 3.1.5.2)

Guidance note:
This item applies to units constructed in accordance with the IMO MODU Code 2009. The Society may accept, based on a review of the relevant documentation, that the option is also used for units constructed in accordance with earlier versions of the Code and class requirements. It is a provision that the preceding lightweight surveys have documented that the unit was maintaining an effective weight control programme. For more information and guidance with regards to lightweight control is referred to DNVGL-OTG-12 Lightweight monitoring and control during the operational life-cycle.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
4.5 Specific requirements for self-elevating units

4.5.1 For thickness measurements shall in general be carried out as presented in Table 8.

**Table 8 Minimum requirements for thickness measurements – Self elevating units**

<table>
<thead>
<tr>
<th>Id.</th>
<th>Area</th>
<th>Renewal survey No.1 Age 0-5 years</th>
<th>Renewal survey No.2 Age 5-10 years</th>
<th>Renewal survey No.3 Age 10-15 years</th>
<th>Renewal survey No.4 and subsequent Age &gt;15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
</tr>
<tr>
<td>2</td>
<td>Structural components of Special and Primary category</td>
<td>Areas with indication of wastage.</td>
<td>Areas with indication of wastage.</td>
<td>Areas with indication of wastage.</td>
<td>Areas with indication of wastage.</td>
</tr>
<tr>
<td>3</td>
<td>Legs</td>
<td>Representative chords and bracings/plate and stiffeners in way of splash zone.</td>
<td>Representative chords and bracings/plate and stiffeners in way of splash zone and at connections to mat/spudcan.</td>
<td>Representative chords and bracings/plate and stiffeners in other levels.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mat or spudcan connections to legs and main structural bulkheads of mat or spudcan.</td>
<td>Representative plates, bulkheads and stiffeners.</td>
<td>Representative plates, bulkheads and stiffeners.</td>
<td>All plates, bulkheads and stiffeners.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Jackhouse and load transfer area (external and in way of preload tanks) including leg wells and lower guides.</td>
<td>Representative plates and stiffeners</td>
<td>Representative plates and stiffeners</td>
<td>All plates and stiffeners.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Upper Hull exposed deck and bottom plating.</td>
<td>Representative plates.</td>
<td>Representative plates.</td>
<td>All plates.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Upper hull “Box” or “I” type sections Main supporting structure.</td>
<td>Representative plates and stiffeners</td>
<td>Representative plates and stiffeners</td>
<td>Representative plates and stiffeners</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Preload tanks</td>
<td>Representative structure of one preload (seawater) tank.</td>
<td>Representative structure of two preload (seawater) tanks.</td>
<td>Representative structure of all preload (seawater) tanks.</td>
<td></td>
</tr>
<tr>
<td>Id.</td>
<td>Area</td>
<td>Renewal survey No.1 Age 0-5 years</td>
<td>Renewal survey No.2 Age 5-10 years</td>
<td>Renewal survey No.3 Age 10-15 years</td>
<td>Renewal survey No.4 and subsequent Age &gt;15 years</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Main supporting structure of heavy substructures and equipment. e.g. crane pedestal, cantilever and drill floor substructure, lifeboat platform and helicopter deck.</td>
<td></td>
<td></td>
<td>Representative plating and stiffeners.</td>
<td>Representative plating and stiffeners.</td>
</tr>
<tr>
<td>10</td>
<td>Structural components of Special or Primary category other than under 3-7 above. (These areas are normally identified in the IIP).</td>
<td></td>
<td></td>
<td>Representative plating and stiffeners.</td>
<td>Representative plating and stiffeners.</td>
</tr>
<tr>
<td>11</td>
<td>Air pipes and ventilators</td>
<td></td>
<td>Selected air pipes and ventilator coamings on exposed main deck.</td>
<td>All air pipes and ventilator coamings on exposed main deck.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Plating of sea chest</td>
<td></td>
<td></td>
<td>All plating of sea chest</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1) and 2) if considered necessary by the attending surveyor.
3) to 12) mandatory thickness measurements, number and extent of thickness measurement requirements may be modified by the surveyor considering the corrosion protection condition and arrangements.

**Guidance note:**
Sample of structures prone to rapid wastage:
- Areas of legs without an efficient/intact hard epoxy coating system in way of the splash zone.
- Upper hull seawater tanks without an efficient/intact hard epoxy coating system.

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**4.5.2 Application categories for structural components to be inspected referred in Table 8 are defined in Table 3.**

**Special areas for inspection:**
- Vertical columns in way of intersection with the mat structure (spudcan).
- Highly stressed elements of bottom of leg, including leg connection to spudcan or mat.
- Intersections of lattice type leg structure, which incorporates novel construction, including the use of steel castings.
- Highly stressed elements of guide structures, jacking and locking system(s), jackhouse and support structure.
- Highly stressed elements of crane pedestals, etc. and their supporting structure.
Primary areas for inspection:
— Combination of bulkhead, deck, side and bottom plating within the hull which form “Box” or “I” type main supporting structure.
— All components of lattice type legs and external plating of cylindrical legs.
— Jackhouse supporting structure and bottom footing structure, which receives initial transfer of load from legs.
— Internal bulkheads, shell and deck of spudcan or bottom mat supporting structures which are designed to distribute major loads, either uniform or concentrated, into the mat structure.
— Main support structure of heavy substructures and equipment, e.g. cranes, drill floor substructure, life boat platform and helicopter deck.

Other areas for inspection:
— Deck, side and bottom plating of hull except areas where the structure is considered primary or special application.
— Bulkheads, stiffeners, decks and girders in hull that are not considered as primary or special application.
— Internal bulkheads and girders in cylindrical legs.
— Internal bulkheads, stiffeners and girders of spudcan or bottom mat supporting structures except where the structures are considered primary or special areas for inspection.

4.5.3 A complete overview is given in DNVGL-RU-OU 0104 Ch. 8 Sec.4[3].

4.6 Specific requirements for units of other shape
The requirements for ship-shaped units shall be applied as far as practical.

5 Renewal survey, machinery and systems

5.1 General
Machinery systems and equipment are covered by the renewal survey as described in [5.2] and separate surveys as listed below.
— Tailshaft survey, see Sec.4 [1].
— Propeller connection survey, see Sec.4 [2].
— Survey of Thrusters for main propulsion or dynamic positioning, see Sec.4 [3] and Sec.4 [4]
— Boiler survey, including steam generator, see Sec.4 [5]
— Thermal oil heater, see Sec.4 [6]

The renewal survey may be replaced by alternative survey arrangements as discussed in Sec.7.

5.2 Machinery

5.2.1 Machinery systems shall be examined and tested according to Sec.7 Table 1.

5.2.2 Settling tank and daily service tanks for heavy fuel oil and diesel oil as well as lubrication oil circulation tanks assessed with respect to tank cleanliness.
If inspection and cleaning have been carried out by the crew during the last 12 months and relevant log extracts are provided and confirmed, this may be credited as surveyed at the surveyor’s discretion.
Opening up of tanks may be required as found necessary by the surveyor.

5.2.3 Auxiliary thrusters shall be examined and tested as follows:
— oil analysis of gear house oil and oil for the CP mechanism
— examination of gear and bearings through inspection openings or by other means
— examination of external piping systems
— examination of bearings, gear and shafts and other relevant parts if any indications of abnormalities are observed. Satisfactory maintenance according to manufacturer’s recommendations to be documented and considered as a base for extent of possible opening.

Opening to be carried out normally at least every 10 years. Any opening up of a thruster shall be witnessed by a surveyor of the Society
— function testing of sealing arrangements
— function testing of lubrication and hydraulic oil system
— function testing of CP mechanism
— function testing of thruster unit including alarm system.

**Guidance note:**
It is advised to take oil analysis at regular intervals and always prior to docking in order to ensure that there is no need for opening of the thruster (e.g. water in the oil).

---end---of---guidance---note---

5.2.4 For units with gas turbine installations the survey shall include verification of records and major overhaul reports onboard.

Major overhaul on gas turbines shall be performed by either the original equipment manufacturer (OEM) or an OEM authorized company.

5.2.5 For non self-propelled units (e.g. most jack ups or semis where the vessel is not intended to do a rig move under its own power) with propellers or thrusters, the renewal survey shall ensure the watertight integrity of the (shaft) sealing of the hull.

5.3 Electrical installations

5.3.1 The survey shall comprise examination of the electrical installations with regard to fire and explosion hazards and injury from accidental touching. The survey is also to include testing of correct functioning of equipment covered by class requirements.

5.3.2 As far as practicable, the following equipment shall be examined for satisfactory condition:
— main and emergency switchboards
— generators
— distribution boards
— motor starters
— electrical motors
— converters (e.g. transformers, rectifiers, chargers)
— cable installations
— enclosures for electrical equipment
— lighting equipment
— heating equipment
— battery installations.

5.3.3 The following tests shall be carried out to the extent deemed necessary by the surveyor to ascertain the proper functioning of the equipment:
— generator full load test
— generator parallel operation
— generator protection relays including non-important load trip, if fitted
— generator remote speed control
— generator synchronising equipment
— power plant interlocking systems
— insulation resistance indicating device
— emergency generator including switchboards
— battery chargers
— mechanical ventilation of battery rooms and lockers
— navigation lights, with controllers including alarms
— electrical motors for essential and important use
— interlocking and/or alarms for pressurised rooms and equipment
— Emergency generator – auto start following loss of main supply

Protection relays in generator and bus tie circuit breakers shall be tested with secondary current injection, or with suitable apparatus made for testing of the installed protection units.

5.3.4 Records of insulation test shall be shown to the surveyor. This requirement may be waived if:
— testing of all individual motors is included and logged in the planned maintenance system, and
— the insulation monitoring alarms required by DNVGL-OS-D202 Ch.2 Sec.2 are integrated in the machinery alarm.

**Guidance note:**
Megger testing may involve risk of explosion due to sparks. Therefore appropriate procedures for such work should be followed as relevant e.g., “gas free certificate”.
Ex equipment should include Ex motors and Ex junction boxes and Ex enclosures.

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5.3.5 Electrical equipment in hazardous areas shall be examined with respect to:
— corrosion
— flameproof enclosure/ingress
— no unauthorised modification
— correct rating of lamps
— earthing (spot check)
— function testing of pressurised equipment and of associated alarms
— testing of insulation resistance of power circuits (Ex p, Ex e and Ex n). Where proper records of testing are maintained consideration may be given to accepting recent readings (maximum 12 months) by the ship’s crew
— insulation monitors with alarms shall be function tested, if installed
— for rooms protected by air locks, interlocking with ventilation of electrical supply to non-explosion protected equipment and de-energising of such equipment in case of ventilation failure shall be examined and function tested as applicable.

**Guidance note:**
Megger testing may involve risk of explosion due to sparks. Therefore appropriate procedures for such work should be followed as relevant e.g., “gas free certificate”.
Ex equipment to include Ex motors and Ex junction boxes and Ex enclosures.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
5.4 Safety and control systems

5.4.1 Correct functioning of the various parts of the following systems shall, as far as applicable, be verified:
— alarm and safety system
— manual control of machinery
— remote control of propulsion machinery
— remote control of position keeping machinery
transfer of control to local control stations.

Guidance note:
For units with notation E0 or ECO, see Sec.6 [10].

5.4.2 When cancelling of automatic load reduction and/or automatic stop of engine are provided, these functions shall be demonstrated to the satisfaction of the surveyor.

5.4.3 Emergency switch(es) for all electrical equipment including main and emergency generators, except alarm and communication systems and lighting in vital areas such as escape routes and landing platforms, shall be proved satisfactory (by a combination of testing and review of maintenance records).
(see IACS UR Z15, 2.8.2)

Guidance note:
The above implies a complete test of the ESD system in the presence of DNVGL. Approved cause and effect diagrams should be available if possible.
SECTION 4 MISCELLANEOUS MAIN CLASS SURVEYS

1 Propeller shaft survey

1.1 General

1.1.1 The propeller shaft shall be drawn to permit examination of the shaft and the following parts:

- propeller shaft bearing areas
- stern bushes or bearings
- shaft sealing arrangement, including lubricating oil system
- aft bearing clearances to be measured/calculated and recorded
- oil level monitoring of lubricating oil system.

Guidance note:
Bearing clearances to be measured or calculated from wear down measurements and clearance from new building or last shaft withdrawal.

---end---of---guidance---note---

1.1.2 For oil lubricated propeller shafts with type approved sealing glands, the withdrawal of the propeller shaft may be exempted at alternate surveys, i.e. extended to 10 years intervals, provided the following items have been examined with satisfactory result (reduced scope):

- new oil seals should be fitted
- oil sealing contact surfaces in order
- aft bearing clearances measured/calculated and recorded
- oil level monitoring of lubricating oil system
- oil analysis (not older than 3 months) in order.

Guidance note:
Bearing clearances to be measured or calculated from wear down measurements and clearance from new building or last shaft withdrawal.

---end---of---guidance---note---

In addition to the above, a propeller connection survey in accordance with [2.1.1] shall be carried out for propeller shafts with a keyway.

Guidance note:
The lubricating oil analysis should include the minimum parameters:

- water content
- chlorides content (sodium and magnesium)
- content of bearing metal particles (iron, aluminium, nickel, chromium, copper, tin, and lead)
- content of other particles (silicon)
- oil aging, resistance to oxidation (TAN, TBN)
- oil sample should be taken under service conditions.

---end---of---guidance---note---

2 Propeller connection survey

2.1 General

2.1.1 For arrangements where the propeller is mounted on a keyed taper the following shall be examined after the propeller is backed off:
— propeller shaft threaded end
— propeller shaft taper and keyway
— propeller hub taper and keyway
— key
— NDT of fore part of the shaft taper and shaft keyway by an approved crack detection method.

2.1.2 For arrangements where the propeller is mounted on a keyless taper, or by means of a cylindrical/conical sleeve the following shall be examined after the propeller is backed off:
— propeller shaft threaded end
— propeller shaft tapered or cylindrical section
— propeller hub taper
— NDT of the fore part of the shaft taper, or shaft cylinder, by an approved crack detection method.

2.1.3 For arrangements where the propeller hub is fitted to a flange coupling or a forged propeller shaft flange the following shall be examined:
— visual inspection of the flange and its fittings
— tightness of bolts or nuts
— NDT of the flange fillet radius, by an approved crack detection method, may be required if the visual examination of the area is not satisfactory.

Guidance note:
For tailshaft condition monitoring see Sec.6 [19.3].

2.2 Dismantling of propellers
Dismantling of keyed propellers will be required at intervals of maximum 5 years, and keyless propellers every 15 years. The following parts shall be surveyed as applicable:
— propeller nut
— tailshaft threaded end
— key and cone including examination of the keyway and the fore part of the taper by an approved crack detection method.

3 Survey of geared thrusters for main propulsion and positioning

3.1 Definitions

3.1.1 Thrusters for dynamic positioning are thrusters incorporated in systems for dynamic positioning of units, where the unit has been granted the additional class notation DYNPOS or DPS.

3.1.2 Thrusters for position mooring are thrusters incorporated in systems for thruster assisted position mooring of units, where the unit has been granted the additional class notation POSMOOR-TA or POSMOOR-ATA.

3.1.3 Thrusters for propulsion are defined as thrusters which are intended for propulsion or propulsion and steering of the unit during sea voyage.

3.2 Survey extent
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.5 [4].
4 Survey of podded thrusters for main propulsion and positioning

4.1 General

4.1.1 The requirements in this sub-section apply to thrusters of podded design, here after denoted pods, for propulsion and positioning of the unit.

4.1.2 Pod survey implies a survey of the pod’s internal power transmission elements and driving motor enclosed in the pod, strut and steering column.

Pods have two scheduled surveys:
— annual
— complete.

For some pod sizes it will be limited access from inside the unit and annual survey should be done to the extent that is practically possibly. Complete survey might require some dismantling.

4.1.3 Parts of the survey may be replaced by an approved condition monitoring arrangement, see DNV Classification Note 10.2.

4.1.4 At each overhaul, all relevant parts of the components made accessible shall be presented for survey by the Society, see DNVGL-RU-SHIP Pt.7 Ch.1 Sec.5 [5.2].

Assembly and mounting on board shall be verified and tested.

4.2 Scheduled surveys

See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.5 [5.2].

5 Boiler survey

Survey of boilers (oil/gas fired, exhaust heated, composite, electric heated and steam generators) shall be carried out according to DNVGL-RU-SHIP Pt.7 Ch.1 Sec.5 [6].

These requirements are also applicable to steam/thermal oil heated steam generators.

6 Thermal oil heater survey

Survey of thermal oil heaters shall be carried out according to DNVGL-RU-SHIP Pt.7 Ch.1 Sec.5 [7].

7 Survey of the unit's bottom and related items

7.1 Schedule

7.1.1 The outside of the unit’s bottom and related items shall be examined two times in any five (5) year period, with an interval not exceeding three (3) years between examinations.

(See MODU Code 1.6.1.5)

Guidance note:
Non-metallic expansion joints in piping systems, if located in a system which penetrates the unit’s side and both the penetration and the non-metallic expansion joint are located below the deepest load waterline, should be inspected as part of the bottom survey and replaced as necessary, or at an interval recommended by the manufacturer (See MODU Code 4.11.3).

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
7.1.2 Consideration may be given at the discretion of the Society, and with acceptance of the flag, to any special circumstances justifying an extension of the interval.

7.2 Survey planning and record keeping
Plans and procedures for these surveys shall be submitted for review in advance of the survey and made available on board.

Guidance note:
External survey of Thrusters – see [3] and [4]
Seachests, overboard valves – see Sec.3 [4.2.14]
Corrosion protection - see Sec.3 [4.2.16]
The Society may consider alternative methods for providing adequate assurance that a unit's bottom is in a satisfactory condition. An example of such a consideration is to carry out the bottom survey afloat. (See Sec.8 [1.3]).
A survey based on such alternative methods is subject to acceptance by the relevant flag administration. (See MODU Code 1.6.2.5)
The Society may consider alternative methods for providing adequate assurance that a unit's bottom is in a satisfactory condition for units not subjected to either MODU Code or SOLAS requirements.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

7.3 Ship-shaped units (ship or barge type units)

7.3.1 External surfaces of the hull, keel, stem, stern frame, rudder, nozzles, and sea strainers shall be selectively cleaned to the satisfaction of the attending surveyor and examined together with appendages, the propeller, exposed parts of stern bearing assembly, rudder pintle and gudgeon securing arrangements, sea chest and strainers, and their fastenings (as applicable).

7.3.2 Propeller shaft bearing, rudder bearing, and steering nozzle clearances (as applicable) shall be ascertained and reported upon.
(See IACS Z15 4.2.1)

7.4 Column-stabilised units
External surfaces of underwater areas forming part of the buoyant volume when the unit is afloat shall be examined.

7.5 Self-elevating units
See DNVGL-RU-OU 0104 Ch.8 Sec.5.

7.6 Other units
External surfaces of underwater areas forming part of the buoyant volume when the unit is afloat shall be examined.

8 Survey of towing and temporary mooring equipment

8.1 Annual survey
Towing and temporary mooring equipment shall be subject to visual inspection and review of certificates and maintenance records.
8.2 Renewal survey

8.2.1 Towing
Towing equipment are to be subject to visual inspection and review of certificates and maintenance records. NDT may be requested depending on condition and service history.

8.2.2 Temporary mooring
Temporary mooring equipment shall be subject to visual inspection and review of certificates and maintenance records.

Windlass, including piping system and foundations shall be examined.
The anchors and chain cables shall be ranged, examined and the required complement and condition verified.
The anchor shackle or swivel, anchor head, flukes and shank shall undergo close visual inspection. If found necessary, NDT shall be carried out with particular attention to the bolts fitted to certain designs for altering the fluke angle.
The chain lockers, holdfasts, hawse pipes and chain stoppers shall be examined and drainage arrangement of the chain lockers tested.
Function testing of the temporary mooring systems shall be performed.

At the second and subsequent renewal surveys, chain cables shall be gauged. Any length of chain cable shall be renewed if the mean diameter at any cross-section is worn beyond 12% of its original diameter.

Guidance note:
The mean diameter of a cross-section may be taken as the average of the minimum diameter and the diameter measured perpendicular to this.

Units which arrive at location under their own propulsion shall be equipped with a permanent temporary mooring system for the voyage as per Ch.2. Sec.1 [7.3.1], unless an exemption is granted.
After Hook-up on location the required renewal survey function testing and inspection cannot always be carried out due to field restrictions like water depth, anchor situated above wellheads, proximity to mooring lines/risers, etc.
The temporary mooring equipment is then to be maintained in class and subject to necessary maintenance; with the exemption of testing. In these cases a Memo to Owner will be issued stating; "Temporary mooring equipment as listed in this MO shall be subject to inspection and testing as per scope for renewal survey prior to leaving location under its own propulsion."
Alternatively, upon owner request, the Society can accept the equipment to be temporarily taken out of class until the unit leaves the field. This applies for units equipped with MODU code certificates. For units under SOLAS Code, the temporary removal/decommissioning will require Flag acceptance.
SECTION 5 PERIODICAL SURVEY EXTENT FOR ADDITIONAL
SERVICE NOTATIONS

1 General

1.1 Introduction
This section presents the standard extent of surveys for retention of additional service notations applicable
to offshore LNG/LPG production and storage units. The requirements shall be applied in addition to those for
main class notation presented in Sec.3.

2 LNG or LPG production and/or LNG or LPG storage units and
installations

2.1 Application
The requirements in B apply to units or installations with class notations:
LNG or LPG Production Unit or LNG or LPG Production Installation
LNG or LPG Storage Unit or LNG or LPG Storage Installation.

2.2 Survey arrangement
Annual and complete periodical surveys may be carried out on location based on an approved planned
maintenance system without interrupting the function of the unit or installation.

2.3 Annual survey

2.3.1 Structures, supporting equipment and heavy modules applied in the production operation shall be
surveyed.

2.3.2 The following items shall be subjected to a general examination:
— storage tank (LNG/LPG/Condensate) openings and pressure/vacuum valves
— produced fluid (LNG/LPG/Condensate) piping systems
— pump and compressor rooms
— escape routes
— fire extinction systems in storage tank and pump/compressor room area
— fire extinguishing system associated with transfer systems

2.3.3 The following components and systems shall be surveyed and tested for correct functioning as found
necessary by the surveyor:
— gas detection systems for flammable and toxic gases
— fire detection system
— storage tank level measurements
— general alarm system and communication between control stations.

2.3.4 In hazardous areas the following equipment and systems shall be surveyed and tested:
— ventilation system including overpressure alarms
— alarms and shutdown for pressurised equipment and rooms
— electrical equipment and cables
— self-closing gastight doors, air locks, openings and accesses
— protection devices for combustion equipment and engines.

2.3.5 The emergency shutdown system for:
— wellhead valves and production facilities
— all non-essential electrical equipment
— all essential electrical equipment
shall be surveyed and function tested. Special attention shall be given to both manual and automatic activation, power supply and alarms.
Where cross connections between piping system for production and safe piping system exist, the means for avoiding possible contamination of the safe system with the hazardous medium shall be surveyed.

2.4 Cargo handling and containment system – annual survey
Annual survey extent for LNG/LPG related handling and storage systems, outside the processing plant, should generally follow the requirements given in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.2 [2.5] and [3.3].

2.5 Complete periodical survey

2.5.1 For objects having boilers burning crude oil or slop, survey and testing of control equipment including monitoring systems and shutdown functions related to the following systems shall be carried out:
— ventilation and gas-tightness, fuel supply line and boiler with boiler front lagging
— fuel pumps and heating arrangement
— drain pipe ducts and automatic closing drain traps
— inert and purging systems
— manual and automatic quick closing valves and shutdown systems
— boiler hood ventilation system
— boiler compartment ventilation
— boiler front extinguishing system
— pilot burner arrangement
— gastight bulkhead penetrations
— gas detection system
— fuel heater.

2.5.2 For objects having turbines, engines or boilers burning gas, survey and testing of the safety and control equipment and alarm and shutdown functions related to the following systems shall be carried out:
— gas heating arrangement
— ventilation arrangement
— protection and flame screens
— gas freeing and purging systems
— manual and automatic shutdown system
— gas detection system
— pilot flame burner or “fuel floor” arrangement
— governor stability switching from gas fuel to oil, or vice versa.

2.5.3 Function test of instrumentation and safety devices for equipment and systems in [2.3.3] shall be carried out.
2.5.4 The fire extinguishing system in or at:
— storage tank (LNG/LPG/Condensate) area
— pump/compressor room
— engine and boiler room
— helicopter deck
— transfer system areas
shall be surveyed and tested for correct functioning.

2.5.5 It shall be verified that required signboards are in order.

2.5.6 The drainage system of hazardous area shall be surveyed.

2.5.7 The insulation resistance of the electrical installation in the hazardous area shall be checked.

2.5.8 The fireman's outfit shall be surveyed.

2.5.9 Industrial equipment included in class according to Ch.2 Sec.3 shall be surveyed. Attention is to be paid to fire and other hazards. Thickness checking of pipework shall be carried out and records reviewed by the surveyor, as applicable. Hydrostatic testing may be requested by the surveyor.

2.6 Cargo Handling and containment system – complete periodical survey
Complete periodical survey extent for LNG/LPG related handling and storage systems, outside the processing plant, should generally follow the requirements given in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 [2.5], [3.3] and [4.7]. Offshore units however have the option of conducting surveys in-situ rather than in drydock.

3 LNG/LPG loading units and installations

3.1 Application
The requirements in [2] apply to units or installations with class notations:
LNG/LPG Loading Unit or LNG/LPG Loading Installation.

3.2 Survey arrangement
Annual and complete periodical surveys may be carried out on location based on an approved operation manual.
SECTION 6 OPTIONAL CLASS NOTATION SURVEYS

1 Introduction

1.1 General

1.1.1 This section presents the standard extent of surveys for retention of additional system and special facility class notations applicable to production and storage units or installations.

1.1.2 Unless otherwise noted, the interval of the complete surveys as listed in this section is 5 years.

2 Position mooring system

2.1 Application

2.1.1 The requirements in this sub-section apply to units with class notation POSMOOR.

2.1.2 If the unit is in DP mode and not in position mooring mode at time of survey and hence equipment's functionality related to the POSMOOR notation is not available for survey/testing a reduced survey scope may be accepted. Annual or complete survey depending on time since last survey is to be carried out before the mode is taking into use.

2.2 Types of surveys

General

2.2.1 Annual surveys may be carried out with the unit at operational draft and the mooring system in use. No special inspection aids are required and no disruption to the unit's operation is intended.

2.2.2 Renewal survey will require appropriate cleaning with good access and adequate lighting. The complete mooring system for position keeping on location is subject to comprehensive survey, including opening up and NDT of selected parts of the mooring equipment installed. Critical parts of all mooring lines and accessories will be thoroughly visually examined and subjected to extensive NDT when required. The extent and type of survey is dependent on the design such as corrosion allowance, corrosion protection and fatigue. See Table 1 below.

For units with mooring line arrangements where line adjustments in operation are not part of original design basis, particular attention will be paid to the hang off arrangement.

A renewal survey requires an inspection plan to be submitted by owner. This plan shall be based on the inspection criteria as set forward in the IIP, and findings and observations from past surveys.

Continuous Survey – Mooring lines

2.2.3 The owner may opt for a continuous survey of the mooring lines by providing an extra mooring line, which is regularly inspected in special facilities onshore and exchanged with lines installed on the unit. This arrangement is normally noted by an MO which gives the last/next survey date of each mooring line. Renewal survey extent on the other parts of the mooring system, i.e. windlass, fairleads, anchors, etc. which are not covered by the continuous survey cycle, shall follow the normal POSMOOR survey requirements; annual and renewal, unless otherwise accepted in an approved Mooring Integrity Management program.
2.2.4 Owners are to ensure that the mooring system can be adequately surveyed. An inspection and survey plan for how the class survey scope will be met, shall be submitted to the Society for approval at the commencement of the in-service phase.

The inspection and survey plan shall be based on information from the post-installation inspection carried out as part of the completed installation of the mooring system. See DNVGL-OS-E301 Ch.3 Sec.2 [14].

This post installation inspection report shall comprise inspection data for all lines; from the anchor pile to the end connection towards hull structure and contain all recorded abnormalities/observations; which shall be noted with picture, description and location on line.

Final tension recorded at installation shall be stated for all lines, and remaining twist, incl. acceptance criteria at time of installation, shall be stated. These data shall be included along with similar recordings from the surveys.

The inspection plan shall as a min. cover the requirements set forward in Table 1 below.

2.2.5 Units installed prior to October 2016 may not have the post installation data mapped and stored to the extent stated in [2.2.4]. For these units the below information shall be available as it was required given to the Society at time of installation:

— chain/wire/fibre rope certificates
— joining shackle certificates
— history of chain/wire/fibre rope, e.g. inspections, chain/ wire /fibre rope breaks, joining shackles
— planned remaining field life
— design fatigue life
— fatigue life used since new / last inspection
— latest inspection reports
— future inspection plans.
— available "as-laid" documentation from the installation
— status and available data on line tension and offset monitoring systems

2.2.6 Units equipped with an approved Mooring Integrity Management (MIM) program shall follow the requirements set forward in this program.

2.3 Survey schemes for long term position mooring

2.3.1 Depending on the rules applicable at the time of design and the chosen solution for the original design, three (3) main survey schemes are in place as listed in Table 1.

The correct survey scheme is hence depending on the original design of the system, and whether the system is thruster assisted.

If an approved Mooring Integrity Management program is in place, this shall be followed instead of Table 1. See [2.12] for requirements to approval of Mooring Integrity Management programs.
Table 1 Applicable survey schemes with reference to survey requirements

<table>
<thead>
<tr>
<th>Survey Requirements&lt;sup&gt;5), 6)&lt;/sup&gt;</th>
<th>General requirements</th>
<th>Additional requirements</th>
<th>Additional requirements for Thruster Assisted systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AS&lt;sup&gt;4)&lt;/sup&gt;</td>
<td>RS</td>
<td>RS</td>
</tr>
<tr>
<td>1) Systems designed before 1996 (no fatigue analysis and corrosion allowance)</td>
<td>[2.4]</td>
<td>[2.7]</td>
<td>[2.8]</td>
</tr>
<tr>
<td>2) Systems designed with a fatigue design life factor of 3</td>
<td>[2.4]</td>
<td>[2.7]</td>
<td>[2.9]</td>
</tr>
<tr>
<td>3) Systems designed with a fatigue life factor of 5-8 or greater</td>
<td>[2.4]</td>
<td>[2.7]</td>
<td>[2.10]</td>
</tr>
<tr>
<td>Systems with an approved Mooring Integrity Management program (MIM)</td>
<td></td>
<td></td>
<td>[2.12]</td>
</tr>
</tbody>
</table>

1) All lines required to be inspected on an onshore/offshore facility in a five year period cycle.
2) At least two lines required to be inspected on an onshore/offshore facility in a five year period cycle
3) All lines inspected on location by ROV.
4) For 1st annual after installation, the additional requirements of [2.5] apply.
5) Recordings from installation survey and the expanded 1<sup>st</sup> annual survey may require inspections below the waterline between the 5 yearly services. This additional inspection scope can also be triggered by special design solutions requiring a more frequent survey interval.
6) Incidents where damages, or suspected damages occur shall be reported to the Society i.l.w. Ch.1, Sec. 5[1.2]. These incidents may require additional inspections

2.4 Annual survey

Annual survey consist of documentation review and GVI of the visible parts on the mooring system, unless otherwise specified in an approved Mooring Integrity Management program or previously recorded damages or flaws require more frequent survey activities; e.g. installation damages, for which MO(s) are issued.

2.4.1 Documentation review shall include:

— Review to ensure that all installation survey documentation are available; complete with certificates for all installed components
— Verify that documentation records from the expanded 1<sup>st</sup> annual survey are onboard (if installed after January 2016). (See [2.5] for requirements to 1<sup>st</sup> annual)
— The Mooring Analysis as required in DNVGL-OS-E301 Ch.3 Sec.1 [4.2] to be verified on board.
— It shall be verified that the unit operates within the limits stated in the mooring analysis.
— Review of mooring line records (as per applicable survey scheme)
— Review of maintenance records for relevant components
— The calibration certificates for the load cells to be verified on board. (Ref. DNVGL-OS-E301 Ch.2 Sec.4 [14]).
— Review of all records of changes/repairs in components since last survey
— Review of reports from all observed or suspected damages, incidents and repairs/replacements carried out since last survey.
2.4.2 Accessible and visible parts of the unit’s mooring system for position keeping on location shall be visually surveyed.

2.4.3 Units equipped with windlasses:
There is to be carried out visual inspection of the accessible part of the mooring lines, on or adjacent to the windlass. Particular attention to be paid to the below (if fitted):
— the proper support of links in the pockets, i.e. contact is made at only the four shoulder areas of the link to avoid critical bending stresses in the link
— wear on the chain shoulders in way of the chain stopper and windlass pockets
— condition of wire or fibre rope
— that no twist is present between fairlead and windlass

Guidance note:
Twist in chain can severely reduce the capacity of the mooring line, as it "locks" the chain links and significantly increases the stresses in the most loaded chain link.
As a guidance the twist between the fairlead and windlass shall not exceed a 5 degree interlink twist when the fairlead are at maximum skew angle, and under no circumstances shall the interlink twist cause restriction in the movement of chain in windlass and fairlead.

2.4.4 Where severe damage or neglect of maintenance is observed, e.g. missing studs, worn cable lifters causing damage to the anchor chain, damage to wire or fibre rope, a more extensive survey should be required, ref. renewal survey.
It shall be checked whether any problems have been experienced in the previous 12 months period with the mooring system, e.g. chain breaks, jumping, mechanical damages, loose joining shackles.

2.4.5 Winch control to be verified from all operator stations.

2.5 Additional requirements - 1st annual after installation

2.5.1 The 1st annual survey after installation shall be expanded to contain the below requirements:
— ROV survey shall be performed from the anchor/pile to the hull connection for all lines
— In this survey the “as is” condition of the system shall be mapped and all recorded abnormalities/observations shall be noted with picture, description and location on line.
— The mooring system components shall be compared with the recordings and observations from the installation survey.
— The alignment of chain links in fairleads, if applicable, shall be inspected.
— Twist shall be recorded.
— Tension shall be verified for units not having continuous monitoring of their tension.
— Trenches in proximity to piles/anchors shall be recorded
— A complete report shall be submitted to class for review
The expanded 1st annual survey is only applicable for the first five year survey cycle.
The data from the expanded 1st annual survey shall be used as baseline for future surveys.

Guidance note:
The additional requirement to the 1st annual survey is based on the fact that within a year in operation the mooring system has "settled"; lines have settled in seabed, trenching; if this is an issue, will now clearly appear. This phase is referred to as the "bed-in phase".
Other deficiencies like misalignments in shackles, H-links and pad eyes will be visible.
Twist in chain and wires could have redistributed and can cause unwanted bending moments in single components; affecting the fatigue life of these.

Chain twist in excess of 3 degree interlink twist is in general not accepted.
Twist in wire beyond stated limit in certificate is not accepted.
Line tension shall be verified to be within the tolerances set in the original design. Tension adjustments shall be done if outside design limit, unless otherwise proven to be acceptable by an updated analysis.
The 1st annual POSMOOR survey can be carried out earlier than the survey window for annual POSMOOR survey, but not earlier than after the season considered the worst with respect to weather and sea movements.
The survey shall be completed before closing of window for 1st annual POSMOOR survey.

2.5.2 After the expanded 1st annual survey, no ROV surveys are required prior to first renewal survey, unless damages or suspected damages occur in operation, or otherwise deemed necessary by attending surveyor/mooring specialist.

2.5.3 The consecutive annuals shall follow [2.4].

2.6 Additional requirements for qualifiers TA or ATA.

2.6.1 System maintenance documentation, including information regarding hardware and software changes, shall be reviewed.

Guidance note:
This requirement includes, in addition to the position mooring TA/ATA control system and other systems necessary for performing position keeping, e.g. thruster control system.

2.6.2 The electrical installation in excess of the main class requirements shall be visually inspected, i.e. installations comprising the position mooring system, e.g. controllers and operating stations for position mooring and references systems, sensors and mode change system.

2.6.3 The technical condition of the position mooring system shall be verified during the survey.

Guidance note:
Verification of the technical condition of the position mooring system denotes testing to verify that the position mooring system is capable of positioning the unit, and thus validating that system functionality is in place.

2.6.4 If the survey is carried out when the unit is undergoing regular operations, then tests that possibly can introduce unacceptable risks shall not be performed.

2.6.5 Capacity of UPSs and other battery systems serving the position mooring control system, including its peripherals, shall be verified.

2.6.6 The alarm for loss of charging power shall be verified.

Guidance note:
If the survey is carried out during regular operations, then the capacity of the batteries need not be proven by testing.
**2.6.7** Emergency stop of thrusters from the position mooring control centre shall be tested. If the survey is carried out when the unit is undergoing regular operations, then testing shall not be performed if there is any possibility of introducing unacceptable risks.

**2.6.8** The simulation facility shall be verified as far as possible.

**2.6.9** It shall be verified that the unit operates in the correct position mooring control system mode.

### 2.7 Complete periodical survey

#### 2.7.1 Application

The requirements given in [2.2] apply with the additions given in this sub-section.

**2.7.2** The scope of the complete periodical survey is complemented depending on availability of fatigue analysis and corrosion allowance as specified in [2.7] to [2.10]. Section [2.11] subsequently specifies additional requirements for thruster assisted systems. See Table 1.

**2.7.3** Function testing of the mooring system equipment shall be performed (unless only permanent stoppers/connectors are used).

- Line tension systems are to be verified calibrated (where fitted)
- Inclinometers are to be verified calibrated (where fitted)
- Broken line warning systems are to be verified in order (where fitted)
- Emergency release systems are to be confirmed/tested (where fitted)
- Emergency release local deluge systems are to be tested (where fitted)
- For units with thruster assist (i.e. with qualifiers **TA** or **ATA**) the interaction with and the operation of the thruster assist is to be tested

**2.7.4 Fairleads and winches irrespective of fatigue life factors**

The fairleads shall be inspected visually and by ROV as far as possible. All fairleads are to be inspected with special attention to wear and tear of fairlead wheels and malfunctioning.

**2.7.5** Visual inspection of windlass and fairlead pockets shall be carried out. Particular attention shall be paid to:

- Rate of wear on pockets, including relative rate of wear between links and pockets.
- Mismatch between links and pockets, including improper support of the links in the pockets.
- Ensure that the required rotation cycle of the chain link resting in pocket is followed.
- The links resting in and in the vicinity of the fairlead shall be subject to CVI. If abnormal or accelerated wear is observed, the rotation cycle shall be reconsidered.
- NDE shall be done if doubt regarding out of plane bending (OBP); due to larger movements than taken into account at design basis.
- Underwater NDE to be performed, on a case by case basis, where NDE cannot be carried out in dry condition.
- Fairleads shall be verified turning freely both in mooring line direction and along its hinges in the horizontal plane.

**2.7.6** Special attention shall be given to the holding ability of the windlass. The chain stopper and the resultant load path to the unit’s structure should be inspected and its soundness verified.
2.7.7 Special attention shall be given to the holding ability of the winch and the satisfactory operation of the
pawls, ratchets and braking equipment. The soundness of the resultant load path to the unit’s structure shall
be verified.

2.7.8 Proper spooling of the wire on the winch drum shall be verified and drums and spooling gear
adjustments made if required.

2.7.9 If chain jacks or adjustable chain stoppers are installed, one shall ensure that the required rotation
cycle of the chain link resting in pocket is followed.

2.7.10 If the design comprises trumpets at the connection point/stopper for chain; provisions for survey of
the chain links inside the trumpet shall be arranged.

2.7.11 The effect of installed cathodic protection systems (if applicable) shall be mapped and documented.

2.7.12 Extent and type of marine growth shall be recorded for all lines

2.7.13 Alterations to above scope shall be agreed in advance with a specialist DNV GL class surveyor, and
the proposed actions shall at least ensure the same integrity level is achieved and documented.
A more extensive scope might be required if findings are observed.

2.7.14 Upon completion of survey the owner, or owner representative, shall submit a complete inspection
report to the Society.
   — A comprehensive inspection report shall be recorded w/pictures giving an overview of the condition of the
   mooring system.
   — All abnormalities (both findings and minor observations) shall be recorded w/position (Line No. & Depth/
     Location on line) and be documented with pictures for follow-up and future reference.
   — The report shall contain an assessment/action plan for future follow-up and reference of all recorded
   findings and observations.

   Guidance note:
   The scope of the renewal survey as described in this sub-section may be adjusted after the first renewal based on the result from
   the 1st 5-year cycle.

2.7.15 Requirements for inspections below the waterline between the 5 yearly surveys after the expanded
1st annual survey may be exempted unless recordings from installation survey and the expanded 1st annual
survey have triggered requirements for a more frequent inspection in excess of initial class scope, or there
are special arrangements in the design solution which mean a more frequent survey interval is required and
agreed.
The exemption being incidents where damages, or suspected damages occur. In these cases the Society shall
be contacted.

2.8 Complete periodical survey – systems designed before 1996 (no fatigue analysis and
corrosion allowance)

2.8.1 For mooring systems designed without corrosion protection/allowance and not designed with respect to
fatigue the following shall be carried out in addition to [2.5]:
   — Inspection of the unit’s log and anchor line records
— Dismantling and non-destructive testing of all joining shackles which have been in service for more than 5 years, except for LTM shackles
— Function testing of windlasses/winches and fairleads, including testing of brake torque. See [2.7]
— Complete inspection of mooring system including:
  — visual examination and extensive non-destructive testing of critical parts of all anchor chains, wire and fibre ropes and accessories
  — dimension control of chain and connection elements
  — inspection of cathodic protection system of sockets.

2.8.2 Chain
For chain which is less than 20 years old with proper documentation and service history, and no previous failures the extent of examination shall be:
— 100% visual examination
— 5% NDT on general chain
— 20% NDT on chain which has been in way of fairleads over last 5 years
— 20% NDT on chain which will be in way of fairleads over next 5 years.

2.8.3 If no documentation or history is available, the examination shall be increased to include mechanical testing of each length of chain and NDT increased to cover 20% of the whole chain.

2.8.4 All joining shackles of Kenter or similar design which have been in service for more than five years, are to be dismantled and magnetic particle (MT) or liquid penetrant testing (PT) is to be carried out on all the machined surfaces.

  Guidance note:
  Abrasive blasting prior to MT or PT, may damage the machined surfaces and should be avoided. Alternative methods of cleaning should be used, e.g. high pressure water washing.

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2.8.5 The following background information shall be supplied prior to start of the renewal survey:
— DNV GL chain certificate
— year entering service
— bar chart; length of chain out versus time
— information on chain breakages, e.g. position, year entering service, certificate
— identification marks on chain
— summary of previous repairs
— summary of previous survey findings
— information on the likely future service of the chain, e.g. if plans to head-to-tail chain, expected length to be over fairleads and windlass, likely area of operations.

2.8.6 For a chain which is more than 20 years old, the following applies:
— If all documentation is available, and historical information including previous reports showing no failures and only minor repairs, then survey extent given in [2.8.2] can remain in place.
— If no documentation is available (i.e. no certificates, unable to identify the chain, unable to ascertain orientation of the chain, which parts have been over the fairleads etc.) then the chain shall be subjected to minimum 20% NDT and mechanical testing of all lengths
— If documentation review reveals history of defects, then NDT shall be increased to 100% in the areas where defects are found.
2.8.7 Wire ropes
Steel wire ropes shall be 100% visually examined of the rope, with a focus on the following items:
— the nature and number of wire breaks
— wire breaks at the termination
— localised grouping of wire breaks
— fracture of strands
— reduction of rope diameter including breaking of core
— external wear and corrosion
— deformation
— termination area.

Guidance note:
Magnetic inductive testing in order to detect possible fracture of strands may be accepted on a case by case basis.

---end---of---guidance---note---

2.8.8 Unless otherwise agreed, checkpoints shall be made for every 100 m. If areas of special interest are detected, the distance shall be significantly reduced.

2.8.9 Fibre rope
Fibre ropes shall be 100% visually examined of the rope, with a focus on the following items:
— external wear
— deformation
— termination area.

2.8.10 In addition to [2.7.9] the in-service load history shall be assessed or, if this information is not available, a cut-off section from the end of the rope shall be tested.

2.8.11 For acceptance/rejection criteria the following standards shall be used as guideline:
— for fibre rope: DNV-RP-E304
— for chain: [2.8.1] and API RP 2I with the following addition: The anchor chains shall be replaced if the original corrosion allowance is consumed. On a case by case basis, a prolonged service life can be accepted by the Society. Such prolongation can only be accepted upon satisfactory review of documentation technically justifying a continued service. See App.C for further requirements.

2.9 Complete periodical survey – fatigue design life factor 3

2.9.1 A survey scheme as outlined herein will only apply for mooring systems with recommended connection elements. The scheme applies to all production and/or storage units designed according to:
— DNV MOU rules Pt.6 Ch.2 Position Mooring (POSMOOR), dated January 1996 (Design life factor 3)
— DNVGL-OS-E301 Position Mooring, dated June 2001 (Design life factor 3).

2.9.2 Recommended connection elements in long term mooring systems shall be purpose made elements such as triplates and D-shackles of Long Term Mooring (LTM) type.

2.9.3 Assumptions and conditions for acceptance of approach:
— The remaining fatigue life exceeds the expected field life by a factor of 3
— Loss of one line will not lead to a critical situation for the installation
— If any defects are found on the chain/wire during visual inspection, all chains/wires are to be pulled for visual inspections
— Chain/wire inspection is carried out under supervision by DNV GL surveyors results of ROV inspection to be verified by DNV GL surveyors
— All studs found loose are to be pressed tight
— The most heavily loaded (extreme tension) line is to be inspected. If a different line is most heavily utilised in fatigue, then this line is also to be inspected
— The most slack line (leeward side) is be inspected for wear in trash zone /touch down area
— No twist shall exist between upper and lower fairlead. Any twists shall be removed
— Fairlead and winches surveyed according to [2.7].

2.9.4 All mooring lines shall be inspected offshore by use of ROV within 5 years.
At least 25% of the lines, but not less than 2 lines, shall be included in visual /MPI inspection at a suitable offshore or onshore facility as follows:
— 100% visual
— 100% MPI of joining links
— 10% of the links are to have overall MPI
— diameter measurements of the chain link every 100th link. The anchor chains shall be replaced if the diameter of the chain with the breaking strength used in the design is reduced by allowable limit as set in design basis
— 2-neck measurement values to be noted every 100th link (measurement of the two diameters taken at the neck of the link at the mating surface).

Guidance note:
When considering 2 neck measurements (intergrip), where loss of diameter exceeding allowable limit is indicated, the owner should carry out a detailed assessment of the remaining breaking load taking into account the manufacturing tolerances and allowable ovality.

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2.9.5 Wire ropes
The survey of steel wire ropes consists of a 100% visual control, and the following items shall be covered:
— the nature and number of wire breaks
— wire breaks at the termination
— localised grouping of wire breaks
— fracture of strands
— reduction of rope diameter including breaking of core
— external wear and corrosion
— deformation
— termination area.

Guidance note:
Magnetic inductive testing in order to detect possible fracture of strands may be accepted on a case by case basis.

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2.9.6 All the remaining lines shall be surveyed with the results from the two lines taken up for inspection (Ref. [2.9.4]), as baseline. Abnormalities and damages on these two lines shall be recorded and evaluated prior to the ROV inspection of the remaining lines.
— Both the corrosion rates and normal intergrip wear for the various locations on the chain shall be tabulated in the reports.

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— All abnormalities like wear and damages at fairleads/windlass and at jewelry attachments shall be measured, checked with NDT and recorded.
— Trenches in proximity to pile/anchors shall be recorded.

2.9.7 All the remaining chain/wires/fibre ropes shall be ROV inspected with respect to the following:
— General Visual inspection (GVI) by ROV of all mooring lines (including cleaning if necessary):
  — Chain/wire attachments to the hull
  — Wear and tear in chain links where the mooring line is locked of in the chain stopper
  — Chain links in the fairlead pockets and close to fairleads shall be given special attention
  — CVI shall include all discontinuities on the line; shackles, connectors, sockets, and similar, including “anchor jewellery” attachment for wear, twist and other damages
  — At least one link between each discontinuity, or as otherwise agreed with attending surveyor, shall be subject to “2 neck measurements” (intergrip)
— Wear and scouring in touch down area shall be mapped:
  — Cleaning of a sufficiently number of links and “2 neck measurements” (intergrip) as well as dia. measurements to determine the wear/abrasion in the touch down-area/trash zone.
  — CVI of selected links towards the pile until the chain is no longer visible (buried).
  — Suspected presence of MIC shall be recorded
— Six strand wire ropes shall be inspected according to [2.9.5].
— Wire segments shall be subject to GVI, all tears in the sheathing shall be recorded:
  — Damages/tears in wire sheathing shall be subjected to CVI. (cleaning shall be done as required to satisfactorily observe the extent of damages).
— Fibre ropes shall be subject to GVI of all lines, but all visible damages and tears in the sheathing shall be recorded.
  — Damages/tears in sheathing/jacket shall be subjected to CVI.
  — All recorded damages to wire and fibre ropes shall be subject to assessment by competent personnel provided by owner, as well as by DNV GL.
— Entanglement of fishing hooks, fishing nets and general debris on mooring lines shall be cleaned to the extent that they do not jeopardize the integrity of the lines for the next five year period.

2.9.8 The inspection shall be detailed more and including MPI If the ROV inspection reveals defects that are considered as critical, i.e. cracks, severe pitting and wear and tear.

2.9.9 Normally connection elements such as Kenter shackles, pear links, C-links and D-shackle with locking pin through bow and bolt, and swivels are not accepted in long term mooring systems. However, if such equipment is accepted and installed they shall either be dismantled and subjected to non-destructive testing of all machined surfaces, or be replaced with new elements at least every 5 years.

2.10 Complete periodical survey – fatigue life factor 5-8 or greater

2.10.1 The requirements in [2.10] are valid for mooring system design according to:
— DNV MOU rules Pt.6 Ch.2 Position Mooring (POSMOOR) dated January 1996 (design life factor 10)
— DNVGL-OS-E301 Position Mooring, dated June 2001 (design life factors 5 – 8).

2.10.2 For assumptions and conditions for acceptance of approach, see [Table 1].

2.10.3 All mooring lines shall be inspected offshore by use of ROV during a 5 years period as follows:
— General Visual inspection by ROV of all mooring lines.
— The mooring lines shall be compared with the reports from previous surveys and any new observations shall be recorded for evaluation.
— Close Visual Inspection (CVI) with ROV w/cleaning capabilities of one line from each mooring line cluster. Where lines are not clustered but evenly distributed; at least three mooring lines shall be selected. The selected lines shall be evenly spread and both normally windward and leeward side shall be included.
— CVI shall include cleaning of all discontinuities on the line; like shackles, sockets, rope connectors, etc.
— Cleaning of at least one link between each discontinuity, or as otherwise agreed with attending surveyor in order to map the condition. Both “intergrip” measurements and dia. measurements shall be taken at this location.
— Cleaning of a sufficiently number of links and “intergrip” measurements as well as dia. measurements to determine the wear/abrasion in the touch down-area/trash zone.
— CVI of selected links towards the pile until the chain is buried.
— Trenches in proximity to pile/anchors shall be recorded.
— Where MIC, and consequently pitting, is observed on the chain links, the MIC affected areas shall be mapped and the extent and size of the pitting shall be recorded for evaluation together with the mapped corrosion rate.
— Chain measurements shall be done in the “splash zone” or in case of submerged systems; downwards from the hull connector/stopper until the readings clearly start to show a reduction in corrosion/wear, but never less than at least 5 m below the waterline when the unit is at its lightest draught.
— These measurements shall include at least one line from each cluster, or min. two representative lines in case of even distribution of lines.
— Both intergrip measurements and dia. measurements shall be taken.
— Should the intergrip measurements and/or dia. measurements show reducing levels below the normal defined splash zone, the measuring shall continue until the data trend-line demonstrates that the lowest values are captured.
— For measurements in the touch-down /trash zone, sufficient reading shall be taken to ensure that the interlink wear and corrosion rate is mapped.

2.10.4 Both the chain link diameter measurements and the 2 neck measurements (intergrip) shall be tabulated and data presented to the Society in such a way that the reading’s trend-line can be established for each selected line. This trend-line shall demonstrate that the areas with lowest readings are captured.

2.10.5 The statistically weakest link shall be evaluated with regards to the overall trend and individual variation between links.

Raw data shall be submitted to the Society for evaluation along with a description of the chosen method utilized to calculate the weakest link.

Deep or large pittings shall be recorded separately with picture and dimensions. Deep pittings on bend and crown shall be evaluated separately.

Guidance note:
For units operating in environments where access in the splash zone carry a too high risk for involved personnel and equipment, and for which measurements for only part of the required length of line can be carried out, alternative solutions may be accepted on a case by case basis. In these cases a more conservative approach with respect to corrosion rate will be required adopted.

The uncertainty in data shall take into account the expected trend-line readings due to variations in corrosion. Data and experience from similar designs and operational areas with respect to potential effect of MIC/pitting should be taken into account.

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2.10.6 Survey and chain measurements based on scanning, photogrammetric 3D modelling, and other similar methods, are accepted used under the condition that the service provider, method and equipment is approved. Case by case approval can be given.
Guidance note:
The Society have no restrictions on the implementation of technologies aiming at improving and increasing the accuracy of the survey methods applied, but new methods shall be subject to formal approval in advance. Case by case approvals with new technology/applications, given attendance of a surveyor or mooring specialist form the Society, can also be given.

---end of guidance note---

2.10.7 Wire segments shall be subject to GVI, and all tears in the sheathing shall be recorded. Damages/tears in sheathing shall be subjected to CVI. Cleaning shall be done as required to satisfactorily observe the extent of damages.

2.10.8 Fibre ropes shall be subject to GVI of all lines, but all visible damages and tears in the sheathing/jacket shall be recorded. Damages/tears in sheathing/jacket shall be subjected to CVI.

2.10.9 All recorded damages to wire and fibre ropes shall be subject to assessment by competent personnel provided by owner, as well as DNV GL.

2.10.10 Special attention shall by paid to connection elements such as:
- LTM shackles and their bolts and locking devices
- wear and tear of connection elements
- corrosion with attention to severe pitting and signs of MIC
- steel wire rope sockets and their cathodic protection system
- chain stoppers
- wear and tear of chain links in chain stoppers and fairleads,
- the links in a position to be subject to out of plane bending
- links either inside or in danger of coming into contact with trumpets
- damage to the protection (sheathing) of steel wire rope.

2.10.11 A more extensive scope may be required if findings are observed.
Where accessible; NDE to be taken of the links closest to the stopper to check for cracks caused by Out of Plane Bending (OPB). A plan for NDE shall be included in the owner’s inspection program.
For Submerged connections, and where the effect of OPB were not part of the original design basis, an assessment shall be done with respect to OPB.

Guidance note:
OPB was not required to be taken into account in the mooring system design prior to the DNV-OSE301, October 2013, Edition.
For these units, new OPB calculations based on the actual measured dimensions of the link, combined with actual vessel movements / link movements in operation, may be required on a case by case basis.

---end of guidance note---

2.10.12 A comprehensive survey report shall be recorded w/pictures giving an overview of the condition of the mooring system.
All abnormalities shall be recorded w/position and documented with pictures and an assessment/action plan for future follow-up and reference.

2.10.13 More detailed inspection including MPI shall be required if the ROV inspection reveals defects that are considered as critical, i.e. cracks, severe pitting and wear and tear.

2.10.14 Normally connection elements such as kenter shackles, pear links, C-links and D-shackle with locking pin through bow and bolt, and swivels are not accepted in long term mooring systems. However, if
such equipment is accepted installed they shall either be dismantled and subjected to non-destructive testing of all machined surfaces, or be replaced with new elements at least every 5 years.

2.10.15 Additional requirements – tropical waters only
For units located in “tropical waters” more extensive chain measurements than described in [2.10.3] to [2.10.5], shall be taken.
For tropical waters the measurements shall be carried out for at least one line from each cluster and a total of 50% of the lines, and comprise:
— 2-neck measurements (intergrip)
— Dia. measurements of the chain link (average over two dia. taken at 90º angle).
All scaling and growth shall be removed at the location of the measurement points.

Guidance note:
When cleaning the links for measurement the area where the tool/calliper is placed, shall be cleaned to the level where shining metal is observed when using a steel brush (grinding not allowed). When cleaning the chain links for inspection one need to be aware that the removal of the hard scaling and corrosion product built up on the surface, will result in the corrosion speeding up for some time after the removal. The corrosion products reduce the mass transfer of oxygen and other agents to the metal surface resulting in the reduction of the kinetic of the cathodic reactions. Hence when removing this layer for inspection, the corrosion rate will increase. It is recommended to paint the cleaned areas (using e.g. standard zinc enriched marine paint) after the measurements are taken, to the extent possible.

---end---of---guidance---note---

2.11 Complete periodical – additional requirements for thruster assisted systems

2.11.1 With the unit in position mooring mode, a sea trial shall be performed.
The complete system shall be tested in all operational modes. The testing shall include simulation of different failure conditions to verify switching of modes, back-up systems and the alarm system.

2.11.2 The different modes of thruster control from the DP control centre(s) shall be tested:
— manual control
— joystick control (if installed)
— position mooring control
— transfer of control.
Manual override shall be demonstrated during normal operation and during failure conditions.

2.11.3 Emergency stop of position mooring thrusters from position mooring control centre to be tested.

2.11.4 All sensors, peripheral equipment and reference systems shall be tested:
— verify correct operation and adequate accuracy
— failure of sensors and reference systems shall be simulated to check the alarm system and the switching logic
— switch-over between reference systems as input to controller shall be carried out to assure that warnings, alarms and information to operator are satisfactory.

Guidance note:
Due to practicalities some reference systems may be unavailable during the tests. In such cases the testing can be performed by the crew as soon as possible after survey. When testing is left to the crew this must be recorded in the survey report, and a
condition of class or memo to owner must be issued. The condition of class or memo to owner can be deleted based on a signed test report from the master.

The survey of the thruster unit should be carried out as for thrusters for propulsion and dynamic positioning. Surveys of the thrusters are separate survey elements and these surveys do not need to take place at the same time as the position mooring survey.

---end---of---guide---note---

2.11.5 Alarm for loss of position and heading out of limit shall be demonstrated. Line Break alarm shall be tested.

2.11.6 Single failures in thruster control systems including signal wire breaks of thruster command and feedback signals shall be tested in order to verify safe response on the thrust output. Equivalent testing may also be required for rudders controlled by the DP control system.

2.11.7 Overload prevention shall be tested.

**Guidance note:**
If it is possible to induce overload by setting out thrust command from the DP control system (e.g. by use of joystick function) then the overload protection function (e.g. pitch reduction) should be tested. System configuration and/or available power considerations may lead to this test being omitted.

---end---of---guide---note---

2.11.8 Capacity of UPSs and other battery systems serving the position mooring control system including its peripherals shall be verified by testing. Alarm for loss of charging power shall also be verified.

2.11.9 For units where the design capacity is dependent on certain thrusters to remain intact after failure, required redundancy shall be documented through an FMEA test. The FMEA report and FMEA test program shall be updated when alterations have been made.

**Guidance note:**
This requirement is only valid for units with class request after 1. July 2004.
The requirement to have an updated FMEA analysis on board is only valid for units with class request after 1. July 2004.
FMEA testing is required for vessels which have redundancy requirements in thruster systems, power systems and/or control systems as part of their mooring analysis. If the vessel also operates in DP mode, the testing carried out as part of the DP FMEA may not need retesting, but FMEA tests specific for position mooring operations need to be completed. This includes tension measurement failures, communication and power failures in the anchor winch control system.

---end---of---guide---note---

2.11.10 Correct functioning of the Consequence Analysis facility shall be verified as far as possible.

2.11.11 It shall be verified that the unit operates in the correct position mooring control system mode vs. operation mode.

2.12 Mooring Integrity Management

2.12.1 In case a Mooring Integrity Management (MIM) program is developed for the unit and this have been subject to class review and approval, this program shall be followed instead of the listed requirements to annual and renewal surveys as described in sub-section [2.4] to [2.11].

2.12.2 A MIM program shall as a minimum address and document the following:
— Risk based assessment of mooring integrity risks imposed throughout the mooring lifecycle for all individual components and the mooring system as a whole
— Identification of key risks for each component
— A developed in-service integrity management strategy to mitigate risks for each component (e.g. inspection, monitoring, replacement etc.), based on the risk assessment
— A strategy for mitigating mooring integrity risks introduced during the design, manufacturing and installation phases
— For units currently in-service, the risks introduced during the past design, manufacturing and installation phases should be assessed retrospectively
— For units currently in-service, a new baseline shall be established at the introduction of the MIM program.

Guidance note:
The below Guidelines/Recommended Practise can be used as reference:
— DNV GL, Recommended Practice for Mooring Integrity Management
— Oil & Gas UK, Mooring Integrity Guidelines, Issue 3, November 2014.

3 Dynamic positioning systems

3.1 General

3.1.1 These rules do not include verification of requirements or recommendations in regard to the vessels operation or other characteristics.

3.1.2 The requirements in this sub-section apply to units with class notation DYNPOS or DPS.

3.2 Specific requirements

3.2.1 Qualifier (A)
For units with qualifier (A) given as DYNPOS-AUTR(A) or DYNPOS-AUTRO(A) notation, the annual survey shall be carried out in accordance with the requirement for complete survey.

3.2.2 An updated FMEA report with a corresponding FMEA test program shall be kept onboard, and shall be used as basis for the testing.

3.2.3 For units in position mooring
If the unit is in moored position and not in dynamic positioning mode at time of survey and hence the equipment's or functionality related the dynamic positioning is not available for survey/testing a reduced survey scope may be accepted. Annual or complete survey depending on time since last survey shall be carried out before the mode is taking into use.

3.3 Annual and complete survey
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [12].

4 Loading computers for damage control

4.1 Application
The requirement in this sub-section applies to units with class notation LCS.
4.2 Annual survey and complete surveys
It shall be checked that the approved in-service test programme for all sensors has been followed.

5 Production plant

5.1 Application
The requirements in this section apply to units or installations with class notations PROD (LNG) or PROD(LPG).

5.2 Survey arrangement
Annual and complete periodical survey may take account of an approved planned maintenance system. As far as possible disruption of the function of the unit or installation should be minimised.

5.3 Annual survey

5.3.1 An overall survey of production related equipment, structures and systems with particular attention to structural integrity, fire or explosion hazards, safety systems and personnel protection shall be carried out. If deemed necessary by the surveyor running test, NDT, and/or opening up of equipment may be required.

5.3.2 For equipment installed subsea at time of annual survey a review of the maintenance manual or test log is an acceptable survey method provided a satisfactory recording system and acceptable maintenance procedure exist.

5.3.3 Riser system and production or well control components shall be visually surveyed as far as accessible. If deemed necessary by the surveyor pressure testing shall be carried out.

5.3.4 Pressure vessels and heat exchangers shall be externally surveyed. Safety valves, instrumentation and systems on tanks or separators shall be surveyed and tested in operating condition as found necessary by the surveyor.

5.3.5 High pressure or capacity pumps and compressors shall be externally surveyed and function tested as deemed necessary by the surveyor.

5.3.6 Piping systems including flexible pipes shall be surveyed as deemed necessary by the surveyor.

5.3.7 Pressure relief and depressurising valves shall be surveyed and tested as deemed necessary by the surveyor.

5.3.8 Riser handling devices, lifting devices for production and related operations, wire ropes, end attachments, and sheaves shall be surveyed. Function testing of safety devices shall be carried out as found necessary by the surveyor.

5.3.9 Survey of accessible parts of the following structures shall be carried out to confirm structural integrity and condition of securing arrangement:
— flare or vent
— pancakes
— skids.
5.3.10 The process and utility safety systems shall be surveyed during operation and tested for correct functioning as found necessary by the surveyor with particular emphasis on:

— shutdown valves
— shutdown instrumentation
— shutdown sequence and logic
— interconnection with emergency shutdown system
— regulation or control system
— alarm system.

A review of the maintenance manual or test log is an acceptable survey method provided a satisfactory recording system and an acceptable maintenance procedure exist.

5.3.11 Drainage system for produced liquids for hazardous areas shall be surveyed.

5.3.12 Water protection system in process area shall be surveyed and function tested as deemed necessary by the surveyor.

5.3.13 Drainage and containment system for cryogenic fluids and spray protection measures shall be surveyed.

5.4 Complete survey

5.4.1 Riser joints, flexible pipes and other riser system components to be closely visually surveyed for mechanical damage and corrosion. Surface NDT methods shall be used to investigate critical areas for cracks. Thickness measurements and dimensioned checks may be required if found necessary by the surveyor. Satisfactory functioning and pressure integrity shall be confirmed.

5.4.2 The production or well control equipment shall be subject to internal inspection to the extent necessary to reveal current condition. Satisfactory functioning and pressure integrity shall be confirmed.

5.4.3 Pressure vessels and heat exchangers shall be subjected to internal surveys. If this is not practical then use of thickness measurements may be considered. Examination of related equipment such as valves, piping and fittings shall be carried out. Pressure testing to rated working pressure shall be carried out.

5.4.4 Correct setting of valves shall be confirmed.

5.4.5 High pressure or capacity pumps and compressors shall be surveyed by opening up fully or partly as deemed necessary by the surveyor. Pressure testing to be carried out when relevant and found necessary by the surveyor.

5.4.6 Overhead lifting equipment and lifting devices shall be dismantled to the extent necessary to evaluate current condition. Main loading parts shall be checked by NDT. Thickness measurements as deemed necessary to be carried out. Wire ropes shall be surveyed.

5.4.7 Structural condition of the venting/flaring arrangement shall be surveyed. NDT of main structural components may be required as deemed necessary by the surveyor.

5.4.8 The fixed fire protection systems in process area and hydrocarbon loading/unloading area shall be surveyed and tested for correct functioning.
5.4.9 Function test of safety devices and instrumentation listed in [5.3.10] shall be carried out.

6 Regasification

6.1 Application
The requirements in this sub-section apply to units with class notation REGAS.

6.2 Annual and complete survey
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [37].

7 Helicopter deck

7.1 Application
The requirements in this sub-section apply to units with class notation HELDK.
For the additional survey requirements for this notation with the qualifier (N) as required by the Norwegian authorities is referred to DNVGL-SI-0166 Ch.3.

7.2 Complete survey
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [8].

8 Crane

8.1 Application

8.1.1 The requirements in [8.2] and [8.3] apply for vessels with additional class notation Crane-offshore.

8.1.2 Crane-offshore applies to any type of offshore crane intended for cargo handling outside the vessel while at sea and to any type of platform crane intended for cargo handling on the vessel. For a vessel with more than one crane installed, class notation Crane-offshore may be applied to selected cranes only. The selected cranes will be identified in the appendix to the classification certificate.

8.1.3 Additional requirements: DNVGL-ST-0378 Sec.14, Standard for offshore and platform lifting, Testing and test certificates marking.

8.1.4 Additional requirements for the qualifier (N) are given in DNVGL-SI-0166 Ch.3.

8.1.5 Scope
The systems covered are in accordance with Ch.2 Sec.7 [10] and include following:
— structure
— machinery
— control and monitoring systems
— safety systems.
8.2 Annual survey

8.2.1 Objective
The intent of the annual survey is to verify satisfactory condition of the equipment without any intrusive interventions, given that the vessel is in operation. It is assumed that normal operations are on-going.

8.2.2 Scope
The extent of the annual survey shall be as follows:
— Spot check review of the vessel's records of routine inspections/tests, the planned maintenance system and the repair/overhaul/modification records.
— Review documentation for equipment installed since last survey, including third party equipment.
General Visual survey shall be carried out on all parts of the lifting appliances in order to detect any abnormalities or deviations from the normal conditions
Where records are available showing that relevant items have been recently tested, these can be examined and applied as part of the evaluation.

8.2.3 General requirements
Generally, the visual examination is to be carried out without dismantling. However, dismantling shall be performed as considered necessary by the attending surveyor.

8.2.4 Any changes to the systems (new equipment, overhauls, repairs and modifications) shall be surveyed and the relevant documentation to be approved.

8.2.5 If crane condition monitoring is to be carried out as part of the planned maintenance system, this is to be carried out in accordance with an approved program. See Sec 7 for further details. Crane condition monitoring will normally be approved on a case by case basis.

8.2.6 Preparation
Applicable equipment shall be made available for survey according to scope. Special attention shall also be made to the inspection program, SHE safety measures, safe access and crane cleanliness.

8.2.7 Structure
The structure shall be examined as follows:
— Boom structure
  A general visual examination shall be carried out with emphasis on the structural condition of boom heel, boom top, cradle support area, bracings.
— Main frame (king)
  A general visual examination shall be carried out with emphasis on the slewing ring support structure, boom hinge, winch support, A-frame support.
— Frame structure
  A general visual examination shall be carried out with emphasis on the frame foot, wire rope sheave system and frame top.

8.2.8 Machinery
The following be examined for satisfactory condition:
— hook block, hook shaft and hook bearing
— sheaves, shaft and bearings
— wire rope and attachments
8.2.9 Control systems
Examination and functional testing shall be carried out as found necessary by the attending surveyor for the following:

— Electric systems
  Resistance measurement of electrical systems, motors, switchboards/cabinets, cables, cables protections, condition of all switches, controllers internal and external

— Hydraulic systems
  Leakages in hydraulic system, pumps, motors, cylinders, valves, piping, safety valves.

8.2.10 Safety systems
Functional tests shall be carried out for the controls, limiting and indicating devices in order to ensure that they are functioning and calibrated correctly for safe operation.

**Guidance note:**
Typical functional tests are
— rated capacity limiters and indicators
— motion limiters and indicators
— performance limiters and indicators
— emergency stop function
— AOPS, MOPS, heave comp, ESD, F&G, slack wire rope detection
— failure in control system, failure in safety system, blackout/shut-down.

8.2.11 Testing
Functional tests shall be carried out for all crane motions, (e.g. hoisting, travelling, traversing, telescoping, slewing and luffing) at the rated speeds and without lifting loads, in order to check for any abnormalities and/or defects. Functional testing shall also be performed with a suitable load, not exceeding the safe working load, as considered by the surveyor.

It shall be verified that the load charts are to be permanently displayed and visible for the crane operator.
8.3 Complete survey

8.3.1 Objective
The intent of the complete survey is to confirm that the equipment and systems may be fit for operation for another 5 years.

8.3.2 Scope
More intrusive inspections and more comprehensive testing shall be carried out. Normally the crane will be tested to the original design limits.

8.3.3 Load tests shall be carried out on basic crane motions, such as hoisting, travelling, traversing, telescoping, luffing and slewing, while suspending a test load (where permitted), in order to check for any abnormalities and/or defects. The test load should not exceed the rated capacity.

8.3.4 Load testing with overload as described in DNVGL-ST-0378 Sec.14. The overload shall be handled with slow speed. All movements shall be tested.

8.3.5 The following components shall be dismantled and made available for examination by NDE:
- boom foot/heel bearings
- fixed sheaves
- load bearing axle pin/shaft and housing
- gear boxes taking part in the lifting operation
- brakes
- couplings
- hook block.

**Guidance note:**
An alternative to dismantling items for examination is to perform "in place inspection" according to OEM recommendation or a "safe remaining life assessment" according to ISO 12482, in addition to visual and NDE inspection. This assessment shall be verified and accepted by the Society, and can be used as a base for examination of relevant parts of the crane. If the lifespan is near to its expiry, the society shall be consulted, before the lifting appliances can be certified for continued use. Ref: DNV GL guidance note for "safe crane condition monitoring" on request.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

8.3.6 Structure
An overall examination shall be carried out with particular emphasis on structural condition A-frame, boom structure, crane frame, boom foot/heel and other load bearing connections.

Thickness measurements of structural parts shall be carried out as far as deemed necessary.

8.3.7 Slewing system.
Slewing bearing ring shall be dismantled (not single ball bearing) and made available for visual examination. Internal fillets, raceway shall be subjected to NDE.

**Guidance note:**
Exemption to opening-up of a bearing will be granted provided:
- If the crane has an approved securing device (retainer) fitted the opening-up is not required or
- the slewing bearing has been specially adapted and approved by DNV GL for non-destructive crack detection or
— a company is available possessing method, skill and specially trained operators within non-destructive crack detection of bearings in question. The company, operators and qualification tests to be approved by DNV GL in each case or
— a procedure including regular clearance measurements established when the crane was new, grease sampling and fatigue evaluations are adopted in agreement with the crane and slewing bearing manufacturer or
— a “Safe remaining life assessment” according to ISO 12482 has been established, in addition to visual and NDE inspection. This assessment shall be verified and accepted by the society, see also DNV GL guidance note for “safe crane condition monitoring” on request.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

20% of the holding down bolts taken in the most loaded sector of the crane shall be removed, examined and subject to NDE. If any significant defects are found during this examination another 20% are drawn. If any of this second set is found to be defective then all bolts shall be drawn.

**Guidance note:**
If the first 20% are found to be acceptable and the examination is stopped, a maintenance schedule should be established for examining the remaining 80% during the 5 years period. An alternative to dismantling is to perform a "fastener elongation measurement" using ultrasonic (UT).

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

Flatness and condition of slew-bearing mounting flanges shall be checked as far as possible.

### 8.3.8 Brakes
The brake shall be dismantled and examined.

### 8.3.9 Couplings
Couplings shall be dismantled and examined.

### 9 Additional fire protection arrangements

#### 9.1 General
The requirements in this sub-section apply to ships with class notation **F**.

#### 9.2 Complete survey
Complete surveys at an interval of 2.5 years shall be i.a.w. **DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [11]**.

### 10 Periodically unattended machinery space and machinery centrally operated

#### 10.1 Application
The requirements in this sub-section apply to units with class notations **E0** and **ECO**.

#### 10.2 Annual and complete surveys
Annual and complete surveys shall be i.a.w. **DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [25]**.

### 11 Hull monitoring system

#### 11.1 Application
The requirements in this sub-section apply to units with class notation **HMON**.
11.2 Objective
The purpose of the survey is to ensure the maintenance of the hull monitoring system as specified for the class notation.

11.3 Annual survey
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [14].

12 Noise, vibration and comfort rating

12.1 Application
The requirements in [12.2] and [12.3] apply to units with the class notations VIBR respectively COMF-MOU.

12.2 Vibration

12.2.1
Before the notation can be issued, vibration measurements at the different positions and components, as described in the Protocol, shall be carried out. The Protocol is a table of positions to be measured worked out prior to the measurements based on a risk evaluation and experience. If minor excessive vibration levels are found for non-critical components or positions, dispensation may be given, which may also include a requirement for new measurements, after a limited period. This will be decided by the Society.

12.2.2
At each Renewal survey complete measurements at the different positions, as described in the Protocol, shall be carried out by or under the supervision of a surveyor of the Society.

12.3 Comfort rating

12.3.1 Alterations and modifications
If approved arrangements, equipment or procedures are altered, updated documentation shall be resubmitted for approval.

12.3.2
The compliance with the rules must be demonstrated by measurements after any significant modifications on board the installation in the following situations:
— When changes have been made for the process itself
— When some of the equipment with impact of the working environment on board is modified

12.3.3 Renewal survey
The renewal survey shall be based on measurement surveys according to predefined programs.

12.3.4
Logbooks of the inspections and measurements as described in DNVGL-OS-A301 Ch.3 Sec.2 [4] shall be examined.
13 Cold climate notations

13.1 Winterization

13.2 application

These requirements apply to units with the following class notation Winterized.

13.3 Annual survey

13.3.1 The Anti-Icing, De-Icing and Anti-Freezing measures applied onboard shall be subject to a general survey to confirm continued satisfactory performance, including the review of the onboard records covering any periods of severe cold climate weather conditions since the last annual survey. The survey shall also assess the effectiveness of the mechanical protection provided against mechanical/water damage for equipment subjected to frequent de-icing activities.

13.3.2 The thermal insulation arrangements relevant to cold climate operations shall be surveyed, with particular attention to the thermal insulation for piping and pressure vessel insulation in areas exposed to weather or deluge. The vessel's "corrosion under insulation” management program shall be reviewed and re-assessed based on the survey findings.

13.3.3 The stability records onboard shall be reviewed to confirm that vessel is adequately monitoring/ accounting for potential and actual ice loadings on an ongoing basis.

13.3.4 The fire fighting equipment exposed to cold climate conditions shall be surveyed, with particular attention that the extinguishing agents are appropriate for cold climate conditions.

13.3.5 The electrical heat tracing systems shall be generally surveyed, with particular attention to the insulation resistance values.

13.3.6 The anti-skid coating on exposed deck surfaces shall be surveyed.

13.3.7 The drainage arrangements for meltwater/ washdown water on exposed decks shall be surveyed, with particular attention to the anti-freezing arrangements for the drains.

13.3.8 The drying arrangements for the compressed air systems shall be surveyed.

13.3.9 The Personal Lifesaving Appliances shall be subject to general surveyed to confirm that their storage arrangements are suitable for cold-climate conditions.

13.3.10 The information onboard related to snow/ice “dropped object” incidents/near misses since the last annual survey shall be presented to the attending surveyor for assessment.

13.3.11 The information onboard related to the continuing effectiveness of the lighting (floodlights, emergency lights, navigation lights, helideck lights, helicopter obstacle lighting, ice searchlight) shall be presented to the attending surveyor for assessment.

13.3.12 For units with the qualifier Polar, the ice searchlight shall be function tested.
13.3.13 For units with the qualifier **Polar**, the annual survey requirements for class notation **Clean** shall be carried out, as applicable.

13.4 Complete survey
The heat tracing systems shall be examined.
Electrical heat tracing systems shall be examined with particular attention for damage/deterioration to the heat tracing cabling, recent megger-test results shall be presented to attending surveyor.
Heat tracing systems using fluids as the heating medium shall be subject to pressure test to maximum working pressure.

14 Environmental notations

14.1 Ballast water management systems

14.1.1 Application
The requirements in [14.1] apply for vessels with the notations **BWM, Clean** and/or **Clean Design**.

14.1.2 Annual, intermediate and complete surveys
Annual, intermediate and complete surveys shall be carried out i.a.w. DNVGL-RU-SHIP Pt.7 Ch.18 Sec.6 [22].

14.2 **Clean** or **Clean Design**

14.2.1 Application
The requirements in [14.2] apply to units with class notations **Clean** or **Clean Design**.

14.2.2 Annual survey
Annual surveys shall be carried out i.a.w. DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [16].

14.3 Recycling

14.3.1 Application
These requirements in this sub-section apply for units with the class notation **RECYCLING**.

14.3.2 Annual survey
Complete surveys shall be carried out in line with DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [35].

14.3.3 At replacement, or significant repair of the structure, equipment, systems, fittings, arrangements and material, the owner may request an occasional survey as described in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [35].

14.4 Vapour control systems (VCS)

14.4.1 Application
These requirements apply for units with the class notation **VCS**.

14.4.2 Renewal surveys
Renewal surveys shall be carried out i.a.w. DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [15].
15 Integrated software dependent systems

15.1 General

15.1.1 Application
The requirements in this sub-section apply to units with the class notation ISDS.

15.1.2 Objective
The purpose of the survey is to ensure the confidence that has been built into the unit is actually maintained.

15.1.3 Modifications
The owner is to inform DNV GL whenever a system with the ISDS notation is modified. For major upgrades or conversions of the unit in operation the full set of requirements in DNVGL-OS-D203 may apply.

15.2 Annual survey

15.2.1 The effective implementation and continuous maintenance of the activities required DNVGL-OS-D203 phase E, operation, shall be assessed.

15.2.2 Any changes, introduced after the latest assessment, to the systems within ISDS scope are to be addressed. An impact analysis of changes shall be reviewed and confirmed. Any follow up activities shall be agreed.

15.2.3 Updated records are to be kept and made available for review by the attending surveyor i.a.w. DNVGL-OS-D203 Ch.3 Sec.1 [3.2].

15.3 Complete survey
The complete assessment will have a specific focus on identified process areas or activities. These areas or activities are to be selected based on a discussion with owner of specific focus areas and should also be based on important or frequent findings from the annual assessments carried out since the last complete survey.

16 Special feature notations

16.1 Non-self-propelled units

16.1.1 The requirements in [16.1] apply to units with special feature notation Non-self-propelled.

16.1.2 Extent of surveys of the following items will be restricted to the main safety facets:
— tailshafts
— thrusters
— motors and other equipment for propulsion
— steering gear.

16.1.3 For these items the scope of classification is to ensure that the equipment does not pose a threat to the unit by its presence onboard when in use. This means the watertightness should be considered and the safety of the equipment for people working in the vicinity must be taken care of. The operation of the equipment is of secondary importance.
16.2 Self-propelled self-elevating units

16.2.1 The requirements in [16.2] apply to self-elevating units with special feature notation Self-propelled.

16.2.2 The extent of the survey shall cover tailshafts, thrusters, motors and other equipment for propulsion and steering gear as defined for main class in Sec.3.

16.3 Tailshaft monitoring

16.3.1 Application
The requirements in [16.3] apply to units with class notation TMON.

16.3.2 General
A tailshaft condition monitoring arrangement will be granted for oil lubricated tailshafts that are monitored to ascertain the condition of the tailshaft system during operation, and that fulfils the design requirements in DNV rules for ships Pt.4 Ch.4 Sec.1 E300 provided a successful initial survey is carried out.

In such cases DNV GL will not require any specific time interval between propeller shaft withdrawal surveys. Units with more than 3 years since the last propeller shaft withdrawal are normally to carry out a propeller shaft survey in connection with the TMON initial survey as described in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [17.2].

Guidance note:
The requirement for a propeller shaft withdrawal at TMON initial survey may be waived on a case by case basis, provided that documentation showing satisfactory condition of the stern tube arrangement is presented to the Society.

Such documentation, normally covering the last 3 years, should include:

— monthly measurements of stern tube bearing temperatures with corresponding sea water temperatures, oil consumption, water content in oil
— for vessels with alternative water in oil analysis performed by an accredited laboratory, results from 3 monthly analysis can be accepted
— lubricating oil analysis reports from accredited laboratory with conclusion, where available (ref. [16.3.3] d).

16.3.3 Annual survey
The survey shall include:

a) examination of the TMON record file:

— verification that the on board oil analysis for checking of water content in the stern tube lubricating oil has been performed monthly and recorded in the file by the chief engineer

Guidance note:
As an alternative to the monthly onboard checking of the water content in the oil, submitted lubricating oil samples to an accredited laboratory every 3 months is acceptable (ref. item d) below).

— verification that the stern tube bearing temperatures have been recorded every month with highest and lowest temperatures, with corresponding seawater temperatures
— verification that the consumption of stern tube lubricating oil has been recorded for every month by the chief engineer
— if there are performed any overhauls, complete oil changes or similar, this shall be recorded in the TMON record file on the overhaul page
— verify functionality of tailshaft grounding device, where applicable
— verification that wear down measurements have been taken at every dry-docking.

b) testing of stern tube aft bearing alarm

c) visual inspection of inner and outer shaft seal for leakage, as far as practicable

d) verification that documentation of laboratory analysis is kept on board:

— at least two oil samples per year shall be submitted to an accredited laboratory for analysis testing of water content, iron, chromium, copper, tin, silicon, Na (sodium) and magnesium

— the documentation shall contain a conclusion regarding the condition of the oil and its suitability for further use

— the report from the latest oil analysis shall be less than three months old.
SECTION 7 ALTERNATIVE SURVEY ARRANGEMENTS

1 Introduction

A survey arrangement applies to a specific area (discipline) or type of equipment on a unit. When implemented it will define all roles and responsibilities applicable for that specific area or equipment and how this shall be followed up on the unit during the operations phase. The standard survey arrangement will always be implemented by default, but alternative survey arrangements may also be accepted as an option. Survey arrangements are applicable to periodical surveys for main class and selected optional class notations.

Survey arrangements are defined and available for the following areas:

— machinery equipment, see [2]
— structure, see [3].

For production systems as covered by the PROD notation, the machinery survey arrangements as described in [2] may be applied, subject to a case-by-case approval.

2 Machinery survey arrangements

2.1 General

2.1.1 Introduction

The different machinery survey arrangements are based on the Society’s machinery list in accordance with Table 1 and as specified for the unit. The difference between them is the conditions for obtaining and maintaining the survey arrangement. If a survey arrangement is not specified, the periodical survey requirements as detailed in Sec.3 [5] shall be followed.

2.1.2 Machinery survey arrangements

The following survey arrangements are available for class related machinery items:

— machinery renewal (default arrangement, see Sec.3 [5]
— machinery continuous (MC), see [2.2]
— machinery planned maintenance system (MPMS), see [2.3]
— machinery planned maintenance system – reliability centred (MPMS RCM), see [2.4]
— offshore condition monitoring (Offshore CM), see [2.5].

2.1.3 Machinery items

Machinery systems listed in Table 1 shall be surveyed according to one of the listed survey arrangements if not part of a separate survey.
### Table 1 Machinery surveys

<table>
<thead>
<tr>
<th>Item</th>
<th>Machinery Renewal and Machinery Continuous</th>
<th>Machinery PMS</th>
<th>Offshore CM</th>
<th>PMS RCM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prime movers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diesel engine</td>
<td>1</td>
<td>3</td>
<td>3 and 4</td>
<td>5&lt;sup&gt;19)&lt;/sup&gt;</td>
</tr>
<tr>
<td>Steam turbines&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>4&lt;sup&gt;16)&lt;/sup&gt;</td>
<td>1</td>
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<tr>
<td>Gas turbines</td>
<td>See Sec.3 [5.2.4]</td>
<td>See Sec.3 [5.2.4]</td>
<td>See Sec.3 [5.2.4]</td>
<td>See Sec.3 [5.2.4]</td>
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<tr>
<td>Electrical main motors, including frequency converters</td>
<td>2</td>
<td>3</td>
<td>3 or 4</td>
<td>5&lt;sup&gt;19)&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Shafting</strong></td>
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<tr>
<td>Thrust-and intermediate shaft including bearings, clutch, couplings and torsional and axial vibration damper</td>
<td>Separate survey Sec.4 [1]</td>
<td>Separate survey Sec.4 [1]</td>
<td>Separate survey Sec.4 [1]</td>
<td>Separate survey Sec.4 [1]</td>
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<tr>
<td><strong>Tailshaft</strong></td>
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<td><strong>Gears&lt;sup&gt;3)&lt;/sup&gt;</strong></td>
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<tr>
<td>Shafts, pinions, gear wheels, couplings and bearings, clutch.</td>
<td>1</td>
<td>3</td>
<td>3 and 4</td>
<td>5</td>
</tr>
<tr>
<td>Power Take Off /In (PTO/PTI)</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td><strong>Power consumption</strong></td>
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<tr>
<td><strong>Power actuating system</strong></td>
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<tr>
<td>Actuator</td>
<td>2</td>
<td>3</td>
<td>3 or 4</td>
<td>5</td>
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<tr>
<td>Hydraulic pumps</td>
<td>2</td>
<td>3</td>
<td>3 or 4</td>
<td>5</td>
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<tr>
<td>Electric motors</td>
<td>2</td>
<td>3</td>
<td>3 or 4</td>
<td>5</td>
</tr>
<tr>
<td>Pipes, valves and filters</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>5</td>
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<tr>
<td><strong>Auxiliary machinery</strong></td>
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<tr>
<td>Turbines&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5&lt;sup&gt;19)&lt;/sup&gt;</td>
</tr>
<tr>
<td>Electrical motors, including frequency converters</td>
<td>2</td>
<td>3</td>
<td>3 or 4</td>
<td>5</td>
</tr>
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<td>3</td>
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</tr>
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<tr>
<td>Generators</td>
<td>2</td>
<td>3</td>
<td>3 or 4</td>
<td>5</td>
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<tr>
<td>Shafting</td>
<td>Shaft, couplings, clutch, and torsional and axial vibration damper</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Gears</td>
<td>Shafts, pinions, gear wheels, couplings and bearings</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Power Take Off (PTO)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Sea water cooling system</td>
<td>Pumps, electrical motor and starter</td>
<td>1</td>
<td>3</td>
<td>4</td>
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<td>Machinery PMS</td>
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<td>Mechanical ventilation of battery lockers or rooms</td>
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<td>Forced draught fan</td>
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<td>Item</td>
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<td>Instrumentation and automation for vessels without notation EO or ECO</td>
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<td>PMS RCM</td>
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1) Survey method: 1) Incinerator arrangement, 3) Inert arrangement for vessels without notation INERT, 5) Instrumentation and automation for vessels without notation EO or ECO.
### Survey method ¹)

1) The survey methods are defined as follows:

   **Survey method No. 1**: Visual inspection by opening up fully or partly. Function testing and or pressure testing to be carried out when relevant and found necessary by the surveyor.

   **Survey method No. 2**: Visual inspection without dismantling and performance test to be carried out. Opening up if found necessary. Last overhaul to be verified.

   **Survey method No. 3**: Audit of maintenance history in the planned maintenance system and selected spot checks.

   **Survey method No. 4**: Audit of condition monitoring results.

   **Survey method No. 5**: Verification of maintenance records, assessment of maintenance handling, review of management, safety incidents and continuous improvement processes and fully or partly opening of equipment, if found necessary by surveyor.

2) As an alternative to Survey method No.1, a performance test and a condition analysis may be carried out.

3) Selected bearings shall be examined. Gears and roller bearings may as far as practicable be inspected without dismantling complicated assemblies.

4) Strainers to be opened. Selected pipes and main engine(s) system tanks to be surveyed for sludge.

5) Valves, cocks and strainers to be opened.

6) For steam pipes with temperature 450°C and above: Crack detection and/or thickness examination may be required. Selected pipes to be pressure tested to 1.5 times working pressure. Steam pipes of copper to be pressure tested to 2 times working pressure.

7) To be pressure tested to 1.2 times working pressure if internal survey not possible.

8) For piping systems outside machinery spaces, see DNV rules for ships Pt.7 Ch.1 Sec.4 (2.1.14).

9) Settling tank and daily service tanks for both heavy fuel oil and diesel oil as well as lubrication oil circulation tanks shall be internally surveyed for assessment of tank condition and presence of sludge. If inspection and cleaning of above mentioned tanks have been carried out by the crew during the last 12 months and relevant log extracts are provided and confirmed, this may be credited as surveyed at the surveyor's discretion.

10) Valves where the function in the piping system is not evident are to be adequately and readably marked.

11) Filters to be opened and system oil tanks internally surveyed for presence of sludge, dirt and particles.

12) It is advised to take oil analysis at regular intervals and always prior to docking in order to ensure that there is no need for opening of the thruster (e.g. water in the oil).

13) Survey of gear and bearings through inspection openings or by other means (may be carried out concurrent with bottom survey).

14) Opening up and Survey of bearings, gear and shafts and other relevant parts if any indications of abnormalities are observed. Satisfactory maintenance according to manufacturer's recommendations to be documented and considered as a base for extent of possible opening. Any opening up of a thruster to be witnessed by a DNV GL surveyor.

15) Hydraulic oil, lubrication oil, alarm and safety systems are to be surveyed as applicable for respective systems.

16) In addition to the annual survey for Offshore CM, a limited internal inspection shall be carried out on main steam turbines.(see CN 10.2 Ch.3.1)

17) Fresh water generator (only for steam turbine propulsion).

18) NDT and load testing on loadbearing structures/components to be carried out. Pressure test piping, valves, pressure vessels and other pressure rated equipment to the maximum allowable working pressure as relevant.

19) Test of safety functions to be carried out.

20) For pipe systems with compression couplings with rubber seals the condition of the seals is to be confirmed.
2.2 Machinery continuous

2.2.1 General
Requirements for machinery continuous survey arrangement (MC) are given in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 [3.1] and with the additional specifications applicable for MOU’s as listed in this chapter.

A follow-up system covering the Society’s machinery list in accordance with Table 1 shall be established on board the unit.

Half of all machinery component surveys, for components of which there are more than one, can be credited based on documented maintenance history presented by the responsible person/chief engineer, every second time they are credited.

The due dates should be distributed with 20% of the surveys each year and the separate surveys shall in all cases be carried out once in each 5 year period of the class certificate.

2.2.2 Responsible person
Manager for the unit shall dedicate a responsible person (chief engineer) on board the unit to ensure correct operations and the integrity of the arrangement. Responsible person shall ensure appropriate execution according to the survey arrangement and be responsible for the professional standard of the resources on board to provide sufficient maintenance supportability at all times. The responsible person shall be a qualified professional with documented qualifications and skills related to technical operations and maintenance on all class related machinery items.

Guidance note:
If the a person onboard hold a valid STCW certificate (See IMO Res. 741 (18) ISM Code, 1995 STCW Section A-III/1 as amended) this will be regarded as sufficient documented qualifications. As an alternative it is recommended to apply EN 15628 – Qualification of maintenance personnel or equivalent when establishing requirements and documenting qualifications for the position. This standard gives guidance on required knowledge, minimum skills and competencies applicable for maintenance personnel. Responsible person shall as a minimum typically comply with the requirements of maintenance supervisor and maintenance engineer defined by the standard. Alternatively a solution involving maintenance management onshore as part of the arrangement, can be considered on a case by case basis.

---end---of---guidance---note---

2.3 Machinery planned maintenance system

2.3.1 General
Requirements for machinery planned maintenance survey arrangement (MPMS) are given in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 [3.2] and with the additional specifications applicable for MOU’s as listed in this chapter.

MPMS is a survey arrangement based on survey of an approved and implemented computerised maintenance management system (CMMS) onboard the unit. This system shall cover all component surveys in the machinery list in accordance with Table 1 for the unit.

Guidance note:
When developing the maintenance program it is recommended to apply standard maintenance terminology ref. EN 13306: Maintenance terminology, or equivalent.

---end---of---guidance---note---

2.3.2 Responsible person
Manager for the unit shall dedicate a responsible person (chief engineer) on board the unit to ensure correct operations and the integrity of the arrangement. Responsible person shall ensure appropriate execution according to the survey arrangement and be responsible for the professional standard of the resources on board to provide sufficient maintenance supportability at all times. The responsible person shall be a qualified professional with documented qualifications and skills related to technical operations and maintenance on all class related machinery items.
### Guidance note:
If the a person onboard hold a valid STCW certificate (See IMO Res. 741 (18) ISM Code, 1995 STCW Section A-III/1 as amended) this will be regarded as sufficient documented qualifications. As an alternative it is recommended to apply EN 15628 – Qualification of maintenance personnel or equivalent when establishing requirements and documenting qualifications for the position. This standard gives guidance on required knowledge, minimum skills and competencies applicable for maintenance personnel. Responsible person shall as a minimum typically comply with the requirements of maintenance supervisor and maintenance engineer defined by the standard. Alternatively a solution involving maintenance management onboard as part of the arrangement, can be considered on a case by case basis.

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#### 2.3.3 Maintenance tasks and intervals
Maintenance tasks and intervals (maintenance recommendations) shall be applied as specified by the OEM. The maintenance recommendations should normally be confirmed appropriate (by the OEM) for the specific environment and operations of the applicable equipment.

#### 2.3.4 Condition monitoring
If condition monitoring of equipment is to be carried out as part of the maintenance, this shall be approved as part of a separate survey arrangement. See [2.5] for further details.

#### 2.3.5 Annual survey
To prolong the validity of the survey arrangement an annual survey of the implemented MPMS system onboard is required. The purpose of this survey is to review and evaluate the previous period’s maintenance activities and experience. Opening of machinery for internal inspection or function testing may be required if found necessary by the surveyor.

#### 2.4 Machinery planned maintenance system – reliability centred

##### 2.4.1 General
Requirements for machinery planned maintenance system – reliability centred (MPMS RCM) is based on a proactive maintenance methodology and with a focus on the manager’s ability to provide required maintenance activities when required (maintenance supportability). It is recommended to be operating according to and comply with MPMS (ref. [2.3]) before entering MPMS RCM.

MPMS RCM survey arrangement is applicable to main class machinery items listed in Table 1.

##### 2.4.2 Approval process
The approval process includes the following activities:
- maintenance management approval
- maintenance analysis approval
- maintenance programme approval
- initial (implementation) survey onboard the unit.

##### 2.4.3 Maintenance management approval
A maintenance management approval is performed to ensure that the manager of the unit can document satisfactory maintenance supportability in the organisation. The approval shall include a documentation review based of the following:

a) maintenance strategy supporting a MPMS RCM survey arrangement.
b) management to support continuous improvement and the ability to obtain required performance level
c) management with necessary resources required to sufficiently support a MPMS RCM survey arrangement
d) governing documentation (procedures) and working processes related to the MPMS RCM for the unit(s)
e) spare part management
2.4.4 Maintenance resources

It shall be the responsibility of the manager for the unit to organise, manage, and develop maintenance resources (personnel, materials and equipment) on board to provide sufficient maintenance supportability at all times. The manager shall, based on applicable class related machinery items onboard the unit, ensure sufficient technical competence related to required maintenance level (maintenance task complexity), type and function of the equipment.

Guidance note:
Based on the applicable machinery equipment and systems as listed in Table 1 it is recommended to categorise the equipment complexity and associate it to a predefined maintenance level. The maintenance level should reflect the increasing complexity. E.g. maintenance levels as defined in EN 13306:

— Level 1: Simple actions/Routine
— Level 2: Basic actions/Preventive/Corrective
— Level 3: Complex actions (Overhaul) with detailed procedures
— Level 4: Actions (Overhaul) requiring detailed “know how” (Specialized personnel)
— Level 5: Actions (Overhaul) requiring knowledge held by the OEM.

Maintenance personnel should be qualified according to the defined maintenance levels.

---end---of---guidance---note---

2.4.5 Responsible person

Manager for the unit shall dedicate a responsible person on board the unit to ensure correct operations and the integrity of the arrangement. Responsible person shall ensure appropriate execution according to the survey arrangement and be responsible for the professional standard of the resources on board to provide sufficient maintenance supportability at all times. The responsible person shall be a qualified professional with documented qualifications and skills related to technical operations and maintenance of applicable machinery systems and equipment.

Guidance note:
If the a person onboard hold a valid STCW certificate (See IMO Res. 741 (18) ISM Code, 1995 STCW Section A-III/1 as amended) this will be regarded as sufficient documented qualifications. As an alternative it is recommended to apply EN 15628 – Qualification of maintenance personnel or equivalent when establishing requirements and documenting qualifications for the position. This standard gives guidance on required knowledge, minimum skills and competencies applicable for maintenance personnel.

Responsible person shall as a minimum typically comply with the requirements of maintenance supervisor and maintenance engineer defined by the standard. Alternatively a solution involving maintenance management onshore as part of the arrangement, can be considered.

---end---of---guidance---note---

2.4.6 Continuous improvement process

A continuous improvement process shall be implemented to verify that the developed maintenance tasks and intervals are performing according to the expectations in the maintenance task analysis. The process shall also ensure that the organisation continuously improve the effectiveness of the maintenance and their maintenance support.

A continuous improvement process shall as a minimum include input from the following elements:
— analysis of collected maintenance data
— evaluation of OEM bulletins
— change proposals made by personnel
— maintenance performance measurements (KPI’s)
— Root Cause Analysis (RCA) process
— management of change.

Guidance note:
When selecting KPI’s it is recommended to use EN 15341 Maintenance Key Performance Indicators, or equivalent. When developing the maintenance system it is recommended to apply standard maintenance terminology ref. EN 13306 Maintenance terminology, or equivalent.

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2.4.7 Approval of the maintenance analysis
The maintenance analysis shall evaluate available maintenance data and based on a selected maintenance strategy, assign appropriate preventive maintenance tasks to relevant class items at optimal intervals. The maintenance analysis shall also identify and determine the specific information and required resources for each item that requires maintenance.

Maintenance tasks are identified by one or a combination of the following approaches:
— OEM maintenance recommendations
— operational experience
— RCM analysis.

2.4.8 A procedure shall be established before the maintenance analysis commences. This document shall describe the maintenance strategy and describe the maintenance analysis process for the specific unit(s). This document shall be submitted for approval.

Guidance note:
A typical procedure should include details and descriptions of the following (not limited to): background and motivation for the project, roles and responsibilities, work processes for the total project, collection of applicable documentation, collection and evaluation of maintenance data, qualification criteria’s for technical expert personnel, applicable rules and regulations (project boundaries).

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2.4.9 OEM maintenance recommendations
Maintenance recommendations (tasks and intervals) shall be applied as specified by the original equipment maker (OEM). OEM maintenance recommendations should normally be confirmed appropriate (by the OEM) for the specific environment and operations of the applicable equipment.

Guidance note:
A unit with maintenance tasks based only on OEM recommendations can apply for MPMS ref. [2.4].

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2.4.10 Operational experience
An alternative to OEM maintenance recommendations can be applying operational experience to optimise the existing maintenance.

Operational experience can be maintenance data collected from past operation with the specific equipment or from same or similar equipment collected under same or similar operational conditions. Operational experience can also be collected from expert judgements.

2.4.11 When optimising maintenance tasks this should follow a structured processes based on a selected maintenance strategy. The main objective of the process is to ensure that all relevant functions and functional failures will be considered (analysed) when existing OEM maintenance recommendations are subject to any proposed change.

The process shall have functions to document and support any decision or change made. This includes a qualitative and quantitative evaluation of available maintenance data to support the change.
Guidance note:
Maintenance data includes failure, condition and performance data, OEM manuals, brochures, bulletins and alerts, international standards, regulatory requirements, historic maintenance tasks and procedures.

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The process shall include:
— methodology for selecting equipment relevant for a maintenance optimisation process
— collection and evaluation of available maintenance data
— identification of relevant functions
— identification of functional failures (failure modes)
— evaluation of the functional failures to determine if the failure is relevant for the proposed change
— established decision logic to determine correct and efficient maintenance tasks at optimal intervals.

Guidance note:
Existing FMEA/FMECA may be used to document relevant functions and failures. Alternative to FMEA/FMECA will be to document significant functional failures by sufficient operational experience. Evaluation of functional failures should include risk rating and inclusion of redundancy.

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2.4.12 Generic maintenance tasks and intervals (maintenance concepts) can be developed for a group of equipment with same or similar design and same functional failures. When a maintenance concept is used for specific equipment it needs to be confirmed appropriate for the actual installation, operational conditions and equipment function.

2.4.13 RCM analysis
For equipment where OEM recommendations are not specified or suitable for the applicable equipment a structured analysis such as reliability centred maintenance (RCM) should be carried out to determine appropriate maintenance tasks at optimal intervals.

Guidance note:
It is recommended that RCM analysis is performed according to a recognised standard like IEC 60300-3-11 Application guide – Reliability centred maintenance, SAE JA1011 Evaluation Criteria for Reliability Centred Maintenance Process or other equivalent standard.

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2.4.14 RCM teams must consist of experienced people related to the equipment that is analysed. If the equipment analysed is new, the analysis process should be performed by the use of operational experience from same or similar equipment collected under same or similar operational conditions.
Team members should represent all relevant operational and maintenance disciplines.
It is recommended that an experienced RCM facilitator is used to coordinate the process.

2.4.15 If condition monitoring of equipment is to be carried out as part of the maintenance, this shall be approved as part of a separate survey arrangement. See [2.5] for further details.

2.4.16 Approval of maintenance programme
The maintenance program shall include at least the applicable class related machinery items listed in Table 1. All these components shall be identified as class items in the system and have a unique tag number in the system and on the item.
Maintenance tasks and intervals shall be in accordance with the results from the maintenance analysis. Changes shall only be accepted when the continuous improvement process can justify the change. Changes shall be traceable and presented to the attending surveyor at the next survey for acceptance.
2.4.17 Implementation in to the computerised maintenance management system (CMMS)

Systems and equipment shall be evaluated according to maintenance level, type and function. Maintenance personnel shall be qualified according to the applicable maintenance task (based on maintenance level, type and function).

All maintenance tasks shall have:

a) detailed task description to the level of detail necessary for a skilled maintenance person
b) maintenance task interval
c) task preparation note describing any preparation necessary
d) maintenance level indicating qualification (competence) level of personnel to perform the task
e) required materials (consumables, spare parts and special tools)
f) applicable documentation (maintenance procedures and service manuals and drawings)
g) information of checks and measurements to be recorded
h) job descriptions in English.

2.4.18 CMMS functionalities

CMMS is subject to approval by the Society, either a type approved system or non-type approved system (case by case approval). See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 [3.2] for further details.

CMMS shall have functionalities that makes it able to:

a) record and separate between different type of maintenance
   — scheduled maintenance (preventive maintenance/deferred corrective maintenance)
   — un-scheduled maintenance (immediate corrective maintenance)
b) produce maintenance history reports on maintenance carried out for a specific time period on machinery class items
c) record maintenance data
   — condition before and after maintenance (state)
   — failure mechanism
   — checks and measurements
d) register revisions of maintenance task (traceability)
e) provide verification of class related maintenance tasks/jobs (quality of work and correct/sufficient level of reporting)
f) provide access control to assure that changes to the system cannot be made by unauthorised personnel and any input will be traceable to the individual user
g) back up data and make it possible to restore all data for minimum 5 years.

Guidance note:

To make it possible to collect, exchange and analyse maintenance data based on common viewpoints and enable industry co-operation it is recommended to use a standardisation of maintenance parameters and data ref. EN ISO 14224: Collection and exchange of reliability and maintenance data for equipment (same as API Std 689), or equivalent.
2.4.19 Initial survey
An initial survey shall be performed to verify that the system has been implemented in accordance with the approved arrangement/documentation and that the system is used as intended. It is recommended that the system has been operated for at least 6 months before the initial survey is carried out. The initial survey is normally split in one offshore part and one onshore part. During the initial survey it shall be verified that:

a) there are sufficient resources available on board the unit and in the organisation to ensure the integrity of the arrangement. Personnel engaged in performing maintenance tasks on class related machinery items have the correct competence based on maintenance level, type and function of the equipment

b) responsible person and other relevant maintenance personnel on board, have sufficient knowledge about the approved maintenance management applicable on board and have access to procedures and documentation to ensure correct operations according to the arrangement

c) responsible person is familiar with the CMMS and is able to demonstrate the different functionalities in the system to the attending surveyor

d) the general condition and maintenance of the equipment and the general maintenance onboard is good

e) the arrangement includes an active continuous improvement process.

Provided the initial survey is carried out with a satisfactory result, the survey arrangement MPMS RCM will be granted and a certificate will be issued stating the system name and conditions for the survey arrangement for the specific unit.

2.4.20 Annual survey
To maintain the validity of the survey arrangement MPMS RCM, an annual survey of the implemented maintenance programme is required, preferably during normal operation. This survey replaces the survey of machinery for components included in the MPMS RCM arrangement. The purpose of this survey is to review and evaluate the previous period's maintenance activities and to ensure that the system is operated correctly according to approved systematics and documentation.

During the annual survey the following will be verified and surveyed by the Society:

a) general assessment of equipment and systems and the general maintenance onboard (rated by the attending surveyor)

b) all maintenance on class related items part of the arrangement is carried out according to the maintenance program

c) any changes to the system (maintenance intervals and task descriptions) shall be documented and presented to the attending surveyor for acceptance. Changes shall only be accepted when the continuous improvement process can justify the change

d) responsible person onboard the unit is familiar with the CMMS and is able to demonstrate the different functionalities in the system to the attending surveyor

e) overdue/ postponed (deferred) jobs shall be explained

f) amount of un-scheduled maintenance (immediate corrective maintenance)

g) visual inspection and function testing if found necessary by the attending surveyor as specified in Sec.3 [2.4]. Opening of machinery may be required in special cases

h) all damage/break-downs (if any) on class related items have been reported to the society.

Guidance note:
Damage to machinery systems or equipment covered by classification shall always be reported to the Society and into the planned maintenance system as a corrective action.

2.4.21 Renewal survey
To prolong the validity of the survey arrangement a renewal survey of the implemented MPMS RCM survey arrangement is required. The purpose of the survey is to ensure that the conditions for approval of the system are still adhered to and that the results of the maintenance work achieve acceptable results. The following will normally be reviewed and verified during the renewal survey:
a) maintenance management (onshore or offshore as applicable)
   — procedures and documentation
   — personnel training
   — responsible person and other relevant maintenance personnel have sufficient knowledge about the
     approved maintenance management on board (interviews)
   — continuous improvement processes
b) safety incidents related to maintenance
c) visual inspection and function testing as specified in Sec.3 [2.4]
d) verification of critical piping and structures.

2.4.22 The maintenance management of the unit shall be audited during the renewal survey to verify that
the basis of the survey arrangement is still intact. This will include review of procedures, verification of
personnel training and interviews.

   Guidance note:
   During the implementation of MPMS RCM a review has been made of several parts of the manager's organisation. During the
   renewal survey the same topics will normally be covered as spot checks. However major changes of the organisation could give
   rise to an increase in the survey scope.

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2.4.23 Review of safety incidents related to maintenance shall be conducted on a spot check basis. It shall
be ensured that identified incidents result in traceable improvement actions and that the maintenance work
itself is conducted in a safe manner.

2.4.24 The continuous improvement process shall be evaluated during the renewal survey. It shall be
verified that approved and implemented procedures are complied with and that the process actually produces
traceable improvements in CMMS (maintenance tasks and/or intervals).

   Guidance note:
   Evaluation of the continuous improvement process includes evaluation of collected information and how this has been processed to
   achieve improvements to the maintenance and maintenance supportability onboard the unit and in the organisation.

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2.4.25 Visual inspection and functional testing is intended to verify the physical results of the maintenance
work by observing the function of the equipment. Opening of machinery for internal inspection may be
required if found necessary by the surveyor.

2.4.26 Risk based inspection (RBI)
The critical structures are verified by review of NDT survey jobs reported in the maintenance system.
However, if the structure inspection program has been generated based on RBI methodology and
approved by the society, the standard renewal scope can be substituted with a modified scope and inspection
intervals.

   Guidance note:
   For further guidance on RBI see also DNVGL-RP-C210 Probabilistic methods for planning of inspection for fatigue cracks in offshore
   structures and DNVGL-RP-C302 Risk based corrosion management.

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2.4.27 Cancellation of the survey arrangement
If the conditions for the survey arrangement are not complied with or in case of change of technical manager
of the unit, the survey arrangement will be automatically cancelled and substituted by survey arrangement
MC or machinery renewal as applicable.
2.5 Offshore condition monitoring

2.5.1 General
Offshore condition monitoring (Offshore CM) is a survey arrangement based on use of an approved service supplier (AoSS) for execution of condition monitoring on rotating machinery and production system to monitor relevant failure mode development. A comprehensive approval process of the AoSS is conducted in order to verify the procedures, competence and resources of the company. When Offshore CM has been implemented successfully on selected equipment on a unit, this will give an alternative to the traditional inspection given by fixed intervals on the equipment. With an approved arrangement the required inspection will be performed according to the condition of the equipment. The survey arrangement is based on compliance with ISO 17359 *Condition monitoring and diagnostics of machines* and can be applied to main class machinery items listed in Table 1. Thrusters for propulsion and/or positioning may be included as part of an Offshore CM arrangement.

2.5.2 Approval of service supplier
The AoSS is granted a general authorisation to carry out condition monitoring in order to cover the scope of annual and renewal survey of machinery and equipment. This authorisation is valid for three years and the approval follows DNV Approval Programme No. 416, see Sec.8.

2.5.3 Conditions
The following conditions must be fulfilled before the survey arrangement is valid:
— approved service supplier, AoSS (Sec.8)
— successful initial survey [2.5.7]
— approved CMMS. See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 [3.2] for further details.

2.5.4 Documentation requirements
Approval of the CM programme is based on submittals of documentation with a description of the following:

a) maintenance strategy

b) monitoring methods including vibration and lubrication (see [2.5.9])

c) implementation of condition monitoring in the planned maintenance system onboard the unit:
— maintenance tasks for vibration measurements
— maintenance tasks for lubrication oil sampling and consumption monitoring
— maintenance tasks for follow up of measurements and AoSS recommendations

**Guidance note:**
Generally it is necessary to comply with ISO17359 or similarly recognised standard.

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d) training programme for involved crew. The operator carrying out vibration measurements and lubrication sampling shall have sufficient competence and documented training for their scope of work.

**Guidance note:**
Sufficient competence and experience shall usually be documented in accordance with ISO 18436-2 (Vibration measurement) and ISO 18436-4 (Field lubricant analysis). Alternatively the responsible AoSS can supply specialised training to the required technical level and approved by the Society. Requirement for competence and training (vibration measurements) will not apply to a unit with a CM system based on online vibration measurement.

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e) name and address of the appointed AoSS and oil analysis laboratory

f) information about the CM installation including:
— who performed the installation (ISO 18436-2 Cat. 1)
— who verified the installation (ISO 18436-2 Cat.2)
— condition of the applicable machinery and equipment including baseline measurements
— acceptance criteria’s for applicable machinery and equipment (limits)
— a list of the machinery systems and equipment included in the arrangement

g) drawings that show the measuring and sampling points on applicable equipment

h) measuring points shall be clearly marked on the equipment with unique ID

i) communication plan that outlines the owner’s communication with the Society and the AoSS

j) list of equipment to be used. Ex-certificate shall be provided if equipment is installed in hazardous areas.

2.5.5 Lubrication and hydraulic oil analysis

The basic requirements to the lubrication/hydraulic oil samples are as follows:

a) Oil samples shall be submitted for analysis on a regular basis as recommended by the AoSS.

b) Laboratory analysis reports and documentation of follow-up of recommended actions shall be available.

c) The oil sampling point should be clearly identified and positioned to ensure that the sample is taken at
   the same position each time.

d) If possible, samples should be acquired from the return flow, usually this will mean immediately
   downstream from the component in question.

e) Oil samples are always to be acquired while the equipment is operating and the oil is circulating.

f) Before sampling, a sufficient draining is required to ensure representative oil samples.

g) Wherever samples intended for particle counting are acquired, special ultra-clean particle free equipment
   and bottles shall be used. Both the sampling point and the procedure shall be designed so as to minimize
   the risk of contamination.

h) Lubrication and hydraulic oil samples shall be submitted to the delivering oil company or an independent
   accredited oil analysis laboratory.

i) For lubricating oils the scope of work should, as a minimum, be:
   — water content
   — sodium content (salt)
   — flash point.
   — wear particles
   — viscosity
   — insoluble material.

j) For hydraulic oils the scope of work should, as a minimum, be:
   — water content
   — viscosity
   — wear particles
   — acid number.

For hydraulic systems with high cleanliness demands specified by manufacturer, particle counting should be
performed.

**Guidance note:**

Oil laboratories performing the oil analysis need to have a quality system and correct resources to provide a satisfactory service. The quality system should comply with ISO/IEC 17025 or similarly recognised standard. Competence of personnel performing oil analysis should be certified according to ISO 18436-5 or similar recognised standard.
2.5.6 Language
All applicable CM documentation including CM programme, procedures and reports shall be in English.

2.5.7 Initial survey
An initial survey shall be carried out on board in order to verify that the system has been implemented in accordance with the approved documentation.

It is recommended that the programme has been operated for at least 6 months before the initial survey is carried out.

Provided the initial survey is carried out with satisfactory results, the survey arrangement will be granted and a certificate will be issued stating conditions of the survey arrangement for the specific unit.

Guidance note:
The survey normally consists of an offshore part and an onshore part. Based on similar and recent survey with the same manager, parts of the survey may be omitted.

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2.5.8 Annual survey
An annual survey shall be carried out on board in order to verify that the conditions for maintaining the survey arrangement are complied with.

This survey replaces the annual and renewal survey of machinery and components included in the condition monitoring scheme. The purpose of this survey is to ensure that the system is operated correctly and that the safety integrity level of the unit is kept intact. Where more than one unit (same manager) follow the same scheme, the annual survey can be based on spot checks of a representative selection of units.

Guidance note:
On units with an approved online vibration measurement system, part of the survey can be performed at the manager's facilities onshore.

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2.5.9 The annual survey shall consist of examination of:
— condition monitoring records
— maintenance records
— CM handling onboard (collection of data and response to recommendations from service supplier)
— reports and maintenance records from breakdowns.

If it is not properly demonstrated that the system is correctly operated and that it serves to ensure the technical integrity level of the unit, opening or testing of machinery may be required.

2.5.10 Damages
Damage to machinery systems or equipment covered by classification shall always be reported to the Society and into the CMMS as a corrective (un-scheduled) maintenance task.

2.5.11 Cancellation of the survey arrangement
If the conditions for the survey arrangement are not complied with or in case of change of technical manager of the unit, the survey arrangement will be cancelled and substituted by survey arrangement MC or MPMS. The arrangement is also cancelled if the AoSS have their approval cancelled.
3 Structural survey arrangements

3.1 General
The structural survey arrangements are based on the IIP, as described in Sec.3 [1.2], in accordance with type of unit. The difference between the arrangements is the conditions for obtaining and maintaining the survey arrangement. If a survey arrangement is not specified, the periodical survey requirements as detailed in Sec.4 shall be followed.

The following survey arrangements are available:
— renewal, see [3.2] (default)
— structural continuous survey arrangement (SC), see [3.3]
— structural integrity management (SIM), see [3.4].

3.2 Renewal (periodic)

3.2.1 The renewal survey arrangement will if no other agreement is made be applied as basis for the survey plan and scope for the unit.

3.2.2 Periodical surveys belong to one of the following categories according to the level of survey requirements:
— annual survey
— intermediate survey
— complete survey.

The survey required in conjunction with issuance of a new class certificate is denoted renewal survey. See Sec.1 for further information.

3.3 Structural continuous

3.3.1 Structural continuous (SU) is a survey arrangement whereby the survey items in the structure (hull) list established for the unit are subject to separate surveys with interval 5 years. The arrangement shall provide for survey of approximately 20% of the total number of survey items during each year of the five-year class period.

3.3.2 Applicable survey requirements as detailed in Sec.3 [2] to Sec.3 [4].

3.4 Structural integrity management

3.4.1 Structural integrity management (SIM) is a survey arrangement offered as an integral part for the in-service inspection program, implemented for classification compliance. The continuous survey arrangement shall be applied in combination with the SIM in order to obtain the intended benefit for the owner. The SIM performance will be reviewed based on the owners reporting in the system (SIM-tool) and by verifying the condition of the structure and maintenance on board the unit.

3.4.2 SIM survey arrangement allows for up to half of the structural items, covered by the units structural inspection program, to be inspected by owners qualified personnel. The parts to be inspected by the owner will be decided based on inspection history and current structural condition. Critical areas, areas with poor condition and/or substantial corrosion are normally not included in owners scope.
3.4.3 A survey plan shall be developed identifying areas that will be surveyed by class and owner. The plan will be continuously monitored during the class period and adjusted based on inspection results and accumulated knowledge.

3.4.4 Approval of the arrangement shall include a documentation review covering a description of the following:
— inspection responsibilities and functions
— SIM tool for inspection reporting
— SIM responsible person on board
— training programme/plan for involved personnel
— inspection manual/instruction including reporting, ratings and acceptance criteria
— communications plan that outlines the owner’s information sharing with the Society.

3.4.5 Inspection by the owner shall be performed by qualified personnel. Qualified personnel shall successfully have attended and completed:
— SIM training course arranged by the society
— tutored survey on board covering relevant inspection technics/areas

Guidance note:
NS 415-1 certification or certification based on equivalent standard may be applied partly to document sufficient qualifications.
Personnel qualifications will usually be linked to a specific owner or unit manager.

3.4.6 The following conditions shall be complied with before the survey arrangement is valid:
— approved inspection program and reporting system (SIM-tool database reporting mandatory)
— qualified inspection personnel
— successful initial (implementation) survey (see [3.4.7]).

3.4.7 Initial survey
An initial survey shall be carried out on board the unit in order to verify that the system has been implemented in accordance with the approved documentation and that the system is used as intended. It is required that the SIM system has been operated for at least 6 months and/or minimum 3 inspection have been performed before the initial survey is carried out.

3.4.8 The initial survey will include verification of the following:
— responsible person have sufficient knowledge in line with approved arrangement
— correct use according to approved inspection program and reporting system
— inspection performed only by qualified inspection personnel
— inspection responsibilities and functions
— training programme/plan for involved personnel
— inspection manual/instruction on board and that involved personnel is familiar with the system.
— communications between owner and the Society.
Upon successful approval of the arrangement (document review) and completion of the initial survey; a SIM survey arrangement certificate will be issued to the unit.

3.4.9 Annual survey
To maintain the validity of the SIM survey arrangement, an annual survey of the arrangement has to be performed by the Society. The purpose of this survey is to ensure proper use of the arrangement and to verify the general condition and maintenance level with special attention to the hull and structure.
3.4.10 The survey will include the following:
— structural inspections inside class scope
— NDT of critical structures
— verification of owners inspections
— verification of proper use of the SIM survey arrangement.
The attending surveyor can, if found necessary, require a re-survey of any structural item inspected by the owner.

3.4.11 Damages (major findings)
Damage and findings related to structural items shall always be reported to the Society according to approved procedure and into the SIM-tool database as a finding.

3.4.12 Cancellation of the survey arrangement
In case of change of manager/owner of the unit, the survey arrangement is usually cancelled. The arrangement may also be cancelled if it is evident that the conditions of the arrangement (procedure, and reporting) are not complied with. Any changes to the arrangement shall be subject to class approval.
SECTION 8 SURVEYS PERFORMED BY APPROVED COMPANIES

1 Surveys by approved companies

1.1 General

Parts of the periodical surveys may be carried out by companies approved by DNV GL. The following survey parts may be performed by such companies:

— thickness measurements
— bottom survey afloat
— general NDT
— mooring line survey
— condition monitoring.

1.2 Thickness measurements

1.2.1 Thickness measurements as part of the periodical surveys shall be carried out by a qualified company approved by the Society.

1.2.2 Thickness measurements shall normally be carried out by means of ultrasonic test equipment. The accuracy of the equipment shall be proven to the surveyor as required.

1.2.3 A thickness measurement report shall be prepared. The report shall give the location of the measurements, the thickness measured and the corresponding original thickness. Furthermore, the report shall give the date when the measurements were carried out, type of measuring equipment, names of personnel and their qualifications. The report shall be signed by the operator.

Guidance note:
For more information, see DNV Standard for certification No. 2.9 / Approval Programme No. 402A: “Firms Engaged in Ultrasonic Thickness Measurements of Ship’s Structure”.

1.3 Bottom survey afloat

An approved company shall be used. The survey shall be witnessed by a surveyor of the Society. The diver shall use pictorial equipment of such quality that the surveyor is fully satisfied with the information relayed.

Guidance note:
For more information, see DNV Standard for certification No. 2.9 / Approval Programme No. 404: “Service Suppliers Carrying Out In-water Survey of Ships, High Speed and Light Craft and Mobile Offshore Units and and DNVGL-OTG-08 “UWILD Guidance”.

1.4 Non-destructive testing

Non-destructive testing as part of the periodical surveys shall be carried out by a qualified company approved by the Society.

Guidance note:
For more information, see DNV Standard for certification No. 2.9 / Approval Programme No. 402B: “Firms Engaged in Non-Destructive Testing (NDT) on Offshore Projects and Offshore Units/Components”.

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1.5 Mooring chain inspections

Dry inspection of mooring lines as part of the periodical surveys shall be carried out by a qualified company approved by the Society.

**Guidance note:**
For more information, see DNV Standard for certification No. 2.9 / Approval Programme No. 413: "Service Suppliers Engaged in Renewal Survey Examination of Mooring Chain Intended for Mobile Offshore Units".

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1.6 Condition monitoring

Condition monitoring as part of DNV GL's periodical surveys of machinery components and equipment incl. drilling equipment, can be carried out by a company approved by the Society.

**Guidance note:**
For more information, see DNV Standard for certification No. 2.9 / Approval Programme No. 416 "Service Suppliers Engaged in condition monitoring of machinery onboard Mobile Offshore Units".

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APPENDIX A SPECIAL CONSIDERATIONS FOR CONVERSIONS

1 Basic principles

1.1 Introduction
This appendix has been prepared to make available DNV GL’s approach for an efficient transfer of existing oil tankers to offshore production and storage units or installations.

1.2 Assumptions
DNV GL assumes that the carrier being proposed for conversion:
— holds a valid class certificate from a recognised classification society
— has been assessed and considered suitable for the intended new duty and service life at a specified location.

1.3 Main principles

1.3.1 All new systems shall comply with the latest rules or standards or recognised international standards. Modified systems will normally be accepted based on rules or standards applicable at the time of construction. Alternative solutions will be considered based on sound engineering principles.

1.3.2 Standard and ‘field proven’ equipment may be accepted without being subjected to re-certification, when equipment certificate (e.g. from a recognised classification society) or other supporting documentation provides evidence of suitability for intended use.

Guidance note:
Evidence of suitability for intended use of field proven equipment may be documented through records of satisfactory operation with identical equipment at similar climatic conditions, environmental and operating parameters for a representative number of installations (indication > 10) and period of time (indication > 2 years).

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1.3.3 Deviations from requirements applicable to unrestricted worldwide operation will be accommodated, by evaluating fitness for purpose at the specific location. The criteria and limitations for the unit or installation, systems or components will be stated in the “Appendix to the classification certificate”.

1.3.4 Approval schemes with terms of reference other than DNV GL rules or standards will be allowed for specific systems, when such references are found to give an acceptable safety level equivalent to the rules or standards.

1.3.5 Renewal surveys on location, avoiding dry-docking, will be accommodated to the extent feasible.

Guidance note:
Owners are encouraged to consider at the conversion stage the in-service inspection aspects of the unit on location. The following are areas where small changes made at the conversion stage can contribute to better and more cost-effective follow-up in service:

Overboard valves
— Consider fitting boroscope fittings downstream of the valves.
— Consider how opening/replace valves can be safely carried out offshore. Attention to be paid to the effect of closing a sea chest, or losing the use of a valve.
Thrusters
— Inspection on location, removal if damage is found.

Survey of bottom
— Consider markings to allow identification of location of ROV/diver (see Ch.2 Sec.1 [12]).
— Consider fitting of hinged sea chest grids.
— Survey of tailshaft systems and rudder systems, e.g. water lubricated rudder bearings should be arranged to allow clearances taken on location.

Mooring systems
— How to survey the part of the system that is close to the hull or the unit.
— How to survey the area past the thrash zone.
— Survey of the SLP/STL connections to the hull and the internals in the hull openings.

2 Class notations
Class notations applicable to conversions will be as given for production and storage units in Ch.1 Sec.3.

3 Technical guidance for classification

3.1 General

3.1.1 All new or modified structures, systems and components shall comply with the current class rules in force at the time of signing the classification contract.

3.1.2 All other structures, systems and components will in principle be accepted based on rules applicable at the time of construction (when the tanker was first classed), if suitable for the intended purpose.

3.2 Hull and topside structures
For guidance on hull and topside structure, see DNVGL-OS-C102 App.A.

3.3 Mooring
With few exceptions, the usual station-keeping concepts are spread mooring for relatively shallow to intermediate water depths, and single-point mooring for deeper waters.
There are basically two approaches for certification of the mooring system design:
— in accordance with class rules; or alternatively
— in accordance with recognised international standards (e.g. API RP 2SK).

3.4 Marine systems and equipment
The marine system piping and equipment are categorised in three groups based on the scope of the conversion work:

a) Not subjected to any alteration, or any effect from the modification of the related systems
These systems and equipment will be accepted based on requirements for renewal survey.

b) Subjected to alteration and modifications
These systems will be accepted as long as the modification of the equipment and system is carried out in accordance with rules, or recognised international standards. Modification to systems and components which are identified as safety critical shall be subject to approval. The modified system shall
also undergo satisfactory pressure or function testing as required by the DNV rules for ships, Pt.7, as applicable for renewal survey.

c) New systems and equipment

New systems and equipment that are covered by the class scope will be subject to approval based on class rules and/or international standards and shall undergo satisfactory pressure or function testing as applicable based on the DNV rules for ships, Pt.4 and Pt.7, for acceptance.

3.5 Electrical and instrumentation

Typical consequences of conversions will be increased power demand and hazardous zone alterations. This requires incorporation of new elements to the existing systems, and obtaining unambiguous area classification with matching equipment requirements. Integration of instrumentation for marine applications with new process and offloading functions need to be implemented based on a consistent approach. Class requirements are based on IEC standards (61892 – series).

In case of incorporating US based equipment, the hazardous area definitions will need specific attention with particular focus on Div 1 and fulfilment of Zone 0 and 1 requirements. DNV GL accept electrical equipment for hazardous areas provided type test certificates issued by a recognised test laboratory or institution support these. This also applies to US based UL / FM listed electrical equipment upon evaluation of premises for use and scope of testing. Requirements to electrical installation as per the SOLAS convention applicable to “Oil Tankers” may be re-evaluated, taking into account the new intended duty and service.

3.6 Safety systems and arrangement

3.6.1 Safety systems will be subject to approval irrespective of the class scope chosen. The focus will mainly be on systems that have global impact on the safety of the vessel, and the effect from safety and control systems beyond the individual process skid or module.

The safety systems include the following:

— hazardous area classification
— ignition prevention (review of 'ex' equipment suitable for hazardous area)
— fire and gas detection system
— fixed fire fighting system
— emergency shutdown system.

3.6.2 Interface between safety and marine systems will be evaluated to ensure that addition of the hydrocarbon process plant has not compromised the safety and functionality of the marine systems.

3.6.3 The arrangement and lay-out of the processing plant should be considered in view of fire and explosion hazards, depending on size and complexity of the plant, as well as location in relation to accommodation, escape, shelter and evacuation facilities. Protection of equipment from operation of the plant should be considered, e.g. cranes and lay down areas to be in locations avoiding lifting operations over pressurised equipment.

3.6.4 Due regards should be given to the already built-in safety features required to fulfil the ICLL, SOLAS and MARPOL requirements.

3.6.5 In addition, special considerations shall be made in case of operational conditions deviating from the design conditions, for example operation in cold climate might call for additional heat tracing.
4 Additional services

Description of additional DNV GL services related to conversion projects within the areas of pre-conversion, class transfer, subsea installations, production facilities and in-service support can be found at the DNV GL web site www.dnvgl.com.
APPENDIX B INTRODUCTION TO OFFSHORE CLASSIFICATION

1 Introduction
This appendix is informative and should not be understood as rule requirements. The appendix explains the system of classification, how it works, conditions of validity, and its interaction with statutory control. This information is to a large extent implied by the rules, but a brief clarification of the essential points in one place is considered useful.

2 The classification system
2.1 The classification process and its limitations

2.1.1 Classification is a system for safeguarding life and property at sea, and the environment due to operational consequences. It implies a process of verifying offshore objects against a set of requirements. The requirements are laid down in the rules and standards established by DNV GL. Classification has gained worldwide recognition as an adequate level of safety and quality.

2.1.2 Classification implies an activity, in which a unit is surveyed during construction based on design approval, tested before being taken into service, and surveyed regularly during its whole operational life until it is scrapped. The aim is to verify that the required rule standard is built in, observed and maintained.

2.1.3 Classification is not performed as a substitute for the customer's own quality and safety control and related duties, or the customer's obligations to third parties, nor to relieve the customer of any consequences of default. Classification implies that rule requirements are verified at regular intervals. It is the owner's responsibility to maintain the unit so as to comply with the rules at all times.

2.1.4 DNV GL keeps complete files on all classed ships and units covering the documentation required by the rules. Reports will not be disclosed to any party, apart from the national authorities involved, without the owner's consent. DNV GL also undertakes all reporting to national authorities required in connection with the safety certificates.

2.2 Who needs classification?
Classification serves as verification system for a number of parties who have special interest in the safety and quality of units, such as:

— National authorities, who accept units for registry, or let units into their territorial waters, need assurance that they are safe and represent a minimum hazard to their surroundings.
— Insurance underwriters require units to be classed in order to give insurance.
— Owners, who need the technical standard of the rules as basis for building contracts and to document the unit's standard when seeking insurance or financing, or when hiring out or selling the unit.
— Building yards and sub-contractors use the rules as a tool for design and construction, as required by their customer.
— Finance institutions use classification as a documented indicator of the unit's value.
— Charterers require confirmation of the unit's standard before hire.
2.3 Recognition of DNV GL

DNV GL is recognised as an international classification society by virtue of its position in the marine industry, founded on the following criteria:

*Independence*

— By classing a substantial share of the world fleet and through high equity and financial independence, the economic basis for independent decisions in classification matters is ensured.

*High technical competence*

— Extensive research and development in class related fields sustain a process where the rules and standards are continuously extended and improved in pace with new technology and experience gained. Research and development also contributes to a high level of staff competence.

— Continuous monitoring of a large classed fleet ensures valuable feedback from casualties, damage incidents and operational experience in general. Analyses of these data are one important source of improvements of the rules.

— DNV GL runs a scheme for training and qualification of its technical personnel to ensure correct, uniform quality of approval and survey work throughout the organisation.

*Worldwide survey station network*

— DNV GL operates survey stations all over the world. Efficient reporting and information systems support the operations, and provide service to customers and national authorities.

2.4 Responsibility for safety at sea

2.4.1 National law institutes national authorities’ responsibility for the total safety control of units flying the national flag. Classification cannot in any way relieve the national authorities of that responsibility.

2.4.2 National authorities may use the classification system and DNV GL’s worldwide survey station network as their executive branch for safety control. The convenience of this arrangement is proved by the fact that DNV GL has been delegated extensive authorisation to work and certify on behalf of the majority of the maritime nations of the world.

2.4.3 The classification system applied to delegated, statutory work offers the national authorities regular monitoring of survey and certificate status of units flying their flag. Verification of DNV GL’s work process and quality systems may also be carried out. In this way, national control is retained at the discretion of the authority involved.

2.5 Classification of newbuildings

2.5.1 The builder initiates the process by submitting a request for classification to DNV GL. In response to a list of documentation issued by DNV GL for the specific class notations requested, the builder and sub-suppliers submit drawings, specifications, related technical descriptions and data, including specification of materials as required by class, for approval.

2.5.2 After examining the above documents, DNV GL informs the builder and sub-supplier whether the design and arrangement of structure, machinery and equipment is acceptable. If not, DNV GL may propose modifications needed to meet the classification requirements.

2.5.3 During the building period DNV GL carries out surveys at the building yard and its suppliers. To assess compliance with the rules the Society may require additional documentation and carry out an assessment of yard’s processes, systems and personnel related to classification projects. The results of the assessment
should be used as a basis to decide on the extent of the involvement of surveyors of the Society. They should be clearly reflected in the Quality Survey Plan (QSP).

2.5.4 The purpose of the surveys is to verify that the construction, components and equipment satisfy the rule requirements and are in accordance with the approved plans, that required materials are used, and that functional tests are carried out as prescribed by the rules.

2.5.5 When DNV GL is satisfied that the requirements specified for the unit in question have been met, the appropriate class notation will be assigned and confirmed by the issuance of a classification certificate. Provided the requirements for retention of class are complied with, the certificate will normally have a validity of five years.

2.6 Classification in the operational phase

2.6.1 Compliance with the rule requirements in the operational phase is verified by DNV GL through a system of periodical surveys. The most comprehensive survey is the one carried out in connection with the renewal of the five-yearly classification certificate. During the five year period the unit undergoes annual and intermediate surveys covering various parts, equipment and systems, depending on the class assigned.

2.6.2 In order to confirm retained validity of class, DNV GL evaluates the extent of possible sustained damage and verifies ensuing repairs. Deferred repairs may be accepted by DNV GL, but always associated with a maximum time limit.

2.6.3 The rules allow periodical surveys to contain an element of sampling. This sampling must be sufficient to enable the surveyor to obtain a proper assessment of the condition of the unit. This assessment is based amongst other things on type, age and technical history of the unit.

2.6.4 Results of the surveys are reported to the owners and to DNV GL's central office for updating records. Special findings are also recorded and used as basis for updating and development of the rules.

2.6.5 “The register of vessels classed with DNV GL” is available for supplying information on ship's and unit's main particulars and details of their classification.

2.7 Owner's duties

2.7.1 In order to maintain valid class the classification system specifies the following to be observed by the owner:
— The unit has to be competently handled in accordance with the rules.
— The unit has to be maintained to rule standard at all times. Any conditions of class have to be carried out as specified.
— The unit has to undergo prescribed periodical and renewal surveys, as well as surveys of damage, repairs, conversions and alterations.
— DNV GL must be furnished with all information that may influence its decisions in connection with classification.

2.7.2 Failure to meet any of these requirements may lead to termination of valid class and withdrawal of all class and statutory certificates.

2.7.3 To assist the owner in this regard DNV GL supplies regular status reports on certificates, surveys carried out and becoming due, and possible conditions of class.
3 Remuneration

Remuneration is normally based on a fee system, in which DNV GL invoices each type of survey according to a basic scale of fees. The basic scale of fees is developed by taking into consideration the amount of work needed to execute, process and follow up the survey in question, as well as the items surveyed. The fees also cover investment and development costs of the rules as well as maintenance of a worldwide survey network, central service support system, etc. Price level and costs vary from country to country and are therefore reflected in the fees charged.

4 Classification support

4.1 General

4.1.1 The staff of DNV GL represents a significant accumulation of knowledge and practical experience in offshore-related technical fields. This is an asset often drawn on by the industry in matters related to classification.

4.1.2 The expertise of DNV GL is available to the owner at any time when needed in connection with operating problems, damage and casualties.

4.2 Pre-contract support

Co-operation with DNV GL early in the design stage, before classification is requested and any contract is signed, is usually very beneficial to both yard and owner. Different technical solutions may be evaluated, thus contributing to a more efficient unit, and ensuring that all safety aspects as specified by the rules are taken care of. In this way, expensive changes late in a project may be avoided.

4.3 In-service support

Similar services are given in connection with units in operation. Alternative ways of repairs may be indicated, acceptable distributions of crude cargo and ballast to alleviate overstressing may be computed in case of damage, stability may be investigated, etc. These are typical examples.

4.4 Limitations

Two main restrictions prevail on DNV GL when undertaking classification support work:

— DNV GL does not carry out complete, conceptual design of units. In cases where DNV GL has been involved in design support, the plans and calculations must still be independently evaluated by DNV GL before being accepted for classification purposes.
— Information received from customers in connection with assignment of class is not disclosed and used in classification support work.
APPENDIX C MOORING EQUIPMENT ACCEPTANCE STANDARD GUIDANCE

1 General

1.1 General
The following acceptance/rejection criteria the following standards may be used as guideline:
— for wire rope: ISO Standard 4309-2004 (E), API RP 2I
— for fibre rope: DNV-RP-E304
— for chain: as stated in [2.4].

2 Anchor chains; renewal survey examination guide

2.1 General

2.1.1 Magnetic particle testing (MT) shall basically cover the whole link, but concentrate on the following areas:
— shoulders of link where mechanical damage may occur
— flash butt weld for defects in way of weld
— ends of stud for cracks propagating into main part of link
— inner bend region where adjacent links bear on each other stud less chain: outer bend region at the crown and inner surfaces where the links start to bend
— any other area where there have been chain breaks or mechanical damage.

2.1.2 The diameter in way of the bend region and any area with excessive wear or gouging is to be measured on approximately 1% of the links distributed through the working length. The links are selected by the attending surveyor based on the findings of the visual inspection. The percentage may be increased or decreased if the visual inspection indicates excessive or minimal deterioration.

2.1.3 The length over five links should be measured approximately once every 100 m. However, measurements can be waived by the attending surveyor provided:
— it is confirmed that there have been no in-service problems with chain twisting/jumping or mismatch between links and windlass/fairlead pockets
— no indications of stretched links observed during the visual inspection.

2.1.4 Supplementary requirements for MT and diameter measurements are to be applied to those lengths of each chain, which have been in contact with the windlass and fairleads when the mooring system was in operation.

2.1.5 MT is to be carried out on approximately 20% of the links and the diameter is to be measured on approximately 3% of the links distributed through the 150 m length.

2.1.6 Appropriate identification marks are to be placed on the surveyed lengths of chains. The identification marks are to:
— uniquely identify each individual length of chain
— identify the common links which are fitted adjacent to joining shackles.
Alternatively, accurate reliable records equivalent to the above markings are to be available onboard. Anchor chains; acceptance criteria and repair.

2.2 Diameter loss due to abrasion and corrosion

2.2.1 Temporary Mooring Equipment: Links or joining shackles with minimum cross-sectional area less than 81% of the original nominal area are to be rejected. The equivalent reduction in diameter is 10%. Two perpendicular measurements are to be taken and the average compared to the allowable 10% reduction.

2.2.2 Position Mooring Equipment: Links or joining shackles with minimum cross-sectional area less than 90% of the original nominal area are to be rejected. The equivalent reduction in diameter is 5%. Two perpendicular measurements are to be taken and the average compared to the allowable 5% reduction. Lengths over five links should be 23.25 D as a maximum.

— Missing studs
Missing studs on stud link chains are not acceptable. Links are to be removed or studs are to be refitted, using an approved procedure.

— Corroded studs
As guidance, if the measured stud cross-sectional area is less than 40% of the nominal link (bar) cross-sectional area, links should be removed or studs should be refitted using an approved procedure.

— Studs secured by fillet welds
Grade 3 chains are sometimes fitted with studs secured by fillet welds. In service the welds may crack. The following applies:

— any axial or lateral movement is unacceptable. Links are be removed or studs are to be re-welded using an approved procedure
— links with intact fillet welds but with gaps exceeding 3 mm between the stud and the link should be removed or repaired using an approved procedure. This because the stud welds will eventually crack due to vibrations when chain is running over fairlead at speed during anchor handling
— existing links which are found to have the stud fillet welded at both ends are subject to special consideration.
— Studs secured by press fitting and mechanical locking
With this design of stud there is little prospect of the stud falling out even if it is loose. However, loose studs have caused fatigue at the edge of imprints. The following applies:

— axial stud movement up to 1 mm is acceptable
— axial stud movement greater than 2 mm is unacceptable. Links are to be removed or studs are to be pressed using an approved procedure
— acceptance of axial stud movement from 1 to 2 mm must be evaluated based on the environmental conditions of the unit’s location and expected period of time before the chain is again available for inspection
— lateral movement up to 4 mm is acceptable provided there is no realistic prospect of the stud falling out
— welding of studs is not acceptable.

2.2.3 Cracks, gouges, and other surface defects
Defects may be removed by grinding to a depth of 7% of original nominal diameter provided the resulting cross-sectional area is at least 81% (90% for Position Mooring Equipment) of the original nominal area. The resulting grooves are to have a length along the link of approximately six times the depth and a bottom radius of approximately three times the depth. Grooves are to be blended into the surrounding surface to avoid any sharp contours.

Complete elimination of defects is to be verified by MT or PT.
2.2.4 Gross-distortion
Links showing distortion/miss-shape are to be rejected.

2.3 Joining shackle defects and repair

2.3.1 Experience has shown a number of anchors and chains lost due to joining shackle failure. Joining shackle is to be rejected if cracks and other defects are found on the machined surfaces. In addition, all joining shackles on that chain which are of the same design and which have an equal or greater service life are also to be considered carefully with a view to rejection. Cracks and other defects on the remaining surface may be removed by grinding.

2.3.2 Distortion
Shackles showing distortion/miss-shape are to be rejected.

2.3.3 Tapered pins
Tapered pins holding the parts of joining shackles together must make good contact at both ends and the recess of counter-bore at the large end of the pin holder should be solidly plugged with a peened lead slug to prevent the pin from working out.

2.3.4 Replacement of links and joining shackles
Links or shackles beyond repair are to be replaced with joining shackles in compliance with current rules and guided by the following good marine practice:
— joining shackles should pass through fairleads and windlasses in the horizontal plane
— since joining shackles have much lower fatigue lives than ordinary chain links as few as possible should be used
— if a large number of links meet the discard criteria and these links are distributed in the whole length, the chain should be replaced with new chain.

Any other type of replacement links are subject to special approval.

2.4 Anchors acceptance criteria and repair

2.4.1 The anchor shackle pin shall be renewed if excessively worn or bent.

2.4.2 Bent flukes or shanks may be heated and jacked back in place according to an approved procedure, followed by magnetic particle testing.

2.4.3 If swivels are fitted to the anchor, the threads engaging the swivel nut shall be examined. If significant corrosion is found, the swivel should be removed or replaced.
CHANGES - HISTORIC

July 2015 edition

Main changes July 2015

The revision of this document is part of the DNV GL merger, updating the previous DNV service specification into a DNV GL format including updated nomenclature and document reference numbering, e.g.:

- Main class identification 1A1 becomes 1A.
- DNV replaced by DNV GL.
- DNV-RP-A201 to DNVGL-CG-0168. A complete listing with updated reference numbers can be found on DNV GL’s homepage on internet.

To complete your understanding, observe that the entire DNV GL update process will be implemented sequentially. Hence, for some of the references, still the legacy DNV documents apply and are explicitly indicated as such, e.g.: Rules for Ships has become DNV Rules for Ships.

In addition to the above, the structure of this document has been converted to decimal numbering, replacing the earlier alphanumeric numbering of subsections, e.g. A100 becomes [1.1], B102 becomes [2.1.2] etc.

- Ch.1 Sec.1 Introduction
  - New definition for rope access control and updated description for offshore installation.

- Ch.1 Sec.2 Classification principles
  - [1.2.1]: Updated clause on approval body.
  - [1.2]: removal of the former clause A207/ 1.2.7 already given in [1.2.4].

- Ch.1 Sec.3 Classification scope and notations
  - Table 1 to Table 6 (xmt. table 2): Updated tables in line with latest updates of class notation portfolio.
  - [2.9]: New clauses handling of service restrictions.
  - [2.10.1]: New clause on field specific design notation.

- Ch.1 Sec.4 Assignment of class
  - [2.3]: Included new clauses to clarify follow up of vessels previously classed by other IACS member society.

- Ch.1 Sec.5 Retention of class
  - [3.2.5]: New clause on certificate validity.

- Ch.1 Sec.6 Certification of materials, components and systems
  - [1.2.1]: Included clause referring to general description on requirements to builders.
  - [2.1]: Including certification types for DNVGL and EU Mutual Recognition Type Approval.
  - [2.2.2]: New clause on case-by-case plan approval.

- Ch.2 Sec.1 Design and construction requirements for 1A MOU main class
  - [4]: Updated description on structural requirements scope.
  - Table 1 and Table 2: Updated to include tension leg main structure.
• Ch. 2 Sec. 2 Design and construction requirements for **OI Floating Offshore Installation** main class
  — [4]: Updated description on structural requirements scope.
  — Table 1 and Table 2: Updated to include tension leg main structure.

• Ch. 2 Sec. 6 Additional class notations: design and construction requirements for special equipment and systems
  — Updated descriptions of all notations to improve overview, including new descriptions for the notation **REGAS** in [8] and **Non-self propelled** in [21.2] and the qualifier R for the **POSMOOR** notation in [2.2].

• Ch. 3 Sec. 1 General provisions for periodical surveys
  — [1.1.5]: Updated clause.
  — [2.5]: Replacing previous table with overview on additional class notation with new sub-section.

• Ch. 3 Sec. 2 General requirements for hull and machinery surveys
  — [1.1]: Removing former clause A102 also stated in [2.1.3].
  — [2.1.2]: New clause on follow up of ceilings etc.
  — [4]: Updated descriptions on special provisions for ageing units.

• Ch. 3 Sec. 4 Periodical survey extent for main class
  — Table 1: Updated table.
  — [1.3]: New guidance note to clarify the application of extended hull survey requirements as defined in ship classification.
  — [1.3.5]: New clause on location of thickness gaugings.
  — [2.1.2]: New clause on survey on location.
  — [2.5.7]: Updated description with minor changes.
  — [4.2]: Removal on original clause D206 on remote controls and alarms for doors etc. as already covered by [2.3.8].
  — [5.1.4]: New clause on survey of gas turbines replacing previous sub-section in Sec. 7.
  — [5.1.5]: New clause on check on watertight integrity of shaft sealing.
  — [12]: Removal on previous clauses describing intermediate survey requirements.

• Ch. 3 Sec. 6 Periodical survey extent for additional class; special equipment and system notations
  Improved overview on operational follow up on class notations by:
  — Replacing earlier descriptions on notations **DYNOPOS, LCS, HELIDECK, CRANE F, HMON, RECYCLING** and **VCS** with references to DNV Rules for Ship updating the descriptions for **WINTERIZATION** and **VIBR**.
  — Removed the description on the SEMP (not longer in use).
  — Removed the description on Single Point Mooring and FMS Including a descriptions on the **REGAS** and **ISDS** notations.
  — [2]: Removal on clauses describing intermediate survey requirements.
  — [8]: Removal superfluous clause on applicability on annual survey requirements.

• Ch. 3 Sec. 7 Machinery alternative survey arrangements
  — Removal of previous sub-section on gas-turbines.

• Appendix A Special considerations for conversions
— [3.2]: Replacing descriptions on hull and topside structure with reference.
Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16 000 professionals are dedicated to helping our customers make the world safer, smarter and greener.