RULES FOR CLASSIFICATION

Offshore units

DNVGL-RU-OU-0300 Edition January 2018

Fleet in service
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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Any comments may be sent by e-mail to rules@dnvgl.com

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CHANGES – CURRENT

This is a new document.

This document replaces the following January 2017 edition of:
- DNVGL-RU-OU-0101, Chapter 1 Section 5, Chapter 3 and App.C
- DNVGL-RU-OU-0102, Chapter 1 Section 5, Chapter 3 and App.D
- DNVGL-RU-OU-0103, Chapter 1 Section 5, Chapter 3 and App.D
- DNVGL-RU-OU-0104, Chapter 6.

This is a new document where the content from the above mentioned rules have been merged into one document with a revised structure allowing more focus on principles and survey arrangements. In addition, the content has been updated as detailed in the following table:

<p>| Changes January 2018, entering into force 1 July 2018 |
|-----------------|-----------------|-----------------|
| <strong>Topic</strong> | <strong>Reference</strong> | <strong>Description</strong> |
| Definition of new rule book fleet in service | Ch.1 Sec.1 | Section contents from DNVGL-RU-OU-0101, DNVGL-RU-OU-0102, DNVGL-RU-OU-0103 and DNVGL-RU-OU-0104 have been merged and a new introduction to fleet in service has been created. |
| | Ch.1 Sec.1 Table 4 | Included DNVGL-RU-OU-0101, DNVGL-RU-OU-0102, DNVGL-RU-OU-0103 and DNVGL-RU-OU-0104 as normative reference documents. |
| Further development of alternative survey arrangements including use of sensor data | Ch.1 Sec.1 Table 2 | New definitions related to use of sensor data included. New terms defined: data, data accuracy, data completeness, data set, data quality management and metadata. |
| | Ch.1 Sec.5 | Introducing digitalization and use of sensor data in class services and as part of owners asset management. This sub-section with reference provides the rule requirements for adapting to future class systematics and ongoing pilot projects on use of sensor. |
| | Ch.2 Sec.2 Table 1 and Ch.3 Sec.1 [1.1.2] | Introduced electrical systems integrity management in the table of survey arrangements. |
| | Ch.2 Sec.2 [1.1.3] | Replaced the table of components with reference to the current definitions found in DNV GL rules for classification of ships. Examination methods defined for the different survey arrangements. |
| | Ch.2 Sec.2 [4] | General development and clarifications incorporated in the complete sub-section. |
| | Ch.2 Sec.2 [4.2.5] | Introducing requirements for use of sensor data in PMS RCM SA. |
| | Ch.2 Sec.2 [5] and Ch.2 Sec.2 [5.1.2] | Offshore CM changed name to CBM. The rules now open up for additional CM technologies other than vibration and oil. |
| | Ch.2 Sec.2 [5.2.4] | Introducing requirements for use of sensor data in a CBM SA. |
| | Ch.2 Sec.2 [6] | Introducing new electrical systems integrity management SA. Complete sub-section new. |
| | Ch.2 Sec.5 | Complete new section introducing general requirements for use of sensor data in classification systematics. |
| | Ch.2 Sec.3 [1.1.2] | Examination methods defined for the different survey arrangements. |</p>
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<td>General development of class systematics</td>
<td>Ch.1 Sec.2 [5]</td>
<td>Introducing class expectations for approval related to units operating in combined operations, i.e. where two units are interconnected and one unit affects the other unit’s approved systems.</td>
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<td></td>
<td>Ch.3 Sec.3 [9.4]</td>
<td>Removed requirements for pressure testing of cargo tanks for oil storage and installation units. Requirements have previously been removed for other service notations and this is to be aligned with previous modifications.</td>
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<td></td>
<td>Ch.3 Sec.4 [5.3.2]</td>
<td>Introduced new dynamic position continuous arrangement which also supports classification for smarter operations.</td>
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<tr>
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<td>Ch.3 Sec.4 [6.5]</td>
<td>Marine riser management introduced. Decide survey interval based upon wet days and/or use of utilization factors. This will also support classification for smarter operations.</td>
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<tr>
<td></td>
<td>Ch.3 Sec.4 [10.4]</td>
<td>Updated and clarified the alternative survey scope by use of a condition assessment. This is also to support classification for smarter operations.</td>
</tr>
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<td>Introduction of Class+/ barrier management reporting for OC</td>
<td>Ch.1 Sec.2 [4]</td>
<td>Introduction to barrier management and reporting principles according to defined major accident hazards in the Class+ survey reporting project.</td>
</tr>
<tr>
<td>Introduction of the classification for smarter operations approach</td>
<td>Ch.1 Sec.2 [5]</td>
<td>Introduction of the concept of Classification for smarter operations. This concept shall reduce unit out of service time due to Class activities and highlight the alternative survey arrangements and inspections methods to obtain classification on location.</td>
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<tr>
<td>Ch.3 Sec.2 [7.7]</td>
<td>Complete sub-section is new to introduce an alternative way for units operating under the smarter operations approach to credit the bottom survey.</td>
<td></td>
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<tr>
<td>Ch.3 Sec.3 [9.2] and Ch.3 Sec.3 [10.2]</td>
<td>Clarifications where the content has been updated to be in line with Classification for smarter operations. Survey extent may be credited in line with the principles of the survey arrangements defined for Classification for smarter operations.</td>
<td></td>
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<tr>
<td>Minor corrections and clarifications</td>
<td>Ch.1 Sec.3 [2.5.3]</td>
<td>Clarification incorporated relating to acceptance of repairs without attendance onboard.</td>
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<td>Ch.2 Sec.1 [2.5]</td>
<td>Clarifications and introduction related to survey arrangements updated.</td>
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<td>Ch.2 Sec.1 [2.8.5]</td>
<td>Introduced prolonged survey intervals for units in lay-up in the rules which today is defined in DNVGL-RP-0290.</td>
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<td>Ch.2 Sec.1 [5.3.10]</td>
<td>Clarification incorporated relating to instances where the FUI exceed 1.0.</td>
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<td>Ch.2 Sec.1 [3.2.11]</td>
<td>Clarification incorporated relating to coating condition for soft or semi-hard coating.</td>
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<tr>
<td>Ch.2 Sec.4 [3]</td>
<td>Minor corrections and clarifications incorporated including restructuring the content.</td>
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<td>Ch.3 Sec.1 Table 1, Ch.3 Sec.1 Table 2 and Ch.3 Sec.1 Table 3</td>
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<td>Introduced new note regarding changed inspection intervals due to fatigue life. The note is a clarification of requirement [1.2.2].</td>
</tr>
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<td>Ch.3 Sec.1 [4.1.5]</td>
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<td>Added requirements for all other units on the 3rd renewal survey.</td>
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<tr>
<td>Ch.3 Sec.1 [5.3.4]</td>
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<td>Updated reference standard from DNVGL-OS-D202 to DNVGL-OS-D201.</td>
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<tr>
<td>Ch.3 Sec.2 [12]</td>
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<td>Minor editorial changes and reference to DNVGL-RP-0290 introduced. The old text in DNVGL-RU-OU-0101 has been split up and in this book it’s presented in two different chapters (which is referred to in [12]).</td>
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<tr>
<td>Ch.3 Sec.3 [11]</td>
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<td>Merged <strong>Oil loading</strong> and <strong>LNG/LPG Loading</strong> requirements previously stated in DNVGL-RU-OU-0102 and DNVGL-RU-OU-0103. Requirements are revised and split in annual and complete surveys. Guidance note to new OTG for loading units introduced.</td>
</tr>
<tr>
<td>Ch.3 Sec.4 [2], Ch.3 Sec.4 [3] and Ch.3 Sec.4 [4]</td>
<td></td>
<td>Implemented a number of clarifications to the Society’s expectations and identified which requirements are applicable for permanent and mobile mooring.</td>
</tr>
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<td>Ch.3 Sec.4 [11] and Ch.3 Sec.4 [29]</td>
<td></td>
<td>Added applicable notations (offshore gangways and battery power) not defined in previous Rules which are applicable for offshore Units. Requirements are given in other Rules which is then referred to.</td>
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<td>Ch.3 Sec.4 [2.1.5]</td>
<td></td>
<td>Updated clause to align with class systematics.</td>
</tr>
<tr>
<td>Ch.3 Sec.4 [15]</td>
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<td>Systems covered by these rules have been aligned with new system names given in latest edition of DNVGL-OS-E101.</td>
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<tr>
<td>Ch.3 Sec.4 [26]</td>
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<td>Removed requirements that are not relevant for well intervention systems/equipment.</td>
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<tr>
<td>Ch.3 Sec.4 [29]</td>
<td></td>
<td>Merged <strong>PROD</strong> requirements previously stated in DNVGL-RU-OU-0102 and DNVGL-RU-OU-0103. There is no difference in the survey requirements for <strong>PROD</strong> on a oil or LNG/LPG unit.</td>
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<tr>
<td>App.B [3]</td>
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<td>Updated remuneration principles to include principles for additional work which is in line with a memo issued by MOI.</td>
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CHAPTER 1 PRINCIPLES FOR CLASSIFICATION

SECTION 1 INTRODUCTION

1 General
This publication presents DNV GL’s Rules for Classification of Offshore Units, Fleet in Service, the terms and procedures for maintaining Classification, including listing of the applicable technical references to be applied for Classification.

2 Scope
This publication covers the Society’s involvement in Classification of a mobile offshore unit’s operational phase (Fleet in Service) and is applicable for the following structural designs types and services:
— ship-shaped units
— column-stabilised units
— cylindrical units
— self-elevating units
— tension-leg type
— deep draught type

intended for the following services:
— drilling
— well intervention
— accommodation
— heavy-lifting
— wind turbine installation
— general offshore support
— hydrocarbon production
— hydrocarbon storage and offloading
— hydrocarbon loading
— LNG/LPG production
— LNG/LPG storage and offloading
— LNG/LPG loading.

Guidance note:
Although this publication 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.

This publication does not cover the operational phase of offshore fish farms or diving systems. These are covered by separate Rules DNVGL-RU-OU-0503 and DNVGL-RU-OU-0375.

This publication addresses floating steel structures. Concrete structures, both floating and bottom fixed have also been proposed for offshore gas applications. For such designs see DNVGL-ST-C503 Concrete LNG terminal structures and containment systems. Where such units are classified, the principles in this document may be applied.

This publication shall be seen in conjunction with the other Rules for Offshore Units as listed in [5.2] that provides requirements for the design and construction phase of a mobile offshore unit.
3 Organisation

This document is divided into three main chapters and appendixes as follows:

— Ch.1: providing general information and principles for classification
— Ch.2: providing general information about survey provisions and survey arrangements
— Ch.3: providing requirements for retention of Classification in the operational phase (periodical survey extent)
— App.A: providing terms and conditions for Classification services
— App.B: providing an introduction to offshore Classification
— App.C: providing special considerations for conversions
— App.D: providing guidance on mooring equipment acceptance standard for mobile mooring.

4 Definitions and abbreviations

4.1 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>

4.2 Definitions

Table 2 Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alteration</td>
<td>A change that does not affect the basic character or structure of the Unit it is applied to.</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>Builder</td>
<td>The party contracted to build a Unit 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 authorised to act. Compliance is confirmed on the date as given in the Certificate.</td>
</tr>
<tr>
<td>Certification</td>
<td>A service that comprises assessment of compliance with applicable requirements and issuance of a Certificate is compliance is confirmed.</td>
</tr>
<tr>
<td>Class</td>
<td>Class is assigned to and will be retained for Units, which the Society has found to be in compliance with applicable requirements of the Society's rules.</td>
</tr>
<tr>
<td>Class Certificate</td>
<td>Certificate confirming compliance with the Society's Rules as applicable and at the time of Survey.</td>
</tr>
<tr>
<td>Class Entry</td>
<td>Assignment of Class to an existing Unit.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Class Notation</td>
<td>An abbreviation or keyword expressing a specific feature relating to a Unit or its machinery, systems and equipment, or service area while referring to specific requirements in the Rules.</td>
</tr>
<tr>
<td>Classification</td>
<td>A service which comprises the development and maintenance of Rules, and the verification of compliance with the Rules throughout the Unit’s life. The extent of and methods for verifying compliance will be decided by the Society to establish reasonable assurance that the relevant Rules are complied with.</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 - hard coating         | - 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 |
| Coating conditions - soft or semi-hard    | - FAIR: condition where structure under the coating have been found without degradation.  
- POOR: condition where structure under the coating have been found with degradations; e.g. general corrosion < 20% and/or initial pittings. |
| 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                        | A requirement that specific measures, Repairs or Surveys shall be carried out within a specific time limit in order to retain Class.                                                                     |
| Condition based maintenance              | Preventive maintenance which include a combination of condition monitoring and/or inspection and/or testing, analysis and the ensuing maintenance actions, see EN 13306.                                    |
| Condition monitoring                      | Activity, performed either manually or automatically, intended to measure at predetermined intervals the characteristics and parameters of the actual state of the item, see EN 13306.                       |
| Condition on behalf of the Flag Administration | A requirement that specific measures, Repairs or Surveys shall be carried out within a specific time limit in order to retain the statutory Certificate  
A Condition on behalf of the Flag Administration will be issued only when the Society has been authorised by the Flag Administration. |
<p>| Conditions                                | General term that includes both Condition of Class and Condition on behalf of the Flag Administration.                                                                                                    |
| Contract for Construction                 | A contract between the prospective Owner and the Builder to build a Unit, see respective DNVGL-RU-OU.                                                                                            |
| Conversion                                | Change that substantially alters the dimensions, carrying capacity or the type of the Unit.                                                                                                              |
| Corrective maintenance                    | Maintenance carried out after fault recognition and intended to put an item into a state in which it can perform a required function, see EN 13306.                                                             |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical structural areas</td>
<td>Areas that have been identified from calculations to require monitoring or from the service history of the subject Unit or from similar or sister Units to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the Unit</td>
</tr>
<tr>
<td>Customer</td>
<td>Any person and/or company which has requested the Society’s service and/or has entered into a contract for services directly with the Society.</td>
</tr>
<tr>
<td>Cyber security</td>
<td>Practices, tools and concepts that protect:</td>
</tr>
<tr>
<td></td>
<td>— the operational technology against the unintended consequences of a cyber incident;</td>
</tr>
<tr>
<td></td>
<td>— information and communications systems and the information contained therein from damage, unauthorised use or modification, or exploitation, and/or</td>
</tr>
<tr>
<td></td>
<td>— against interception of information when communicating and using internet.</td>
</tr>
<tr>
<td>Data</td>
<td>Symbolic representation of something that depends, in part, on its metadata for its meaning, see ISO 8000-2</td>
</tr>
<tr>
<td>Data accuracy</td>
<td>Composite of trueness and precision, see ISO 5725-1</td>
</tr>
<tr>
<td>Data completeness</td>
<td>Quality of having all data that existed in the possession of the sender at time the data message was created, see ISO 8000-2</td>
</tr>
<tr>
<td></td>
<td>Alt: Completeness of data is the extent to which (i) the relevant data sets, (ii) the expected records of a data set, and (iii) data elements, attributes, and values in a data set are provided and reflect the scope and the real world.</td>
</tr>
<tr>
<td>Data precision</td>
<td>The closeness of agreement between independent test results obtained under stipulated conditions, see ISO 5725-1</td>
</tr>
<tr>
<td>Data set</td>
<td>Logically meaningful grouping of data, see ISO 8000-2.</td>
</tr>
<tr>
<td>Data trueness</td>
<td>The closeness of agreement between the average value obtained from a large series of test results and an accepted reference value, see ISO 5725-1</td>
</tr>
<tr>
<td>Data quality management</td>
<td>Coordinated activities to direct and control an organisation with regards to data quality, see ISO 8000-2</td>
</tr>
<tr>
<td>Deficiency</td>
<td>A failing or shortcoming with respect to applicable requirements.</td>
</tr>
<tr>
<td>Designer</td>
<td>A party who created or developed Documentation which is submitted to the Society for approval or information.</td>
</tr>
<tr>
<td>Documentation</td>
<td>Drawings, descriptions, calculations, reports, procedures, certificates and similar information describing e.g. the design, installation, testing, operation, maintenance or status of an object.</td>
</tr>
<tr>
<td>Exceptional circumstances</td>
<td>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.</td>
</tr>
<tr>
<td>Emergency towing</td>
<td>Towing related to an emergency situation normally caused by failure of the units own propulsion (compare with normal towing)</td>
</tr>
<tr>
<td>Flag Administration</td>
<td>The government of the state whose flag the Unit is entitled to fly.</td>
</tr>
<tr>
<td>Guidance Notes</td>
<td>Additional information containing advice which is not required for the assignment or retention of Class, but with which the Society, based on experience, advises compliance.</td>
</tr>
<tr>
<td>Independent tank</td>
<td>Self-supporting tank which does not form part of the unit’s hull and does not contribute to the hull strength</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
</tr>
<tr>
<td>Independent gravity tank</td>
<td>A tank with design vapour pressure not exceeding 0.7 bar</td>
</tr>
<tr>
<td>Interpretation</td>
<td>Norms for fulfilling the associated principal 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.</td>
</tr>
<tr>
<td>Inspection</td>
<td>Examination according to a predefined plan of a product design, product or installation and determination of its conformity with specific requirements.</td>
</tr>
<tr>
<td>Lay-up</td>
<td>Term used for Units that are out of commission. In this state the offshore Units may be at anchorage or permanently moored in a safe harbour.</td>
</tr>
<tr>
<td>Main class notation (see e.g DNVGL-RU-OU-0101 Ch.1 Sec.2 [2.2])</td>
<td>Characters showing compliance with a defined set of Classification Rules for hull and/or machinery.</td>
</tr>
</tbody>
</table>
| Main functions | In the context of these Rules for Classification:  
  - structural strength  
  - stability, watertight integrity and weathertightness  
  - drainage and bilge pumping  
  - ballasting  
  - power generation  
  - propulsion (as applicable)  
  - steering (as applicable)  
  - position keeping (as applicable) |
<p>| Main hoisting system | All major lifting equipment directly involved in lifting pipe, riser etc. into and out of the well, such as drawworks, hydraulic cylinders, top drive, links, elevators etc. Pipe handling equipment used for making up and breaking out pipe/stands are not considered main hoisting systems. |
| Maintenance objective | Target assigned and accepted for the maintenance activities, see EN 13306. |
| Maintenance plan | Structured and documented set of tasks that include the activities, procedures, resources and the time scale required to carry out maintenance, see EN 13306. |
| Maintenance strategy | Management method used in order to achieve maintenance objectives, see EN 13306. |
| Maintenance support | provision of resources, services and management necessary to carry out maintenance, see EN 13306 |
| Maintenance supportability | ability of maintenance organisation to have the correct maintenance support at the necessary place to perform the required maintenance activity when required, see EN 13306. |
| Manufacturer | An organisation 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 | 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. |</p>
<table>
<thead>
<tr>
<th><strong>Term</strong></th>
<th><strong>Definition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Memorandum to Owner</td>
<td>Information related to the Unit, its machinery, systems and equipment or applicable requirements. A Memorandum to Owner will be issued in relation to information that does not require any corrective action or Survey.</td>
</tr>
<tr>
<td>Metadata</td>
<td>Data that describes and defines other data, see ISO 8000-2</td>
</tr>
<tr>
<td>Mobile Offshore Unit</td>
<td>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.</td>
</tr>
<tr>
<td>Newbuilding</td>
<td>A new Unit under construction at a Builder.</td>
</tr>
<tr>
<td>Offshore Installation</td>
<td>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 one particular location for an extended period.</td>
</tr>
<tr>
<td>Overall examination</td>
<td>An examination intended to report on the overall condition of the structure.</td>
</tr>
<tr>
<td>Overhaul</td>
<td>Comprehensive set of preventive maintenance actions carried out, in order to maintain the required level of performance of an item, see EN 13306.</td>
</tr>
<tr>
<td>Owner</td>
<td>The registered owner and/or manager of the Unit and/or any other organisation and/or person who has assumed the responsibility for operation of the Unit and who on assuming such responsibility has agreed to take over all the duties and responsibilities related to the Unit.</td>
</tr>
<tr>
<td>Patrolling</td>
<td>An independent and unscheduled check that the applicable processes, activities and associated Documentation of the building functions continue to comply with the Rules and statutory requirements.</td>
</tr>
<tr>
<td>Plan approval</td>
<td>A systematic and independent examination of drawings, design documents or records by the Society in order to verify compliance with the Rules or statutory requirements where authorised by the Flag Administration. The extent and method of Plan Approval will be decided at the discretion of the Society.</td>
</tr>
<tr>
<td>Plan Approval Staff</td>
<td>Personnel authorised to carry out Plan Approval and to conclude whether or not compliance with the Rules or statutory instruments has been met.</td>
</tr>
<tr>
<td>Port State Authority</td>
<td>The maritime authority in the country of the Unit’s port of call.</td>
</tr>
<tr>
<td>Position mooring</td>
<td>Anchoring system for position keeping at the Unit’s working location.</td>
</tr>
<tr>
<td>Preventive maintenance</td>
<td>Maintenance carried out at predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item, see EN 13306.</td>
</tr>
<tr>
<td>Predictive maintenance</td>
<td>Condition based maintenance carried out following a forecast derived from repeated analysis or known characteristics and evaluated of the significant parameters of the degradation of the item, see EN 13306.</td>
</tr>
<tr>
<td>Pressure vessel</td>
<td>A tank with design gas or vapour pressure exceeding 0.7 bar.</td>
</tr>
<tr>
<td>Procedural requirements</td>
<td>Requirements for the process of assessing compliance with technical requirements. Procedural requirements cover: — basis for design assessment, i.e. information or Documentation requirements — requirements for certification of products — requirements for Surveys to assign, maintain and retain Class.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
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</tr>
<tr>
<td>Quality</td>
<td>Degree to which a set of inherent characteristics fulfils requirements, see ISO 8000-2</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 management system</td>
<td>Management system to direct and control an organisation with respect to quality, see ISO 9000:2015</td>
</tr>
<tr>
<td>Quality system</td>
<td>A quality management system and established procedures for production and control.</td>
</tr>
<tr>
<td>Quality survey plan</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, yard's QA, DNV GL and owners (if desired)) will undertake. Such a plan needs to be submitted to the Society for approval prior to commencement of Classification projects.</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>Repair</td>
<td>To restore an object that is damaged or broken to a condition that it is in compliance with the Rules. In general, this implies that the original design is restored.</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. 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</td>
<td>A requirement in the Rules or a statutory requirement that will enter into force for certain Units in operation and under construction at a given date or at an upcoming Survey. The Retroactive Requirement 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>Rules</td>
<td>Independent standard that consist of all requirements, technical and procedural, adopted by the Society as the 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>Society</td>
<td>DNV GL AS and its affiliates carrying out Classification and Statutory Certification.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tbody>
</table>
| Safety Systems       | Systems, including required utilities, which are provided to prevent, detect/warn of an accidental event/abnormal conditions and/or mitigate its effects  
Interpretation:  
The following should be considered as safety systems:  
— ESD, including blowdown where relevant  
— PSD  
— fire and gas detection  
— PA/GA  
— fire-fighting systems  
— BOP incl. control system  
— safety systems for essential or important services  
— safety systems are normally considered as on-demand functions.  
---e-n-d---o-f---i-n-t-e-r-p-r-e-t-a-t-i-o-n--- |
<p>| Spaces               | Separate compartments including holds and tanks                                                                                                                                                           |
| Statement of Compliance | A document confirming compliance with specified requirements for which the Society has not been authorised to act. Compliance is confirmed on the date as given in the statement. |
| Statutory Certification | A service with the intention of confirming compliance with regulatory codes and regulations - in agreement with relevant Flag Administrations.                                                              |
| Subject matter expert | (Or Domain expert) Technical authority with extensive experience and with special knowledge or skills in a particular area or topic                                                                         |
| Substantial corrosion | Extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75% of allowable margins, but within acceptable limits.                                                      |
| Survey               | A systematic and independent examination of a Unit, materials, components or systems in order to verify compliance with the Rules and/or statutory requirements. Surveys will be carried out on the Unit, 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 Survey. |
| Surveyor             | Personnel authorised to carry out Surveys and to conclude whether or not compliance has been met.                                                                                                             |
| Suspect areas        | Areas showing substantial corrosion and/or are considered by the Surveyor to be prone to rapid wastage.                                                                                                     |
| Technical Requirements | Requirements for design and construction of a Unit, system or component, and the minimum requirements they shall meet during the operational lifetime.                                                      |
| Temporary Conditions | Design conditions not covered by operating conditions, e.g. conditions during fabrication, mating and installation phases, and dry transit phases.                                                           |
| Temporary Equipment  | Equipment intended for use on board for a period not exceeding 30 months and which is covered by Class, and/or 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 and/or equipment which will need to be shut down in case of a Unit ESD as a result of a significant gas release. |
| Temporary Mooring    | Anchoring in sheltered waters or harbours exposed to moderate environmental loads.                                                                                                                        |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tentative Rules and Standards</td>
<td>Provisional Rules or Standards to which the Society reserves the right to make immediate and/or retroactive adjustments 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).</td>
</tr>
<tr>
<td>Transit Conditions</td>
<td>All wet Unit movements from one geographical location to another.</td>
</tr>
<tr>
<td>Unit</td>
<td>In the context of these Rules signifies a Mobile Offshore Unit (MOU).</td>
</tr>
<tr>
<td>Verification</td>
<td>A service that confirms through the provision of objective evidence (analysis, observation, measurement, test, records or other evidence) that specified requirements have been met.</td>
</tr>
<tr>
<td>Witnessing</td>
<td>Attendance of tests or measurements with the intention of verifying compliance with agreed test or measurement procedures.</td>
</tr>
</tbody>
</table>

4.3 Abbreviations

**Table 3 Abbreviations**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AoSS</td>
<td>Approval of service suppliers</td>
</tr>
<tr>
<td>API</td>
<td>American Petroleum Institute</td>
</tr>
<tr>
<td>ACFM</td>
<td>Alternating current field measurement</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>CA</td>
<td>Condition on behalf of the flag administration</td>
</tr>
<tr>
<td>CBM</td>
<td>Condition based maintenance</td>
</tr>
<tr>
<td>CC</td>
<td>Condition of class</td>
</tr>
<tr>
<td>C&amp;E</td>
<td>Cause and effect</td>
</tr>
<tr>
<td>CM</td>
<td>Condition monitoring</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>CVI</td>
<td>Close visual inspection</td>
</tr>
<tr>
<td>DFF</td>
<td>Design fatigue factors</td>
</tr>
<tr>
<td>DP</td>
<td>Dynamic positioning</td>
</tr>
<tr>
<td>DPMS</td>
<td>Drilling equipment planned maintenance system</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>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
</tr>
<tr>
<td>ESD</td>
<td>Emergency shut down</td>
</tr>
<tr>
<td>ET/EC</td>
<td>Eddy current testing</td>
</tr>
<tr>
<td>FFA</td>
<td>Functional failure analysis</td>
</tr>
<tr>
<td>FMEA</td>
<td>Failure mode and effects analysis</td>
</tr>
<tr>
<td>FMECA</td>
<td>Failure mode, effects and criticality analysis</td>
</tr>
<tr>
<td>FUI</td>
<td>Fatigue Utilisation Index</td>
</tr>
<tr>
<td>IACS</td>
<td>International Association of Classification Societies Unified requirements, interpretations, guidelines and recommendations may be found on <a href="http://www.iacs.org.uk">www.iacs.org.uk</a>.</td>
</tr>
<tr>
<td>IC</td>
<td>Inspection category</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
</tr>
<tr>
<td>IIP</td>
<td>In-service inspection programme</td>
</tr>
<tr>
<td>IMO</td>
<td>International Maritime Organization</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organisation for Standardization</td>
</tr>
<tr>
<td>HAZOP</td>
<td>Hazard and operability study</td>
</tr>
<tr>
<td>HP</td>
<td>High pressure</td>
</tr>
<tr>
<td>HT</td>
<td>High temperature</td>
</tr>
<tr>
<td>KPI</td>
<td>Key performance indicator</td>
</tr>
<tr>
<td>LRFD</td>
<td>Load and resistance factor design</td>
</tr>
<tr>
<td>LSD</td>
<td>Limit state design</td>
</tr>
<tr>
<td>LTTF</td>
<td>Lead time to failure (PF-curve)</td>
</tr>
<tr>
<td>MAH</td>
<td>Major accident hazards</td>
</tr>
<tr>
<td>MC</td>
<td>Machinery continuous</td>
</tr>
<tr>
<td>MDF</td>
<td>Mean down time</td>
</tr>
<tr>
<td>MIM</td>
<td>Mooring integrity management</td>
</tr>
<tr>
<td>MO</td>
<td>Memorandum to owner</td>
</tr>
<tr>
<td>MT</td>
<td>Magnetic particle testing</td>
</tr>
<tr>
<td>MTBF</td>
<td>Mean time between failure (MTBF = MTTF + MDF)</td>
</tr>
<tr>
<td>MTTF</td>
<td>Mean time to failure (effective failure rate with or without maintenance carried out)</td>
</tr>
<tr>
<td>NDT</td>
<td>Non-destructive testing</td>
</tr>
<tr>
<td>OEM</td>
<td>Original equipment manufacturer</td>
</tr>
<tr>
<td>PT</td>
<td>Penetrant testing</td>
</tr>
<tr>
<td>QSP</td>
<td>Quality survey plan</td>
</tr>
<tr>
<td>RCA</td>
<td>Root cause analysis</td>
</tr>
</tbody>
</table>
### 5 Normative references

#### 5.1 Normative references

This document includes references to other DNV GL documents and recognised codes and standards which shall be used in conjunction with the requirements given in this document for assignment and retention of class.

#### 5.2 DNV GL reference documents

Applicable DNV GL reference documents are listed in Table 4. See respective DNVGL-RU-OU Ch.1 Sec.3 [2.1] for applicable editions.

**Guidance note:**
See Sec.2 [3] for additional guidance on respective DNVGL-RU-OU.

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#### Table 4 DNV GL reference documents

<table>
<thead>
<tr>
<th>Document code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNVGL-RU-OU-0101</td>
<td>Offshore drilling and support units</td>
</tr>
<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, including wind turbine installation units and liftboats</td>
</tr>
<tr>
<td>DNVGL-OS-A101</td>
<td>Safety principles and arrangement</td>
</tr>
</tbody>
</table>
### Table 5 Other normative references

<table>
<thead>
<tr>
<th>Document code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IACS</td>
<td>International Association of Classification Societies, International Association of Classification Societies, Shipbuilding and Repair Quality Standard, see <a href="http://www.iacs.org.uk">www.iacs.org.uk</a></td>
</tr>
</tbody>
</table>
6 Informative references

6.1 DNV GL informative references

The publications listed in Table 6 are referenced in the text of this document, and may be used as a source of supplementary services and information. See respective DNVGL-RU-OU for applicable editions.

Guidance note:
See Sec.2 [3] for additional guidance on respective DNVGL-RU-OU.

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Table 6 DNV GL informative references

<table>
<thead>
<tr>
<th>Document code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<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 United Kingdom shelf regulations</td>
</tr>
<tr>
<td>DNVGL-SI-0003</td>
<td>Verification for compliance with United States regulations on the outer continental shelf</td>
</tr>
<tr>
<td>DNVGL-CP-0338</td>
<td>DNV GL type approval scheme</td>
</tr>
<tr>
<td>DNVGL-RP-0497</td>
<td>Data quality assessment framework</td>
</tr>
<tr>
<td>DNVGL-RP-0496</td>
<td>Cyber security resilience management for ships and offshore units in operations</td>
</tr>
<tr>
<td>DNV-OTG-05</td>
<td>Temporary Equipment on Offshore Installations</td>
</tr>
<tr>
<td>DNV-OTG-07</td>
<td>Guidance on DNV’s DRILL notation</td>
</tr>
<tr>
<td>DNVGL-OTG-08</td>
<td>Guideline on UWILD</td>
</tr>
<tr>
<td>DNVGL-OTG-11</td>
<td>Well test equipment survey</td>
</tr>
<tr>
<td>DNVGL-OTG-12</td>
<td>Mobile Offshore Units - Lightweight monitoring and control during the operational lifecycle</td>
</tr>
<tr>
<td>DNVGL-OTG-16</td>
<td>Offshore Loading Units</td>
</tr>
<tr>
<td>DNVGL-OTG-18</td>
<td></td>
</tr>
</tbody>
</table>

6.2 Other references

Other references are given in Table 7. See respective DNVGL-RU-OU for applicable editions.

Guidance note:
See Sec.2 [3] for additional guidance on respective DNVGL-RU-OU.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
### Table 7 Other references

<table>
<thead>
<tr>
<th>Document code</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>
<tr>
<td>ISO 3166</td>
<td>Codes for the representation of names of countries and their subdivisions</td>
</tr>
<tr>
<td>ISO 4309</td>
<td>Cranes – Wire ropes – Care, maintenance, installation, examination and discard</td>
</tr>
<tr>
<td>IEC 60050-191</td>
<td>International Electrotechnical Vocabulary</td>
</tr>
<tr>
<td>IEC 62550</td>
<td>Spare parts provisioning</td>
</tr>
<tr>
<td>ISO 13381-1</td>
<td>Condition monitoring and diagnostics of machines-Prognostics</td>
</tr>
<tr>
<td>ISO 5725-1</td>
<td>Accuracy of measurements methods and results</td>
</tr>
<tr>
<td>ISO 27000</td>
<td>Information technology-Security techniques-Information systems-Requirements</td>
</tr>
<tr>
<td>ISO 12482</td>
<td>Cranes - Monitoring for crane design working period</td>
</tr>
<tr>
<td>ISO 14224</td>
<td>Collection and exchange of reliability and maintenance data for equipment (see also API Std 689)</td>
</tr>
<tr>
<td>ISO 9001</td>
<td>Quality management systems – Requirements</td>
</tr>
<tr>
<td>ISO 17025</td>
<td>General requirements for the competence of testing and calibration laboratories</td>
</tr>
<tr>
<td>ISO 17359</td>
<td>Condition monitoring and diagnostics of machines – General guidelines</td>
</tr>
<tr>
<td>ISO 18436</td>
<td>Condition monitoring and diagnostics of machines - Requirements for training and certification of personnel</td>
</tr>
<tr>
<td>ISO 13379-1</td>
<td>Condition monitoring and diagnostics of machines - Data interpretation and diagnostics techniques</td>
</tr>
<tr>
<td>ISO 8000-2</td>
<td>Data quality-Vocabulary</td>
</tr>
<tr>
<td>ISO 8000-8</td>
<td>Data quality-Information and data quality: Concepts and measuring</td>
</tr>
<tr>
<td>PD 5500 (Previous BS 5500)</td>
<td>Specification for unfired fusion welded pressure vessels</td>
</tr>
<tr>
<td>SAE JA1011</td>
<td>Evaluation criteria for reliability centred maintenance (RCM) process</td>
</tr>
</tbody>
</table>
SECTION 2 CLASSIFICATION APPROACH

1 Objective
The objective of DNV GL Classification is to safeguard life, property and the environment. The objective of the technical and procedural requirements of this Rule book is to establish reasonable assurance that the Unit's hull, machinery, equipment and systems are in satisfactory condition and in compliance with applicable standards so to allow continued operation.

2 The Rules

2.1 General
These Rules lay down technical and procedural requirements for retention of Class for Units covered by the provisions of these Rules. Requirements are applicable to main class, service notations and additional Class notations unless otherwise stated. For a definition of main class, see [3].

2.2 Validity of applicable rules
The Rules and amendments to the Rules accepted by the Society will enter into force on a date decided by the Society. Unless stated otherwise, the entry into force date shall be six (6) months after the date of publication.

Guidance note:
The date on which changes to the Rules come into force is shown on page 3 of new/revised Rules.

For applicable design, fabrication and certification requirements see Sec.3 [2.1]

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3 Class notations

3.1 General
Classification involvement is defined by the relevant Class notations. Class notations are defined in the respective Rules for Classification of offshore units (DNVGL-RU-OU) for the applicable service type, as listed in Table 4.

3.2 Main class notation

3.2.1 Two main class notations (1A and OI) are referred to in this publication. These main class notations are defined in the respective DNVGL-RU-OU for the applicable service type. When main character of Class 1A is referred to in these Rules, it shall be understood to be applicable also for main class notations 1A1 and 100 A5.

3.2.2 Periodical survey requirements applicable only for 1A or OI are marked where relevant.

4 Classification for smarter operations

4.1 General
Classification for smarter operations is a concept promoting arrangements and methodologies with focus on enabling new (smarter) ways of working that can be utilised in cooperation with the Society to minimize out of service time and obtain better utilisation of the unit and its resources. This is done by:

— integrating activities from owner and Society
— performing classification activities on a continuous basis
— using alternative systematics (survey arrangements)
— performing survey according to condition and utilisation
— applying condition based maintenance (CBM)
— accepting owners inspection and testing part of Class scope
— performing survey according to change in operations.

The concept may be one or a combination of arrangements and methodologies put together in a system and selected in accordance with company operational requirements and maintenance strategies and plan.

Classification for smarter operations gives a basis for digitalization and enables use of new technologies for testing, inspection and reporting, collection of sensor data and use of data analytics.

4.2 Arrangements and methodologies

4.2.1 A unit operated in accordance with the Classification for smarter operations concept can optimise the operational performance by selecting available arrangements and methodologies within the Rules of Classification. The following are available as single arrangements or a combination:

4.2.2 Hull and structure
1) Surveys and preparations:
   — permanent means of access
   — alternative means of surveys (incl. use of drones or other remote survey techniques)
   — bottom survey afloat, see Ch.2 Sec.6 [1.3] and Ch.3 Sec.2 [7.7]
2) Structural survey arrangement, see Ch.2 Sec.4:
   — structural continuous
   — shared structural inspection (SSI)
3) Inspection programme, see Ch.3 Sec.1 [1.2]:
   — basic RBI (generic)
   — qualitative RBI (specific Unit design, design documentation, fabrication details and workmanship, coating specification)
   — quantitative RBI, refined probabilistic approach where uncertainties wrt. different parameters affecting degradation are accounted for
4) Application of data, see Ch.2 Sec.5 [2.2].
   Guidance note:
   Alternative inspection methods accepted on a case by case basis. Drone survey to be performed by the Society.

4.2.3 Machinery and systems
1) Machinery survey arrangements see Ch.2 Sec.2:
   — machinery planned maintenance system
   — machinery planned maintenance system - reliability centered
   — condition based maintenance (CBM)
   — electrical systems integrity management
2) Spare part management, see Ch.2 Sec.1 [4.3]
3) Application of data, see Ch.2 Sec.5 [2.1].
4.2.4 Drilling plant
1) Drilling equipment survey arrangements, see Ch.2 Sec.3:
   — drilling plant continuous
   — drilling plant planned maintenance system
   — drilling plant planned maintenance system - reliability centered
   — drilling equipment condition based maintenance (CBM)
2) Marine riser management, see Ch.3 Sec.4 [6.5]
3) Spare part management, see Ch.2 Sec.1 [4.3]
4) Application of data, see Ch.2 Sec.5 [2].

4.2.5 Dynamic positioning
1) Alternative survey scope:
   — DP continuous arrangement, see Ch.3 Sec.4 [5.3.1].

4.2.6 Offshore crane
1) Alternative survey scope:
   — alternative survey scope (condition assessment), see Ch.3 Sec.4 [10.5].

4.2.7 Production plant
1) Alternative survey scope:
   — alternative survey scope, see Ch.3 Sec.4 [26.5].

4.2.8 Position mooring
1) Alternative survey scope for long term mooring:
   — mooring integrity management, see Ch.3 Sec.4 [4.12]
   — continuous survey - mooring lines, see Ch.3 Sec.4 [4.2.3].

4.2.9 Other Main Class related equipment and systems
For equipment and systems covered by Main Class surveys described in Ch.3 Sec.1 which are not covered
by survey arrangements described in Ch.2, the Society may evaluate on a case by case basis a continuous
survey systematics with survey intervals as specified by the Main Class requirements. Hence equipment and
systems may be credited outside the standard survey window and be given a next due date equivalent to the
specified survey interval. Standard survey window will apply for the new due date.

5 Combined operations

5.1 Definition
Combined operations is defined as an operating mode where a Unit is installed or operating in close vicinity
of, or above, another fixed or mobile installation, typically a drilling unit over a well head or production
platform.

   Guidance note:
   In some cases this may also be applicable to support Units and accommodation Units.
5.2 Scope

5.2.1 If a Unit's Class approved plans are affected by combined operations and new/revisions of drawings and procedures covered by main class (1A or OI) are issued, these are subject to plan approval and survey.

Guidance note:
Examples of drawings and plans that will require approval are hazardous area plan, fire & safety plan, PA/GA system and ESD C&E.
It should also be evaluated if topics as covered by statutory certificates are effected.

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

5.2.2 The strength of the landing area on the classed unit of any temporary bridge or equipment between the two units shall be considered.

5.2.3 Approval shall be in accordance with main class safety principles, but may be specially considered for each location.

5.2.4 Where services are provided by the Unit to the adjacent platform the capability of the Unit shall not be impaired beyond the minimum requirements set by Class Rules.

Guidance note:
Services provided may be power supply, fire water, cooling water, etc.

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

5.2.5 Survey extent shall be agreed with the Society based upon the identified effects on the safety and structural systems during the plan approval process.
SECTION 3 RETENTION OF CLASS

1 Conditions for retention of Class

1.1 General requirements

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

1.1.2 Operation of the Unit shall comply with the assumptions and conditions stated in the Appendix to the Class Certificate and in applicable operating manuals.

1.1.3 The Unit, 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 machinery, systems and equipment carried on board 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 machinery, system or equipment cannot be used.

1.1.5 Temporary systems and equipment shall comply with relevant requirements in accordance with the assigned Class Notations of the Unit.

Guidance note:
See DNVGL-OTG-05 Temporary Equipment on Offshore Installations for further guidance on safety aspects that shall be evaluated by the Society.

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

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 the respective rule book.

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 Requirements 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 on board 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 Condition of Class (see [2.3]), the Society shall immediately be informed.

The Unit shall be surveyed 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.

Guidance note:
Excursions from the Unit’s design envelope e.g. punch through or rack phase difference for self-elevating units, shall be reported.

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1.2.3 If inspections by port, Flag or shelf state Administration reveal deficiencies related to Certificates issued by DNV GL, the Customer shall immediately notify the Society. In case of detention, the Society shall be contacted for immediate attendance.

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. It may also be in accordance with an approved survey arrangement covering maintenance.

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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 Machinery, systems and equipment that are replaced shall be delivered with Certificates and Documentation as required by the Rules for the original machinery, systems and equipment. Certification according to current Rules which are less stringent than those originally enforced, may be accepted by the Society on a case by case basis.

2 The Society’s involvement

2.1 Applicable Rules

2.1.1 Units 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 [2.5] and [2.6].

Guidance note:
Survey methodologies and procedural requirements for retention of Class shall be in accordance with Sec.2 [2.2].

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2.1.2 For Units built under the supervision of a classification society recognised by the Society, the 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 “contract for construction” will be applied (see the respective DNVGL-RU-OU).

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

2.1.4 Amendments to the Rules may be made retroactive. If so, this will be specially stated in the Rules.

2.1.5 In cases where amendments to the Rules are made applicable to existing Units at the first annual, intermediate or renewal Survey after a specified date, or after the Unit reaches a specified age, the expiry date of the related Survey time window shall determine when the amendments become effective.

2.2 Surveys

2.2.1 The objective of a survey shall be to establish reasonable assurance 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 Surveys when deemed necessary in order to ascertain the condition of the Unit.

2.3 Conditions and Memoranda

2.3.1 A Condition of Class will be imposed for, but not limited to the following:
— Repairs and/or renewals related to damage, defect or breakdown that are considered by the Society to be sufficiently serious to affect the assigned Class (e.g. grounding, structural damages, machinery damages, wastage over the allowable limits etc.)
— supplementary Survey requirements
— temporary repairs.

2.3.2 The Society will issue a Condition of Class when deemed necessary to carry out Assessments in order to ascertain whether damage, a defect or a deficiency affecting the Class has been sustained or is imminent.

2.3.3 A Condition of Class may contain the following:
— a description of the deficiency, defect, damage or the Assessment 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 Condition of Class may refer to a Survey statement for above details.

2.3.4 If a Condition of Class is considered by the Society to seriously affect 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 Condition of Class will be deleted when the Society, through a Survey or received information, is satisfied that requested action has been satisfactory completed.

2.3.6 When the Society has been authorised to carry out a statutory Survey and identifies a finding that exclusively relates to a statutory Certificate, a Condition on behalf of the Flag Administration will be imposed for specific measures, Repairs or Surveys that shall be carried out within a specific time limit in order to retain the statutory Certificate.

2.3.7 For information related to the Unit, its machinery systems, and equipment or to requirements in the Rules, the Society may issue a Memorandum to Owner. A Memorandum to Owner may supplement information given otherwise, e.g. in the Appendix to the Class Certificate or the Society’s Register of Vessels.

2.3.8 A Memorandum to Owner may be used in, but not limited to, the following cases:

— exemptions from requirements in the Rules
— accepted deviations from applicable 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.

2.3.9 Outstanding findings will be given in writing at completion of Surveys and may be recorded as Condition of Class. 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 Condition of Class.

2.3.10 The Society may at any time modify a Condition of Class or Memorandum to Owner if considered appropriate. The Owner will be notified accordingly.

2.3.11 Condition of Class or Memorandum to Owner are recorded in the Unit’s Class status from where they will be deleted when no longer valid. The Owner will be notified accordingly.

2.3.12 The Owner will be informed of Retroactive Requirements.

2.4 Survey statement and Survey status

2.4.1 The Surveyor will provide a statement to the Customer on Surveys carried out.

2.4.2 Survey statements 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
— Conditions issued or deleted
— Memorandum to Owner issued or deleted
— Retroactive Requirements issued or deleted.

Guidance note:
Where reporting is carried out according to barrier management reporting principles, see Sec.4, the reporting may contain additional details.
2.4.3 The Society will make Class status reports available to Customers on the Society’s Internet website, see the respective DNVGL-RU-OU. It is the Customer’s responsibility to obtain this information from the Society’s Internet website. Class 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, may be accepted by the Society on a case by case basis 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.

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.

Guidance note:
Repairs may be accepted without attendance upon special consideration if proper documentation of the repair is presented and accepted by the Surveyor. The repair should be visually examined at next possible opportunity.

2.5.4 In any emergency circumstance, emergency repairs shall be effected immediately. The repairs shall be documented in the Unit’s log and submitted thereafter to the Society for use in determining further Survey requirements.

2.6 Conversions and Alterations

2.6.1 Alterations of Units, except for assignment of New Class Notations, shall in general comply with the Rules applied during Newbuilding (see the respective DNVGL-RU-OU). Upon request, the current Rules may be applied. Conversion of a Unit shall in general comply with the current Rules. Current Rules will in general be applied when assigning a new Class Notation to a Unit.

2.6.2 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 Units.
2.6.3 Conversion or alterations shall take place under the supervision of the Society.

2.7 Temporary equipment

2.7.1 The Society shall be informed before the installation of temporary equipment as defined in Sec.1 [4.2].

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 not covered by the scope of Classification, it shall be confirmed that placement of this equipment on board does not negatively affect the safety of the Unit.

Guidance note:
The following aspects should typically be considered:
— blocking of escape ways
— that the equipment is covered by the fire and gas system and ESD logic, as applicable
— deck load limits
— effects on hazardous areas
— interface to systems covered by Class (no negatively affect on availability)
— sea fastening.
The list is not exhaustive and other aspects may be considered. See DNVGL-OTG-05 for additional guidance.

Equipment in compliance with DNVGL-ST-E271, DNVGL-ST-E272 or DNVGL-ST-E273 may provide assurance of several of the aspects to be considered.

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 and intermediate Surveys for Main Class and Class Notations, as applicable. The Certificate will be endorsed for satisfactory completion of renewal Survey if there is a delay in issuance of the new Certificate according to [3.2].

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 If 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. If the Class Certificate has expired at the time of renewal Survey completion, new Certificate should be issued.

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 shall 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.

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 has established reasonable assurance that the requirements for retention of Class have been met.

**Guidance note:**
The Certificate will normally be delivered on board upon completion of Survey.

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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], or when the renewal Survey has been completed following Unit being laid up or being out of service for a considerable period due to a major Repair or modification, the validity of the new Certificate will be 5 years from the date of completion of renewal Survey. In such cases, the scope of the renewal survey shall be increased to the extent of the next renewal Survey.

3.2.5 For certain Units the Certificate validity and Survey intervals may be reduced by the Society, e.g. for Units with new or novel design or for systems or items exposed to abnormal rates of wear or failure. Such conditions will be stated in the Appendix to the Class Certificate and in Memorandum to Owners.
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 Unit's Class where the conditions for retention of Class have been violated.

4.1.3 The decision to suspend or withdraw a Unit'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:
— inform the Owner
— inform 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. This time limit will in general not exceed 6 months. A longer suspension period may be granted when the Unit is not operating, as in cases of lay-up, awaiting disposition in case of a casualty or attendance for reinstatement.

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 and/or mandatory Class Notations are not completed before the expiry date of the Class Certificate, and no postponement has been granted or unless the Unit is under attendance for completion of the Survey.

4.2.2 If the annual or intermediate Surveys for Main Class and/or mandatory Class Notations are not completed within 3 months from the anniversary date of the Class Certificate, the Class is automatically suspended with immediate effect, unless the Unit is under attendance for completion of the Survey.

4.2.3 The Society may decide to suspend a Unit's Class if the Unit 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 Unit's Class with immediate effect.

4.2.5 In addition to the conditions laid down above, a Unit's Class may be suspended with immediate effect in cases where:
— rectification of Deficiencies has not been carried out or otherwise dealt with in an appropriate manner
— rectification of Deficiencies has not been surveyed and accepted by the Surveyor
— the Rules or other requirements imposed by the Society have been violated.
4.2.6 Class will not be automatically suspended according to [4.2.1] or [4.2.2] whilst a Unit is laid up, provided the requirements in Ch.2 Sec.1 [2.8] are complied with.

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 If the Class has been suspended due to outstanding debt, the Class will automatically be reinstated when all outstanding debt has been paid, provided that there are no other reasons for suspension as outlined in [4.2].

4.4 Withdrawal of Class

4.4.1 The Owner can request a withdrawal of Class at any time.

4.4.2 If the overdue Surveys specified in [4.2.1], [4.2.2] and [4.2.3] or requirement as given in [4.2.4] are not carried out within the specified time after the Class suspension, the Society will withdraw the Unit's Class.

4.4.3 When a Unit 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 Unit 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 retroactively.

4.4.5 When it is considered that an Owner'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 Units controlled or operated by the same Owner.

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

4.4.7 If the Owner 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 Owner, the Society may withdraw the Class with immediate effect.

4.4.8 For Units having statutory Certificates issued by third parties, except in those cases defined in the respective DNVGL-RU-OU Sec.2 [4.1], 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 Unit 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 Unit is re-assigned Class, the Society will:
- inform the Owner
- inform the Flag Administration
- make an entry to this effect in the Society's Register of Vessels
- 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 accessible for Surveys when Surveys become overdue, the Society may allow the Unit to operate in Class. This is provided that the Unit proceeds directly to an agreed location and, if necessary, proceeds 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 or inability to complete operations due to unusually lengthy periods of severe weather, strikes, civil strife, acts of war or other force majeure.
SECTION 4 BARRIER MANAGEMENT

1 General principles

1.1 Purpose
The purpose of barrier management is to establish and maintain barriers so that the risk faced at any given time can be handled, by preventing an undesirable event from occurring or by limiting the consequences should such an event occur.

Barrier management is the coordinated activities to establish and maintain barriers at all times, and includes the processes, systems, solutions and measures which shall be in place to ensure the necessary risk reduction.

1.2 Barrier functions and elements
Barrier elements are technical, operational and organisational components which are intended, individually or collectively, to reduce possibility for a specific error, hazard or incident to occur, or which limit consequences of an error, hazard or incident.

1.3 Barrier strategy
A barrier strategy is the result of a process that, based on the risk picture, describes and clarifies the barrier functions and elements that need to be implemented in order to establish barriers and reduce risk.

2 Classification supporting barrier management

2.1 Generic overview
To support a barrier management approach, the Society may report its findings focusing on major accident hazards (MAH) and visualize the status of corresponding barrier functions. The Society has developed a set of generic MAHs and barrier functions for this purpose.

Guidance note:
Class reporting is normally limited to technical barriers. As part of some survey arrangements, partly operational and organisational barriers may be included in the reporting.

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2.2 Unit specific overviews
The generic MAHs and barrier functions, see [2.1], may be further detailed and/or complemented as deemed relevant for the Unit in question.
SECTION 5 DIGITALIZATION AND APPLICATION OF DATA

1 Introduction
Digitalization and application of sensor data is a valuable and important part of modern asset management. By collecting and performing quality assurance of available sensor data, it can be used for applications like performance monitoring, maintenance and inspection optimisations and utilisation analysis/calculations. Data can also be applied in advanced analytics to uncover patterns and make predictions of future behavior. Application of sensor data can give the owner a better control of the Unit operations, and provide alternatives to traditional surveys.

2 Application in Classification systematics
Application of sensor data as an integrated part of Classification surveys is an accepted alternative. Sensor data used for classification surveys shall be quality assured and the methodology shall be approved. For further descriptions and requirements see Ch.2 Sec.5.

Guidance note:
The process of establishing data quality requirements is described in DNVGL-RP-0497 Data quality assessment framework and based on ISO 8000-8 Data quality - Part 8: Information and data quality: Concepts and measuring.
CHAPTER 2 SURVEY PROVISIONS AND SURVEY ARRANGEMENTS

SECTION 1 GENERAL PROVISIONS

1 Introduction

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.

All units shall be subjected to a survey arrangement (with relevant periodical surveys) in accordance with requirements of these Rules in order to confirm that the structure, machinery, equipment and systems remain in satisfactory condition and in compliance with approval or accepted standards. See [2.5] for details about survey arrangements.

2 Survey systematics

2.1 General

2.1.1 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).

2.1.2 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.

2.1.3 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:
— date of class assignment
— date of commissioning
— due date of the previous corresponding survey
— date of completion of the previous corresponding survey
— date of completion of a major conversion.
A survey may be commenced prior to the defined time window at owner's request. In such a case the due date of subsequent surveys will be adjusted accordingly.

2.1.4 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.

2.1.5 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.

2.1.6 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.

2.2 Survey pre-planning, preparation and record keeping

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

2.2.2 A specific survey programme shall be worked out in advance of each survey by the Owner in cooperation with the Society.

2.2.3 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 [3.1].

2.2.4 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 (marine growth), 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 necessary in light of experience.

**Guidance note:**
See Ch.3 Sec.2 [7] and Ch.3 Sec.2 [8] for additional requirements related to underwater survey of a unit's bottom, spudcans and legs.

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2.2.5 Accessibility and facilities for surveys on location
Surveys may be carried out on location based on approved procedures outlined in a maintenance system and survey arrangement, without interrupting the operation of the unit or installation.

In accordance with the Classification for smarter operations concept see Ch.1 Sec.2 [4], the Society allows for all survey activities to be carried out on location to reduce the out of service time. Safe accessibility and facilities for surveys must be available and based on approved procedures. Relevant survey arrangements and applicable methodologies ensuring the concept to be implemented and approved.

2.3 Survey schedules

2.3.1 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.

2.3.2 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.

2.3.3 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.

2.3.4 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 can not be credited towards both intermediate and renewal survey. Units that are re-commissioned after being laid-up may be specially considered.

2.3.5 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 2009 1.6.1.5)
Guidance note:
Surveys of the unit's outside bottom, spudcan and underwater part of legs are covered by specific surveys, see Ch.3 Sec.2 [7] and Ch.3 Sec.2 [8].

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2.3.6 Surveys 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.

2.3.7 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 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.
For units more than 10 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. Boiler installations with one main boiler only and one auxiliary boiler powerful enough to operate the propulsion plant in an emergency (take-home boiler), count as multi-boiler plants.
The boiler surveys apply to all types of boilers, i.e.:
— oil/gas fired
— exhaust gas heated
— composite
— steam generators
— electric heated.

2.3.8 Thermal oil heater will be internally surveyed and tested once during each 5-year period of the classification certificate. The survey will 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.
The thermal oil surveys apply to all types of thermal oil heaters, i.e.:
— oil fired
— exhaust heated
— steam heated.

2.4 Class notations

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

Table 1 Surveys for optional class notations

<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>Battery</td>
<td>Battery installations in battery powered units</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [29]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Renewal</td>
<td>Renewal</td>
<td></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><strong>Bow loading</strong></td>
<td>Offshore bow loading system</td>
<td>Complete</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [24]</td>
</tr>
<tr>
<td><strong>BWM</strong></td>
<td>Ballast water management</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [19.1]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intermediate</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
</tr>
<tr>
<td><strong>Clean</strong></td>
<td>Arrangements for controlling and limiting operational emissions and discharges</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [19.2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intermediate</td>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete</td>
<td>Renewal</td>
<td></td>
</tr>
<tr>
<td><strong>COMF-MOU</strong></td>
<td>Noise, vibration, illumination and indoor climate</td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [17]</td>
</tr>
<tr>
<td><strong>Crane and Crane-offshore</strong></td>
<td>On board crane</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [10]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Diving system</strong></td>
<td>Diving system</td>
<td>Annual</td>
<td>Annual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>DNVGL-RU-OU-0375</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
</tr>
<tr>
<td><strong>DP</strong></td>
<td>Dynamic positioning system</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [5]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>DPS</strong></td>
<td>Dynamic positioning system</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [5]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>DRILL</strong></td>
<td>Drilling plant</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [6]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>DYNPOS</strong></td>
<td>Dynamic positioning system</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [5]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>E0</strong></td>
<td>Periodically unattended machinery space</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [14]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
</tr>
<tr>
<td><strong>ECO</strong></td>
<td>Machinery centralised operation</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [14]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></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>F</td>
<td>Additional fire protection</td>
<td>Complete (2.5 years)</td>
<td>Intermediate and renewal</td>
<td>Ch.3 Sec.4 [12]</td>
</tr>
<tr>
<td>HELDK</td>
<td>Helicopter deck</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [7]</td>
</tr>
<tr>
<td>HMON</td>
<td>Hull monitoring system</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [16]</td>
</tr>
<tr>
<td>ISDS</td>
<td>Integrated software dependent systems</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [20]</td>
</tr>
<tr>
<td>LCS-DC</td>
<td>Loading computer system</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [13]</td>
</tr>
<tr>
<td>ME</td>
<td>Position mooring equipment</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offloading</td>
<td>Crude offloading system</td>
<td>Complete</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [25]</td>
</tr>
<tr>
<td>POSMOOR</td>
<td>Position mooring system</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [3] or Ch.3 Sec.4 [4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROD</td>
<td>Production system</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [26]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete</td>
<td>N/A</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>Ch.3 Sec.4 [19.3]</td>
</tr>
<tr>
<td>REGAS</td>
<td>Regasification plants</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [27]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
</tr>
<tr>
<td>TEMPSTORE</td>
<td>Facility for temporary storage of oil</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [9]</td>
</tr>
<tr>
<td>TMON</td>
<td>Tailshaft monitoring</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [23]</td>
</tr>
<tr>
<td>VCS</td>
<td>Vapour control system</td>
<td>Complete</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [19.4]</td>
</tr>
<tr>
<td>VIBR</td>
<td>Vibration level limitation</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [17]</td>
</tr>
<tr>
<td>Walk2work</td>
<td>Offshore gangway</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [11]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WELL</td>
<td>Well intervention systems</td>
<td>Annual</td>
<td>N/A</td>
<td>Ch.3 Sec.4 [15]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WELLTEST</td>
<td>Well testing plant</td>
<td>Annual</td>
<td>Annual</td>
<td>Ch.3 Sec.4 [8]</td>
</tr>
</tbody>
</table>
### 2.4.2 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>
<th>Survey type</th>
<th>Conjunction with main class survey</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winterized</td>
<td>Operation in cold climate</td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annual</td>
<td>Annual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete (5 years)</td>
<td>Renewal</td>
<td>Ch.3 Sec.4 [18]</td>
</tr>
</tbody>
</table>

### 2.4.3 Compliance with coastal state legislation

When the Society 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, e.g. DRILL(N).

Coastal state code notations currently in use, are listed in Table 3.

**Table 3 Notations for coastal state verification**

<table>
<thead>
<tr>
<th>Notation</th>
<th>Description</th>
<th>Survey requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation(N)</td>
<td></td>
<td>DNVGL-SI-0166 Ch.3</td>
</tr>
<tr>
<td>Drilling(N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well intervention(N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil production unit or installation(N)</td>
<td>Verified for compliance with DNV GL's interpretation of relevant Norwegian coastal state requirements.</td>
<td></td>
</tr>
<tr>
<td>Storage unit or Installation(N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROD(N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRILL(N)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 2.5 Survey arrangements

A survey arrangement is an agreement between owner of a unit and the Society stating how and when the structure, equipment and systems subjected to Class followup shall be surveyed, inspected, maintained and tested. It shall also specify parts covered by the Society and parts covered by owner's qualified personnel, if applicable.

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 during the operational phase. A default survey arrangement will be implemented for each area as defined below. Alternative survey arrangements may also be accepted as an option to applicable periodical surveys for main and optional class (if requested by the owner).

Survey arrangements covers the scope as defined for main class and selected optional class notations. Survey arrangements are defined and available for the following areas:

- machinery and electrical equipment, see Sec.2
- drilling equipment, see Sec.3
- structure, see Sec.4.

The extent of periodical surveys for a default survey arrangement is presented in Ch.3 Sec.1 and Ch.3 Sec.2 for main class, Ch.3 Sec.3 for additional service notations and Ch.3 Sec.4 for optional system and facility notations.

### 2.6 Surveys performed by approved companies or service suppliers

Parts of the periodical surveys may be carried out by companies approved by the Society. More details are given in Sec.6.

### 2.7 Postponement of periodical surveys

**2.7.1** Except for annual and intermediate surveys for main class, the Society may accept to postpone periodical surveys upon special consideration. Postponement of main class renewal survey may be considered only in exceptional circumstances.
2.7.2 Postponement of main class renewal survey shall not exceed 3 months. Postponement of periodical surveys will not change the surveys’ next due date.

2.7.3 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.

2.8 Survey of units out of commission

2.8.1 Units which have been out of commission, and 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 carried out during lay-up
— the extent of surveys carried out during the time out of commission.

All overdue surveys shall be completed prior to re-entering service.

2.8.2 Units laid up for less than 12 months are considered as having operated continuously, i.e. being maintained like under normal operating conditions. In such cases, only overdue surveys shall be carried out during re-commissioning.

For units not being maintained, a sighting survey may be required. Function testing will be considered.

Guidance note:

2.8.3 During layup, units shall be subjected to annual survey. The extent of the annual survey is described in Ch.3 Sec.2 [12].

2.8.4 Before re-entering service, units shall be subjected to a re-commissioning survey. The extent of the this survey is described in Ch.3 Sec.2 [12].

2.8.5 Prolonged survey intervals may be considered when preservative measures are taken, and the re-commissioning is taking all elements of a renewal survey into consideration.

Guidance note:
See DNVGL-RP-0290 [9.2] for acceptance criteria for prolonged survey intervals during lay-up. Flag administration acceptance is required if Statutory surveys are affected.

2.9 Asbestos free declaration

2.9.1 For units that shall comply with SOLAS Reg.II-1/3-5 or MODU code 2.10.3 (2009) the surveyor will carry out a review of asbestos-free declarations documenting that new installations of materials do not contain asbestos.

2.9.2 For non-SOLAS/MODU Code units, a master’s declaration that asbestos has not been installed on board the unit since last survey shall be given.
3 Structure and equipment

3.1 Conditions for survey and access to structures

3.1.1 In preparation for survey and to allow for a thorough examination, all spaces shall be cleaned including removal of all loose accumulated corrosion scale from surfaces. 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.

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

3.1.2 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.

3.1.3 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.

3.1.4 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:
See IACS Recommendation No. 39 – Guidelines for the use of Boats or Rafts for Close-up surveys.
---end---of---guidance---note---

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 should 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 will 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.
---end---of---guidance---note---

3.1.5 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.

3.2 Survey extent

3.2.1 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.

3.2.2 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.

3.2.3 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 (can be replaced/substituted by remote survey techniques [3.1]). 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.

3.2.4 In-service Inspection Programme (IIP)
The Society will develop and maintain an in-service inspection programme (IIP) which will contain the structural items to be surveyed to satisfy the minimum requirements for retention of main class (i.e. 1A and OI) as outlined in Ch.3 Sec.1 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 requirements as given in Ch.3 Sec.1 constitute 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. The requirements are implemented in the IIP depending upon applicable survey arrangement. The survey extent is defined in Ch.3 Sec.1 [1.2]. The survey scope will be evaluated and adjusted based on the present status (gained knowledge from previous surveys and latest observations) for each individual unit.
3.2.5 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 requirements for thickness measurements for the units are presented in Ch.3 Sec.1 [1.2.8].

3.2.6 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.6 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.

3.2.7 Where substantial corrosion, as defined in Ch.1 Sec.1 [4], is found, additional thickness measurements shall be taken to confirm the extent of substantial corrosion, as defined in Ch.3 Sec.1 [2.2.17].
Areas found with substantial corrosion, which are not repaired, shall be recorded for thickness measurements at subsequent annual surveys.

3.2.8 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.

3.2.9 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.

3.2.10 Corrosion allowance
In the design of column-stabilised, self-elevating and other non-ship-shaped 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-shaped units, corrosion allowance is included as part of the DNV GL rules for ships, but in addition combined with a corrosion protection system similar as for column-stabilised and other units.
The corrosion diminution criteria as given in DNVGL-CG-0172, shall be applied. Alternative methods may be accepted in agreement with the Society.
3.2.11 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 4.

Table 4 Conditions of protective coating

| Corrosion prevention system | 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. (See 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 organisational set-up to maintain adequate corrosion protection. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coating condition GOOD 1)</td>
<td>Condition with only minor spot rusting.</td>
</tr>
<tr>
<td>Coating condition FAIR 2)</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 2)</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>

Notes:

1) Good condition is not to be used for soft or semi-hard coating.

2) Conditions used for soft or semi-hard coating to be based on surveyor's judgement

Guidance note:
The condition of soft or semi-hard coating is to be given as FAIR or POOR only, due to the uncertainties related to the protection of the structure under the coating. A survey is to verify the effectiveness of the coating by carrying out an assessment of the conditions of internal structures which may include spot removal of the coating.

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3.2.12 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.

3.2.13 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.
3.3 Specific surveys for self-elevating units

3.3.1 The following additional specific surveys are defined for self-elevating units:
— spudcan and leg survey (covering spudcans and the underwater areas of legs, together with their connections)
— survey after ocean transit
— surveys in relation to permanent installation.

Schedule and scope for these specific surveys are given in Ch.3 Sec.2.

3.4 Repair of structural damage or deterioration

3.4.1 A prompt and thorough repair is a permanent repair if completed at the time of survey and 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 it is referred to DNVGL-RP-C301. Class shall be involved before the application.

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3.4.2 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.

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

3.4.4 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.

4 Machinery and systems

4.1 Maintenance and preparation for survey

4.1.1 Every unit shall have implemented a maintenance system including machinery systems and equipment subject to class (see Sec.2 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 systems and equipment subject to class shall be maintained in accordance with the implemented maintenance system.
Guidance note:
The maintenance system shall be on an electronic format. It is recommended to apply a computerised maintenance management system (CMMS), 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] and DNVGL-CP-0206 for further details.

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

4.2 Machinery verification

4.2.1 If significant repairs or modifications are carried out to main class machinery and systems the Owner shall inform the Society. Applicable repair or modification to be followed up accordingly by the attending surveyor.

4.2.2 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 unit afloat and be presented to the attending surveyor. Systems which require shaft alignment are specified in DNVGL-RU-SHIP Pt.4 Ch.2.

4.2.3 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.

4.3 Spare part management

4.3.1 Spare part management is a set of systematics applicable for all types of units and applies to main class machinery and equipment related to optional class notations (as listed in Ch.3 Sec.4). Spare part management is a fleet-oriented and centralised systematics applicable for a group of units managed by the same organisation (owner). The group of units will have a centralised pool of DNV GL certified equipment (spare parts) that can be applied on any of the units in the group. The equipment is thereby not linked to a specific unit.

Guidance note:
For guidance on spare part management, IEC 62550 Spare part provisioning can be used.

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Equipment which is not in operation on a unit shall be stored with sufficient preservation according to type of equipment, location of storage and duration of the preservation. For equipment in storage covered by a spare part management and with sufficient preservative measures, prolonged survey intervals can be accepted.

Guidance note:
For further guidance on preservation see also DNVGL-RP-0290 for acceptance criteria for prolonged survey intervals during layup.

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4.3.2 Extended survey interval

Spare part management systematics includes the option to extend classification survey interval on equipment not taken into operation after a renewal and/or complete survey or equipment used in operation for less than 2 years with subsequent preservation. The survey interval will then be extended accordingly.
4.3.3 Equipment monitoring

The Spare part management systematics shall include monitoring of the equipment. The monitoring shall be controlled by an application (software) for registration (logging) of operational time on board a unit and time in storage. The application shall have, but not limited to, the following functions:

— track location and use of any equipment which is part of the systematics
— access control to assure that changes to the system cannot be made by unauthorised personnel and assure that any input will be traceable to the individual user
— access to applicable documentation for each equipment part of the systematics
— back up of data.

Guidance note:
When tracking location of the equipment, this should be done on a continuous basis and include state of the equipment i.e. in operation, in storage, in preservation.

Equipment part of the Spare part management systematics shall be tagged with a unique identification number/code and be traceable in the application.

The Society shall have access to the application and relevant data.

4.3.4 Approval process

The approval process includes a detailed review based on the following submitted documentation:

— equipment monitoring details (application)
— preservation procedures (long term, short term)
— inspection and maintenance details (during operation, before preservation, after preservation)

Implemented procedures and systematics shall be verified during first annual survey.

Guidance note:
Spare part management is linked to main class Ch.3 Sec.1 [2.4] or optional class notation(s) Ch.3 Sec.4 covering main class machinery and applicable equipment which is part of the methodology.

4.3.5 Periodical audits and surveys

To maintain the validity of the spare part management, an annual audit of the implemented systematics is required, preferably during annual survey related to the applicable equipment. The purpose of this audit is to evaluate the implemented spare part management to ensure that it is operated correctly according to approved systematics and procedures.

5 Special provisions for ageing offshore units

5.1 General

5.1.1 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.

5.1.2 The special provisions for maintaining required safety level are 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 shall also be given due consideration by owner through maintenance activities, and by surveyors through periodical surveys.
5.2 Corrosion measurements and condition of protective coating

5.2.1 In the design of an offshore 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, see [3.2.10] for additional information..

5.2.2 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 Ch.3 Sec.1 [4]. In addition, reference is made to [3.2] with regard to thickness measurements and inspection of protective coatings in general.

5.2.3 Owner shall document that the corrosion protection of the unit's hull is adequate and in line with conditions assumed in original design. The corrosion protection system shall be specially surveyed.

5.3 Fatigue utilisation index

5.3.1 The fatigue utilisation index (FUI) is defined as the ratio between the effective operational time and the initially documented fatigue life.

5.3.2 When the actual age of the unit exceeds the documented fatigue life, the fatigue utilisation index (FUI) shall be calculated for units other than ship-shaped units, i.e. column-stabilised and self-elevating units. The owner is responsible for providing the necessary documentation, e.g. fatigue utilisation and fatigue capacity.

   **Guidance note:**
   It is recommended to update the operational history at least at every main class renewal survey.

5.3.3 All ship-shaped units shall follow the principles for life time extension as given in DNVGL-OS-C102 App.B when the unit's design life is exceeded.

5.3.4 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.

5.3.5 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.

5.3.6 Owner shall submit FUI as part of the planning process prior to renewal survey, see [5.3.2] above.

5.3.7 The FUI may be calculated separately and in detail for various parts of a self-elevating unit such as:

   — leg nodes
   — spud cans
   — jack house
— deck structure.

The calculations may reflect the various degrees of bottom restraints and loading pattern resulting from the
deck being fixed at various levels during the operational history of the unit.

5.3.8 When the FUI > 1.0, the following measures shall in general be taken:
— The Society will issue a MO (memo to owner) stating the actual FUI.
— The installed leak detection system for column stabilised units shall be examined for leakage two times
each month and shall be confirmed at each annual survey.
— Evaluation of structural status, see [5.3.9] to [5.3.13].

5.3.9 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 in accordance with [5.3.11] (i.e. NDT scope with 2 1/2 year interval)
or
— by performing a condition based assessment for the Unit.

Where a condition based assessment for the unit is performed, the procedure and method shall 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 Unit 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 analysis results in a risk based analysis (RBI) including historical data from inspections/findings and
inspection quality for preparing the inspection programme.
— 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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5.3.10 For a unit with FUI > 1.0, where no fatigue cracks have been detected in fatigue sensitive areas, or
any findings have been evaluated to have insignificant influence on the fatigue capacity, no special provisions
will be required until such cracks are detected. To be documented by the owner.

5.3.11 Previous cracks located in fatigue sensitive areas shall be subject to additional NDT at intermediate
surveys corresponding to the extent of the NDT inspection required for the renewal surveys.

5.3.12 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 programme will depend on the initial
assessment and owner's plans for further use of the unit. Units which have undergone an assessment and
improvement programme to the Society's satisfaction will be surveyed based on the modified inspection
programme.
5.3.13 The scope for survey of jacking gears as outlined in Ch.3 Sec.1 [5.5] shall be increased to 20% of jacking gear units, but not less than two units per leg.
SECTION 2 SURVEY ARRANGEMENTS - MACHINERY AND ELECTRICAL

1 General

1.1 Introduction

1.1.1 The different machinery survey arrangements are based on the Society’s machinery list 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 Ch.3 Sec.1 [5] shall be followed.

1.1.2 Machinery survey arrangements
The following survey arrangements are available for class related machinery and electrical equipment and systems:

— machinery renewal (MR), see Ch.3 Sec.1 [5] (default)
— machinery continuous (MC), see [2]
— machinery planned maintenance system (MPMS), see [3]
— machinery planned maintenance system – reliability centred (MPMS RCM), see [4]
— machinery condition based maintenance (MCM), see [5]
— electrical systems integrity management (ESIM), see [6].

1.1.3 Survey methods for machinery
Machinery equipment and systems listed in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26 shall be surveyed according to one of the listed survey arrangements if not part of a separate survey. Surveys shall be performed according to the following type of examination:

— Examination method 1:
  Visual examination by opening up fully or partly as deemed necessary by the surveyor. Function testing and/or pressure testing shall be carried out when relevant.

— Examination method 2:
  Examine visually without dismantling. Performance test shall be carried out. Open up if deemed necessary. Verify last overhaul.

— Examination method 3:
  Audit of maintenance/test/inspection history in the CMMS. Test of safety functions as deemed necessary. General visual examination.

Table 1

<table>
<thead>
<tr>
<th>Survey arrangement</th>
<th>Examination method (component)</th>
<th>Additional verification (systematics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery renewal</td>
<td>1 or 2</td>
<td></td>
</tr>
<tr>
<td>Machinery continuous</td>
<td>1 or 2</td>
<td></td>
</tr>
<tr>
<td>Machinery PMS</td>
<td>3</td>
<td>Continuous improvement function</td>
</tr>
<tr>
<td>Machinery PMS RCM</td>
<td>3</td>
<td>Maintenance support (management), process (reporting, procedures and communication), continuous improvement function and personnel competence</td>
</tr>
</tbody>
</table>
1.1.4 Language

All documentation relevant to and part of an approval of a survey arrangement and/or generated as part of an implemented survey arrangement, shall be in English.

1.2 Cancellation of the survey arrangement

If the conditions for the survey arrangement are not complied with or in case of change of owner of the unit, the survey arrangement will be automatically cancelled and substituted by the default survey arrangement. Any changes to the survey arrangement shall be subject to class approval.

2 Machinery continuous

2.1 General

2.1.1 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 as listed in this chapter.

A follow-up system covering the Society’s machinery list in accordance with DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26 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% (default) 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.

2.1.2 Responsible person

The Owner of the unit shall dedicate a responsible person (e.g. chief engineer or maintenance supervisor) on board the unit to ensure correct operations and the integrity of the arrangement. The 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 support 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 person on board holds 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.

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3 Machinery planned maintenance system

3.1 General

3.1.1 Machinery planned maintenance system (MPMS) is a survey arrangement based on survey of an approved and implemented computerised maintenance management system (CMMS) on board the unit. This system shall cover all component surveys in the machinery list in accordance with DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26 for the unit.

Guidance note:
When developing the maintenance programme it is recommended to apply standard maintenance terminology as described in EN 13306: Maintenance terminology, or equivalent.

It is recommended that security mechanisms are implemented to assure any data transfer and storage. Special attention should be given to critical components and control systems used for connecting data acquisition units to external networks, including remote connection to shore-based systems. Examples of components are Nodes, Switches, Gateways and Wireless gateways. General guidance on cyber security is given in DNVGL-RP-0496.

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3.1.2 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.

3.2 Approval process

3.2.1 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 as listed in this chapter.

3.2.2 Responsible person
The Owner for the unit shall dedicate a responsible person (e.g. chief engineer) on board the unit to ensure correct operations and the integrity of the arrangement. The 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 person on board holds 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.

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3.2.3 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.
3.2.4 Condition based maintenance
If condition based maintenance (CBM) of equipment is carried out as part of the maintenance, this shall be approved as part of a separate survey arrangement. See [5] Machinery condition based maintenance for further details.

3.3 Periodical audits and surveys

3.3.1 Annual survey
To maintain the validity of the survey arrangement an annual survey of the implemented MPMS system on board 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 survey or function testing may be required if found necessary by the surveyor. Survey requirements shall be according to DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 [3.2.5].

4 Machinery planned maintenance system – reliability centred

4.1 General

4.1.1 The requirements for machinery planned maintenance system – reliability centred (MPMS RCM) are based on a proactive maintenance methodology and with a focus on the owner's ability to provide required maintenance activities when needed (maintenance supportability).

Guidance note:
It is recommended to be operating according to and comply with MPMS (see [3]) before entering MPMS RCM.

4.1.2 MPMS RCM survey arrangement is applicable to main class machinery items listed in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26.

Guidance note:
For units with DRILL notation it also applies to the drilling systems (DPMS RCM), see Sec.3 [4].

4.1.3 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.

4.2 Approval process

4.2.1 The approval process includes the following activities:
— maintenance management approval, see [4.2.2]
— maintenance analysis approval, see [4.2.3], [4.2.4] and [4.2.5]
— maintenance programme approval, see [4.2.6]
— initial (implementation) survey on board the unit, see [4.2.7].

Guidance note:
To retain the survey arrangement annual and complete audits shall be completed as described in this section.
4.2.2 Maintenance management approval

A maintenance management approval is performed to ensure that the owner of the unit is able to provide satisfactory maintenance supportability within his organisation. The approval shall include a documentation review consisting of the following:

— maintenance strategy supporting a MPMS RCM survey arrangement and required level of maintenance support
— management to support continuous improvement and the ability to obtain required performance level
— management with necessary resources required to sufficiently support a MPMS RCM survey arrangement
— governing documentation (procedures) and working processes related to the MPMS RCM for the unit(s)
— spare part management

**Guidance note:**

Spare part management should be linked to function criticality and lead time to failure (LTTF) and/or PF interval. See also Sec.1 [4.3] for more information.

4.2.2.1 Maintenance resources

It is the responsibility of the owner to organise, manage, and develop maintenance resources (personnel, materials and equipment) on board to provide sufficient maintenance supportability at all times. The owner shall, based on applicable class related machinery items on board the unit, ensure sufficient technical competence related to required maintenance level (maintenance task complexity), type and function of the equipment. There shall be a clear definition of competence requirements related to maintenance for all applicable positions.

**Guidance note:**

Based on the applicable machinery equipment and systems as listed in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26 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.

4.2.2.2 Responsible person

The owner shall dedicate a responsible person on board the unit to ensure correct operations and the integrity of the arrangement. The 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 person on board holds 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.

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4.2.2.3 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
— internal audits (maintenance management)
— 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 see EN 13306 Maintenance terminology, or equivalent.

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4.2.3 Approval of the maintenance analysis
A written procedure shall be established before the maintenance analysis commences. This procedure shall describe the maintenance strategy and describe the maintenance analysis process for the specific unit(s). This procedure 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 for technical expert personnel, applicable rules and regulations (project boundaries).

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4.2.4 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.
4.2.4.1 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 see [3].

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4.2.4.2 Operational experience

An alternative to OEM maintenance recommendations can be applying operational experience to optimise the existing maintenance (OEM).

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 (SME).

4.2.4.3 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 failure modes. An 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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4.2.4.4 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.

4.2.4.5 RCM analysis

For equipment with no OEM maintenance recommendations, no specified or suitable maintenance, or for other reason where current maintenance tasks and intervals represent a potential for optimisation, a structured analysis such as reliability centered 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 centered maintenance, SAE JA1011 Evaluation Criteria for Reliability Centered Maintenance Process or other equivalent standard.

---end---of---guide---note---

4.2.4.6 RCM teams shall consist of experienced people related to the equipment that is analysed. If the equipment analysed is new, the analysis process shall 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. The RCM analysis shall be coordinated by a facilitator with relevant experience related to maintenance management and RCM analysis.

Guidance note:
It is recommended that the RCM facilitator comes from outside the organisation.

---end---of---guide---note---

4.2.5 Application of sensor data
Maintenance tasks and intervals may be based on data and results from data analytics. Collected sensor data, other data and information may be analysed and applied as part of the processes to detect, diagnose, predict faults and determine correct maintenance tasks, see [4.2.4]. The process shall include a standardised methodology to evaluate relevant functions; identify functional failures (failure modes), function criticality, failure mechanisms (degradations), failure symptoms and how application of sensor data can enable monitoring and enhance the control of selected functional failure modes and replace or support traditional maintenance tasks.

Guidance note:
It is recommended to apply ISO 13381 as guidance for development and application of a prognosis process. The process will typically include failure mode and effect analysis (FMEA) see IEC 60812, in combination with failure mode symptoms analysis (FMSA), see ISO 13379-1. See also ISO 13379-2 for information related to data driven applications.

---end---of---guide---note---

When relating sensor data with applicable failure modes the function criticality shall be confirmed and be the basis for defining data quality requirements.

Owners collecting and applying sensor data as part of their maintenance management, shall as part of their data management have the ability to provide sufficient data and analytic quality according to established requirements. For details and applicable rules see Sec.5.

4.2.6 Approval of maintenance programme
The maintenance programme shall include at least the applicable class related machinery items listed in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26. All these components shall in the CMMS be identified as class items and have a unique tag number. The tag number shall be physically marked on the component. Maintenance tasks and intervals shall be in accordance with the results from the maintenance analysis. Changes shall only be accepted when justified by the continuous improvement process. Changes shall be traceable and presented to the attending surveyor at the next survey for acceptance.

Guidance note:
When applying acceptance criteria required to perform maintenance this should be obtained from OEM, or otherwise justified by technical evaluation and approved by the Society.

---end---of---guide---note---
4.2.6.1 Implementation of maintenance programme into the computerised maintenance management system (CMMS)

Systems and equipment shall be evaluated according to maintenance level, type and function. Maintenance personnel shall be qualified for 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) descriptions in English.

Guidance note:
A spare part philosophy should be established to support relevant maintenance tasks and in accordance with applicable failure modes. Spare part location should be based on function criticality and lead time to failure (LTTF).

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4.2.6.2 CMMS functionality

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 functionality that makes it able to:

— record and separate between different types of maintenance
  — scheduled maintenance (preventive maintenance/deferred corrective maintenance)
  — un-scheduled maintenance (immediate corrective maintenance)
— produce maintenance history reports on maintenance carried out for a specific time period on machinery class items
— record maintenance data
  — condition before and after maintenance (state)
  — failure mechanism
  — checks and measurements
— register revisions of maintenance task (traceability)
— provide verification of class related maintenance tasks (quality of work and correct/sufficient level of reporting)
— 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
— 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 cooperation it is recommended to use a standardisation of maintenance parameters and data see EN ISO 14224: Collection and exchange of reliability and maintenance data for equipment (same as API Std 689), or equivalent.

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4.2.7 Initial audit
An initial audit 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 audit is carried out. The initial audit is split in one company audit and one shipboard audit.

Provided the initial audit 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.

4.2.7.1 Company audit
A company audit is performed to verify the results from the maintenance management approval see [4.2.2].

Guidance note:
The company audit will be applicable for a unit owner and may be applied to all units managed under same management.

During the company audit it shall be verified that:
— there are sufficient resources available in the organisation to ensure sufficient support of the arrangement
— the management has the required organisational maturity needed to provide sufficient data quality according to established requirements see Sec.5 [5].
— maintenance tasks and intervals have been implemented in CMMS according to the requirements (demonstration) see [4.2.6]
— CMMS have the required functionality see [4.2.6]
— data processability as specified in Sec.5 [4] is followed
— the organisation has an active continuous improvement process see [4.2.2.3].

4.2.7.2 Shipboard audit
During the initial shipboard audit it shall be verified that:
— there are sufficient resources available on board the unit to ensure operations according to the arrangement. Personnel engaged in performing maintenance tasks on class related machinery items shall have the correct competence based on maintenance level, type and function of the equipment
— organisational maturity as specified in Sec.5 [5] is followed.
— 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
— responsible person is familiar with the CMMS and is able to demonstrate the different functionalities in the system to the attending surveyor see [4.2.6]
— the general condition, maintenance of equipment and maintenance in general on board is good
— the arrangement includes an active continuous improvement process see [4.2.2.3].

4.3 Periodical audits and surveys

4.3.1 Annual shipboard audit
To maintain the validity of the survey arrangement MPMS RCM, an annual audit of the implemented maintenance programme is required, preferably during normal operation. This audit replaces the survey of machinery for components included in the MPMS RCM arrangement. The purpose of this audit 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 governing documentation.

During the annual audit the following shall be verified:
— general assessment of equipment and systems and the general maintenance on board (rated by the attending surveyor)
— all maintenance on class related items part of the arrangement is carried out according to the maintenance programme
— 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 justified by the continuous improvement process
— responsible person on board the unit is familiar with the CMMS and is able to demonstrate the different functionalities in the system to the attending surveyor
— overdue/postponed (deferred) maintenance tasks (jobs) shall be explained
— amount of un-scheduled maintenance (immediate corrective maintenance)
— visual survey and function testing if found necessary by the attending surveyor as specified in Ch.3 Sec.1 [2.4]. Opening of machinery may be required in special cases
— all damage/break-downs 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. See Ch.1 Sec.3 [1.2.2] for additional guidance on damage/break-downs.

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4.3.2 Complete audit
To prolong the validity of the survey arrangement a complete audit of the implemented MPMS RCM survey arrangement is required. The purpose of the audit 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 complete audit is split in one company audit and one shipboard audit.

Guidance note:
Items covered during the initial audit will normally be covered as spot checks. Major changes of the organisation could give rise to an increase in the survey scope.

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4.3.2.1 Company audit
A complete company audit is performed to verify that the system, resources and conditions from the initial audit is still complied with.

The following should be verified during the complete company audit:
— sufficient resources available to support the survey arrangement
— the owner has the required organisational maturity needed to provide sufficient data quality according to established requirements see Sec.5 [5]
— data processability, see Sec.5 [4]
— any software updates to type approved CMMS
— active continuous improvement process, see [4.2.2.3]
— maintenance performance monitoring
  — amount of un-scheduled maintenance (immediate corrective maintenance)
  — amount of overdue/postponed (deferred) maintenance tasks (jobs)
— competence and knowledge of support personnel with functions relevant for the maintenance management (interviews).

Any documentation approved during the maintenance management approval, see [4.2.2], that has been updated, issued (new) or re-issued shall be submitted for review before the complete company audit.

4.3.2.2 Shipboard audit
The maintenance management of the unit shall be audited during the complete shipboard audit to verify that the basis of the survey arrangement is still intact. This should normally include a review and verification of the following:
4.3.2.3 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.

4.3.2.4 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 on board the unit and in the organisation.

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4.3.2.5 Visual survey 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 survey may be required if found necessary by the surveyor.

5 Machinery condition based maintenance

5.1 General

5.1.1 Machinery condition based maintenance (Machinery CBM) is a survey arrangement based on condition based maintenance. Maintenance actions are established based on repeated analysis of data collected from applicable equipment evaluated in combination with input from relevant inspection and/or test results.

5.1.2 Machinery CBM covers preventive maintenance that is a combination of predetermined maintenance and predictive maintenance, such as standardized non-intrusive technologies used for condition monitoring (CM) and fault diagnostics. It also covers application of sensor data and data analytics to detect, diagnose and predict fault progression.

Guidance note:
Applicable technologies can be used separately or in combination to develop and optimise the most effective monitoring programme. Standardized non-intrusive CM technologies include vibration, oil and wear debris analysis, infrared thermography, acoustic and ultrasonic analysis and electric signature analysis.

Application of data for CBM is not limited to only sensor data. Data analytics are not limited to any specific analytic technique. See Sec.5 for applicable requirements for application of data.

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5.1.3 Machinery CBM requires use of an approved service supplier for development and coordination of condition based maintenance tasks and fault diagnostic. An approval process of the supplier is conducted in order to verify the procedures, competence and resources of the company. When machinery CBM has been implemented successfully on selected equipment on a unit, this will give an alternative to the traditional maintenance given by fixed intervals on the equipment. With an approved arrangement the required maintenance will be performed according to a maintenance analysis and the condition of the equipment.

**Guidance note:**
An approved service supplier is granted a general authorisation to carry out condition based maintenance 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 DNVGL-CP-0484 App.B [5], see Sec.6.

5.1.4 Machinery CBM may be applied to main class machinery items listed in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 Table 26. Thrusters for propulsion and/or positioning may be included as part of an machinery CBM arrangement.

**Guidance note:**
For equipment covered by the DRILL notation see DCMSA, Sec.3 [5].

5.1.5 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.

5.2 Approval process

5.2.1 An approval process consists of the following steps that shall be fulfilled before the survey arrangement is valid:
— approved service supplier, see Sec.6 [1.6]
— successful documentation review, see [5.2.2]
— approved CMMS, see DNVGL-RU-SHIP Pt.7 Ch.1 Sec.7 [3.2] for further details.
— successful initial audit, see [5.2.5].

5.2.2 Documentation requirements
Approval of the CBM programme is based on submittals of documentation with a description of the following:
1) maintenance strategy
2) name and address of the appointed approved service supplier and oil analysis laboratory
3) a list of the machinery systems and equipment included in the arrangement
4) monitoring methods, including information required in [5.2.3] and [5.2.4] if applicable.
5) information about the installation and programme
   — who performed the installation and who did the verification (standardised CM techniques)
   — one line diagram giving a description of the installation
   — drawings that show measuring points (if any) on applicable equipment

**Guidance note:**
CBM programmes and installations should comply with ISO 17359 or similar standard.

6) baseline measurements
7) maintenance tasks in CMMS related to:
— measurements
— sampling
— recordings
— recommendations (from the approved service supplier)

8) procedure outlining a process for continuous improvement

**Guidance note:**
The continuous improvement process should include workflow for both measuring and improving the quality of the data and data management. The workflow should include root cause analysis (RCA) process and be integrated with the approved service supplier.

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

9) procedure for communication and reporting between owner and approved service supplier

10) training programme for involved personnel on board. Personnel on board performing measurements and/or lubrication oil sampling shall have sufficient competence and documented training for their scope of work.

**Guidance note:**
Sufficient competence and experience should be documented in accordance with ISO 18436. Alternatively the responsible approved service supplier can supply specialised training to the required technical level which should be approved by the Society.

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

11) communication plan that outlines the owner’s communication with the Society and the approved service supplier

12) condition of the applicable machinery and equipment

13) acceptance criteria for applicable machinery and equipment (limits)

14) list of measuring equipment to be used. Ex-certificates shall be provided if equipment is installed/used in hazardous areas.

**5.2.3 Oil sampling and analysis part of a CBM programme shall be documented including:**

1) quality system and personnel qualifications applicable for the selected oil analysis laboratory

**Guidance note:**
Oil laboratories performing the oil analysis shall have a quality system and adequate 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.

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

2) procedures and maintenance tasks assuring:
— oil sampling performed and submitted according to recommendations from the approved service supplier
— applicable oil sampling process minimize the risk of contaminations and provide sufficient quality
— oil analysis reports/results made available to the approved service supplier on a regular basis

3) drawings with sampling points clearly identified

**Guidance note:**
Samples should be acquired from the return flow while the equipment is operating and the oil is circulating. Sufficient draining before sampling should be ensured to produce oil samples with satisfactory quality.

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

4) acceptance criteria for elements included in the oil analysis specified for relevant equipment
5.2.4 Collection of sensor data as part of a CBM programme shall be documented including:

1) list of sensors part of the system, identified by an ID marking, making it possible to identify the physical sensor (data source) based on identifiers in a dataset.

   Guidance note:
   Sensor data intended for application on class relevant equipment and systems shall be quality assured. This process includes verification and validation performed by the Society. The process requires relevant sensor data to be provided by the owner in a non-proprietary, license-free, not encoded and non-binary or platform specific format. Streamed data will be considered on a case by case basis. Formats shall be documented and should specify field types, any requirements such as valid values and any inter-table relationships.

2) procedure(s) ensuring collection of sensor data in accordance with data quality requirements, see Sec.5 [3].

   Guidance note:
   Process and functions related to collection and quality assurance of data need to be evaluated on a case by case basis. In each case it needs to be determined what part(s) of the process that will be handled by the owner and by the applicable approved service supplier.

3) security mechanisms in place to assure data transfer and storage, see Sec.5 [8]

4) sensors part of the CBM programme described, including:
   — performance requirements
   — locations
   — possible degradations
   — installation and calibration
   — data collector performance

5) clearly defined prerequisites, sensibility and performance requirements of algorithms part of any predictive maintenance established by the approved service supplier. It shall also be possible to verify the sensibility and performance of the algorithm. The verification process shall assure the performance in accordance with specified requirements for the applicable equipment installed on the specific unit.

5.2.5 Initial audit

An initial audit shall be carried out on board in order to verify that the programme has been implemented in accordance with the approved documentation.

The CBM programme shall have been operated for at least 6 months before the initial audit is carried out.

   Guidance note:
   Operated for at least 6 months usually indicates 6 months after installation and/or baseline readings.

Provided the initial audit is carried out with satisfactory results, the survey arrangement shall be granted and a MO will be issued stating conditions of the survey arrangement for the specific unit.

   Guidance note:
   The audit normally consists of an offshore part and an onshore part. Based on similar and recent audit with the same owner, parts of the audit may be omitted.
5.3 Periodical audits and surveys

5.3.1 Annual audit
An annual audit shall be carried out on board in order to verify that the conditions for maintaining the survey arrangement are complied with.
This audit replaces the annual and renewal survey of machinery and components included in the condition based maintenance scheme. The purpose of this audit 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 owner) follow the same scheme, the annual audit 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 owner’s facilities onshore.

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5.3.2 The annual audit shall consist of examination of:
— condition monitoring records
— maintenance records
— CBM handling on board (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.

6 Electrical systems integrity management

6.1 General

6.1.1 Electrical systems integrity management (ESIM) can be applied to main class electrical installations as covered by Ch.3 Sec.1.

6.1.2 ESIM is offered as an integral part of classification compliance for main class electrical equipment and systems through the alignment and integration of classification requirements with an approved and implemented inspection and test programme.

6.1.3 Survey arrangement machinery planned maintenance system (MPMS), see [3], is required both for implementing and maintaining survey arrangement ESIM.

6.1.4 ESIM allows for parts of the inspection and testing programme to be performed by owner’s qualified personnel, see [6.2.5]. An Inspection and testing programme shall be approved and implemented, see [6.2.3]

6.1.5 When an ESIM has been implemented successfully on a unit, this will give an alternative to the traditional survey and testing of electrical installations described in Ch.3 Sec.1 [2.4] and Ch.3 Sec.1 [5.3].

6.2 Approval process

6.2.1 The approval process consists of the following steps:
— documentation review with focus on the systematics, management, CMMS, competence and inspection and test programme
6.2.2 Documentation review
Approval of the arrangement shall include a documentation review covering a description of the following:
— inspection and test programme
— CMMS type approval
— ESIM responsible person on board
— competence requirements for involved personnel
— procedures with requirements for reporting, ratings and acceptance criteria
— communications plan that outlines the owner’s information sharing with the Society.

Guidance note:
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] and DNVGL-CP-0206 for further details.

6.2.3 Inspection and test programme
The survey scope for a 5 year period should be performed continuously with activities each year in the period. Inspection and testing should be adjusted according to prevailing operations to reduce out of service time and the impact of testing and inspection activities.

Guidance note:
Inspection and testing performed on a continuous basis will normally result in an increased scope accumulated during a 5-year period compared to the traditional (basic) scope.

Inspection and testing shall normally not exceed 5 years interval. In cases where OEM has recommendations for maintenance tasks incorporating also inspection and test activities deviating from the 5 year interval, this may be accepted based on case by case approval.

Inspection and testing of electrical equipment covering the scope as detailed in Ch.3 Sec.1 [2.4] and Ch.3 Sec.1 [5.3] can partly be performed by owner’s qualified personnel on board. The inspection and testing activities shall be detailed in a programme subject for the Society's approval. All activities shall be implemented and followed up in a CMMS.

Guidance note:
When developing an inspection and testing programme it is recommended to apply standard terminology see IEC 60050-191 Electrotechnical vocabulary, or equivalent.

The owner shall ensure sufficient technical competence according to applicable inspection and test complexity. There shall be a clear definition of competence requirements related to all activities in the programme covered by the owner.

Guidance note:
Inspection and test activities part of surveys associated with certificates where the Society has delegated authority by a flag administration, may include separate approval from the applicable flag administration.

All inspection and test activities shall have:
— detailed description to the level of detail necessary for a skilled person
— interval/date
— preparation note describing any preparation necessary
— required qualification (competence) level of personnel to perform the inspection and/or test
— applicable documentation (test procedures, service manuals and drawings)
— information of checks and measurements to be recorded
— reporting requirements (failures, condition, positive reporting, pictures etc.)
— all descriptions in English.

Guidance note:
It is recommended to align inspection and test activities with relevant maintenance tasks on the same equipment and/or system. Inspection and testing activities should be in accordance with OEM recommendations. Owner's scope should not include parts covered by any statutory requirement and where DNV GL acts on behalf of a flag administration.

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Test and inspection results shall be satisfactorily documented and registered in CMMS. Test results shall be documented by pictures, video and/or diagrams exported from the test application/control system.

6.2.4 Alternative testing methodology

6.2.4.1 General
Testing of electrical equipment covering the scope as detailed in Ch. 3 Sec.1 [2.4] and Ch. 3 Sec.1 [5.3] can be subject to alternative test methodologies. Main objective with any alternative test methodologies is to test electrical equipment and systems on a continuous basis, reduce out of service time and limit the impact of the testing. Alternative test methodologies shall in combination with planned maintenance activities ensure equivalent level of confidence compared to the conventional test methodologies. Alternative test methodologies shall be qualified and are subject to approval on a case to case basis. The approval process includes a documentation review followed by testing according to approved test programme.

Guidance note:
Alternative test methodologies include (not limited to) automated testing, fault simulations, isolation and local testing, built in test equipment and remote test functionalities.

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6.2.4.2 Documentation review
The approval shall include a documentation review covering:
— technical description, including system drawings and list of test equipment
— functional description
— description of test intention/objective
— test programmes [6.2.4.3]
— requirements for personnel qualifications [6.2.5]
— requirements for reporting and handling of findings
— test activities (procedures) implemented in CMMS

Guidance note:
CMMS should include control activities to ensure and verify the effectiveness of the alternative testing methodology.

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6.2.4.3 Qualification testing
Testing shall be performed according to an approved programme and witnessed by the Society. The test programme shall include descriptions of test:
— objective
— method(s)
— equipment and calibration if applicable
— conditions (operational)
— intervals
— acceptance criteria or reference value(s)
— accuracy (precision and trueness), see also ISO 5725-1
— personnel qualifications
6.2.5 Personnel qualifications
The owner is responsible for maintaining and documenting sufficient competence for the involved personnel applicable for the task they shall perform.
Involved personnel shall be qualified to ensure sufficient performance and quality according to applicable test and inspection programme. Sufficient qualifications shall be documented by educational level together with relevant experience.

6.2.5.1 Responsible person
The owner shall dedicate a responsible person on board the unit to ensure correct operations and the integrity of the arrangement. The 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 performance and quality according to applicable test and inspection programme at all times. The responsible person shall be a qualified professional with documented qualifications and skills related to technical operations, maintenance, testing and inspection of applicable electrical equipment and systems.
It is recommended that the position is covered by the same person responsible for the MPMS [3] or MPMS RCM [4].

6.2.5.2 Personnel performing inspection and testing
Personnel performing inspection and testing shall have successfully completed a technical vocational training of several years and have a minimum of 10 years’ experience from relevant position (head of electrical department etc) on board.

Guidance note:
It is recommended to apply EN 15628 - Qualification of maintenance personnel or equivalent when establishing requirements and documenting sufficient qualifications:
— Personnel performing inspection and testing shall as a minimum typically comply with the requirements of Maintenance technician specialist defined by the standard.
— Responsible person shall as a minimum typically comply with the requirements of maintenance supervisor and/or maintenance engineer defined by the standard.

6.2.6 Initial audit
The initial audit shall include verification of:
— responsible person has sufficient knowledge in line with approved arrangement
— testing and inspection according to approved programme
— inspection and testing reported in accordance with governing procedure
— inspection and testing performed only by qualified inspection personnel
— inspection manual/instruction available on board and that involved personnel is familiar with the system
— communications between owner and the Society.
Provided the initial audit is carried out with satisfactory results, the survey arrangement shall be granted and a MO will be issued stating conditions of the survey arrangement for the specific unit.
6.3 Periodical audits and surveys

6.3.1 Annual audit
To maintain the validity of the ESIM survey arrangement, an annual audit of the arrangement shall be performed by the Society. The audit shall include the following:

— review of testing and inspections within class scope
— verification of owner's testing and inspections
— verification of proper use of the ESIM survey arrangement.

Guidance note:
The audit is usually performed in combination with survey according to scope as detailed in Ch.3 Sec.1 [2.4] and Ch.3 Sec.1 [5.3] (parts not covered by owners scope).

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The attending surveyor may, if found necessary, require re-testing and/or survey of any test or inspection performed by the owner and part of the approved programme.
SECTION 3 SURVEY ARRANGEMENTS - DRILLING EQUIPMENT

1 General

1.1 Introduction

1.1.1 This section is applicable for units with the notation DRILL.

1.1.2 The different drilling survey arrangements are based on the Society’s drilling item list 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 Ch.3 Sec.4 [6] shall be followed.

The following survey arrangements are available for drilling items covered by the DRILL notation:

— drilling equipment renewal, see Ch.3 Sec.4 [6] (default)
— drilling equipment continuous (DCSA), see [2]
— drilling equipment planned maintenance (DPMS), see [3]
— drilling equipment planned maintenance – reliability centred (DPMS RCM), see [4]
— drilling equipment condition based maintenance (DCBMSA), see [5].

Drilling equipment and systems covered by the DRILL notation shall be surveyed according to one of the listed survey arrangements if not part of a separate survey.

Surveys shall be performed according to the following type of examination:

— Examination method 1: Visual inspection by opening up fully or partly as deemed necessary by the surveyor. Function testing and/or pressure testing shall be carried out when relevant, see Ch.3 Sec.4 [6].
— Examination method 2: Audit of maintenance/test/inspection history in the CMMS. Test of safety functions as deemed necessary, see Ch.3 Sec.4 [6]. General visual inspection, NDT and load testing on load bearing structures/components to be carried out.

Table 1

<table>
<thead>
<tr>
<th>Survey arrangement</th>
<th>Examination method (component)</th>
<th>Additional verification (systematics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling equipment renewal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Drilling equipment continuous</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Drilling equipment PMS</td>
<td>2</td>
<td>Continuous improvement function</td>
</tr>
<tr>
<td>Drilling equipment PMS RCM</td>
<td>2</td>
<td>Maintenance support (management), process (reporting, procedures and communication), continuous improvement function and personnel competence</td>
</tr>
<tr>
<td>Drilling equipment CBM</td>
<td>2</td>
<td>Process and personnel competence</td>
</tr>
</tbody>
</table>

Well testing systems not permanent installed are part of separate survey see Ch.3 Sec.4 [6] and not included in arrangements listed in Table 1.

1.1.3 Language

All documentation relevant to and part of an approval of a survey arrangement and/or generated as part of an implemented survey arrangement, shall be in English.
1.2 Cancellation of the survey arrangement
If the conditions for the survey arrangement are not complied with or in case of change of owner of the unit, the survey arrangement will be cancelled and substituted by default survey arrangement. Any changes to the survey arrangement shall be subject to Class approval.

2 Drilling equipment continuous

2.1 General

2.1.1 Drilling equipment continuous (DCSA) is a survey arrangement where the components in the drilling item list established for the unit (in accordance with equipment defined in DNVGL-OS-E101) are subject to separate surveys with survey interval 5 years. The survey scope for each component remains the same as for periodical survey requirements as detailed in Ch.3 Sec.4 [6].

2.1.2 The time window for surveys to be carried out is generally set as 6 months before the due dates as distributed.

2.1.3 The equipment surveys should be distributed with 20% (default) 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.

2.1.4 A follow-up system covering the society's drilling item list in accordance with examination method as specified in Table 1 shall be established on board the unit.

2.2 Surveys
To maintain the validity of the survey arrangement, the following audits shall be carried out.

2.2.1 Annual survey
Annual survey of the drilling systems shall be carried out according to Ch.3 Sec.4 [6].

2.2.2 Complete survey
Complete survey of the drilling systems shall be carried out according to Ch.3 Sec.4 [6].

3 Drilling equipment planned maintenance system

3.1 General

3.1.1 Drilling equipment planned maintenance system (DPMS) is a survey arrangement that applies only to the equipment part of the drilling item list as defined in [1.1.2].

3.1.2 The DPMS is based on approval of the company management and the implemented planned maintenance system on board.

3.1.3 It is normally required to comply with the machinery planned maintenance system, MPMS see Sec.2 [3] before entering DPMS.

3.1.4 All damage/break-downs on class related drilling items shall be reported to the society.
3.2 Approval process

3.2.1 The approval process consists of the following steps:
— maintenance management approval
— drilling equipment planned maintenance programme approval
— initial audit on board.

3.2.2 Maintenance management approval
A maintenance management approval is performed to ensure that the owner 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 DPMS survey arrangement
b) management with necessary resources required to sufficiently support a DPMS survey arrangement
c) governing documentation (procedures) and working processes related to the DPMS for the unit(s)
d) quality management system supporting:
   — competence level on involved maintenance personnel
   — supervision and verification of work
   — continuous improvement process.

3.2.2.1 Maintenance resources
It is the responsibility of the owner to organise, manage and develop the maintenance resources (personnel, materials and equipment) on board to provide sufficient maintenance supportability at all times. The owner shall, based on the drilling equipment and systems as defined in [1.1.2] and on board the unit, ensure sufficient technical competence related to required maintenance level (maintenance task categorisation by complexity) according to type and function of the equipment.

Guidance note:
Based on the applicable drilling equipment and systems as defined in [1.1.2] it is recommended to categorize the equipment on board 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.

3.2.2.2 Responsible person
The owner shall dedicate a responsible person (supervisor) on board the unit to ensure the integrity of the arrangement. The 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 drilling systems and equipment.
Guidance note:
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. The responsible person should 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---

3.2.2.3 Verification
Owner of the unit shall ensure verification of work performed satisfactory on any category 1 equipment see DNVGL-OS-E101 Ch.3 Sec.3. Verification shall be based on the maintenance task complexity and performed by the Society, or by owner’s qualified personnel.
Verification shall be registered and documented in CMMS.
Any repair or modification performed on category 1 equipment shall be approved see Ch.1 Sec.3 [2.5] and verified by the Society.

Guidance note:
Verification may be performed by responsible person see [3.2.2.2] or other qualified personnel part of the arrangement.
Verification shall not be performed by the same person also involved in performing the maintenance task(s). Verification of high level complexity (overhaul) should be performed by the Society.

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

3.2.3 Drilling equipment planned maintenance programme approval
The following requirements apply for the approval:

a) The maintenance programme shall include at least the applicable drilling items defined in [1.1.2]. All these components shall be identified as class items in the system.

b) Maintenance tasks and intervals shall be based on original equipment maker’s (OEM's) recommendations. OEM maintenance recommendations should be applied as specified by the OEM, but tasks and interval should normally be confirmed appropriate for the specific environment and operations of the applicable equipment.

c) 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.

d) CMMS shall have functionalities that make it able to:
— record and separate between different types of maintenance such as
  1) scheduled maintenance (preventive maintenance/deferred corrective maintenance)
  2) un-scheduled maintenance (immediate corrective maintenance)
— produce maintenance history reports on maintenance carried out for a specific time period on machinery class items
— register revisions of maintenance task (traceability)
— provide verification of class related maintenance tasks/jobs (quality of work and correct/sufficient level of reporting)
— 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
— back up data and make it possible to restore all data for minimum 5 years.

e) Systems and equipment shall be evaluated according to maintenance level, type and function.
Maintenance personnel shall be qualified for the applicable maintenance task (based on maintenance level, type and function).

f) All maintenance tasks shall have:
— detailed task description to the level of detail necessary for a skilled maintenance person

---end---of---guidance---note---
— maintenance task interval
— task preparation note describing any preparation necessary
— maintenance level indicating qualification level of personnel to perform the task
— verification level indicating verification by owner or the Society
— required materials (consumables, spare parts and special tools)
— applicable documentation (maintenance procedures and service manuals and drawings) readily available on board
— checks and measurements to be made
— descriptions and maintenance history in English.

Guidance note:
   It is recommended to apply EN 13306 – Maintenance terminology, or equivalent in development of a maintenance system.

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3.2.4 If condition based maintenance (CBM) of equipment shall be carried out as part of the DPMS, this shall be in accordance with an approved programme. See drilling equipment CBM [5] for further details. CBM on equipment may be approved on a case by case basis.

3.2.5 Initial audit
An initial audit 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 recommended that the system has been operated for at least 6 months before the initial survey is carried out. During the initial audit, it shall be verified that:
— There are sufficient resources available on board the unit to ensure the integrity of the arrangement. Personnel engaged in performing maintenance tasks on the equipment have the correct competence based on maintenance level, type and function of the equipment.
— Responsible person on board has the sufficient knowledge and access to applicable procedures and documentation to ensure correct operations according to the arrangement.
— The responsible person is familiar with the CMMS and is able to demonstrate the different functionalities in the system to the attending surveyor.
— The general condition and maintenance of the drilling equipment and systems is good.

Provided the initial audit is carried out with a satisfactory result, the survey arrangement DPMS shall be granted and a certificate will be issued stating system name and conditions for the survey arrangement for the specific unit.

Guidance note:
   Prior to the initial audit on board, the maintenance management approval ([3.2.2]) and Approval of the drilling equipment planned maintenance programme ([3.2.3]) may be carried out in the Owner office, if found convenient both to the Society and Owner. This requires that all applicable documentation and the on board database are available in subject office.

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3.3 Periodical audits and surveys
To maintain the validity of the survey arrangement, the following audits shall be carried out.

3.3.1 Annual audit
To maintain the validity of the survey arrangement DPMS, an annual audit of the implemented planned maintenance system is required. This audit replaces the annual and complete survey of drilling equipment included in the DRILL notation applicable for the unit. The purpose of this audit is to review and evaluate the previous period’s maintenance activities and to ensure that the arrangement is working as intended.
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3.3.2 During the annual audit the following shall be verified:

— all maintenance on class related drilling items is carried out according to the maintenance programme
— unit DPMS certificate is valid for present owner
— responsible person on board the unit is familiar with the CMMS and is able to demonstrate the different functionalities in the system to the attending surveyor
— maintenance records (reporting)
— documented assessment of overdue/postponed (deferred) maintenance tasks
— documentation of changes to the system (maintenance intervals and job descriptions made by OEM)
— certification for category 1 equipment (see DNVGL-OS-E101 Ch.3 Sec.3) available on board
— general condition and maintenance of the drilling equipment to be evaluated (rated)
— that the Unit has a robust and operational continuous improvement function. Continuous improvement should utilise input from safety reports, feedback from maintenance personnel and information given by the OEM. Furthermore the results of the improvement actions should be evaluated by the owner in order to ensure that real improvements are achieved.

Guidance note:
Changes to the OEM maintenance recommendations may be accepted when documented operational experience can justify the change and be supported by the OEM. Changes shall be traceable and presented to the attending surveyor at the next annual survey for acceptance. Documented experience will typically be service letters (bulletins) from the OEM, maintenance reports, wear measurements and maintenance history.

3.3.3 The surveyor can, if found necessary, require a re-audit including opening or testing of items reported by the responsible person on board.

3.3.4 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 programme 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.

3.3.5 Verification
For maintenance tasks performed on category 1 equipment see DNVGL-OS-E101 Ch.3 Sec.3 requiring verification by the Society. The attending surveyor shall be contacted to agree on his/her involvement. The verification can be performed during the annual audit see [3.3.1] or an occasional survey requested by the Owner. Verification shall be registered and documented in CMMS.

3.3.6 Damages
Damage to drilling equipment and systems covered by classification shall always be reported to the Society and into the CMMS as a corrective (un-scheduled) maintenance task.
4 Drilling equipment planned maintenance system – reliability centred

4.1 General

4.1.1 For units with a DPMS RCM survey arrangement, the survey scope of Ch.3 Sec.4 [6] is replaced with the scope outlined in Sec.2 [4] for MPMS RCM and applied as for drilling equipment.

4.1.2 Drilling systems and equipment with corresponding survey method for this arrangement see applicable drilling items defined in [1.1.2].

4.1.3 Risk based inspection

The critical structures are verified by review of NDT survey jobs reported in the maintenance system. However, if the structure inspection programme 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.

4.2 Approval process

4.2.1 The approval process shall be as per the approval process for MPMS RCM, see Sec.2 [4], in addition to requirements below.

4.2.2 Responsible person

The owner for the unit shall dedicate a responsible person on board the unit to ensure correct operations and the integrity of the arrangement. The 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:**

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. The responsible person should typically fulfill 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.

4.2.3 Verification

Owner of the unit shall ensure verification of work performed satisfactory on any category 1 equipment see DNVGL-OS-E101 Ch.3 Sec.3. Verification shall be based on the maintenance task complexity and performed by the Society, or by owner’s qualified personnel.

Verification shall be registered and documented in CMMS.

Any repair or modification performed on category 1 equipment shall be approved see Ch.1 Sec.3 [2.5] and verified by the Society.
4.3 Periodical audits and surveys
To maintain the validity of the survey arrangement, the following audits shall be carried out.

4.3.1 Annual audit
To maintain the validity of the survey arrangement DPMS RCM, an annual audit of the implemented maintenance programme is required, preferably during normal operation. This audit replaces the annual and complete surveys of drilling systems and equipment included in the DPMS RCM arrangement. The purpose of this audit 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.

4.3.2 During the annual audit and in addition to the scope detailed in Sec.2 [4.3.1], a visual inspection and function testing as specified in Ch.3 Sec.4 [6.2] shall be verified and surveyed by the Society.

4.3.3 Complete audit
To maintain the validity of the survey arrangement a complete audit of the implemented DPMS RCM survey arrangement is required. The purpose of the audit is to ensure that the conditions for approval of the system are still adhered to and that the maintenance work achieve acceptable results.

During the complete audit and in addition to the scope detailed in Sec.2 [4.3.2] the following shall be verified and surveyed by the Society:
— visual inspection, load testing and function testing as specified in Ch.3 Sec.4 [6.3]
— final testing of BOP and well control safety systems
— certification for category 1 equipment (see DNVGL-OS-E101 Ch.3 Sec.3) available on board.

4.3.4 Verification
For maintenance tasks performed on category 1 equipment see DNVGL-OS-E101 Ch.3 Sec.3 requiring verification by the Society, see [4.2.3] the attending surveyor shall be contacted to agree on his/her involvement. The verification can be performed during the annual audit see [3.3.1] or an occasional survey requested by the Owner. Verification shall be registered and documented in CMMS.

5 Drilling equipment condition based maintenance

5.1 Application

5.1.1 For units with an approved drilling equipment condition based maintenance survey arrangement (DCBMSA), condition based maintenance replaces the relevant survey requirements of Ch.3 Sec.4 [6.2] and Ch.3 Sec.4 [6.3], for applicable equipment and failure modes.

Guidance note:
Condition based maintenance will not replace load testing and the NDT scope on load carrying equipment as required in Ch.3 Sec.4 [6]. If the structure inspection programme has been developed based on RBI methodology (reliability approach) and approved by the Society, the standard renewal scope can be substituted with a modified scope and inspection intervals. 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.

The survey arrangement will only be applicable on the selected equipment it’s approved for.
5.2 Approval process
The arrangement shall be approved in accordance with Machinery CBM, see Sec.2 [5]. The attending surveyor shall update the drilling item list at every annual survey.

5.3 Periodical audits and surveys

5.3.1 Annual audits
To maintain the validity of the survey arrangement, an annual audit of the implemented condition based maintenance survey arrangement is required. The scope shall be as for annual machinery CBM audit, see Sec.2.

5.3.2 Verification
For maintenance tasks performed on category 1 equipment see DNVGL-OS-E101 Ch.3 Sec.3 requiring verification by the Society, see [4.2.3] the attending surveyor shall be contacted to agree on his/her involvement. The verification can be performed during the annual audit see [5.3.1] or an occasional survey requested by the owner. Verification shall be registered and documented in CMMS.
SECTION 4 SURVEY ARRANGEMENTS - STRUCTURAL

1 General
The structural integrity of a unit is maintained by different survey arrangements. The structural survey arrangements are based on the survey scope as described in Ch.3. The default scope and schedule may be altered based on acceptance by the Society, see Ch.3 Sec.1 [1.2.2]. If a survey arrangement is not specified, the periodical survey requirements as detailed in Ch.3 Sec.1 shall be followed.

The following survey arrangements are available:
— renewal, see Ch.3 Sec.1 (default)
— structural continuous (SC), see [2]
— shared structural inspection (SSI), see [3].

All documentation relevant to and part of an approval of a survey arrangement and/or generated as part of an implemented survey arrangement, shall be in English.

1.1 Cancellation of the survey arrangement
If the conditions for the survey arrangement are not complied with or in case of change of owner of the unit, the survey arrangement will be automatically cancelled and substituted by default survey arrangement. 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 survey arrangement shall be subject to class approval.

2 Structural continuous

2.1 General
Structural continuous (SC) is a survey arrangement whereby the structural survey items for the unit are subject to separate surveys within the class period. The arrangement should provide for uniform distribution of the total survey plan during each year of the five-year class period.

2.2 Survey requirements
Applicable survey requirements are detailed in Ch.3 Sec.1 [2] to Ch.3 Sec.1 [4].

3 Shared Structural Inspection

3.1 General

3.1.1 Shared structural inspection (SSI) is a survey arrangement available as an integral part for the in-service inspection programme, implemented for classification compliance. The SSI performance will be reviewed based on the owner’s reporting in the system (SIM-application) and by verifying the condition of the structure on board the unit.

3.1.2 The schedule and scope for this agreement shall follow either renewal or continuous survey arrangement as specified in [1].

3.1.3 Upon successful approval of the arrangement and completion of the initial audit, the SSI survey arrangement will be notified as a memo to owner (MO) for the unit.

3.1.4 SSI arrangement allows for up to half of the structure, covered by the unit’s IIP structural inspection programme, to be inspected by owner’s qualified personnel.
3.1.5 It is the responsibility of the owner to provide sufficient inspection support at all times.

3.1.6 Any finding or damage on structural items shall be recorded in the SIM-application and reported to the society as required, see Ch.1 Sec.3 [1.2.2].

3.2 Survey plan

3.2.1 The survey plan shall be developed in accordance with requirements given in Ch.3 Sec.1 [2] to Ch.3 Sec.1 [4]. The survey plan shall identify areas that will be surveyed by class and owner as described in [3.1.4]. The sharing of the scope 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.

3.2.2 The owner's inspection scope may be adjusted based on inspection results and accumulated knowledge.

3.2.3 The SSI performance shall be reviewed based on the owners reporting in the system (SIM-application) by verifying the recordings performed on behalf of class and evaluating the overall unit status, e.g. structural condition on board the unit.

3.3 Approval process

3.3.1 The following conditions shall be complied with before the survey arrangement is approved and granted:
— inspection management approval
— successful initial audit.

3.3.2 Inspection management approval
An inspection management approval is performed to ensure that the owner of the unit can document satisfactory inspection support in the organisation. The approval shall include a documentation review based on a description of the following:
— inspection responsibilities and functions
— use of the SIM-application for inspection reporting (reporting in the SIM-application is mandatory)
— SSI 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.

3.3.2.1 Qualified inspection personnel
Inspection by the owner shall be performed by qualified personnel. Qualified personnel shall successfully have attended and completed:
— SSI training course arranged by the Society
— tutored survey on board covering relevant inspection techniques/areas.

Guidance note:
NS 415-1 certification or certification based on equivalent standard may be applied partly to document sufficient qualifications.
Personnel qualifications will normally be linked to a specific Owner.

---end of guidance note---
3.3.2.2 Responsible person

The owner shall dedicate a responsible person (supervisor) on board the unit to ensure the integrity of the arrangement. The responsible person shall ensure appropriate execution according to the survey arrangement and be responsible for providing sufficient inspection supportability at all times. The responsible person shall be a qualified professional and in addition comply with the same competence requirements as applicable for qualified inspection personnel, see [3.3.2.1].

3.3.3 Initial audit

An initial audit shall be carried out on board the unit 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 SSI survey arrangement has been operated for at least 6 months and/or minimum 3 inspections have been performed before the initial audit is carried out.

3.3.4 The initial audit shall include verification of the following:
- responsible person has sufficient knowledge in line with approved arrangement
- correct use according to approved inspection programme 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.

3.3.5 SSI shall not be granted where it is evident that the maintenance level is reported as poor.

3.4 Annual audit

3.4.1 To maintain the validity of the SSI, an annual audit of the arrangement shall be performed by the Society. The purpose of this audit 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.

3.4.2 The audit shall include the following:
- review of structural inspections within class scope
- review of NDT of critical structures
- verification of owner's inspections and reporting
- verification of proper use of the SSI. Changes to the survey arrangement as approved in [3.3] shall be subject to class approval.

The attending surveyor may if found necessary, require a re-survey of any structural item inspected by the owner.
SECTION 5 APPLICATION OF DATA

1 Introduction

Sensor data, other data and information collected from a specific unit, fleet of units or from other available sources may be applied to determine optimal solutions and enable more real time and well documented decisions. Sensor data can be used for applications like performance monitoring (local/remote), maintenance optimisations, utilisation calculations and remote surveys.

The Society promotes the application of sensor data as an integrated part of classification systematics and follow up during in-service. Any type of application shall be approved and any sensor data used shall be quality assured according to the rules and applicable standards.

2 Applications

2.1 Maintenance optimisation

Maintenance tasks and intervals may be based on sensor data and results from data analytics. Collected sensor data, other data and information may be analysed and applied as part of a processes to detect, diagnose, predict faults and determine correct maintenance tasks as part of applicable survey arrangements, see Sec.2, Sec.3 and Sec.4.

2.2 Fatigue utilisation analysis

Sensor data providing information of lateral and angular motions may be used to re-calculate fatigue damage of specific structural members and/or special areas.
Calculations may be performed continuously (real time) to determine fatigue and ultimate strength utilisation and used to determine sufficient inspection (NDT) scope with optimal intervals.

Guidance note:
Typical sensor data can be displacement, velocity and accelerations. Other sources of data can be the loading computer, wind and wave monitoring applications.

3 Data quality

Acquired sensor data intended for application on class relevant equipment and systems shall be quality assured (QA). The QA shall be a continuous process monitoring relevant sensor data from sensor to storage and analysis (data lineage). To assure sufficient quality, an initial data quality assessment shall be performed.

The data quality assessment shall be performed in accordance with ISO 8000-8 that describes how accurate the data are related to what is being represented and the relevant usage. The data shall be addressed with respect to syntactical rules, conformance to real world entities, and the extent to which the purpose of the application is served. Data quality shall be defined and evaluated according to:

— syntactic quality: the degree to which data conforms to its specified syntax, i.e. requirements stated by the metadata
— semantic quality: the degree to which data corresponds to what it represents
— pragmatic quality: the degree to which data is found suitable and useful for a particular purpose. It validates data users perception of fitness for purpose.
Guidance note:
Syntactic and semantic measurements are data quality verifications whereas the pragmatic measurements are data quality validations.
Data profiling describes different dimensions of the data in a context-agnostic manner, regardless of the intended usage or requirements and can be applied as an alternative on data with low maturity levels where metadata could be missing or incomplete.

Based on the initial data quality assurance there shall be established data quality requirements. The requirements should focus on criteria relevant for intended use and be based on:

- schema
- metadata
- function
- criticality
- function availability
- function reliability
- algorithm requirements.

The initial data quality assurance shall be followed up by a continuous process during operation to assure the data quality according to the established data quality requirements. The process shall be implemented as an element in a continuous improvement process, see Sec.2 [4.2.2.3].

Guidance note:
The process of establishing data quality requirements is described in DNVGL-RP-0497 *Data quality assessment framework* and supported by ISO 8000-8 *Data quality - Part 8: Information and data quality: Concepts and measuring*. When performing a data quality assessment it is recommended to apply standard vocabulary see ISO 8000-2, *Data quality - Part 2: Vocabulary*, or equivalent.

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

4 Data processability

Sensor data intended for application on class relevant structures, equipment and systems shall be quality assured. This process includes verification and validation performed by the Society. The process require relevant sensor data to be provided by the owner in a non-proprietary, license-free, not encoded and non-binary or platform specific formats. Streamed data may be considered on a case by case basis.

Formats shall be documented and should specify field types, any requirements such as valid values and any inter-table relationships.

Guidance note:
The preferred data format for tabular data is *csv* (comma separated values) as specified by RFC 4180 (common format and MIME type for comma separated values files). Hierarchical data can be formatted as *XML* or *JSON*. All date values should be specified according to ISO 8601.

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

Metadata shall be made available and specify time of origin, source and data owner.

5 Organisational maturity

Owners collecting and applying sensor data as an integrated part of classification systematics and follow up during in-service, shall as part of their data management have the ability to provide sufficient data quality according to established requirements. This comprise all relevant processes, technologies and activities that are required to measure and improve data quality. Owner shall document sufficient organisational maturity in a self assessment including elements like:

- data governance: that defines policies, processes, roles and responsibilities required for continuous improvement and improvement in data quality
---organisation and people: with sufficient competency and ability to fulfil responsibilities to achieve governing goals related to data quality
---data quality processes: implemented to support the data quality policies and governance
---requirements: covering data integration, reporting, analytics and operation
---metrics and dimensions: establish and structure the logical rules to be programmed and executed on data. These rules are used to generate the data quality assessment results
---process efficiency: measuring the performance of the data quality governance, management, processes and tools that have been implemented
---architecture, tools and technologies: required to support the data quality governance and execute data quality measurements and reporting
---standards: data and metadata standards. Domain models, data exchange standards etc.

**Guidance note:**
If an approved service supplier, see DNVGL-CP-0484 App.B [5], are performing services as part of owners data management, the organisational maturity will be evaluated measuring the united responsibilities and capabilities of both owner and the approved service supplier.

As a general guidance maturity level 3, see DNVGL-RP-0497, should be obtained to ensure sufficient organisational maturity.

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

### 6 Data flow and sensor system

Data flow and sensor system shall have traceability and be identifiable. Any sensor part of the system shall be identified by an ID and from any dataset it should be possible to identify the physical sensor (data source) based on identifiers in the dataset.

It shall be possible to track the data flow through the system (data lineage) to ensure sufficient verification and integrity of the data.

Sensors part of the system shall be described, including:

---performance requirements
---locations
---possible degradations
---installation and calibration
---installation and baseline measurements
---data collector performance.

### 7 Data algorithms

If data algorithms are part of any predictive maintenance established by the maintenance analysis, see Ch.3 Sec.2 [4.2.5] and Sec.2 [5.2.4], it shall be clearly defined what prerequisites, sensibility and performance requirements apply for the algorithm. It shall also be possible to verify the sensibility and performance of the algorithm. A detailed test programme shall be established covering the verification. The verification process shall assure the performance in accordance with required specification for the applicable equipment installed on the specific unit. Verification shall consider criticality of relevant function.

**Guidance note:**
Data algorithms can be verified with simulations introducing faults to representative data sets and in accordance with known failure modes (quality assured FMEA).

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

### 8 Security mechanisms

Security mechanisms shall be in place to assure security of data transfer and storage.

Data shall be transferred by secure protocols providing encryption during transit.
The source system (owner) must ensure that sensitive information is not uploaded to the target system without required authorisation and security capabilities. The target system shall have control functions for:

— data quality requirements
— security requirements (integrity and availability of the source system).

**Guidance note:**

It is recommended to comply with ISO/IEC 27001: Information technology — Security techniques — Information security management systems — Requirements or equivalent standard. When establishing data security mechanisms to protect the data flow it is recommended to apply DNVGL-RP-0496 Cyber security resilience management for units in operation as a guideline (or equivalent).

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

Owner shall document satisfactory security mechanisms by performing a cyber security assessment.
SECTION 6 SURVEYS PERFORMED BY APPROVED COMPANIES

1 Surveys by approved companies or service suppliers

1.1 General

Parts of the periodical surveys may be carried out by companies approved by the Society. The following survey parts may be performed by such companies:

— thickness measurements
— bottom survey afloat
— non-destructive testing (NDT)
— mooring line survey
— condition monitoring (CM).

1.2 Thickness measurements

1.2.1 Thickness measurements as part of the periodical surveys shall be carried out by an approved service supplier.

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:

1.3 Bottom survey afloat

An approved company shall be used. The survey shall be witnessed by a surveyor of the Society. The diver or ROV shall use pictorial equipment of such quality that the surveyor is fully satisfied with the information relayed.

Guidance note:

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:
1.5 Mooring line 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:

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

1.6 Condition based maintenance
Condition based maintenance as part of the Society's periodical surveys of machinery components and equipment incl. drilling and production equipment, can be carried out by a company approved by the Society. See CBM survey arrangements, Sec.2 and Sec.3, for further details where this is required.

Guidance note:
For more information, see DNVGL-CP-0484 App.B [5] Service suppliers engaged in condition monitoring of machinery on board ships and mobile offshore units.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
CHAPTER 3 PERIODICAL SURVEY EXTENT

SECTION 1 MAIN CLASS SURVEYS

1 General

1.1 Introduction

1.1.1 This chapter presents the standard extent of surveys (default survey arrangements) for retention of main class for mobile offshore units (1A) and for floating offshore installations (OI) as applicable for all service notations. The descriptions for the different surveys cover requirements relevant for all unit types followed by unit type specific descriptions for subsequently ship-shaped, column-stabilised, self-elevating units and other types.

1.1.2 The requirements for additional service notations are given in Sec.3, and optional class notations are given in Sec.4.

1.1.3 Additional system and special facility notations covered by main class are given in Sec.2. Subsections for propeller related surveys (Sec.2 [1] and Sec.2 [2]) and thrusters for propulsion (Sec.2 [3] and Sec.2 [4]) are not applicable for main class OI.

1.1.4 For units and installations with special feature notation Non-self-propelled, the survey scopes for steering gear, propeller related surveys 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 programme (IIP) as described in [1.2].

1.2 In-service inspection programme (IIP)

1.2.1 The in-service inspection program (IIP) (see Ch.2 Sec.1 [3.2.4]) includes the unit specific survey plan with structural lists and with the plan of what, when and how to inspect, and holds the recordings from the surveys.

Guidance note:
Ship-shaped offshore units are not subject to extended hull survey requirements (EHSR) or enhanced survey programmes (as shown by the ESP class notation) as defined in the DNV GL rules for classification of ships.

1.2.2 The default basic scope for development of IIP for units are given in Table 1 through Table 3. The plan in the tables are prepared as guidelines for ship-shaped, column-stabilised and self-elevating units, however, for other units the most relevant among the tables should be selected for the initial plan. Depending on the level of the design documentation, the basic plan may be altered.
Guidance note:
The standard in-service inspection programme (IIP) is a generic programme based on gained experience and accumulated knowledge from years of unit (and ship) surveys. The following three levels are identified:

— The standard inspection, basic plan, denoted first level, is prepared based on a simple risk based inspection (RBI) approach. (The plan is established based on general knowledge and experience from inspection of units in the past. If not otherwise agreed, this type of in-service inspection programme will be developed by default.

— The second level, qualitative RBI, is based on the above basic RBI with the addition of design and fabrication particulars for the specific unit. This might be detailed fatigue results, ultimate strength utilisation, coating system applied etc. which will be combined as basis for preparing the in-service inspection programme. This approach is applied, if requested by the owner, for units where adequate information is available from design and construction phase.

— The third level is to prepare the in-service inspection programme using a quantitative, refined probabilistic approach where uncertainties wrt. 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 class in-service inspection plan.

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1.2.3 If the design documents the structural fatigue utilisation with considerable margins, or if the unit has FMS notation (see DNVGL-RU-OU-0102 or DNVGL-RU-OU-0103 Ch.2 Sec.6 [15.1]), the basic requirements for NDT inspection can be modified/reduced compared to the basic scope.

1.2.4 When the unit is operating under other environmental conditions than considered in the design, the inspection scope may be modified/changed, according to the actual utilisation of the unit.

1.2.5 The owner/operator has the responsibility to provide the necessary documentation for class approval, when modification of the basic in-service inspection programme is requested. Survey plans adopting a probabilistic approach, have to be continuously updated (owners responsibility) based on the results from last survey. Upon adjustments to the existing plan, documentation has to be submitted for class approval to constitute a part of the governing in-service inspection programme, IIP.

1.2.6 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 second level of the IIP, see [1.2.2]).

1.2.7 The extent of examination specified in the referred tables may be refined by use of RBI methodologies (defined as third level of the IIP, see [1.2.2]).

Guidance note:
At the 1st annual or intermediate survey after construction, column-stabilised 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 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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1.2.8 Thickness gauging should be prepared as found necessary based on the condition of the unit. Applicable tables for guidelines are presented in Table 7 through Table 9 when gauging is to be performed.
### Table 1 Basic plan for structure inspection of for ship-shaped units

<table>
<thead>
<tr>
<th>Special areas for inspection 1) (SP) – connections:</th>
<th>Type of service</th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1 Moompool openings</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A A A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP2 Turret</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A A A A A A</td>
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<td></td>
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<tr>
<td>Attachments of:</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A A A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP5 Crane pedestals; to deck and top flange</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A X A X A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP6 Anchor windlasses</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A X A A A X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP7 Anchor chain fairleads</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>C B C A A C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP8 Helideck, derrick and drill-floor support</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X C A A C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP9 Other attachment/support connections e.g. sponsons, process deck to main deck, flare and lifeboat support structure</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X X A A X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary areas for inspection (PR): 2)</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X X A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR4 Deck structure and turret</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X X A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR5 Drill floor with substructure</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X X A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR6 Crane/gangway pedestal</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A A A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR7 Lifeboat platforms support</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>A A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR8 Helideck and flare support structure</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X A A A A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR9 Other support structures</td>
<td>V NDT V NDT V NDT 5) V NDT 5) V NDT 5) V NDT 5) V NDT 5)</td>
<td>X X X X A A A A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Inspection scope:**
- 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 Testing (MT), Eddy Current (ECI), or Alternating Current Field measurement (ACFM) 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 [4.2.2].

2) Primary areas for inspection (PR) are elements which are essential to the overall structural integrity of the unit. See listing in [4.2.2].

3) - of the total number of these parts.

4) The inspection extent might be reduced (be less than 100%) if based on design documentation, see [1.2.4] (above).

5) Inspection intervals to be changed due to calculated fatigue life as follows: >40 yrs, >60 yrs, and >80 yrs give correspondingly 10, 15, and 20 years intervals.
### Table 2 Basic plan for structure inspection of column-stabilised units

<table>
<thead>
<tr>
<th>Special areas for inspection 1) (SP) – Connections;</th>
<th>Type of survey</th>
<th>Type of survey</th>
<th>Type of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AS INT</td>
<td>AS EXT</td>
<td>IS INT</td>
</tr>
<tr>
<td></td>
<td>V NDT</td>
<td>V NDT</td>
<td>V NDT 2)</td>
</tr>
</tbody>
</table>

**Special areas for inspection 1) (SP) – Connections;**

**SP1**
- Horizontal bracing: A A A A 8) A A A A
- Pontoon to pontoon: A A A A A

**SP2**
- Vertical diagonal bracing: B A A A A

**SP3**
- Columns to pontoon: X C A X A C 3)
- Column to deck: X C A X A C 3)

**SP4**
- Main Barge girder/bulkhead: X X X X A A X 4)

**Attachments of:**

**SP5**
- Crane pedestals; to deck and top flange: A A A X A X A A A A

**SP6**
- Anchor windlasses: X A X A A A A C 9)

**SP7**
- Anchor chain fairleads and anchor bolsters: C X B C A A A C 9)

**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

**Primary areas for inspection (PR); 2)**

**PR1**
- Horizontal bracings: 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 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
### Type of survey

<table>
<thead>
<tr>
<th></th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT</td>
<td>INT</td>
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<td>EXT</td>
<td>EXT</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>V</th>
<th>NDT</th>
<th>V</th>
<th>NDT</th>
<th>V</th>
<th>NDT</th>
<th>V</th>
<th>NDT</th>
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<tr>
<td>7)</td>
<td>V</td>
<td>NDT</td>
<td>V</td>
<td>NDT</td>
<td>V</td>
<td>NDT</td>
<td>V</td>
<td>NDT</td>
<td>V</td>
<td>NDT</td>
</tr>
</tbody>
</table>

Inspection scope: 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 Testing (MT), Eddy Current (ECI), or Alternating Current Field measurement (ACFM) 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 \[4.3.2\].

2) Primary area for inspection (PR) are elements which are essential to the overall structural integrity of the unit. See listing in \[4.3.2\].

3) As a minimum centre bulkheads and corners to be covered.

4) Area adjacent to column connection to deck.

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 \[1.2.4\] above.

7) Inspection intervals to be changed due to calculated fatigue life as follows; >40 yrs, >60 yrs, and >80 yrs give correspondingly 10, 15, and 20 yrs. intervals.

8) External NDT may be waived at IS if the unit has an approved leakage detection system according to guidelines issued by the Society.

9) May be waived if unit operating on DP.
### Table 3 Basic plan for structure inspection of self-elevating units

<table>
<thead>
<tr>
<th>Type of survey</th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V</td>
<td>NDT</td>
<td>V</td>
</tr>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Special areas for inspection (SP) – connections:**

<table>
<thead>
<tr>
<th>SP</th>
<th>Description</th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1</td>
<td>Leg to spudcan&lt;sup&gt;7)&lt;/sup&gt;</td>
<td></td>
<td>X&lt;sup&gt;10)&lt;/sup&gt;</td>
<td>X</td>
</tr>
<tr>
<td>SP2</td>
<td>Leg nodes and connections below the waterline&lt;sup&gt;7)&lt;/sup&gt;</td>
<td>X</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Leg nodes and connections above the waterline</td>
<td>X</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>SP3</td>
<td>Connections of primary members in jack house</td>
<td>A</td>
<td>A</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Leg guides (IACS UR Z15 3.3.6)</td>
<td>X</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>SP4</td>
<td>Main barge girder/bulkhead connections</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Plating in way of leg well (IACS UR Z15 3.3.6)</td>
<td>A</td>
<td>A</td>
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</table>

**Attachments of:**

<table>
<thead>
<tr>
<th>SP</th>
<th>Description</th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP5</td>
<td>Crane/gangway pedestals; to deck and top flange</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>SP6</td>
<td>Support of drill floor and cantilever</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>SP7</td>
<td>Windlass and anchor chain/wire fairleads</td>
<td>C</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>SP8</td>
<td>Helideck support</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SP9</td>
<td>Other attachment/support connections, e.g. flare and life boat support structures</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Primary areas for inspection (PR):**

<table>
<thead>
<tr>
<th>PR</th>
<th>Description</th>
<th>AS</th>
<th>IS</th>
<th>RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR1</td>
<td>Spudcans&lt;sup&gt;7)&lt;/sup&gt;</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>PR2</td>
<td>Legs below the waterline&lt;sup&gt;7)&lt;/sup&gt;</td>
<td>X</td>
<td>A</td>
<td>A&lt;sup&gt;8)&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Legs above the waterline</td>
<td>X</td>
<td>A</td>
<td>A&lt;sup&gt;8)&lt;/sup&gt;</td>
</tr>
<tr>
<td>PR3</td>
<td>Jack houses</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>PR4</td>
<td>Main barge (deck structure) girders/bulkheads</td>
<td>X</td>
<td>X</td>
<td>A</td>
</tr>
<tr>
<td>PR5</td>
<td>Drill floor with substructure and cantilever</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Inspection Scope</td>
<td>Type of survey</td>
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<td><strong>6)</strong></td>
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<td><strong>6)</strong></td>
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<td><strong>NDT</strong></td>
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<td><strong>6)</strong></td>
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<td><strong>6)</strong></td>
<td><strong>V</strong></td>
<td><strong>NDT</strong></td>
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</tr>
</tbody>
</table>

**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 [4.4.2].

2) Primary areas for inspection (PR) are elements which are essential to the overall structural integrity of the unit. See listing in [4.4.2].

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 [1.2.4] (above).

6) Inspection intervals to be changed due to calculated fatigue life as follows; >40 yrs, >60 yrs, and >80 yrs give correspondingly 10, 15, and 20 yrs. intervals.

7) See Sec.2 [8], spudcan and leg survey.

8) For plate type legs, square or circular, examine also the pin holes IACS UR Z15 2.3.3).

9) May be waived if unit permanently operating on the field.

10) Governing for units after second renewal. See Sec.2 [8.3].
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 should normally cover systems and parts for:
— structure and equipment
— machinery and safety systems
— temporary equipment as defined in Ch.1 Sec.1 [4.2].

The survey for the temporary equipment shall only confirm class involvement as specified in Ch.1 Sec.3 [2.7].

Guidance note:
Survey requirements on towing and temporary mooring systems are covered by the separate survey scheme as described in Sec.2 [11]. Survey requirements on position mooring equipment and systems are covered by the voluntary notations ME respectively POSMOOR as described in Sec.4.

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

2.1.2 The survey may be performed on location provided that the structure, including submerged parts, can be thoroughly inspected. If required, underwater inspection shall be in accordance with an approved procedure, and using an approved service supplier, see Ch.2 Sec.6 [1.3].

2.2 Structure and equipment

2.2.1 The following requirements are applicable for all types of structural design. Specific type requirements, e.g. self-elevating, ship-shaped, column-stabilised, are given in [2.3].

The extent of the structure survey is given in the IIP as described in [1.2], and will additionally include the requirements given in the remaining of this section.

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 UR Z15 3.3.2)

2.2.3 If a loading instrument or loading computer system is available on board 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 on board. Approved loading and stability information shall be verified available on board. 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.

(see MODU code 2009 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.

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

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 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 UR Z15 3.3.4)

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 Remote control system for valves in bilge including emergency, ballast and cooling water systems shall be surveyed and tested.

2.2.8 It shall be checked as far as practicable that draught marks are legible. Functionality and proper working of draught measurement gauges shall be confirmed.

2.2.9 Manual and automatic fire doors and dampers shall be examined and function tested.

2.2.10 Ventilation ducts and operation of ventilation including emergency stop for engine and boiler rooms to be verified.

2.2.11 Emergency escape breathing device (EEBD) shall be verified in order.

2.2.12 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 DNV GL, the requirements in [2.2.7] and [2.2.12] are covered by this survey.

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

2.2.13 The appendix to the classification certificate and the documents referred to therein, shall be verified and kept available on board the unit.

2.2.14 It shall be confirmed that the unit is operating within its approved design envelope as included in the appendix to classification certificate.

2.2.15 Where the unit has an impressed current cathodic protection system, the annual overview readings from the system shall be examined.

2.2.16 Condition of protective coating shall be reported on according Ch.2 Sec.1 [3.2.11]. 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.
2.2.17 Suspect areas 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>

See IACS UR Z7 Table 2

Guidance note:
See Ch.2 Sec.1 [3.2] for the extent of thickness measurements.
See Ch.2 Sec.1 [5] for special provisions for ageing units.

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

2.2.18 Means of escape
Means of escape from working and accommodation spaces to muster location, helideck and lifeboat embarkation deck shall be verified in order.

2.2.19 For units with bow or stern loading arrangement emergency escape routes from the associated control station shall be verified in order.

2.2.20 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 shall complete a list of evidence of possible safety management system failures recorded on the occasion of the annual survey. The list shall be submitted with the annual survey statement.

Guidance note:
The list should be issued as per tables presented in IACS PR 17 report.

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

2.3 Structure and equipment - specific requirements for unit types

2.3.1 Additional requirements for ship-shaped units
The structure around the moonpool (sides and decks), in vicinity of any other structural changes in sections, slots, steps, or openings in the deck and bulkheads are to be visually examined. In addition, if sponsons are appended, the supporting structure and connection areas/details are to be focused.

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 shall 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
The structure within the jack house and connections to main deck, jacking system and external parts of leg guides are to be visually examined. In addition the legs part above sea, as well as the supporting structure in way of the leg wells are to be surveyed.

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 Helifuel systems shall be examined with attention to general cleanliness, maintenance and fire/ explosion hazards.

2.4.5 Survey of boilers (oil/gas fired, exhaust heated, composite, electric heated and steam generators) shall be carried out according to Sec.2 [5].
These requirements are also applicable to steam/thermal oil heated steam generators.

2.4.6 The bilge and ballasting system and related subsystems, such as remote operation of pumps, valves and tank level indication and water-level alarms shall be visually surveyed and tested.

2.4.7 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.

2.4.8 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 through 3.7)

2.4.9 Remote controls and alarm systems for doors, hatches and watertight dampers shall be surveyed and function tested.
(See IACS UR Z15 3.3.4)

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 **EO/ECO** units (built at any time) and all units constructed on or after 1 July 1998, where electricity is necessary for propulsion and steering.
   For DP(3) units 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 on board
— 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 gas-tight doors and air-locks 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.4 [14].

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.

2.5 Machinery and safety systems - specific requirements for unit types

2.5.1 Additional requirements ship-shaped units
No additional requirements.

2.5.2 Additional requirements for column-stabilised units
No additional requirements.

2.5.3 Additional requirements for self-elevating units
The brake torques of jacking machinery shall be checked. Where provided, the fixation rack system shall also be checked.

Spot check on oil sample records for jacking system.

Guidance note:
The frequency of oil samples should follow OEM recommendations but typically twice per year for self-elevating self-propelled units with a high jacking frequency.

A visual examination of the hydraulic lifting system shall be carried out, where applicable.

(See IACS UR Z15 3.3.6)
2.5.4 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.

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. (See IACS UR Z15 4.1.3)

3.2 Structure and equipment

3.2.1 Particular attention shall be given to corrosion prevention systems in ballast spaces, free flooding areas and other locations subjected to sea water from both sides. The extent of the structure survey is given in the IIP as described in [1.2], and will additionally include the requirements given in the remaining of this section.

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 [3.3] 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. (see IACS UR 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.

Guidance note: 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 on board maintenance system during the last 12 months and relevant records are provided and confirmed.

— 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.
— for independent tanks external examination including the tank supporting structures.
— thickness measurements shall be carried out as deemed necessary.

3.3 Structure and equipment- specific requirements for unit types

3.3.1 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 UR Z15 4.3.2)

3.3.2 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 UR Z15 4.3.4)

3.3.3 Additional requirements for self-elevating units
For units over 5 years, at least two representative hull pre-load tanks shall be inspected. Representative ballast tanks (if used for transit) shall be inspected.
(See IACS UR Z15 4.3.3).
Survey of the upper part of the legs (above waterline) is normally required as specified in the IIP. Protective coating to be evaluated.
Survey of lower leg (leg part below water line), spudcan and leg/spudcan connection are defined within the spudcan and leg survey in Sec.2 [8].

3.3.4 Additional requirements for units of other shape
Requirements for ship-shaped units shall be applied as far as practical.

3.4 Machinery and safety systems
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 in order to confirm that the unit complies with the relevant rule requirements and is in satisfactorily maintained condition.

Guidance note:
Survey requirements on towing and temporary mooring systems are covered by the separate survey scheme as described in Sec.2 [11]. Survey requirements on position mooring equipment and systems are covered by the voluntary notations POSMOOR and ME respectively as described in Sec.4.

4.1.2 An annual survey (see [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.

4.1.3 Thickness measurements shall as a minimum be carried as specified in [4.2], [4.3], [4.4]and [4.5] for respectively ship-shaped, column-stabilised, self elevating and other units.
Additional thickness measurements may be required where wastage is evident or suspect as evaluated during surveys.

4.1.4 Air pipe heads on exposed decks shall be externally and internally examined following the table below. According to the results of the examination, the surveyor may require examination of other air pipe heads.

Table 5

<table>
<thead>
<tr>
<th>Unit type</th>
<th>1st renewal survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship-shaped</td>
<td>Preferably serving ballast tanks as follows:</td>
</tr>
<tr>
<td></td>
<td>— one port and one starboard, forward</td>
</tr>
<tr>
<td></td>
<td>— one port and one starboard, serving spaces aft.</td>
</tr>
<tr>
<td></td>
<td>— all within 0.25 L from the forward end</td>
</tr>
<tr>
<td></td>
<td>— at least 20% of those serving spaces aft, preferably serving ballast tanks</td>
</tr>
<tr>
<td></td>
<td>all air pipe heads. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All other units</th>
<th>1st renewal survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Four randomly chosen, preferably serving ballast tanks</td>
</tr>
<tr>
<td></td>
<td>25% of all the air pipes randomly chosen</td>
</tr>
<tr>
<td></td>
<td>all air pipe heads. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.</td>
</tr>
</tbody>
</table>

4.1.5 All tanks, compartments and free-flooding spaces throughout the unit shall 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.

4.1.6 For sewage (black water) tanks and wastewater (grey water) tanks the survey shall include:
  — for integral tanks internal examination.

  Guidance note:
  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 on board 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.

4.1.7 Where provided, the condition of the corrosion prevention system of cargo oil tanks shall be examined.

4.1.8 Examination of fuel oil, lube oil and fresh water tanks shall be in accordance with Table 6. Independent tanks in machinery spaces shall be externally examined including the tank supporting structures.
Table 6 Minimum requirements for internal examination of service tanks 1) 2) 3)

<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 [4.1.5]. (see IACS UR Z7)

4.1.9 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.

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

4.1.10 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, cargo tanks and other tanks (FO/DO/LO/FW tanks, mud pits, mixing tanks etc.), including holds adapted for the carriage of water ballast, can be required if found necessary by the surveyor (depending on the condition of the compartment). 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. If testing of any compartment shall be performed, the guidance note below applies.
### Guidance note:

<table>
<thead>
<tr>
<th>Tanks 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 hold 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>Lube 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 unit.
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.

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

#### 4.1.11 Remote level indicating systems for ballast tanks shall be surveyed and function tested.

#### 4.1.12 Bottom survey
A bottom survey shall be carried out in accordance with Sec.2 [7] as part of the renewal survey. (see IACS UR Z15 2.2.1)

#### 4.1.13 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.

**Guidance note:**
Alternative survey method procedure shall be agreed upon prior to survey. A risk evaluation will normally be required for the method suggested. Alternative survey methods are typically applicable for surveys carried out on location and may be performed by divers, borescope inspection and blanking off seachest and survey valves dry from inside the seachest. Extreme care and safety precautions shall be in place as part of a risk evaluation before entering a dry seachest while the unit is afloat.

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

#### 4.1.14 Signboards
The presence of required signboards shall be verified.
4.1.15 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.

4.1.16 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.

4.1.17 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. A survey carried out on location should follow the principles in Ch.1 Sec.2 [5].

Guidance note:
See also the following references for matters that will be taken into consideration for acceptance of surveys on location:

— DNVGL-RU-OU of the respective rule set for the unit for design related requirements.

4.1.18 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.

4.1.19 For self-elevating units intended to stay on location for prolonged periods, see Sec.2 [10].

4.2 Specific requirements for ship-shaped units

4.2.1 Thickness measurements shall as a minimum be carried out as shown in Table 7.
### Table 7 Minimum requirements for thickness measurements - ship-shaped units

<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>
</tbody>
</table>

1) Suspect areas throughout the unit.
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.
3) Moon pool boundary bulkhead plating.

1) Suspect areas throughout the unit.
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.
3) Moon pool boundary bulkhead plating.

1) Suspect areas throughout the unit.
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).
3) Moon pool boundary bulkhead plating.
4) Internals in forepeak and after peak tanks as deemed necessary.
5) Lowest strake of all transverse bulkheads in hold spaces.
6) All plates in two wind and water strakes, port and starboard, full length.
7) All exposed main deck plating full length and all exposed first-tier super-structure deck plating (poop, bridge and forecastle decks).
8) All keel plates full length plus additional bottom plating as deemed necessary by the surveyor, particularly in way of cofferdams and machinery spaces.
9) Duct keel or pipe tunnel plating or pipe tunnel plating and internals as deemed necessary.
10) All air pipes and ventilator coamings on exposed main deck.
11) Plating of sea chests. Shell plating in way of overboard dischargers as considered necessary by the attending surveyor.

### Notes:
1) if considered necessary by the attending surveyor.
2) 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.

#### 4.2.2 Inspection area categorisation

The structural parts to be inspected according to Table 1 are defined as:
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, 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 primary or special areas for inspection.
- Deckhouses.
- Other structures not categorised as special or primary.

4.3 Specific requirements for column-stabilised units

4.3.1 Thickness measurements shall as a minimum be carried out as shown in Table 8.

Table 8 Minimum requirements for thickness measurements – column-stabilised units

<table>
<thead>
<tr>
<th>Id.</th>
<th>Area</th>
<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 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.</td>
<td>Representative plates and stiffeners at the connection to column/pontoon and bracings (k-nodes).</td>
<td>Representative plates and internals in splash zone.</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>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></td>
</tr>
<tr>
<td>5</td>
<td>Pontoons</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>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Column and/or Pontoon seawater tanks used for trimming the unit</td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Chain lockers</td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Exposed upper hull where box or I beams receive major concentrated loads</td>
<td>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
<td></td>
</tr>
<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>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
<td></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>Representative plates and stiffeners.</td>
<td>Representative plates and stiffeners.</td>
<td></td>
<td></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>
## 4.3.2 Inspection area categorisation

The structural parts to be inspected according to Table 2, are defined as:

### 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.
- Highly stressed areas 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.
4.3.3 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.

**Guidance note:**
For additional guidance with regards to lightweight control, see DNVGL-OTG-12 Lightweight monitoring and control during the operational life-cycle. See also MODU Code 2009 code 3.1.5

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

**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.

---end---of---interpretation---

4.3.4 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 [4.3.3].

(See MODU code 3.1.5.2)

**Guidance note:**
This item applies to units constructed in accordance with the IMO MODU Code 2009 code 3.1.5. 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.

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

4.4 Specific requirements for self-elevating Units

4.4.1 Thickness measurements shall as a minimum be carried out as shown in Table 9.

**Table 9 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>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>3a&gt;</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 way of splash zone and at connections to mat/spudcan.</td>
<td>Representative chords and bracings/plate and stiffeners in other levels.</td>
</tr>
<tr>
<td>4a&gt;</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>Jack house 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 &quot;Box&quot; or &quot;I&quot; type sections</td>
<td>Representative plates and stiffeners</td>
<td>Representative plates and stiffeners</td>
<td>All 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>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>Representative plating and stiffeners</td>
<td>Representative plating and stiffeners</td>
<td>Representative plating and stiffeners</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Structural components of special or primary category other than under 3 to 7 above (These areas are normally identified in the IIP)</td>
<td>Representative plating and stiffeners</td>
<td>Representative plating and stiffeners</td>
<td>Representative plating and stiffeners</td>
<td></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>
<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>12</td>
<td>Plating of sea chest</td>
<td></td>
<td></td>
<td></td>
<td>All plating of sea chest</td>
</tr>
</tbody>
</table>

**Id. remarks:**
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.

**Notes:**
a) Part of the spudcan and leg survey, see Sec.2 [8].

**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.

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

**4.4.2 Inspection area categorisation**
The structural parts to be inspected according to Table 3, are defined as:

**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), jack house 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
— jack house 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
— in addition to the above, spot checks may be taken in other areas in order to assess the general condition of the unit.
Guidance note:
Recommended locations for the spot checks are the main deck (often problem area due to frequent deck loading/unloading) and pre-load tanks.

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

4.4.3 Legs above waterline
Survey of the upper part of the legs, i.e. part of legs not surveyed during spudcan and leg survey, shall be surveyed as required by the IIP. Corrosion protection system for the legs to be surveyed, e.g. corrosion in splash zone and general corrosion of the legs.

4.4.4 Legs below waterline and spudcan
Survey of lower leg (leg part below water line), spudcan and leg/spudcan connection is defined within the spudcan and leg survey in Sec.2 [8].

4.4.5 Piping systems
Jetting piping systems or other external piping, particularly where penetrating mats or spud cans, shall be surveyed.
(IACS UR Z15 2.3.3.)

4.4.6 Towing equipment
The permanent towing arrangement of the unit shall be surveyed. Towing equipment is subject to visual inspection. NDT may be requested depending on condition and service history.

4.5 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
Renewal survey is a major survey including visual examinations, measurements and testing of the machinery and systems in order to confirm that the Unit complies with the relevant rule requirements and is in satisfactorily maintained condition.
Machinery systems and equipment are covered by the renewal survey as described in this subsection and separate surveys as listed below:
— propeller shaft (tailshaft) survey, see Sec.2 [1].
— propeller connection survey, see Sec.2 [2].
— survey of Thrusters for main propulsion or dynamic positioning, see Sec.2 [3] and Sec.2 [4]
— boiler survey, including steam generator, see Sec.2 [5]
— thermal oil heater, see Sec.2 [6].
The renewal survey may be replaced by alternative survey arrangements as described in Ch.2 Sec.2.

5.2 Machinery

5.2.1 Machinery systems shall be examined and tested according to Ch.2 Sec.2 [1.1.3].

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 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).
(See IACS UR Z15, 2.8.2)

5.2.4 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 by visual inspections
— examination of external piping systems
— satisfactory maintenance according to manufacturer's (OEM) recommendations to be documented and considered as a base for extent of inspection.
— 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). It is recommended to apply condition based maintenance (CBM) as an alternative to time based inspection/maintenance. See Ch.2 Sec.2 [5] for more information.

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

Guidance note:
Opening to be carried out normally at least every 10 years. Any opening up of a thruster should be witnessed by the Society.

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

5.2.5 For units with gas turbine installations the survey shall include verification of records and major overhaul reports on board.
Major overhaul on gas turbines shall be performed by either the original equipment manufacturer (OEM) or an OEM authorised company.

5.2.6 For non-self-propelled units (e.g. typically column-stabilised and self-elevating units where the unit is not intended to transit or 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 including alarms
— 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 presented to the surveyor. This requirement may be waived if:
— testing of all individual motors is included and logged in the planned maintenance system (CMMS), and
— the insulation monitoring alarms required by DNVGL-OS-D201 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.

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

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
— 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.4 [14].

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

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.

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

5.5 Specific requirements for self-elevating units

5.5.1 Jacking system
The jacking systems, including shock pads, shall be examined to the satisfaction of the surveyor, by the original equipment manufacturer or other competent third party inspector.
A selected number of jacking gear units (about 20%, but not less than one unit per leg) shall be opened up for inspection. Oil analysis shall be presented for all the jacking gear units.

Guidance note:
Where the Owner has a system for continuous maintenance of the gears and gear boxes the Society may vary the scope of the survey. See Ch.1 Sec.2 [4.2.9] for requirements for continuous survey systematics.

The inspection shall include the following:
a) racks and climbing pinions (visual examination for wear and proper tooth contact)
b) planetary gear boxes (opening and visual examination of at least one per leg, oil analyses for all) (see guidance note)
c) linear gearboxes (can be inspected by means of endoscope or inspection covers when provided)
d) braking systems (opening and visual examination of at least one per leg)
e) pinions (pinion clearance if accessible)
f) survey and NDT of jacking guides to the extent possible to be included

   Guidance note:
   The above is specific for rack-pinion types of jacking systems. Alternative systems should have a comparable level of inspection making sure the system is safe to operate for the next 5 year.

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For units with hydraulic cylinders for lifting the working and holding pins shall be examined by NDT. The working and holding yokes shall be tested for cracks by NDT.
For self-elevating units, all parts of the legs shall be examined.

5.5.2 Raw water pumps
Availability of water supply for safety systems shall be examined. This also includes redundancy of power supply for all relevant operational conditions (in transit, during jacking and in elevated condition).
SECTION 2 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---guide---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---guide---note---

1.1.3 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---guide---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.4 [23].

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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
— propeller shaft (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 The requirements in this sub-section apply to thrusters for propulsion and thrusters for propulsion and steering of the unit.

3.1.2 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.
3.1.3 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).

3.1.4 Thrusters for propulsion are defined as thrusters which are intended for propulsion or propulsion and steering of the unit during sea voyage.

3.1.5 Provided that an approved thruster condition based maintenance survey arrangement (Machinery CBM) is in place, see Ch.2 Sec.2 [5], the scope for complete survey described in [3.2], is covered by the annual Thruster Condition Monitoring survey. Follow up of the pod is then done during annual Thruster Condition Monitoring surveys and bottom surveys.

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 Survey of pods 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 Provided that an approved thruster condition based maintenance survey arrangement (Machinery CBM) is in place, see Ch.2 Sec.2 [5], the scope for complete survey described in [4.2], is covered by the annual Thruster Condition Monitoring survey. Follow up of the pod is then done during annual Thruster Condition Monitoring surveys and bottom surveys.

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.2 [3.1.19] and DNVGL-RU-SHIP Pt.7 Ch.1 Sec.5 [6.1] for annual and renewal survey respectively.
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 bottom and related items

7.1 Schedule

7.1.1 The exterior of the unit 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:
See also Sec.1 [4.1.12] regarding bottom survey as part or renewal survey.
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).

7.1.2 Consideration may be given at the discretion of the Society, and with acceptance of the flag administration, to any special circumstances justifying an extension of the interval.

7.2 Survey planning and record keeping

7.2.1 Plans and procedures for these surveys shall be submitted for review in advance of the survey and made available on board.

Guidance note:
When carrying out this survey the following should be considered:
— external survey of thrusters, see [3] and [4]
— seachests, overboard valves, see Sec.1 [4.1.13]
— corrosion protection, see Sec.1 [4.1.15].

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 Ch.2 Sec.6 [1.3] and Ch.2 Sec.1 [2.2.4]). DNVGL-OTG-08 shall be used as guidance when developing plans and procedures for bottom survey afloat.

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.

7.2.2 A bottom survey afloat may replace the statutory dry-dock survey provided acceptance from the flag administration. Underwater inspection in lieu of dry-dock survey (bottom survey afloat) may not be acceptable where there is record of abnormal deterioration or damage to the structure, or where damage affecting the fitness of the unit is found during the course of the survey.

Guidance note:
A bottom survey performed on a self-elevating unit in elevated condition is considered a dry survey, hence involvement of the flag administration is not required.
7.3 Ship-shaped 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 UR 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

External surfaces of upper hull areas forming part of the buoyant volume when the unit is afloat, are included in the bottom survey scope. Spudcans and lower leg parts are excluded as covered separately in [8].

7.6 Other units

External surfaces of underwater areas forming part of the buoyant volume when the unit is afloat shall be examined.

7.7 Units following Classification for smarter operations principles

7.7.1 For units, which are operating in accordance with operations for smarter classification principles, see Ch.1 Sec.2 [5], the external surfaces of the submerged hull and associated submerged equipment are considered to have low risk of damages and deterioration because of their robust design and continuous operation in deeper waters. For these units, alternative means of inspection than traditional in-water survey by divers or ROVs may be introduced to maintain the control of the watertight integrity.

Guidance note:

This is normally not applicable to units going in and out of ports and or shallow waters where risk of contact with ground or other units is higher.

A survey based on this alternative method is subject to acceptance by the relevant flag administration if credited towards Statutory certification.

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7.7.2 A procedure describing activities ensuring compliance with the intention of survey of the unit's outside bottom shall be submitted to the Society for review prior to implementation. Such activities could include the following:

— tracking of traffic around the units to assure no damage due to contact with other units
— tracking of all lifting activities on board to assure no damages due to lifting/dropped objects
— inspection of sea chests, seawater inlets, strainers etc. by borescope from the inside
— blinding off and testing of sea valves from the inside
— risk based approach for inspection of corrosion protection system, inspection scope to be agreed and followed
— inspection from the inside of holds, tanks and hull parts
— potential measurement (cathodic protection reading) with bathycorrometer
— measurement of possible impressed current system
— alternative measurement of bottom plating thickness from inside of double bottom/ tanks if considered necessary
— thruster performance covered by machinery CBM arrangement, i.e. not considered part of bottom survey scope.

8 Spudcan and leg survey

8.1 General

8.1.1 The spudcan and leg survey (below water line) for self-elevating units is a part of the main class survey and consists of two (2) surveys in any five (5) year period; with an interval not exceeding three (3) years between examinations. The execution of these surveys are independent of the class renewal and may be aligned with the unit’s operation.

Guidance note:
When the next renewal survey due date conflicts with the unit’s planned operation, the spudcan and leg survey should be planned for being completed in advance when the relevant structure is accessible for survey.

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8.1.2 The default basic scope for development of the structural inspection for self-elevating units is given in Sec.1 Table 3. The inspection programme may be optimised as explained in Sec.1 [1.2.2].

Guidance note:
The spudcan and leg survey consists of areas SP1 Leg to spudcan, SP2 Leg nodes and connections below the waterline, PR1 Spudcans and PR2 Legs below water level in the referred tale.

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8.1.3 Consideration may be given at the discretion of the Society to any special circumstances justifying an extension of the survey intervals. (See also Ch.2 Sec.1 [2.7] and Sec.4 [28]).

Guidance note:
An example of such a consideration is the spudcan and lower leg partly or completely under the mud line. In such a case the spudcan and leg survey may be postponed to the next rig move (see IACS UR Z15 2.3.3).

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8.2 Scope

8.2.1 The spudcan and leg survey includes the spudcan and leg nodes below the water line in elevated condition.

Guidance note:
If the survey is carried out when spudcan and legs are submerged, approved service suppliers shall be used as for bottom survey afloat, see Ch.2 Sec.6 [1.3].

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8.2.2 The nodes above the waterline are surveyed during the normal periodical surveys, as given in Sec.1 [3.3.3] and Sec.1 [4.4.3].

8.2.3 Considerations shall be given to safe entry and accessibility of the spudcans before the survey, i.e. ventilation, arrangements for pumps, cables for lighting etc.
8.3 Intermediate survey

8.3.1 The intermediate survey is a visual survey of the structure. The main purpose is to check for typical damages/defects.

8.3.2 At intermediate surveys, external examination of the lower leg (nodes) and leg/spudcan connection shall be performed.

At intermediate surveys after the second renewal survey, an evaluation of the internal spudcan structure shall be performed (see IACS UR Z15 4.2.2).

8.3.3 Condition based assessments documenting the actual condition of the lower leg and spudcan structure may be used as basis for crediting the survey. This documentation shall as a guide include;
— historical condition of the structure at previous inspections with respect to degradation and previous repairs
— heavy landing on the seabed
— preferably recent footage of the structure
— documentation of spudcan bottom structure registered at latest rig move
— frequency of rig moves
— any special circumstances or instances recorded by the owner/operator.

The condition based assessment is subject to a formal review in advance.

8.4 Complete survey

8.4.1 Extent

The complete survey is a thorough inspection of the spudcan, spudcan to leg connections, and leg nodes. External and internal surfaces of spudcans/mat, underwater areas of legs, together with their connections as applicable, shall be selectively cleaned to the satisfaction of the attending surveyor and examined. Visual examination shall be supplemented by NDT. For further guidance on scope, see Sec.1 Table 3.

The cathodic protection system of the submerged zone shall be surveyed. The efficiency of the system for the forthcoming 5-year period shall be confirmed.

The cathodic protection system shall be surveyed by visual inspection of sacrificial anodes and extent of corrosion. Corrosion in welds of vital parts which may be subject to fatigue shall be particularly considered.

8.4.2 Thickness measurements

Thickness measurements shall in general be carried out as presented in Table 1.

Areas where substantial corrosion is found, shall have thickness measurements extended following Sec.1 Table 4, where the Ids marked with the astrix a) are parts of the "spudcan and leg survey".

**Table 1 Minimum requirements for thickness measurements – self elevating units**

<table>
<thead>
<tr>
<th>Id.</th>
<th>Area</th>
<th>Complete survey no.1 age 0-5 years</th>
<th>Complete survey no.2 age 5-10 years</th>
<th>Complete survey no.3 age 10-15 years</th>
<th>Complete 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>
</tbody>
</table>
### Id. Area | Complete survey no.1 age 0-5 years | Complete survey no.2 age 5-10 years | Complete survey no.3 age 10-15 years | Complete survey no.4 and subsequent age >15 years
--- | --- | --- | --- | ---
3 | Legs<sup>3)</sup> | Representative chords and bracings/plate and stiffeners in way of splash zone | Representative chords and bracings/plate and stiffeners in way of splash zone and at connections to mat/spudcan | Representative chords and bracings/plate and stiffeners in way of splash zone and at connections to mat/spudcan. Representative chords and bracings/plate and stiffeners in other levels |
4 | Mat or spudcan connections to legs and main structural bulkheads of mat or spudcan. <sup>a)</sup> | Representative plates, bulkheads and stiffeners | Representative plates, bulkheads and stiffeners | All plates, bulkheads and stiffeners |

**Id. remarks:**
1) and 2) if considered necessary by the attending surveyor.
3) to 4) mandatory thickness measurements, number and extent of thickness measurement requirements may be modified by the surveyor considering the corrosion protection condition and arrangements.

**Notes:**
- a) Part of the spudcan and leg survey, see [8].

Application categories for structural components to be inspected referred in the table above, are defined in Sec.1 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.

**Primary areas for inspection:**
- all components of lattice type legs and external plating of cylindrical 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.

**Other areas for inspection:**
- 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.

### 9 Survey after ocean transits of self-elevating units

After an ocean transit, a survey shall be carried out to ensure that the unit is in sound condition and undamaged. This post-transit survey applies both for wet and dry tows and shall be carried out before lowering the legs and elevating the hull out of the water.

The survey shall consist of visual inspection and NDT testing with a focus on the following structural areas:
- jack house structure and connection to the hull
- leg nodes in way of upper/lower guides and chord spudcan connection
— main deck area in way of support of gearboxes.

The owner shall prepare a survey plan including details of the tow to be submitted to the Society for approval prior to commencement.

The owner may perform the survey himself. If the survey reveals damage, DNV GL shall be involved in line with Ch.1 Sec.3 [2.5]. If no damage are found, inspection records shall be shown at the next periodical survey.

10 Permanently installed self-elevating units

10.1 Introduction

10.1.1 The requirements and guidance given in this chapter are supplementary requirements for units that are intended to stay on location for prolonged periods, normally more than 5 years.

10.1.2 Permanently installed self-elevating units shall be designed or documented for the site specific environmental and soil conditions. Fatigue properties and facilities for survey on location shall be specially considered.

The actual fatigue life of the areas which cannot be inspected - as would be relevant if the unit was mobile - shall be sufficient that no inspection is acceptable (Design Fatigue Factor, DFF ≥ 3). This shall be based on the planned field life with a suitable margin.

10.1.3 Adequate corrosion protection shall be implemented to cover the entire prolonged operation period.

10.2 Fatigue

Design fatigue factors (DFF) are introduced as fatigue safety factors. DFF shall be applied to structural elements according to the principles in DNVGL-OS-C104 App.A and/or DNVGL-OS-C201 App.C.

10.3 Inspection and maintenance

10.3.1 Facilities for survey

Surveys may be carried out on location based on agreed procedures outlined in a maintenance system and survey arrangement, without interrupting the function of the unit. The following matters shall be taken into consideration to be able to carry out surveys on location:

— arrangements and methods for survey of hull, legs and seabed foundation structure
— corrosion protection of hull, legs and seabed foundation structure
— underwater cleaning facilities.

10.3.2 Surveys

Surveys for permanently installed units follow the same approach as described in the previous section with the following remarks:

— The in service inspection programme (IIP) should reflect possible stress concentrations in critical areas, fatigue criticality, and the previous operational and inspection histories.
— Provided the fatigue analysis as described in [10.1] justifies integrity during the installation period, the Spudcan and Leg survey is limited to the accessible structure above the mudline.
— Provided the unit has arrangements for a fix load transfer by a permanent fixation system, the jacking system will be excluded from survey after the initial jacking of the unit.

Requirements for surveys when structural parts are designed without planning inspection are given in DNVGL-OS-C104 App.A.
10.3.3 Inspection before re-location
Permanent installed units planned for a re-location shall have a survey prior to movement. The survey scope shall include the jacking system.
Before re-location, an analyse shall document that the unit’s structural strength taken into account the new location’ environmental and soil conditions is sufficient for the remaining lifetime.
A complete spudcan and leg survey as described in [8] shall be completed before re-location.

11 Survey of towing and temporary mooring equipment

11.1 Annual survey
Towing and temporary mooring equipment shall be subject to visual inspection and review of certificates and maintenance records.

11.2 Renewal survey

11.2.1 Towing
Towing equipment shall be subject to visual inspection and review of certificates and maintenance records.
NDT may be requested depending on condition and service history.

Guidance note:
For units that are seldom towed, it is acceptable for the towing equipment to be either stored ashore or to be rented when needed.
In this case a MO will be given.

11.2.2 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.
Guidance note:

Units which arrive at location under their own propulsion shall be equipped with a permanent temporary mooring system for the voyage as per DNVGL-RU-OU-0102 or DNVGL-RU-OU-0103 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 acceptance by the flag administration.

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12 Survey of units out of commission (laid-up)

12.1 Annual survey

The extent of the annual survey will be reduced compared to main class annual covering as a minimum watertight integrity, bilge system, fire hazard and equipment in use. Maintenance activities performed last year to be evaluated in accordance with requirements given in applicable survey arrangement, see Ch.2 for more information.

Guidance note:


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12.2 Re-commissioning survey

12.2.1 Before re-entering service, the owner in cooperation with DNV GL shall prepare a re-commissioning survey scope depending upon the parameters listed in Ch.2 Sec.1 [2.8]. As a minimum, function testing to confirm the satisfactory operation of the machinery installation shall be carried out.

12.2.2 All overdue surveys shall be completed prior to re-entering service.

12.2.3 Condition and status of class relevant machinery items and equipment to be evaluated according to requirements in applicable survey arrangement, see Ch.2 for more info.
SECTION 3 ADDITIONAL SERVICE NOTATIONS

1 Introduction
This section presents the specific survey items for the services defined in DNVGL-RU-OU Ch.1 Sec.3 Table 4. The requirements shall be applied in addition to those for main class notation presented in Sec.3 and Sec.4. The detailed scope is given in the following sub-sections.

2 Drilling units

2.1 Introduction

2.1.1 The requirements in this subsection apply to units with class notation Drilling.

2.1.2 Scope
Drilling units shall be surveyed with focus on:
— drill floor and substructure
— cross connections on drilling/well test and safe piping system
— hazardous areas
— shutdown systems (ESD).
The surveys do not cover the drilling equipment.

2.1.3 Temporary well test equipment and systems installed on board units with DRILL class notation shall be design approved and surveyed after installation on board, and before any well test operations commence. See Sec.4 [6.1.7] for details.
Temporary well test equipment and systems installed on board units without DRILL class notation shall be approved with focus on interfaces with Main Class. See Ch.1 Sec.3 [2.7.3] for guidance.

2.1.4 Temporary MPD (managed pressure drilling) equipment and systems installed on board units with DRILL class notation shall be design approved and surveyed after installation on board, and before any MPD operations commence. See DNVGL-OS-E101 for details.

2.2 Annual survey

2.2.1 The drill floor and substructure shall be surveyed withemphasis on structural integrity and supporting structure for equipment applied in drilling operations.

2.2.2 Where cross connections between piping system for drilling or well testing operation and safe piping system exist, the means for avoiding possible contamination of the safe system with the hazardous medium shall be surveyed.

2.2.3 Owners are required to operate a system for planned inspection and maintenance of highly pressurised equipment related to the drilling plant. The surveyor shall verify the satisfactory implementation of this system.

2.3 Complete survey

2.3.1 The drainage system of hazardous area shall be surveyed.
2.3.2 Systems and equipments included in scope of classification according to DNVGL-RU-OU-0101 Ch.2 Sec.2 [1.2.1] shall be surveyed. Attention shall be paid to fire and other hazards. Thickness checking of pipe work shall be carried out and records reviewed by the surveyor, as applicable. Hydrostatic testing may be requested by the surveyor.

2.3.3 Cement and dry mud pressure tanks shall be tested to 1.2 times the working pressure if found necessary by the surveyor.

3 Well intervention units

3.1 Introduction

3.1.1 The requirements in this sub-section apply to units with the class notation Well intervention 1 and Well intervention 2.

3.1.2 Scope
Well intervention units shall be surveyed with focus on:
— supporting structure
— cross connections on well intervention and safe piping system
— hazardous areas
— shutdown systems.

The surveys do not cover the systems and equipment related to well intervention.

Guidance note:
For handling of well test equipment on units with the WELL notation, see Sec.4 [8].

3.1.3 Temporary well test equipment and systems installed on board units without WELL notation shall be approved with focus on interfaces with main class. See Ch.1 Sec.3 [2.7.3] for guidance.

3.2 Annual survey

3.2.1 Supporting structures for decks, platforms and equipments shall be surveyed with emphasis on structural integrity.

3.2.2 Where cross connections between piping system for well intervention operation and safe piping system exist, the means for avoiding possible contamination of the safe system with the hazardous medium shall be surveyed.

3.2.3 Owners are required to operate a system for planned inspection and maintenance of highly pressurised equipment related to the well intervention system. The surveyor shall verify the satisfactory implementation of this system.

3.3 Complete survey

3.3.1 The drainage system for hazardous areas shall be surveyed.
3.3.2 Systems and equipments included in the scope of classification according to DNVGL-RU-OU-0101 Ch.2 Sec.3 [3.1.3] and DNVGL-RU-OU-0101 Ch.2 Sec.3 [4.1.2], as applicable, shall be surveyed with focus on fire and other hazards. Thickness checking of pipe work shall be carried out and records reviewed by the surveyor, as applicable. Hydrostatic testing may be requested by the surveyor. Pressure vessels according to Sec.1 [4.1.11], shall be pressure tested if found necessary by the surveyor.

3.3.3 For units arranged for carriage of low flash point liquids the survey shall include examination of heating coils, anodes, tank cleaning apparatus and other equipment in cargo tanks and cofferdams. Heating coils are normally to be pressure tested.

3.3.4 The quick disconnect system shall be tested.

4 Accommodation units

4.1 Introduction

4.1.1 The requirements in this sub-section apply to units with class notation Accommodation.

4.1.2 Scope
Accommodation units shall be surveyed with respect to the specific details w.r.t:
— structural strength of the accommodation
— connection of the accommodation modules to main structure
— gangways.

4.2 Annual survey

4.2.1 The accommodation shall be surveyed with attention to structural strength. The connections of accommodation modules between the modules and to the main supporting structure shall be surveyed.

4.2.2 Gangways intended for transfer of personnel to/from other installations which are permanently fitted to the unit shall be surveyed with respect to structural integrity and proper functioning.

4.3 Complete survey
There are no additional requirements.

5 Crane units

5.1 Introduction

5.1.1 The requirements in this sub-section apply to units with class notation Crane.

5.1.2 Scope
The supporting structure of the crane shall be surveyed.

5.2 Annual survey
The crane foundation shall be surveyed with emphasis on structural integrity.
5.3 Complete survey
There are no additional requirements.

6 Wind turbine installation units

6.1 Introduction

6.1.1 The requirements in this sub-section applies to units with the class notation Wind turbine installation.

6.1.2 Scope
Wind Turbine Installation units shall be surveyed with specific focus to the supporting structure of the crane units.

6.2 Annual survey

6.2.1 The structural strength shall be examined in line with the requirements for ship-shaped units.

6.2.2 The crane foundation shall be surveyed with emphasis on structural integrity.

6.2.3 Loading deck area to be surveyed with respect to possible damages resulting from installation and removal of sea-fastening (welding/flame cutting).

6.3 Complete survey
There are no additional requirements.

7 Offshore support units

7.1 Introduction

7.1.1 The requirements in this sub-section applies to units with the class notation Offshore support.

7.1.2 Scope
The unit shall be surveyed in accordance with the parts of:
— drilling unit
— offshore production unit
— accommodation unit
— crane unit
as far as the unit has the equipment listed in those parts of the rules.

8 Oil production units and installations

8.1 Application

8.1.1 The requirements in this sub-section apply to units or installations with class notations: Oil production(Unit) or Oil production(Installation).
8.1.2 For units with both production and storage facilities (e.g. FPSOs), the requirements of this sub-section shall be supplemented with the requirements of [9].

8.2 Survey arrangement

Survey arrangements are part of the concept Classification for smarter operations, with focus on enabling new (smarter) ways of working that can be utilised in cooperation with the Society to minimize out of service time and obtain better utilisation of the unit and its resources. See Ch.1 Sec.2 [4] for more information.

Available survey arrangements for:
- structure and
- machinery and electrical equipment and systems can be found in Ch.2 Sec.2.

Guidance note:
Survey arrangements applicable for machinery can also be applied to production related equipment and systems.

8.3 Annual survey

8.3.1 Structure
The following structure issues shall be subjected to a general survey:
- structure related to process and utility modules foundation (hull reinforcements).
- accessible parts of the turret structure, and submerged turret structure (including STP buoy) shall be surveyed to confirm structural integrity and condition of securing arrangement.

8.3.2 Arrangement
The following arrangement issues shall be subjected to a general survey:
- condition of measures preventing escalation of process incidents to the cargo tank area, e.g. related to openings/penetrations in process deck
- condition of additional safety measures taken for any approved process equipment located below process deck. Typical measures would be oil spillage collection, additional fire detectors, fire water system, structural fire protection, piping, and cables,
- condition of drainage and bunding for spillage collection at process deck for prevention of escalation to lower deck.
- cross connection between marine systems (non-hazardous) and production systems (hazardous) does not exist.
- any damage from green sea on structures, riser ESD valves, and equipment covered by the class.
- condition of access for inspection, maintenance and fire fighting in the space between process/utility deck and storage tank deck (FPSO)
- personnel protection against moving machinery parts, or hot surfaces. Also any flare radiation shielding shall be surveyed.
- laydown areas w.r.t protection against impact from dropped items or other crane incidents associated with their usage. Any new laydown areas being observed shall be subject to design approval.

8.3.3 Hazardous area classification
The following hazardous area classification issues shall be subjected to a general survey:
- condition of entrances and openings between hazardous areas and accommodation, machinery, and service spaces w.r.t tightness, alarms, and marking
- condition of explosion protected equipment in non-hazardous areas being intended for operation in ESD situations
- condition of instrumented ignition source control
— condition of ignition protection of any hot surfaces
— condition of ventilation system and associated alarms, door tightness etc in rooms kept non-hazardous by overpressure ventilation
— condition of ignition prevention measures for any combustion engine/boiler approved for operation in hazardous area.

8.3.4 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 unit'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.

8.3.5 Emergency shutdown system
The emergency shutdown (ESD) system shall be subjected to survey and function testing:
— the production unit shall be confirmed being in safe operating condition before any testing
— a system status regarding maintenance and any modifications/changes shall be obtained
— a visual survey of control room safety screens, mimics, critical alarm panel and manual ESD activation devices shall be done
— survey of boundary ESD valves, actuators and accessories
— survey and testing of power supply, including UPS, and associated system alarms
— communication/interfaces between various sections and systems (e.g F&G detection, PSD) and associated alarms shall be demonstrated
— test of the highest ESD level, showing alarms and status in control room, and correct actions and alarms in field. It shall be confirmed that the applied logic is the latest approved revision of the cause and effect diagrams. The test shall be carried out to the extent deemed necessary by the surveyor.

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.

8.3.6 Fire and gas detection
The fire and gas detection system shall be surveyed and function tested:
— the production unit shall be confirmed being in safe operating condition before any testing
— a system status regarding maintenance and any modifications/changes shall be obtained (1A)
— a visual survey of control room safety screens, mimics, critical alarm panel shall be done (1A)
— a general survey of condition of fire and gas detectors in hazardous areas, and their cables
— a test of shutdown actions by fire and gas detection system to an extent as required by the surveyor. This normally applies to ventilation shutdown (1A).

8.3.7 Passive fire protection
— Condition of fire division in production area shall be surveyed.
— Condition of structural fire protection on load-bearing structure shall be surveyed. This applies to process and utility modules support structure. For passive fire protection within process plant see PROD notation.

8.3.8 Fire water and foam systems
The fire water and foam systems shall be surveyed and tested in line with the requirements for 1A/01 with the following specific focus:
— All fire pumps shall be confirmed available for duty. Start sequence of fire pumps from fire detection or manual push button from main control room shall be tested. Pump status given in control room shall be verified. (1A).
— Pressure surge prevention measures shall be surveyed (1A).
— Marine growing condition in fire water system. Also protective measures shall be surveyed.
— Condition including operation of sectional valves in ring main, and for the two supplies to deluges valve skids.
— Monitors, hydrants and hose equipment shall be visually surveyed in general (1A).
— The function of fire water systems in all turret and process areas, as deemed necessary by the surveyor.
— It shall be verified that the fire water ring main is not in use for other than fire-fighting purposes.
— The function of deluge valves, including their activation. Test shall be carried out.
— The deluge nozzles shall be surveyed as deemed necessary by the surveyor, and their cleanness shall be verified by a water discharge test. In this respect systems using carbon steel piping, also galvanised, may require extended testing.
— Survey and testing of deck foam system.
— Verify certificates confirming the physical and chemical condition of the foam concentrate.

8.3.9 Fixed fire extinguishing systems
Condition of fixed fire extinguishing system in turbine enclosure, in any engine and/or boiler room not included in main class, and in any turret enclosure shall be verified as deemed necessary by the surveyor.

8.3.10 Turret machinery systems
Any turret machinery shall be surveyed and function tested.

8.3.11 Instrumentation and telecommunication system
Function test of overall unit safety related alarms shall be done (typical fire, gas, ESD, mustering and evacuation alarms).

8.4 Complete periodical survey

8.4.1 Emergency shutdown system
The emergency shutdown system (ESD) test required for annual survey shall be extended to include a representative number of higher and lower ESD levels as deemed necessary by the surveyor.

8.4.2 Crude fuelled boilers in enclosed spaces
For units or installation having boilers in enclosed spaces in hull or topsides, 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
— boilers located outdoor in topsides follow safety principles of DNVGL-OS-E201.

8.4.3 Gas fuelled machinery in enclosed spaces
For units or installations having turbines, engines or boilers in enclosed spaces in hull or topsides, 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
— boilers located outdoor in topsides follow safety principles of DNVGL-OS-E201.

8.4.4 Hydrocarbon processing equipment in hull compartments
Production systems and equipment installed in hull compartments below damage water line shall be surveyed
as per PROD requirements. Thickness checking of pipework shall be carried out and records reviewed by the
surveyor, as applicable. Hydrostatic testing may be requested by the surveyor. Attention is to be paid to fire
and other hazards.
8.4.5 Gas turbines
Upon completion of on board overhaul, or installation of overhauled unit or module, the gas turbine shall be tested. The testing shall cover alarms, local fire fighting systems and shutdown functionality as required in Sec.1 and [8.4.1].

Guidance note:
Original operations documentation retained on board will reflect the original manufacturer alarm or acceptance limits and set points as established through the type approval.

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9 Oil storage units and installations

9.1 Application
The requirements in this sub-section apply to units or installations with class notations: Oil storage(Unit) or Oil storage(Installation).

9.2 Survey arrangement
Survey arrangements are part of the concept Classification for smarter operations, with focus on enabling new (smarter) ways of working that can be utilised in cooperation with the Society to minimize out of service time and obtain better utilisation of the unit and its resources. See Ch.1 Sec.2 [4] for more information

Available survey arrangements for:
— structure and
— machinery and electrical equipment and systems can be found in Ch.2 Sec.2.

Guidance note:
Survey arrangements applicable for machinery can also be applied to production related equipment and systems.

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9.3 Annual survey

9.3.1 Arrangement
Laydown areas shall be surveyed w.r.t protection against impact from dropped items or other crane incidents associated with their usage. Any new laydown areas being observed shall be subject to design approval.

9.3.2 Hazardous area
The following hazardous area classification issues shall be subjected to a general survey:
— condition of entrances and openings between hazardous areas and accommodation, machinery, and service spaces w.r.t tightness, alarms and marking
— wheelhouse doors and windows, side scuttles and windows in superstructure and deckhouse bulkheads facing the cargo area and possible bow or stern loading and unloading arrangements shall be surveyed for gas and vapour tightness
— condition of electrical equipment in hazardous areas
— condition of explosion protected equipment in non-hazardous areas being intended for operation in ESD situations
— condition of instrumented ignition source control.

9.3.3 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 unit'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.

9.3.4 Emergency shutdown
The emergency shutdown (ESD) system shall be surveyed and function tested:
— the storage unit shall be confirmed being in safe operating condition before any testing
— a system status regarding maintenance and any modifications/changes shall be surveyed
— a visual survey of control room safety screens, mimics, critical alarm panel and manual ESD activation shall be done
— survey of boundary ESD valves, actuators and accessories
— survey and testing of power supply, including UPS, and associated system alarms
— communication/interfaces between various sections and systems (e.g F&G detection, PSD) and associated alarms shall be demonstrated
— test of the highest ESD level, showing alarms and status in control room, and correct actions and alarms in field. It shall be confirmed that the applied logic is the latest approved revision of the cause and effect diagrams. The test shall be carried out to the extent deemed necessary by the surveyor.

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.

9.3.5 Fire and gas detection
The fire and gas detection system shall be surveyed and function tested:
— the storage unit shall be confirmed being in safe operating condition before any testing
— a system status regarding maintenance and any modifications/changes shall be surveyed
— a visual survey of control room safety screens, mimics, critical alarm panel shall be done
— a general survey of condition of fire and gas detectors in hazardous areas, and their cables, shall be done
— examination and testing of gas detection system in cargo pump rooms
— a test of shutdown actions by fire and gas detection system shall be demonstrated to an extent as required by the surveyor. This normally applies to ventilation shutdown (1A).

9.3.6 Fire water systems
The fire water system shall be surveyed and function tested:
— all fire pumps shall be confirmed available for duty. Start sequence of fire pumps from fire detection or
manual push button from main control room shall be tested. Pump status given in control room shall be
verified
— marine growing condition in fire water system shall be confirmed. Protective measures shall be surveyed
— operation of sectional valves in fire main, shall be surveyed
— monitors, hydrants and hose equipment shall be visually surveyed in general
— survey and testing of deck foam system
— verify certificates confirming the physical and chemical condition of the foam concentrate.

9.3.7 Cargo systems
The following cargo system and components shall be surveyed and tested as shown:
— survey of cargo transfer and stripping pumps
— testing of remote operation and shut-down devices for the cargo system
— survey of temperature sensors in bulkhead shaft glands bearings for pumps installed in cargo pump rooms
— survey and testing of gas detection/sampling system in tanks/spaces adjacent to cargo tanks. The
examination shall include verification of integrity of the suction lines between suction points and analysing
units
— survey of pressure gauges on cargo/cow discharge lines
— survey of temperature sensors for cargo, tank washing and ballast pumps
— survey of oily water interface detector
— survey of oil discharge monitoring system
— all piping on deck shall be overall surveyed. Pressure testing and thickness measurements of any piping
system may be required if found necessary by the surveyor
— survey of provisions for drainage of cargo tank vent lines
— segregation between cargo and segregated ballast system shall be confirmed, if applicable
— crude oil washing system
— pump rooms shall be surveyed with special attention to piping and pumps, bulkheads for signs of oil
leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room
bulkheads, and access ladders
— condition of protection measures against overpressure in slop tank from any pipe connection with process
plant shall be surveyed
— for units with gas detection system, the examination shall include verification of integrity of the suction
lines between suction points and analysing units (where applicable).

9.3.8 Inert and tank vent systems
The following cargo tank vent items shall be surveyed and tested as deemed necessary by the surveyor:
— the inert gas generator, included oil burning equipment, blowers, scrubber, deck water seal, associated
control and safety systems, P/ V breaker and non-return valve
— testing of remotely operated or automatically controlled valves, interlock features of soot blowers, and
alarms and safety devices
— inert gas piping shall be surveyed with attention to gas or effluent leakage
— the pressure/vacuum monitoring arrangement for cargo tanks
— cargo tank openings with pressure/vacuum valves
— venting/gas freeing arrangements including masts and risers with flame screens/ flame arrestors
— valve securing system.

9.3.9 Instrumentation and telecommunication system
Function test of overall unit safety related alarms shall be done (typical fire, gas, ESD, mustering and
evacuation alarms).
9.4 Complete periodical
There are no additional requirements.

10 LNG or LPG production and/or LNG or LPG storage units and installations

10.1 Application
The requirements in this subsection 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.

10.2 Survey arrangement
Survey arrangements are part of the concept classification for smarter operations, with focus on enabling new (smarter) ways of working that can be utilised in cooperation with the Society to minimize out of service time and obtain better utilisation of the unit and its resources. See Ch.1 Sec.2 [4] for more information. Available survey arrangements for:
— structure and
— machinery and electrical equipment and systems
  can be found in Ch.2 Sec.2.

Guidance note:
Survey arrangements applicable for machinery can also be applied to production related equipment and systems.

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10.3 Annual survey

10.3.1 Structures, supporting equipment and heavy modules applied in the production operation shall be surveyed.

10.3.2 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

10.3.3 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.
10.3.4 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.

10.3.5 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.

10.3.6 Cargo handling and containment system

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].

10.4 Complete periodical survey

10.4.1 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.

10.4.2 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.
10.4.3 Function test of instrumentation and safety devices for equipment and systems in [10.3.3] shall be carried out.

10.4.4 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.

10.4.5 The drainage system of hazardous area shall be surveyed.

10.4.6 The insulation resistance of the electrical installation in the hazardous area shall be checked.

10.4.7 Industrial equipment included in class according to DNVGL-RU-OU-0102 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.

10.5 Cargo Handling and containment system

10.5.1 Complete periodical survey
Complete 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], DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 [3.3] and DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 [4.7]. Offshore units however have the option of conducting surveys in-situ rather than in drydock.

11 Offshore loading units and installations

11.1 Application
The requirements in this sub-section apply to units or installations with class notations: Oil loading(Unit), Oil loading(Installation), LNG/LPG loading unit or LNG/LPG loading installation.

Guidance note:
Additional guidance about loading units is given in OTG-16 Offshore Loading Units.

11.2 Survey scope
Annual and complete periodical surveys may be carried out on location based on an approved procedures outlined in a planned maintenance system and survey arrangement, without interrupting the function of the installation.

Mooring systems shall be covered by requirements for class notation POSMOOR Position mooring system (long term mooring), see Sec.4 [4].

11.3 Annual survey

11.3.1 Review of approved planned maintenance system (maintenance programme).
11.3.2 General visual survey of:
— load bearing structure and buoyancy compartments
— corrosion protection system or arrangement
— main bearing, turret and turntables
— piping and valves
— offloading hose and mooring hawser.
shall be carried out.

11.4 Complete periodical survey

11.4.1 A thorough survey of:
— underwater areas
— load bearing structure and buoyancy compartments
— corrosion protection system or arrangement
— function testing of equipment, as applicable
— main bearing, turret and turntables
— piping and valves:
  — external visual survey
  — open up and perform pressure testing of valves and piping as deemed necessary
  — visual survey of condition of piping system for inert gas purging and drain lines
— offloading hawser and mooring hawser
  — general condition
  — test interlock functions for the mooring and offloading system.
shall be carried out.
SECTION 4 OPTIONAL CLASS NOTATION SURVEYS

1 Introduction
This section presents the standard extent of surveys for retention of optional class notations. Unless otherwise noted, the interval of the complete surveys as listed in this section is 5 years.

2 Position mooring equipment (mobile mooring)

2.1 Application

2.1.1 The requirements in this subsection apply to units with class notation ME.

Guidance note:
The Class notation ME is only issued for mobile units. The ME notation covers all mooring equipment installed on the unit, or belonging to the unit. Rental equipment when rented by the owner, is included in this definition.

2.1.2 Annual Survey
Annual survey consist of documentation review and visual examination to ascertain the general condition of the relevant items. The survey is normally carried out on location 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.

2.1.3 Complete Survey
Complete survey requires appropriate cleaning with good access and adequate lighting.
The complete mooring system equipment for position keeping on location is subject to comprehensive survey, including function testing, opening up and NDT of selected parts of the mooring equipment installed.

2.1.4 Continuous survey
As an alternative, the Owner may opt for a continuous survey of mooring lines by providing one or more extra mooring lines which are 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.

Guidance note:
For acceptance criteria for chain, wire and fibre mooring see App.D.

2.1.5 Occasional survey
An occasional survey shall be performed in case of damage (s) or suspected damage(s) that may have occurred to a mooring line. All mooring line components which may have or may have been affected by the incident shall be surveyed to the extent where the damages which might have been sustained from the incident can be detected. For details on mooring chain see App.D. A full description of the incident as it occurred shall always be submitted to the Society. See also Ch.1 Sec.3 [1.2.2].
**Guidance note:**
The description of the incident is important in order to map and understand the full damage potential and ensure the correct items are inspected. Investigations shall be carried out to ensure no hidden damages or weakened components remain in the mooring line assembly. In cases of e.g. mooring chain failure during an anchor-handling operation, this hence implies that not only the adjacent links to the failed link shall be subject to inspection, but also other parts of the chain which might have been subject to an abnormal loading situation leading up to the incident, or as a direct result of it. This may e.g. be the chain links taking tension over the stern roller, shackles, or other components subject to twist and/or shock/impact loads as a result of the incident.
If the failed chain was connected to other line assembly components during the operation, like fiber-ropes, etc, and these fall to the seabed as a result of the incident, the potential damage to also these line assembly components shall be part of the evaluation.

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

### 2.2 Annual survey

**2.2.1** Position mooring equipment shall be inspected as follows:
There shall 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 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
- condition of anchors and anchor bolsters
- 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.
Twist in chain between the fairlead and windlass should 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.
Twist in mooring wire shall not exceed the allowed twist stated in manufacturer specification or certificate.
During installation of the mooring system twist in mooring lines shall be monitored and confirmed to be within pre-set acceptance criteria.

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

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, see complete survey.
The surveyor shall ascertain if 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.
If available, visual inspection of the anchors shall be carried out. If anchors have experienced any problems and/or been replaced, the anchor certificate shall confirm suitability.

### 2.3 Complete survey

#### 2.3.1 General
The complete mooring system for position keeping on location is subject to comprehensive survey, including function testing, opening up and NDT of selected parts of the mooring equipment installed.

#### 2.3.2 A documentation review shall be carried out in order to verify that all mooring components have correct certification and that the service history of the mooring components are recorded. Inspection scope level is based on the available service records.
2.3.3 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.

2.3.4 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.

2.3.5 All joining shackles of Kenter or similar design which have been in service for more than five years, shall be dismantled and magnetic particle (MT) or liquid penetrant testing (PT) shall 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.

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

2.3.6 Background information to be supplied for the complete survey:
The service history of the chain should be supplied beforehand to the attending surveyor. The following information shall be provided:
— 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.

2.3.7 For a chain which is more than 20 years old the following apply:
— If all documentation is available, and historical information including previous reports showing no failures and only minor repairs, then survey extent given in [2.3.2] 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.

2.3.8 Steel wire rope
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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2.3.9 It is advised that checkpoints are made for every 100 m. If areas of special interest are detected, the distance should be significantly reduced.

2.3.10 Re-certification of stranded wire ropes shall be carried out. It shall be based on a visual examination of the wire rope and a condition assessment and/or a section shall be cut from the end of the rope and inspected.

2.3.11 Fibre rope
On the survey of the fibre ropes consists of a 100% visual examination of the rope covering the following items:
— external wear
— deformation
— termination area.

2.3.12 In addition to [2.3.10], 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.

2.3.13 Winches and fairleads
The fairleads shall be inspected visually and by ROV as far as possible. All fairleads shall be inspected. Fairlead bearings shall be verified in working order and verified turning freely. Wear in bearings shall be checked.

2.3.14 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.

2.3.15 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.

2.3.16 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.

2.3.17 Proper spooling of the wire on the winch drum shall be verified and drums and spooling gear adjustments made if required.

2.3.18 Windlasses and winches and fairleads, including brake torques, shall be function tested.

2.3.19 The system for emergency release of the winch brake shall be tested. The visual and audible alarm shall be confirmed. The activation of the deluge system over the anchor windlasses shall be tested.
3 Position mooring system (mobile mooring)

3.1 Application

3.1.1 The requirements in this sub-section apply to units with class notation **POSMOOR** and that are not permanently moored.

**Guidance note:**
This type of mooring system is normally applicable for drilling and support units not fixed at one location for a longer period of time.
Permanently moored units (typically fixed at one location for a longer period of time) shall follow the requirements stated in [4].

3.1.2 The requirements in [3.3] and [3.5] are applicable to units with qualifiers **TA**, **TAR**, **ATA** or **ATAR** only.

3.1.3 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 shall be carried out before the mode is taking into use.

3.2 Annual survey

3.2.1 Accessible and visible parts of the unit's mooring system for position keeping on location shall be inspected. Requirements in [2.2] with respect to annual survey of equipment under notation **ME** apply, in addition to below.

3.2.2 The mooring analysis as required in **DNVGL-OS-E301 Ch.3 Sec.1 [4.2]** to be verified on board. It shall also be verified that the unit operates within the limits stated in the mooring analysis. The operating envelope is described in the appendix to the classification certificate.

**Guidance note:**
The above implies that a site specific mooring analysis should be submitted to DNV GL if the unit is to operate on a location where one or several of the following items are not according to the documentation submitted when the **POSMOOR** notation was granted:

— water depth outside the original range
— environmental condition is more severe
— different mooring pattern and pretension
— new inserts in the mooring system and/or change in mooring line length
— introduction of Mooring Line Buoyancy Elements (MBLE) or clump weights in one or several of the mooring lines.

3.2.3 Documentation review

3.2.3.1 The mooring line records shall be reviewed.

**Guidance note:**
The mooring line records review shall include a verification that all parts of the mooring line assembly including pre-laid mooring lines and components hold valid certificates. It is recommended that the mooring line assembly is presented in a relevant application.
3.2.3.2 Service history of the mooring lines and components shall be reviewed. Service history includes the following and shall be recorded:
— logging of position of e.g. chain links over windlass and fairleads
— any damages, as well as records from incidents with damage potential
— peak and shock loads in the system

Guidance note:
The sampling software recording the load cell readings, shall be set up with sufficient sampling frequency to capture shock loads. Sampled data values may be deleted at regular intervals, but sufficient sampling history (sample data) should be stored for the units survey cycle to the detail level that all loads above a defined level beyond normal pre-tension value is recorded. The data stored should be sufficient to graphically present the load history incl. shock loads/max readings.

Survey scope can be adjusted based on documented service history.

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3.2.4 The calibration certificates for the load cells to be verified on board, (see DNVGL-OS-E301 Ch.2 Sec.4 [14]).

3.2.5 The length and tension measurements, including alarm settings shall be verified.

3.2.6 Winch control to be verified from all operator stations.

3.2.7 The mooring lines from windlass towards fairleads shall be surveyed. See [2.2.1] with respect to requirements to twist in line.

3.3 Annual survey - thruster assisted systems

3.3.1 System maintenance documentation, including information regarding hardware and software changes, shall be reviewed.

Guidance note:
This requirement includes, in addition to the position mooring control system and other systems necessary for performing position keeping, e.g. thruster control system.

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3.3.2 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.

3.3.3 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. This includes thruster operation, tension and line length indication system and alarm settings.

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3.3.4 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.
3.3.5 Capacity of UPSs and other battery systems serving the position mooring control system, including its peripherals, shall be verified.

3.3.6 The alarm for loss of charging power shall be verified.

Guidance note:
Verification of UPS capacity can be carried out through a review of recent records of on board capacity testing if testing can introduce unacceptable hazards.

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3.3.7 Emergency stop of thrusters from the position mooring control center shall be tested. If the survey is carried out when the unit is undergoing regular operations and there is a possibility of introducing unacceptable risks, then testing may be exempted.

3.3.8 The Simulation facility shall be verified as far as possible.

3.3.9 Thruster operation shall be function tested.

3.4 Complete survey

3.4.1 The complete mooring system for position keeping on location shall be subject to a comprehensive survey, including opening up and NDT of selected parts of windlasses and winches and fairleads. The requirements listed under scope for complete survey of the notation ME in [2.3] applies.

3.5 Complete survey – thruster assisted systems

3.5.1 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.

3.5.2 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.

3.5.3 Emergency stop of the position mooring thrusters from the position mooring control center to be tested.

3.5.4 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 is be recorded in the survey report, and a condition of class or memo to owner is 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 POSMOOR survey.

3.5.5 Alarm for loss of position and heading out of limit shall be demonstrated. Line break alarm shall be tested.

3.5.6 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.

3.5.7 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.

3.5.8 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.

3.5.9 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 programme shall be verified to ensure that they have been updated when alterations have been done.

Guidance note:
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 units which have redundancy requirements in thruster systems, power systems and/or control systems as part of their mooring analysis. If the unit 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.

3.5.10 Correct functioning of the consequence analysis facility shall be verified as far as possible.

4 Position mooring system (long term mooring)

4.1 Application

4.1.1 The requirements in this subsection apply to units with class notation POSMOOR and that is permanently moored.
4.1.2 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.

4.2 Types of surveys

4.2.1 Annual survey
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.

4.2.2 Complete survey
Complete survey requires 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 shall 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 should be paid to the hang off arrangement.
A complete survey requires an inspection plan to be submitted by owner. This plan shall be based on the inspection criteria as set forward in this sub-section in addition to findings and observations from past surveys.

4.2.3 Continuous survey – mooring lines
The owner may opt for a continuous survey of the mooring lines by providing extra mooring line(s), 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. Complete 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 complete, unless otherwise accepted in an approved Mooring Integrity Management programme.

4.2.4 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 minimum cover the requirements set forward in Table 1 below.
4.2.5 Units installed prior to October 2016 may not have the post installation data mapped and stored to the extent stated in [4.2.4]. 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.

4.2.6 Units equipped with an approved mooring integrity management (MIM) programme shall follow the requirements set forward in this programme.

4.3 Survey schemes for long term position mooring

4.3.1 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 programme is in place, this shall be followed instead of Table 1. See [4.12] for requirements to approval of mooring integrity management programmes.

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>Survey requirements&lt;sup&gt;5), 6)&lt;/sup&gt;</th>
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<tr>
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<td>General requirements</td>
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<td>Annual&lt;sup&gt;1)&lt;/sup&gt;</td>
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<tr>
<td>Systems designed before 1996 (no fatigue analysis and corrosion allowance)</td>
<td>[4.4]</td>
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<td>Systems designed with a fatigue design life factor of 3</td>
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<td>Systems designed with a fatigue life factor of 5-8 or greater</td>
<td>[4.4]</td>
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<tr>
<td>Systems with an approved mooring integrity management programme (MIM)</td>
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<tr>
<td>Survey requirements</td>
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<tr>
<td>General requirements</td>
<td>Additional requirements</td>
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<tr>
<td>Annual 4)</td>
<td>Complete</td>
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</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 [4.5] apply.
5) Recordings from installation survey and the expanded 1st 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.3 [1.2]. These incidents may require additional inspections.

### 4.4 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 programme or previously recorded damages or flaws require more frequent survey activities, e.g. installation damages, for which MO(s) are issued.

#### 4.4.1 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 1st annual survey are on board (if installed after October 2016). See [4.5] for requirements to 1st 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. (See 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
- re-tensioning shall be verified carried out on units where re-tensioning of the mooring lines in the first year(s) of operation is part of the design requirements.

#### 4.4.2 Accessible and visible parts of the unit's mooring system for position keeping on location shall be visually surveyed.

#### 4.4.3 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, but under no circumstances shall the interlink twist cause restriction in the movement of chain in windlass and fairlead.

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4.4.4 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, see complete 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.

4.4.5 Winch control to be verified from all operator stations.

4.5 Annual survey - additional requirements - 1\textsuperscript{st} annual after installation

4.5.1 The 1\textsuperscript{st} 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 1\textsuperscript{st} annual survey is only applicable for the first five year survey cycle.

The data from the expanded 1\textsuperscript{st} annual survey shall be used as baseline for future surveys.

**Guidance note:**
The additional requirement to the 1\textsuperscript{st} 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 1\textsuperscript{st} 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 1\textsuperscript{st} annual POSMOOR survey.

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4.5.2 After the expanded 1st annual survey, no ROV surveys are required prior to first complete survey, unless damages or suspected damages occur in operation, or otherwise deemed necessary by attending surveyor/mooring specialist.

4.5.3 The consecutive annuals shall follow [4.4].

4.6 Annual survey - additional requirements for thruster assisted systems

4.6.1 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.

---end of guidance note---

4.6.2 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.

4.6.3 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.

---end of guidance note---

4.6.4 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.

4.6.5 Capacity of UPSs and other battery systems serving the position mooring control system, including its peripherals, shall be verified.

4.6.6 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.

---end of guidance note---

4.6.7 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.

4.6.8 The simulation facility shall be verified as far as possible.

4.6.9 It shall be verified that the unit operates in the correct position mooring control system mode.
4.7 Complete periodical survey

4.7.1 Application
The requirements given in [4.2] apply with the additions given in this sub-section.

4.7.2 The scope of the complete periodical survey is complemented depending on availability of fatigue analysis and corrosion allowance as specified in [4.8] to [4.9]. Section [4.10] subsequently specifies additional requirements for thruster assisted systems. See Table 1.

4.7.3 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.

4.7.4 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.

4.7.5 Visual inspection of windlass and fairlead pockets shall be carried out. Particular attention shall be paid to:
1) Rate of wear on pockets, including relative rate of wear between chain links and pockets.
2) Mismatch between links and pockets, including improper support of the inks in the pockets.
3) Ensure that the required rotation cycle of the chain link resting in pocket is followed.
4) 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.
5) NDT shall be done if suspected out of plane bending (OBP); due to larger movements than taken into account at design basis.
6) Underwater NDT to be performed, on a case by case basis, where NDT cannot be carried out in dry condition.
7) Fairleads shall be verified turning freely both in mooring line direction and along its hinges in the horizontal plane.

4.7.6 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.

4.7.7 Special attention shall be given to the holding ability of the winch and the satisfactory operation of the pawls, ratchets and braking equipment. The structural integrity of the resultant load path to the unit’s structure shall be verified.

4.7.8 Proper spooling of the wire on the winch drum shall be verified and drums and spooling gear adjustments made if required.

4.7.9 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.
4.7.10 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.

4.7.11 The effect of installed cathodic protection systems (if applicable) shall be mapped and documented.

4.7.12Extent and type of marine growth shall be recorded for all lines

4.7.13 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.

4.7.14 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. and 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 complete survey as described in this sub-section may be adjusted after the first complete survey based on the result from the 1st 5-year cycle.

4.7.15 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.

4.8 Complete periodical survey – systems designed before 1996 (no fatigue analysis and corrosion allowance)

4.8.1 For mooring systems designed without corrosion protection/allowance and not designed with respect to fatigue the following shall be carried out in addition to [4.4]:

— 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 [4.7]
— 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.
4.8.2 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.

4.8.3 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.

4.8.4 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.

4.8.5 The following background information shall be supplied prior to start of the complete 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.

4.8.6 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 [4.8.2] 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.

4.8.7 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
4.8.8 Unless otherwise agreed, checkpoints shall be made for every 100 m. If areas of special interest are detected, the distance shall be significantly reduced.

4.8.9 Fibre rope
Fibre ropes shall be 100% visually examined of the rope, with a focus on the following items:
— external wear
— deformation
— termination area.

4.8.10 In addition to [4.8.9] 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.

4.8.11 For acceptance/rejection criteria the following standards shall be used as guideline:
— for fibre rope: DNVGL-RP-E304
— for chain: [4.8.1] 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.

4.9 Complete periodical survey – fatigue design life factor 3

4.9.1 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)
— DNV-OS-E301 Position Mooring, dated June 2001 (Design life factor 3).

4.9.2 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.

4.9.3 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, and 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 with respect to fatigue for various reasons, then this line is also to be inspected
— the most slack line (leeeward 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
4.9.4 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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4.9.5 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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4.9.6 All the remaining lines shall be surveyed with the results from the two lines taken up for inspection (see [4.9.4]), 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.
— 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.

4.9.7 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 [4.9.5].
— 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.

4.9.8 The inspection shall be more detailed and include MPI if the ROV inspection reveals defects that are considered as critical, i.e. cracks, severe pitting and wear and tear.

4.9.9 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.

4.10 Complete periodical survey – fatigue design life factor 5 or greater

4.10.1 The requirements in [4.10] 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)
— DNV-OS-E301 Position Mooring, dated June 2001 (design life factors 5 – 8).

4.10.2 For assumptions and conditions for acceptance of approach, see Table 1.

4.10.3 All mooring lines shall be inspected offshore by use of ROV, and/or divers, 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.
4.10.4 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.

4.10.5 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 utilised 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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4.10.6 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.

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4.10.7 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.

4.10.8 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.

4.10.9 All recorded damages to wire and fibre ropes shall be subject to assessment by competent personnel provided by owner, as well as DNV GL.

4.10.10 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.

4.10.11 A more extensive scope may be required if findings are observed.
Where accessible, NDT to be taken of the links closest to the stopper to check for cracks caused by out of plane bending (OPB). A plan for NDT shall be included in the owner’s inspection programme.
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-OS-E301, October 2013, Edition.
For these units, new OPB calculations based on the actual measured dimensions of the link, combined with actual unit movements/link movements in operation, may be required on a case by case basis.

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4.10.12 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.
4.10.13 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.

4.10.14 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.

4.10.15 Additional requirements – tropical waters only
For units located in tropical waters, or waters with a history with high risk of MIC, more extensive chain measurements than described in [4.10.3] to [4.10.5], shall be taken.

**Guidance note:**
For areas considered tropical waters the ILLC 1966 definition apply. For units located in the outer edges of the chart zones, or for which other presented and comparable field data clearly indicate a more normal corrosion/MIC rate, the additional requirements may be waived on a case by case basis. In addition for unit inside the tropical zone for which the measurement results from 1st complete survey show a corrosion/MIC rate and extent considered to be in line with project estimates, the additional scope may be waived for further complete surveys.

---end---of---guidance---note---
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 90° 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---

4.11 Complete periodical survey – additional requirements for thruster assisted systems

4.11.1 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.

4.11.2 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.

4.11.3 Emergency stop of position mooring thrusters from position mooring control centre to be tested.
4.11.4 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.

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4.11.5 Alarm for loss of position and heading out of limit shall be demonstrated. Line break alarm shall be tested.

4.11.6 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.

4.11.7 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.

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4.11.8 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.

4.11.9 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 programme 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 units which have redundancy requirements in thruster systems, power systems and/or control systems as part of their mooring analysis. If the unit 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.

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4.11.10 Correct functioning of the consequence analysis facility shall be verified as far as possible.
4.11.11 It shall be verified that the unit operates in the correct position mooring control system mode vs. operation mode.

4.12 Mooring integrity management

4.12.1 In case a mooring integrity management (MIM) programme is developed for the unit and this have been subject to class review and approval, this programme shall be followed instead of the listed requirements to annual and complete surveys as described in sub-section [4.4] to [4.11].

4.12.2 A MIM programme 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 programme.

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.

4.12.3 The MIM programme shall be surveyed and audited at each annual survey.

5 Dynamic positioning systems

5.1 General

5.1.1 These rules do not include verification of requirements or recommendations in regard to the units operation or other characteristics.

5.1.2 The requirements in this sub-section apply to units with class notation DYNPOS, DP or DPS.

5.2 Specific requirements

5.2.1 Qualifier (A)
For all units with additional class notation qualifier (A) attached to the dynamic positioning class notation, both the annual survey and the complete survey shall be carried out in accordance with the requirement for complete survey, as given in [5.3].

5.2.2 An updated FMEA report with a corresponding FMEA test programme shall be kept on board, and shall be used as basis for the testing.
5.2.3 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 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 DP mode is taking into use.

5.3 Annual and complete survey

5.3.1 Annual and complete surveys shall be according to DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [12]

5.3.2 Dynamic positioning continuous arrangement
Dynamic positioning continuous (DPC) arrangement is offered as an integral part of classification compliance for optional class notations DYNPOS(AUTR), DYNPOS(AUTRO), DP(2), DP(3), DPS(2), DPS(3), DYNPOS(E) and DYNPOS(ER) through the alignment and integration of classification requirements with an approved and implemented test programme. DPC allows the owner to arrange parts of the test scope required during annual and complete survey as defined in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [12] on a continuous basis. The main objective is to reduce out of service time and limit the impact of the testing.

 Guidance note:
It is recommended to align test activities with relevant inspection and/or maintenance tasks on the same equipment and/or system.

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Smaller parts of the test scope can be performed by owners qualified personnel on board. All activities shall be implemented and followed up in a CMMS or other application.
Test results shall be satisfactory documented and registered in CMMS. Test results shall be registered and documented by pictures, video and/or diagrams exported from the test control system.
Testing to verify DP redundancy, independence, separation, and system function in relation to control and protective functions on a system level, shall be surveyed by the Society.
The alternative test arrangement is subject for the Society's approval.
The approval shall include a documentation review covering:
— test programme detailing test scope and parts to be covered by the owner
— required qualification (competence) level of personnel to perform the testing
— requirements for reporting and handling of findings
— test activities (procedures) implemented in CMMS.
The alternative test arrangement and results from the test programme shall be subject for an audit by the Society during annual survey, see DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [12].
The audit shall include an examination of:
— test records in CMMS
— test documentation and reporting
— personnel qualification records (compared to test records)
The result from the verification shall together with results from testing performed by the Society give the basis for crediting the annual and/or complete survey.
If it is not properly demonstrated that the test programme have been correctly performed and according to approved procedures, the Society may require re-testing of parts performed by the owner.

5.3.3 Alternative testing methodology
For alternative test methodology see Ch.2 Sec.2 [6.2.4] for more information.
6 Drilling plant

6.1 Application

6.1.1 The requirements in [6] apply to units with class notation **DRILL**.

6.1.2 Well testing equipment survey as described in [6.4] is applicable for units with additional notation **DRILL**, **WELL** and **WELLTEST**.

6.1.3 Additional requirements for the qualifier (N) are given in DNVGL-SI-0166 Ch.3.

6.1.4 Additional requirements for the qualifier (US) are listed in [6.6].

6.1.5 Scope
The systems covered in the survey include the following:

— hoisting, rotating and handling systems, see DNVGL-OS-E101 Ch.2 Sec.6
   — drilling structures
   — hoisting and rotating systems
   — heave compensation and tensioning systems
   — drilling and well intervention equipment handling systems
   — other drilling equipment (winches, gear transmissions, man-riding equipment).

— well pressure and flow control systems, see DNVGL-OS-E101 Ch.2 Sec.7
   — bulk storage, drilling fluid mixing and circulation, and cementing systems
   — well control systems
      — well influx prevention - drilling fluid circulation and cementing systems
      — well influx management & well shut-in and disconnect
      — well influx relief - diverter systems
      — well normalising - chock and kill systems
      — drilling riser system
   — well test systems, see DNVGL-OS-E101 Ch.2 Sec.7 [8].

**Guidance note:**
For further details on the systems, see DNVGL-OS-E101.

6.1.6 Where third party equipment (TPE) is used to support the drilling operation it shall be surveyed with regard to its inherent safety and the interface between the unit and the equipment.

**Guidance note:**
The following equipment may fall into this category:

— mud logging
— wireline
— casing running equipment
— measurement/logging while drilling
— ROV.

Further guidance can be found in DNV-OTG-05 Temporary equipment on offshore installations.
6.1.7 Well test equipment
Temporary well test equipment and systems shall be design approved and surveyed after installation on board and before any well test operations are commenced. For survey requirements see [6.4].

6.1.8 For well test equipment permanently installed on the unit, the individual items shall be surveyed using the descriptions of [6.4] as annual survey scope.

6.2 Annual survey

6.2.1 Objective
The intent of the annual survey is to get a sufficient understanding of the condition of the equipment without intrusive interventions, given that the unit is in operation. It is assumed that normal operations are ongoing.

6.2.2 Scope
The extent of the annual survey shall be as follows:
— Spot check review of the unit’s records of the 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 and testing as required. Non-destructive testing may be required, as considered necessary by the surveyor.
Where records are available showing that the items listed below have been recently tested by the crew, these may be considered by the surveyor.

Guidance note:
Further guidance can be found in DNVGL-OTG-07 Guidance on DNV GL’s DRILL notation.

6.2.3 General requirements
During annual survey it is acceptable that the test pressure to which the BOP and the HP pipelines, choke and kill manifold have been tested to is limited to that appropriate to the well conditions, i.e not maximum working rated pressure.

6.2.4 Any changes to the systems (new equipment and overhauls, repairs and modifications) shall be surveyed and the relevant documentation to be reviewed.

6.2.5 The surveys shall be based on the OEM recommendations and recognised standards. Any deviations from these shall be justified by technical arguments.

6.2.6 Drilling structures – hydraulic cylinder based (Ramrig™/cylinder hoisting rig) or conventional derrick
A general visual survey shall be carried out with emphasis on the structural condition of footings, bracings and with respect to deformation and loose bolts (if of bolted design). Visual spot check of skids and brackets for lifting purposes in derrick, moonpool and drill floor.

6.2.7 Blowout preventing equipment
BOP systems shall be surveyed visually as far as practicable. Test records for periodical function and pressure testing of the blowout preventer system shall be reviewed.
6.2.8 Blowout preventing, control equipment
Records of the precharge of the accumulators shall be reviewed. Spot check review of calibration certificates for safety valves shall be carried out.

6.2.9 Diverter unit, equipment and control equipment
The diverter system shall be visually surveyed and inspected for corrosion, cracks and wear. Function test records and maintenance records to be reviewed.

6.2.10 Choke and kill equipment and control equipment
High pressure choke, kill and booster piping systems including flexible hoses shall be externally surveyed for corrosion and damage. Thickness measurement records shall be available upon request.

Guidance note:
High pressure piping is defined in Chapter IX of ANSI/ASME B31.3 to be piping with a piping class larger than ASME B16.5 CL2500 (PN420) classes. The API piping classes are all high pressure piping. Typical high pressure piping is choke and kill lines.

6.2.11 Test records for periodical function and pressure testing of the choke and kill manifold and piping including HP flexible hoses, shall be reviewed.

6.2.12 Marine riser, equipment and control equipment
Marine riser joints, telescopic joint, ball joint, spider and support ring (as far as accessible) shall be visually surveyed and inspected for leakages, corrosion, cracks and wear.

6.2.13 Heave compensation
All heave compensation systems, including accumulators, mountings, piping and possible insulation shall be visually surveyed during normal operation as far as possible. Spot check review of calibration certificates for safety valves.

6.2.14 Tensioning systems
All tensioning systems, including accumulators, wire ropes, sheaves, cylinders, mountings, piping and possible insulation shall be visually surveyed during normal operation as far as possible. Spot check review of calibration certificates for safety valves.

6.2.15 Hoisting system – hydraulic cylinder based (Ramrig™/cylinder hoisting rig) or conventional
Main hoisting systems shall be surveyed visually during normal operations. Spot checks of safety devices and emergency stop functions shall be carried out. Wire ropes (including end attachments) and sheaves shall be surveyed.

6.2.16 Hoisting and rotating equipment
Visual survey of the drawworks, crown block, travelling block, top drive, dolly, elevators, elevator links and rotary table shall be carried out. Spot check SWL marking on individual components. Review maintenance records on equipment, calibration reports for dead line anchor, crown and travelling block sheave groove measurements and NDT reports (i.e elevator links and load carrying equipment). Review certificates and NDT/inspection records on loose gear (lifting gear).

6.2.17 Blow out preventor and x-mas tree handling
Blow out preventor (BOP) and x-mas tree handling systems shall be surveyed visually as far as practicable. Spot checks of safety devices and emergency stop functions shall be carried out.
6.2.18 Pipe, riser handling and miscellaneous lifting appliances
Pipe, riser handling systems and appliances for lifting purposes shall be surveyed visually as far as practicable. Spot checks of safety devices and emergency stop functions shall be carried out.

6.2.19 Bulk storage, drilling fluid circulation and mixing
High pressure piping systems for well circulation systems including flexible hoses shall be externally surveyed for corrosion and damage. Thickness measurement records shall be available upon request. Spot check review of calibration certificates for safety valves shall be carried out.

Guidance note:
High pressure piping is defined in Chapter IX of ANSI/ASME B31.3 to be piping with a piping class larger than ASME B16.5 CL2500 (PN420) classes. The API piping classes are all high pressure piping. Typical high pressure piping is choke and kill lines.

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

6.2.20 High and low pressure mud pumps and mud return system shall be visually surveyed during normal operation. Spot checks of calibration of tank level indicators, flow meters and alarms shall be carried out.

6.2.21 The maintenance and test records on the Inside BOP valves shall be reviewed.

6.2.22 Cementing
Cement pump and high pressure components, incl. piping system, to be surveyed visually. Review maintenance records, pressure test records and calibration certificates for safety valves. Certificates of cement pump equipment as described in DNVGL-OS-E101 to be reviewed. Emergency stops to be tested (as far as practicable, if not review records).

6.2.23 Manriding equipment
Personnel and utility hoisting equipment; baskets, stabbing boards and winches including wires and sheaves, shall be visually surveyed. Spot checks of safety devices and emergency stop functions shall be carried out. SWL marking shall be confirmed to be legible.

6.2.24 Control systems
At the annual survey a review of documentation of alarm testing of the control systems shall be carried out. In addition, random testing of alarms that can be tested without interfering with operations to be carried out to the surveyors satisfaction.

6.3 Complete survey

6.3.1 Objective
The intent of the complete survey is to confirm that the equipment and systems are fit for operation for another 5 years.

6.3.2 Scope
More intrusive inspections and more rigorous testing will be carried out. Normally items will be tested to their original design limits.
Original certificates for category I equipment and records of the routine inspections/tests and the maintenance/repair/overhaul records shall be presented for review. Review calibration certificates for safety valves. Emergency stops to be tested.

Guidance note:
Further guidance can be found in DNVGL-OTG-07 Guidance on DNV GL’s DRILL notation.

---end---of---guidance---note---
6.3.3 Drilling structures – hydraulic cylinder based (Ramrig™/cylinder hoisting rig) or conventional

Derrick/guiding tower installations shall be examined. Reports for derrick bolt torque/pre-tension checks shall be presented. Thickness measurements may be required. 100% NDT of derrick/guiding tower footings shall be carried out. The torque of the foundation bolts shall be confirmed. If the derrick has welded foundation, NDT shall be carried out.

Guidance note:
NDT and foundation bolt check may be waived depending on design.

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Skids and brackets for lifting purposes in the derrick, moonpool and drill floor etc. shall be visually surveyed/confirmed to be in order. NDT and/or thickness measurements may be required according to surveyor’s satisfaction.

6.3.4 Blowout preventing equipment

Overhaul of the BOP assembly shall be carried out at intervals of 5 years, in accordance with an overhaul plan based on the condition of the BOP. The overhaul plan shall be presented for review prior to the work being carried out. Records of overhaul shall be kept on board and shall be reviewed. The blow-out preventer system shall be subject to complete strip down, internal visual inspection and dimensional check, reassembly and performance test, including pressure testing of each pipe ram, annular, choke and kill valves, control system and piping systems (low pressure and maximum rated working pressure, as applicable). 25% of the clamps shall be opened and inspected dimensionally and by NDT.

Test stump shall be NDT checked.

Guidance note:
Typically the BOP will be stripped down, internally inspected, dimensionally checked to the OEM’s specification. See also DNVGL-OTG-07, DNV-RP-E101 and DNV-RP-E102 for further guidance especially where the items are overhauled at an onshore facility, and/or where weld repairs are needed.

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6.3.5 Blowout preventing, control equipment

Pressure vessels shall be surveyed internally. If internal survey is not practical, base the examination on thickness measurements as described in [6.3.7]. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed.

6.3.6 All emergency disconnect system (EDS) sequences to be function tested. Test may be done at surface or subsea.

6.3.7 Thickness measurements shall be carried out and compared with the minimum strength thickness. Piping systems including flexible hoses shall be pressure tested to the maximum working pressure.

6.3.8 Capacity test of the pump unit with accumulators shall be carried out. The time to recharge the unit from precharge pressure to normal operating pressure shall be measured using both power systems one at a time (cf API 16D).

6.3.9 All BOP control panels shall be function tested, incl the acoustic panel (where fitted). Capacity test of BOP control system UPS to be carried out. Sample alarms shall be tested, including:

— low accumulator pressure
— loss of power supply
— low levels in the control fluid storage tanks
— loss of communication (multiplex control systems)
— UPS alarms:
  — loss of input power and internal failure
  — loss of battery back-up of BOP.

6.3.10 Where fitted Autoshear and Deadman systems, see API Spec 16D (2nd edition, July 2004) Ch.5 [9], shall be tested on subsea stacks.

6.3.11 On subsea BOPs where Remote Operated intervention capability (ROV) exists it shall be tested.

6.3.12 Diverter unit and control equipment
PT or MT methods shall be used to investigate critical areas such as for instance connector/main pipe welds for cracks. Thickness measurements of piping and housing to be carried out as found necessary. Full function testing from all diverter panels to be carried out. Test of interlocks to be carried out from all control panels. Verify the response time is within acceptable limits, e.g. API Spec 16 D/DNVGL-OS-E101.

6.3.13 Choke and kill equipment
Thickness measurements of choke and kill equipment shall be carried out and compared with the minimum strength thickness. NDT to be carried out on critical areas if found necessary. Choke and kill lines, hydraulic lines and booster line, shall be pressure tested to the maximum allowable working pressure.

6.3.14 Choke and kill manifold and piping shall be subject to complete performance test to maximum allowable working pressure of each applicable valve configuration. Pressure test at low pressure and maximum rated working pressure on upstream high-pressure manifold valves. Function testing of remote operated valves and chokes to be carried out. Opening of valves (approx 10%) for internal inspection by the surveyor shall be carried out. All choke valves (manual or remote) to be opened for internal inspection.

6.3.15 Marine riser, equipment and control equipment
PT or MT methods shall be used to investigate critical areas such as for instance connector/main pipe welds for cracks. Choke and kill lines, hydraulic lines and booster line shall be pressure tested to the maximum allowable working pressure. Thickness measurements shall be carried out and compared with the minimum strength thickness. The riser shall be surveyed with the buoyancy elements removed.

  Guidance note:
  Approved service suppliers can apply automated inspection techniques (internal pig) without dismantling buoyancy elements or clamps. Operational work procedures for each NDT method to be approved and tested. For more information about DNV GL approval of service supplier scheme see DNVGL-CP-0484.

6.3.16 For units where the riser joints are sent ashore routinely for overhaul the records of the overhauls ashore shall be presented.

6.3.17 Slip joint rubber goods and packers shall be replaced following the manufacturer’s recommendation. Records to be reviewed shall show that this has been done at the proper intervals. Thickness measurements of the barrel shall be taken and compared with the min. strength thickness. Function test of packers and locking dogs to be carried out. Pressure test of control lines to maximum allowable working pressure.

6.3.18 For a riser joint with fill valve the inspection is as for a standard joint plus NDT of the cut-out for the fill valve. Records of testing of the valve to be reviewed.
6.3.19 On the riser support ring, NDT of high stressed areas shall be carried out and the last overhaul report shall be reviewed.

6.3.20 For the goosenecks on the riser thickness measurements shall be taken and compared with the min. strength thickness.

6.3.21 Ball joint and flex joint shall be stripped down, examined visually, NDT of the critical areas and dimension checks to be carried out and compared with OEM dimensions.

6.3.22 Heave Compensation

Thickness measurements shall be taken and compared with the min. strength thickness. Pressure vessels shall be surveyed internally e.g by borescope. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed. Calibration certificates for all safety valves shall be presented.

6.3.23 Piping systems including flexible hoses shall be thickness measured and compared with the min. strength thickness. Flexible hoses shall be visually surveyed, both internally and externally.

6.3.24 On compensators with chains the chain extension shall be checked, where fitted wires shall be examined.

6.3.25 For active heave compensation systems the overload protection system shall be surveyed.

6.3.26 NDT of the fixation of the foundation shall be carried out.

6.3.27 Where fitted, anti recoil valves (e.g Olmsted/slingshot valves) shall be overhauled and tested.

6.3.28 Sheaves shall be visually surveyed and checked by NDT.

6.3.29 For active heave compensation systems, perform a motion compensation function test, see OEM recommendations.

6.3.30 Check the records of refilling of the hydraulic system to confirm the condition of the system regarding the internal leakage rate.

6.3.31 Tensioning Systems

The tensioner oil analysis results shall be reviewed (for lack of explosive capability), the records of sheave wear measurement shall be reviewed, and the ton mile records for the rope shall be reviewed. The termination of any tensioner ropes shall be surveyed. The foundations of the tensioners shall be surveyed and NDT shall be carried out.

6.3.32 Thickness measurements shall be taken and compared with the min. strength thickness. Pressure vessels shall be surveyed internally e.g by borescope. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed.

Compressors shall be run, tested and the record of overhaul of the relief valves shall be checked. Where fitted, anti recoil valves (e.g Olmsted/slingshot valves) shall be overhauled and tested.
Tensioning system to be function tested. Pistons shall be fully extended to allow examination of the surface condition of the piston rod.

6.3.33 For cylinder type/direct acting tensioners the foundations shall be NDT checked. Turn down sheaves shall be examined and NDT checked.

6.3.34 The control system shall be tested to prove that riser break and/or riser tensioning cylinder break indicators are in order.

6.3.35 Where a top tension system is fitted (e.g. on a self-elevating unit or a floater with a surface BOP) the system shall be surveyed. The hang off support points on the units structure shall be NDT inspected. The hydraulic system shall be surveyed and the control panel checked.

6.3.36 Hoisting system – hydraulic cylinder based (Ramrig™/cylinder hoisting rig) or conventional NDT of main hoisting system, lifting appliances and deadline anchor shall be carried out.

Thickness measurements may be required. API RP 8B may be used as reference. If hoisting system is of a bolted design, all bolts shall be torque checked over a 5 year period.

Lifting appliances shall be load tested, as specified in DNVGL-OS-E101. Limit switches and safety functions to be tested. NDT to be carried out as deemed necessary. On the guide track check for wear, bent members, carry out NDT of structural supports and check for wear of rollers on the dolly. Check the centring of the drill pipe into the rotary when the dolly is extended. Review alignment reports.

6.3.37 For main structural parts of main hoisting system and lifting appliances where NDT is normally carried out, this NDT may be omitted if it can be documented that the following conditions are fulfilled:

— Accumulated fatigue damage is less than the calculated fatigue life of the component at the end of the 5 year period, based on logging of actual load cycles.
— Fatigue calculations and logging of load cycles shall be evaluated by DNVGL.
— The fatigue calculations shall comply with DNVGL-OS-C101 Ch.2 Sec.5 Fatigue limit states. The calculations should include the design fatigue factors (DFF) as given in DNVGL-OS-C101 Ch.2 Sec.5 [1.2].
— There is no previous history of cracks in the particular area.
— The remaining fatigue life is sufficient for the period until next complete survey.
— If NDT has been omitted at one complete survey then it will normally have to be done at the next complete survey.

Guidance note:
If NDT is to be omitted the logging equipment and the fatigue calculations should be made available for review at the fourth annual survey or earlier.

6.3.38 Function test hydraulic cylinder based hoisting system. Pressure test pipework and cylinders to maximum allowable working pressure. Thickness measurements shall be taken and compared with the minimum strength thickness. Main control valve blocks shall be overhauled, unless equivalent solution can be documented and accepted.

6.3.39 The failure mode, effect and criticality analysis (FMECA), where applicable, for the drawwork shall be reviewed and inspections carried out based on the info in this document.

6.3.40 The crown saver and floor saver functions shall be tested.

6.3.41 NDT of high stressed areas on the riser spider to be carried out. Review overhaul report.
6.3.42 NDT of the main structural parts of main hoisting system shall be carried out. Thickness measurements may be required. API RP 8B may be used as reference. Any deviations from API RP 8B shall be agreed with the OEM and DNV GL.

6.3.43 Rotating equipment
The top drive shall be overhauled. The main load path shall be checked by NDT. OEM recommended tolerance measurements shall be taken and compared with the allowable. The top drive gooseneck shall be thickness checked, and the results compared with the min. strength thickness.

6.3.44 Pipe and riser handling
Load testing, function test of limits/safety functions and NDT shall be carried out as required. Runway beams to be surveyed.

6.3.45 Anti collision functions of the pipe handling system with the top drive to be confirmed.

6.3.46 The gripper function/head shall be specially surveyed.

6.3.47 Spot checks of safety devices and emergency stop functions shall be carried out. Emergency manoeuvring system to be tested. Loss of main power battery back-up pipe handling magnets to be tested.

6.3.48 Blow out preventer and x-mas tree handling
NDT for main structural parts of main hoisting system and lifting appliances shall be carried out. Thickness measurements may be required. API 7L may be used as guidance.

6.3.49 Lifting appliances shall be load tested, as specified in DNVGL-OS-E101.

6.3.50 Movable lifting appliances for BOP and/or x-mas tree shall be load tested, including travelling the full length of supporting rails (or similar). The hooks shall be NDT checked. The condition of the hoisting and transport system shall be confirmed. NDT may be required on the support structure for the BOP hoist/transport system. However, where the BOP or x-mas tree is supported at its base, i.e skidded handling device without lifting capabilities, these need not be overload tested.

6.3.51 Emergency manoeuvring system to be tested.

6.3.52 Safety features
Safety features (i.e. emergency stop, brakes, slack wire detection, limit switches, etc. as applicable) on winches to be tested. Personnel protection shielding on winches to be surveyed.

6.3.53 Bulk storage
Pressure vessels shall be surveyed internally. If internal survey is not practical, thickness measurements shall be taken and compared with the min. strength thickness. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed. Calibration certificates for all safety valves shall be presented.

6.3.54 Foundations to be visually surveyed and NDT checked as required.

6.3.55 A function test of the bulk control system shall be carried out.
6.3.56 Piping systems for bulk transport including flexible hoses shall be pressure tested to the maximum working pressure. Thickness measurements shall be taken and compared with the min. strength thickness. Flexible hoses shall be visually surveyed internally. The routing of the relief line from the safety valve shall be surveyed. The system for ensuring the relief line is unobstructed shall be checked.

6.3.57 Drilling fluid circulation and mixing
Thickness measurements of the piping systems shall be taken and compared with the min. strength thickness. Flexible hoses shall be visually surveyed internally. Piping systems including flexible hoses and manifolds shall be pressure tested to the maximum allowable working pressure.

6.3.58 The mud pump system maintenance records shall be reviewed with particular attention to the power transmission system from the electrical motor to the pump. The bearing clearances on the crankshaft shall be reviewed. The records of mud pump discharge safety valve testing shall be reviewed. Documentation of replacement mud pump modules shall be reviewed. Where pulsation dampers are welded, NDT shall be carried out of any welding (e.g. circumferential weld on the damper body). Records of pre-charge pressure shall be reviewed.

6.3.59 10% of the standpipe manifold valves shall be opened for inspection, thickness check and NDT of welds. If the standpipe is heat traced then check for corrosion under the tracing.

6.3.60 Records for replacement of the rotary/mud hoses to be reviewed. Thickness measurements of the gooseneck on the standpipe shall be taken and compared with the min. strength thickness.

6.3.61 NDT and pressure testing to max. WP shall be carried out on Kelly cocks and inside BOP valves, and LP testing sealing to be confirmed. The operability of these valves to be confirmed.

6.3.62 Degasser shall be surveyed internally visually. Thickness measurements to be taken as deemed necessary.

6.3.63 Dump valves in the mud return system shall be confirmed operable, thickness checks of mud pits shall be carried out. On the trip and active tank the level alarms shall be confirmed to be in order.

6.3.64 Cementing
Cement pump fluid ends shall be surveyed and checked for cracks in critical areas. Thickness measurements to be carried out. Calibration certificates for all safety valves shall be presented. Safety functions to be tested, including running the cement system as emergency mud circulation system, where applicable. Where pulsation dampers are welded, NDT shall be carried out of any welding (e.g. circumferential weld on the damper body). Documentation of maintenance of articulated piping shall be reviewed.

6.3.65 Function test to be carried out.

6.3.66 Thickness measurements shall be taken and compared with the min. strength thickness. Flexible hoses shall be visually surveyed internally. Piping systems including flexible hoses shall be pressure tested to the maximum working pressure.

6.3.67 Since cement pumping units are often rented in from specialist third parties the records of the third party’s maintenance shall be reviewed, with attention to safety functions, shut downs etc. The location and arrangement of the discharge of the relief valves shall be surveyed with regard to avoiding danger to people
working near the unit. Where the cement unit is also the emergency mud pumping system the independence of the start air system from the unit’s air system shall be confirmed.

6.3.68 The remote control system (if fitted) on the cement pump unit shall be confirmed to be in order.

6.3.69 Manriding and miscellaneous lifting equipment
Personnel hoisting equipment and utility winches for lifting purposes shall be load and function tested as specified in DNVGL-OS-E101 Ch.2 Sec.6 [5]. Safety devices described in DNVGL-OS-E101 Ch.2 Sec.8 [3] to be tested. NDT of main load path to be carried out, including foundation of equipment. Adjustment of the regulator for the tension/lifting capacity to be checked. Emergency recovery to safe position within 10 minutes to be confirmed.

6.4 Well test equipment survey

6.4.1 Objective
Permanent or temporary installation covering well testing, production clean-up or any other operation where a hydrocarbon-flow is handled by other systems then the degasser shall be designed and approved according to requirements in DNVGL-OS-E101.
When the installation has been design approved it shall be verified by an occasional well test equipment survey. The intent of the survey is to get a sufficient understanding of the condition of the installation without intrusive interventions. It is assumed that normal operations are ongoing.

6.4.2 Scope
Well test related equipment, structures and systems shall be surveyed, with particular attention to the safe operation, fire or explosion hazards and personnel protection. The extent of the well test equipment survey shall include testing, verification of documentation and visual examination with focus on the following:
— installed equipment and piping systems
— area classification (and EX protection of equipment)
— location assessed in relation to air intakes, lifeboats, control room etc.
— deluge and passive or active fire protection
— drain system
— fire and gas detection system
— ESD/PSD and safety philosophy
— structures and deck loading
— sea fastening of equipment.

Guidance note:
Further guidance can be found in DNVGL-OTG-11 Guidance on Well Test Equipment survey.

6.4.3 Documentation
Following to be verified and available on board:
— DNVGL certification for installed well test equipment, see DNVGL-OS-E101 Ch.3 Sec.3.
— Survey statements for installed well test equipment not older than 5 years.
— Test records for pressure vessels and separator safety valves.

Guidance note:
Examination of the well test equipment is applicable for choke manifold, heat exchanger, pressure vessels, separators, chicksans, flexible hoses, air compressors, steam generators, surface test tree, surface safety valve, and control and monitoring systems. Safety valves are normally re-calibrated at max. 12 months intervals.

---end---of---guidance---note---
6.4.4 Well test equipment installation
The installation of well testing equipment shall be subject to visual examination to confirm correct installation according to approved documentation. Satisfactory function and pressure testing to be carried out when relevant and found necessary.
Following to be verified:
— sea fastening of the equipment
— deck loading limits
— sufficient bunding and drip trays around the well test area/equipment and drain system to collection tank

Guidance note:
Drains in well test area should have no connections to non-hazardous drain systems or direct to sea. Bunded area and drainage system shall be able to handle flooding due to fire water release. Usually this is verified by a wet test.

— layout and equipment installation according to hazardous area zones. Ex-certification for the electrical equipment and cables in compliance with hazardous area
— emergency escape routes from well test area and emergency exit from control station.

6.4.5 Flare boom
The flare boom installations shall be examined, with emphasis on structural condition of footings, bracings and with respect to deformation and loose bolts (if of bolted design). Condition of burner heads and connected piping to be verified. Thickness measurements may be required.
Load test of the flare boom to be carried out to a load corresponding to the weight of the burner head and 1 person with a safety factor of 1.25. Function test of installed water cooling system to be carried out. Sufficient protection measures related to heat radiation from the burners to be verified.

Guidance note:
See DNVGL-OS-E101 Ch.2 Sec.8 [3.4.10] for the overload factors.

6.4.6 Pressure vessels
Pressure vessels, separators and heat exchangers shall be subjected to visual inspection. Internal inspection or thickness measurements and/or crack detection test, to be performed if deemed necessary. Visual examination of related equipment such as valves, piping and fittings shall be carried out. Pressure testing to rated working pressure shall be carried out. Separate steam generators for the well test equipment installation shall be verified.

6.4.7 Piping
Pressure test to be performed to maximum working pressure of the entire piping system, including flexible pipes/chock manifold, heat exchanger, separator etc.
Examination of pipe supports particularly in way of the bends/constrictions. Spot-check of wall thickness in way of bends/fitting/constrictions to be performed if deemed necessary.
Correct setting (set point) of relief valves shall be confirmed.

6.4.8 Fire and gas detection system
Fixed gas detection units for HC and/or H2S in the well test area to be function tested. (Connected to the unit ESD system).
Portable gas detection units for HC and/or H2S to be function tested and last calibration confirmed. F&G detectors and manual call point(s) related to the well test installation to be function tested.
Any component/unit connected to the well test equipment installation with integrated F&G system to be function tested and connection to the Unit (MCC) verified.

### 6.4.9 Control and monitoring system
PSD system to be function tested. Interface between the PSD and the ESD system to be verified. Blow down (BD) system activation to be tested.

**Guidance note:**
ESD on the unit should activate total production shutdown (PSD) of the well test equipment installation (plant).

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

### 6.4.10 Fire protection
The fixed water protection (cooling) systems in well testing area shall be examined and tested.
Deluge system to be examined and function tested (wet testing), both mounted on components/equipment and permanently installed in the well test area.
Fire monitors covering the well test equipment to be examined and function tested (wet testing), both fixed and temporarily installed.
Temporary or fixed facilities for foam to be function tested.

**Guidance note:**
Alcohol resistant foam is to be provided if methanol is used during the well test.

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

### 6.5 Marine riser management

#### 6.5.1 Application
Riser management (RM) is applicable for units with DRILL notation and it applies to elements of the marine riser system, e.g. riser joints, telescopic joints, ball/flex joints, etc. which are part of the drilling items registered to the unit.
RM is an alternative systematics offering methodologies to assess and plan riser maintenance and inspection. When RM has been implemented successfully on a unit, this will give an alternative to the traditional survey given by fixed intervals in [6.3] related to marine riser systems. Required inspection will be performed according to the approved systematics and/or intervals given in the updated inspection programme. The methodology shall include systematics follow up and continuous monitoring of the risers.
RM can be established based on different levels of information and type of methodology. Main objective is to monitor all relevant failure modes with associated degradations and assure sufficient control and required level of integrity.

#### 6.5.2 Methodology
To obtain an acceptable level of riser management it is recommended to apply alternative methodologies to register operational history of each riser and apply this to determine sufficient inspection and follow up.
The following methodologies are available and can by applied separately or in combination:
- riser wet days, see [6.5.3]
- fatigue life utilisation, see [6.5.4].

#### 6.5.3 Riser wet days
Riser wet days’ methodology is based on registering actual number of days the riser is used (wet days). The number of days will trigger when the riser need to be inspected and maintained.
The methodology requires special adapted storage and preservation in periods between use (wet days).
Inspection intervals shall be limited to 1825 days (5 years) counting actual number of days the riser has been used and the methodology allows for a survey prolongation of maximum 10 years. Fatigue utilisation
design basis shall be considered for the applicable riser design when determining relevant maximum number of wet days.

Guidance note:
Fatigue utilisation consideration shall be evaluated typically with regards to the specific riser component design, historical utilisation, operating location and environmental loads.

An alternative to limit the maximum number of wet days based upon fatigue utilisation design may be to document an average utilisation during normal operation (in a 5 year period) for a typical marine riser.

---end---of---guide---note---

6.5.4 Fatigue life utilisation
Fatigue life utilisation methodology is fatigue analysis based on actual riser condition and usage. The results from the analysis will give the inspection intervals. The analysis shall be based on operational data like (not limited to):

— wave characteristics
— riser tension
— water depth
— riser location in string
— other environmental influence
— type of drilling operations
— riser movement (sensor data).

Operational data applied in the analysis shall be quality assured.

Guidance note:
Missing or lack of data and/or insufficient data quality shall result in a conservative data input. For further guidance on data quality see also DNVGL-RP-0497.

---end---of---guide---note---

Based on operational data and design specifications the fatigue utilisation shall be calculated for each riser joint. The results shall be applied in establishing a detailed risk based inspection (RBI) programme.

The programme shall be based on basic requirements detailed in [5.3.15] to [5.3.21].

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.

---end---of---guide---note---

Fatigue utilisation methodology can be applied in combination with the riser wet days' systematics.

6.5.5 Riser monitoring
The RM systematics shall include automated realtime monitoring of the risers. The monitoring shall be controlled by an application for registration (tracking) of operational time in water and time in storage. The application shall have functions like (not limited to):

— register (realtime) location of all marine risers registered to the unit
— provide access control to assure that changes to the system cannot be made by unauthorised personnel and assure that any input will be traceable to the individual user. DNV GL need to have access to the application and relevant data
— provide access to applicable documentation for each riser
— back up of data.
Guidance note:
Application for monitoring of the risers shall have logging capabilities according to applicable methodology. If the risers are part of a centralised group of risers applied on several units under same management, the application shall have capabilities to display and log location associated with the specific units it is (and have been) applied on. See also Spare part management, see Ch.2 Sec.1 [4.3]

6.5.6 Preservation
Preservation to be performed according to OEM recommendations or other specialist company.

Guidance note:
For further guidance on preservation see also DNVGL-RP-0290.

6.5.7 Inspection and maintenance
Inspection and maintenance shall follow general requirements as specified in [5.3.15] to [5.3.21]. Inspection and maintenance tasks shall be performed before and after preservation. Inspection and maintenance tasks shall be available in CMMS.

Guidance note:
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.

When developing the maintenance programme, it is recommended to apply standard maintenance terminology see EN 13306: Maintenance terminology, or equivalent.

The methodology shall also include a continuous inspection systematics to assure sufficient condition. This inspection shall be both internal and external with focus on corrosion level, corrosion protection and other damages. Applicable acceptance criteria’s to be established.

Guidance note:
Continuous inspection systematics shall ensure sufficient condition of the risers and that the maintenance and preservation are working as intended. This activity typically includes a visual inspection performed on a continuous basis on a selection of risers to confirm internal and external condition.

If risers components are overloaded, the condition of the risers shall be evaluated. Inspection (NDT) and/or analysis should be considered to confirm the condition of affected components. Overloading shall be recorded in the RM application.

Thickness measurements (UTM) and non-destructive testing (NDT) on critical structure shall be performed on a 5 year (1825 days) interval following general requirements as specified in [6.3.15] to [6.3.21] or according to a RBI analysis see [6.5.4]. UTM and NDT shall be performed by an approved service supplier (AoSS) and according to specific approved procedures.

Guidance note:
Approved service suppliers can apply automated inspection techniques (internal pig) without dismantling buoyancy elements or clamps. Operational work procedures for each NDT method to be approved and tested. For more information about DNV GL approval of service supplier scheme see DNVGL-CP-0484.

6.5.8 Responsible person
The Owner shall dedicate a responsible person on board to be responsible for and ensure correct operations and quality of the approved RM. The responsible person shall be responsible for sufficient riser monitoring and correct follow up in accordance with approved procedures and systematics.
6.5.9 Approval process
The approval process includes the following activities:
— document approval
— verification of the systematics on board the unit (implementation).

6.5.9.1 Document approval
As part of the approval process the Owner need to submit documentation and procedures supporting a RM systematics including:
— methodology details
— riser monitoring details (application/software)
— preservation of risers (procedures long term/short term)
— inspection and maintenance (programme and procedures)
— CMMS information (type approval).

6.5.9.2 Implementation
Verification of the implemented systematics shall be performed to verify that the system has been implemented in accordance with the approved procedures and methodology.
The verification to be performed during the drilling plant annual survey [6.2.12] or complete survey [6.2.15].
During the survey, it shall be verified that the methodology is used as intended and that the responsible person have sufficient knowledge about the systematics. It is recommended that the RM has been operated for at least 6 months before the verification is carried out.

6.5.10 Cancellation of the RM
If the conditions for the RM are not complied with or in case of change of owner of the unit, the alternative methodology shall automatically be cancelled and substituted with survey requirements given in [6.3].

6.6 DRILL (US)

6.6.1 Scope
The survey items in this section covers the additional survey requirement of DRILL(US).

6.6.2 Annual survey
Verify independent third-party verification has been carried out.

Guidance note:
In order to verify the compliance of BSEE’s requirement 30 CFR part 250, par. 250.416(f).

6.6.3 Confirm there is procedure to follow up the latest update of the BSEE requirements.

6.6.4 Review records of inspections and test in case the blind-shear or casing shear rams have been activated in a well control situation during the past year.

Guidance note:
In order to verify the compliance of BSEE’s requirement 30 CFR part 250 par. 250.451(i)

6.6.5 Check existence and proper maintenance of a ROV.
6.6.6 Complete survey
Autoshear and deadman systems should be tested on subsea stacks.

**Guidance note:**
Autoshear and deadman systems are required for DP units, see DNVGL-RU-OU-0101 Ch.2 Sec.7 [6], and should be tested in accordance with BSEE’s requirement 30 CFR part 250 par. 449(k), 517(d)(9) and 250.617(h)(2).

6.6.7 On subsea BOPs remote operated ROV intervention capability should be tested.
The above test shall be performed during stump test covering at least one set of rams during the initial test on the seafloor.

**Guidance note:**
See BSEE’s 30 CFR part 250 par. 449(j), 517(d)(8) and 250.617(h)(1).

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 Well test

8.1 Application
The requirements in this sub-section apply to units with class notation **WELLTEST**.

8.2 Annual and complete surveys
Survey requirements given for well testing equipment in [6.4] shall be applied, as applicable.

9 Temporary oil storage

9.1 Application
The requirements in this sub-section apply to units with class notation **TEMPSTORE**.

9.2 Annual survey

9.2.1 The survey shall include a general examination of:
— cargo tanks, including verification of bulkheads with respect to tightness
— cargo pumping and piping systems
— ventilation system of the cargo pump room
— electrical equipment in gas dangerous zones
— inert gas system, if installed.

9.2.2 The following components of the cargo systems shall be surveyed and tested for correct functioning:
— pressure/vacuum relief valves
— emergency stop of pumps
— quick release of transfer hose
— cargo tanks overflow protection system (i.e. tank high level alarms).

9.3 Complete survey

9.3.1 All storage tanks shall be internally visually examined. Depending on the condition of the tanks, pressure testing may be required upon surveyors request, see Sec.1 [4.1.10]. If pressure testing is to be performed, the compartments are to be tested to their MARVS (Maximum allowable relief valve setting).

9.3.2 If fitted, heating coils, anodes, tank cleaning apparatus and other equipment in cargo tanks and cofferdams shall be surveyed. Heating coils shall normally be pressure tested.

9.3.3 Cargo pumps, pipes, valves, inert gas arrangement, etc. together with the pump’s prime movers shall be surveyed in line with the requirements of Sec.1.

10 Crane

10.1 Application

10.1.1 The requirements in this subsection apply for units with additional class notation Crane or Crane-offshore.

10.1.2 Crane or Crane-offshore applies to any type of offshore crane intended for cargo handling outside the unit while at sea and to any type of platform crane intended for cargo handling on the unit. For a unit with more than one crane installed, class notation Crane or Crane-offshore may be applied to selected cranes only. The selected cranes will be identified in the appendix to the classification certificate.

10.1.3 Additional requirements: DNVGL-ST-0378 Sec.14, Standard for offshore and platform lifting appliances, Testing and test certificates marking.

10.1.4 Additional requirements for the qualifier (N) are given in DNVGL-SI-0166 Ch.3.

10.1.5 Scope
The systems covered include:
— structure
— machinery
— control and monitoring systems
— safety systems.
10.2 Maintenance

A maintenance programme shall be implemented for systems and equipment covered by the Crane or Crane-offshore notation. Maintenance tasks and intervals shall be in accordance with OEM maintenance recommendations and/or international standard.

If condition based maintenance of equipment is carried out as part of the maintenance, this shall be approved as part of a separate survey arrangement. See Ch.2 Sec.2 [5] for further details.

10.3 Annual survey

10.3.1 Objective

The intent of the annual survey is to verify satisfactory condition of the equipment without any intrusive interventions, given that the unit is in operation. It is assumed that normal operations are on-going.

10.3.2 Scope

The extent of the annual survey shall be as follows:

— Spot check review of the unit'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.

Guidance note:

Where records are available showing that relevant items have been recently tested, these can be examined and applied as part of the evaluation.

10.3.3 General requirements

Generally, the visual examination may be carried out without dismantling. However, dismantling shall be performed as considered necessary by the attending surveyor.

10.3.4 Any changes to the systems (new equipment, overhauls, repairs and modifications) shall be surveyed.

10.3.5 Preparation

Applicable equipment shall be made available for survey according to scope. Special attention shall also be made to the inspection programme, safety measures, safe access and crane cleanliness.

10.3.6 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.
10.3.7 Machinery
The following be examined for satisfactory condition:
— hook block, hook shaft and hook bearing
— sheaves, shaft and bearings
— wire rope and attachments

Guidance note:
See also ISO 4309 Maintenance, installation, examination and discard.

— winches, rope drum, gear, fixation and frame
— luffing system, winches, rope drum, gear, frame and fixations or cylinder with fixations
— slewing system, machinery
— slewing ring and tightness of bolts. Documentation of the condition of the slewing ring shall be examined,
  OEM programme or other recognised programme. The programme shall as a minimum include grease
  testing, gap measurement
— brakes, including function testing and correct adjustment
— couplings main part and bushing, including function testing.

Guidance note:
If the coupling is type gear, tooth or spline, the wear must be specially considered and the coupling considered to be opened for
examination.

— couplings main part and bushing, including function testing.

10.3.8 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.

10.3.9 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.
— emergency operations including load lowering and slewing

10.3.10 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 permanently displayed and visible for the crane operator.

10.4 Complete survey (5-yearly)

10.4.1 Objective
The intent of the complete survey is to confirm that the equipment and systems are fit for operation for another 5 years.

10.4.2 Scope
More intrusive inspections and more comprehensive testing shall be carried out. Normally the crane shall be tested to the original design limits.

10.4.3 Documentation review
Product certificates, applicable design approvals related to modifications/repairs and maintenance reports/records to be verified.

10.4.4 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.

10.4.5 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.

10.4.6 The following components shall be dismantled and made available for examination by NDT:
— boom foot/heel bearings
— fixed sheaves
— load bearing axle pin/shaft and housing
— gear boxes taking part in the lifting operation
— hook block.

10.4.7 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.

10.4.8 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 NDT.

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

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20% of the holding down bolts taken in the most loaded sector of the crane shall be removed, examined and subject to NDT. 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).

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Flatness and condition of slew-bearing mounting flanges shall be checked as far as possible.

**10.4.9 Brakes**
The brakes shall be dismantled and examined by NDT.

**10.4.10 Couplings**
Couplings shall be dismantled and examined by NDT.

**10.5 Condition Assessment**

**10.5.1 Introduction**
As an alternative to the survey scope described in [10.3] and [10.4], a condition assessment of the crane may be performed. The condition assessment shall be based on design working period calculations. Based on the condition assessment a repair, replacement and inspection plan shall be established and implemented.
The objective is to base the Society’s surveys on the design working period and condition of the crane.

**10.5.2 Approval process**
The following steps shall be completed:
— identification of design and installation data
— recording necessary in operation data
— calculating the Design Working Period
— performing special assessment
— reporting all necessary information, calculations and assessment
— establishing a repair, replacement and inspection programme.
The above steps shall be performed according to ISO 12482. The qualifications for performing this work shall be according to guidance given in ISO 12482. The condition assessment and repair, replacement and inspection programme is subject for approval.

**Guidance note:**
See DNVGL-OTG-18 for guidance on the use of ISO 12482 to comply with [10.5].

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The assessment report and corresponding repair, replacement and inspection plan shall be reviewed and updated by the owner as a minimum every 5th year.
The assessment report and corresponding plan shall be submitted for approval by the Society every 5th year, and will be used as a basis for the crane complete survey. Upon approval of the repair, replacement and inspection plan the Society will identify the extent of involvement of surveyors of the Society.

**10.5.3 Annual survey**
The annual survey shall include the following:
— survey scope according to [10.2]
— verify owner’s own inspections, repairs and replacements according to the approved plan.
### 10.5.4 Complete survey
The complete survey shall include the following:
- verification of product certificates, applicable design approvals related to modifications/repairs and maintenance reports/records
- survey scope based on the approved plan
- verify owner’s own inspections, repairs and replacements according to the approved plan
- load test as described in [10.4.4] and [10.4.5]
- verify condition of breaks and couplings as described in [10.4.9] and [10.4.10].

The attending surveyor may, if found necessary, require a re-survey of any item inspected by the owner. Additional inspection, NDT and/or dismantling up of equipment may be required if found necessary.

### 11 Offshore gangways

#### 11.1 General
The requirements in this subsection apply to units with class notation **Walk2work**.

#### 11.2 Annual survey
Annual survey shall be according to DNVGL-ST-0358 App.B.

#### 11.3 Complete survey
Complete surveys shall be according to DNVGL-ST-0358 App.B.

#### 11.4 Repairs and modifications
Repairs and modification of the gangway shall be according to DNVGL-ST-0358 App.B.

### 12 Additional fire protection arrangements

#### 12.1 General
The requirements in this subsection apply to units with class notation **F**.

#### 12.2 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].

### 13 Loading computers for damage control

#### 13.1 Application
The requirement in this subsection applies to units with class notation: **LCS(DC)**.

#### 13.2 Annual survey and complete surveys
It shall be checked that the approved in-service test programme for all sensors has been followed.
14 Periodically unattended machinery space and machinery centrally operated

14.1 Application
The requirements in this subsection apply to units with class notations E0 and ECO.

14.2 Annual and complete surveys
Annual and complete surveys shall be i.a.w. DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [25].

15 Well intervention system

15.1 Application

15.1.1 The requirements in this subsection apply to units with class notation WELL 1 and WELL 2.

15.1.2 Additional requirements for the qualifier (N) are given in DNVGL-SI-0166 Ch.3.

15.1.3 Scope
The systems covered in the survey include, but are not limited to, the following:

— hoisting, rotating and handling system
  — well intervention structures
  — hoisting systems
  — heave compensation and tensioning systems
  — handling system for well control equipment and pipe handling systems
  — other systems (e.g. winches, man riding equipment, skids, carriers)
— well pressure and flow control systems
  — bulk storage, well intervention fluid mixing and circulation systems
  — well control systems
    — well influx prevention - drilling fluid circulation and cementing systems
    — well influx management & well shut-in and disconnect
    — well influx relief - diverter systems
    — well normalising - chock and kill systems
    — drilling riser system
— hydrocarbon handling system
— wire line systems
— coiled tubing systems
— well testing systems.

Guidance note:
For further details on the systems, see DNVGL-OS-E101.

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15.1.4 Third party equipment used to support the well intervention operation shall be surveyed with regard to its inherent safety and the interface between the unit and the equipment.
15.1.5 Well test equipment
Temporary well test equipment and systems shall be design approved and surveyed after installation on board in line with [6.4], and before any well test operations are commenced.

15.1.6 Well test equipment permanently installed on the unit the individual items shall be surveyed using the descriptions of [6.4] as annual survey scope.

15.2 Annual survey

15.2.1 Objective
The intent of the annual survey is to get a sufficient understanding of the condition of the equipment without intrusive interventions, given that the unit is in operation. It is assumed that normal operations are ongoing.

15.2.2 Scope
The extent of the annual survey shall be as follows:
— Spot check review of the unit's records of the 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 and testing as required. Non-destructive testing may be required, as considered necessary by the surveyor.

Where records are available showing that the items listed below have been recently tested by the crew, these will be considered by the surveyor.

Guidance note:
Further guidance can be found in DNVGL-OTG-07 Guidance on DNV's DRILL notation.

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15.2.3 General requirements
During annual survey it is acceptable to document that the latest pressure testing of the Well Control Equipment and the HP pipelines, choke and kill manifold have been carried out to maximum anticipated wellhead pressure, i.e. not to rated maximum working pressure.

15.2.4 Any changes to the systems (new equipment and overhauls, repairs and modifications) shall be surveyed and the relevant documentation reviewed.

15.2.5 The surveys should be based on the maker’s recommendations and recognised standards. Any deviations from these shall be justified by technical arguments.

15.2.6 Well intervention structures
A general visual survey shall be carried out with emphasis on the structural condition of footings, bracings and with respect to deformation and loose bolts (if of bolted design). Visual spot check of skids and brackets for lifting purposes.

15.2.7 Well control equipment
Well control equipment shall be surveyed visually as far as practicable. Test records for periodical function and pressure testing of the blowout prevention system shall be reviewed.

Records of the precharge of the accumulators shall be reviewed. Spot check review of calibration certificates for safety valves shall be carried out.
15.2.8 Diverter unit, equipment and control equipment
The diverter system shall be visually surveyed and inspected for corrosion, cracks and wear. Function test records and maintenance records to be reviewed.

15.2.9 Choke and kill equipment and control equipment
High pressure choke, kill and booster piping systems including flexible hoses shall be externally surveyed for corrosion and damage.

Guidance note:
High pressure piping is defined in Chapter IX of ANSI/ASME B31.3 to be piping with a piping class larger than ASME B16.5 CL2500 (PN420) classes. The API piping classes are all high pressure piping. Typical high pressure piping is choke and kill lines.

Test records for periodical function and pressure testing shall be reviewed.

15.2.10 Riser equipment
Riser joints, spider and support ring (as far as accessible) shall be visually surveyed and inspected for leakages, corrosion, cracks and wear.

15.2.11 Heave compensation
All heave compensation systems, including accumulators, mountings, piping and possible insulation shall be visually surveyed during normal operation as far as possible. Spot check review of calibration certificates for safety valves.

15.2.12 Tensioning systems
All tensioning systems, including accumulators, wire ropes, sheaves, cylinders, mountings, piping and possible insulation shall be visually surveyed during normal operation as far as possible. Spot check review of calibration certificates for safety valves.

15.2.13 Hoisting system
Main hoisting systems shall be surveyed visually during normal operations. Spot checks of safety devices and emergency stop functions shall be carried out. Wire ropes (including end attachments) and sheaves shall be surveyed.

15.2.14 Hydrocarbon handling system
Piping systems, including pressure vessels, manifolds and flexible hoses shall be externally surveyed for corrosion and damage.
Test records for periodical function and pressure testing shall be reviewed.

15.2.15 Lifting equipment
Lifting equipment for running in equipment and associated operations shall be surveyed, with particular emphasis on structural integrity. Examination and functional testing shall be carried out as found necessary by the surveyor, for example safety devices and emergency stop function. The marking (SWL) shall be verified as acceptable.

15.2.16 Well control equipment handling system
Well control equipment handling system shall be surveyed visually as far as practicable. Spot checks of safety devices and emergency stop functions shall be carried out.
15.2.17 Pipe, riser handling
Pipe, riser handling systems shall be surveyed visually as far as practicable. Spot checks of safety devices and emergency stop functions shall be carried out.

15.2.18 Bulk storage, well intervention fluid mixing and circulation systems
High pressure piping systems for well circulation systems including flexible hoses shall be externally surveyed for corrosion and damage. Spot check review of calibration certificates for safety valves shall be carried out.

Guidance note:
High pressure piping is defined in Chapter IX of ANSI/ASME B31.3 to be piping with a piping class larger than ASME B16.5 CL2500 (PN420) classes. The API piping classes are all high pressure piping. Typical high pressure piping is choke and kill lines.

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High and low pressure mud pumps and mud return system shall be visually surveyed during normal operation. Spot checks of calibration of tank level indicators, flow meters and alarms shall be carried out.

15.2.19 Manriding equipment
Personnel hoisting equipment; baskets, stabbing boards and winches including wires and sheaves, shall be visually surveyed. Spot checks of safety devices and emergency stop functions shall be carried out. SWL marking shall be confirmed to be legible.

15.2.20 Control systems
Review of documentation of alarm testing of the control systems shall be carried out. In addition, random testing of alarms that can be tested without interfering with operations to be carried out to the surveyors satisfaction.

15.2.21 Pressure vessel
Pressure vessels shall be externally surveyed. The general condition of the pressure vessel including mountings, piping and possible insulation shall be ascertained. The surveyor may require opening or internal survey or thickness measurements and/or crack detection test, if found necessary.

Safety valves, instrumentation and automation systems shall be surveyed and tested in operating condition as required by the surveyor. Liquid level controls on tanks or separators shall also be tested.

15.3 Complete survey

15.3.1 Objective
The intent of the complete survey shall confirm that the equipment and systems are fit for operation for another 5 years.

15.3.2 Scope
More intrusive inspections and more rigorous testing will be carried out. Normally items shall be tested to their original design limits.

Original certificates for category I equipment and records of the routine inspections/tests and the maintenance/repair/overhaul records shall be presented for review. Review calibration certificates for safety valves. Emergency stops to be tested.

Guidance note:
Further guidance can be found in DNVGL-OTG-07 Guidance on DNV GL’s DRILL notation.

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15.3.3 Well intervention structures.
Derrick/guiding tower installations shall be examined. Reports for derrick bolt torque/pre-tension checks shall be presented. Thickness measurements may be required. 25% NDT of derrick/guiding tower footings shall be carried out. The torque of the foundation bolts is to be confirmed. If the derrick has welded foundation, NDT shall be carried out.

Guidance note:
NDT and foundation bolt check may be waived depending on design.

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Skids and brackets for lifting purposes in the derrick, moonpool etc. shall be visually surveyed/confirmed to be in order. NDT and/or thickness measurements may be required according to surveyor's satisfaction.

15.3.4 Well control equipment
Overhaul of the well control equipment assemblies shall be carried out at intervals of 5 years, in accordance with an overhaul plan based on the condition of the equipment. The overhaul plan is to be presented for review prior to the work being carried out. Records of overhaul shall be kept on board and shall be reviewed. The well control equipment shall be subject to complete strip down, internal visual inspection and dimensional check, reassembly and performance test, including pressure testing of shear seal rams, valves, connectors, control system and piping systems (low pressure and maximum rated working pressure, as applicable).

15.3.5 Well control system
Pressure vessels shall be surveyed internally. If internal survey is not practical, base the examination on thickness measurements as described in [6.3.7]. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed.

15.3.6 All emergency disconnect system (EDS) sequences to be function tested. Test may be done at surface or subsea.

15.3.7 Thickness measurements shall be carried out and compared with the minimum strength thickness. Piping systems including flexible hoses shall be pressure tested to the maximum working pressure.

15.3.8 Capacity test of the pump unit with accumulators shall be carried out.

15.3.9 All control panels shall be function tested. Capacity test of control system UPS to be carried out. Sample alarms are to be tested, including:
- low accumulator pressure
- loss of power supply
- low levels in the control fluid storage tanks
- loss of communication (multiplex control systems)
- UPS alarms:
  - loss of input power and internal failure
  - loss of battery back-up.

15.3.10 Where remote operated intervention capability (ROV) exists it shall be tested.

15.3.11 Diverter unit and control equipment
PT or MT methods shall be used to investigate critical areas such as for instance connector/main pipe welds for cracks. Thickness measurements of piping and housing to be carried out as found necessary. Full function
testing from all diverter panels to be carried out. Test of interlocks to be carried out from all control panels. Verify the response time is within acceptable limits, e.g. API Spec 16 D/DNVGL-OS-E101.

15.3.12 Choke & kill equipment
Thickness measurements of choke and kill equipment shall be carried out and compared with the minimum strength thickness. NDT to be carried out on critical areas if found necessary. Choke and kill lines, hydraulic lines and booster line, shall be pressure tested to the maximum allowable working pressure.

15.3.13 Choke and kill manifold and piping shall be subject to complete performance test to maximum allowable working pressure of each applicable valve configuration. Pressure test at low pressure and maximum rated working pressure on upstream high-pressure manifold valves. Function testing of remote operated valves and chokes to be carried out. Opening of valves (approx. 10%) for internal inspection by the surveyor shall be carried out. All choke valves (manual or remote) to be opened for internal inspection.

15.3.14 Riser equipment and control equipment
PT or MT methods shall be used to investigate critical areas such as for instance connector/main pipe welds for cracks. Choke and kill lines, hydraulic lines and booster line shall be pressure tested to the maximum allowable working pressure. Thickness measurements shall be carried out and compared with the minimum strength thickness. The riser shall be surveyed with the buoyancy elements removed.

15.3.15 For units where the riser joints are sent ashore routinely for overhaul the records of the overhauls ashore shall be presented.

15.3.16 For a riser joint with fill valve the inspection is as for a standard joint plus NDT of the cut-out for the fill valve. Records of testing of the valve to be reviewed.

15.3.17 On the riser support ring, NDT of high stressed areas shall be carried out and the last overhaul report shall be reviewed.

15.3.18 For the goosenecks on the riser thickness measurements shall be taken and compared with the min. strength thickness.

15.3.19 Heave Compensation
Thickness measurements shall be taken and compared with the min. strength thickness. Pressure vessels shall be surveyed internally e.g. by borescope. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed. Calibration certificates for all safety valves shall be presented.

15.3.20 Piping systems including flexible hoses shall be thickness measured and compared with the min. strength thickness. Flexible hoses shall be visually surveyed, both internally and externally.

15.3.21 On compensators with chains the chain extension shall be checked where fitted wires shall be examined.

15.3.22 For active heave compensation systems the overload protection system shall be surveyed.

15.3.23 NDT of the fixation of the foundation shall be carried out.

15.3.24 Where fitted, anti-recoil valves (e.g. Olmsted/slingshot valves) are to be overhauled and tested.
15.3.25 Sheaves shall be visually surveyed and checked by NDT.

15.3.26 For active heave compensation systems, perform a motion compensation function test, see OEM recommendations.

15.3.27 Check the records of refilling of the hydraulic system to confirm the condition of the system regarding the internal leakage rate.

15.3.28 Tensioning Systems
The tensioner oil analysis results shall be reviewed (for lack of explosive capability), the records of sheave wear measurement are to be reviewed, and the ton mile records for the rope shall be reviewed. The termination of any tensioner ropes shall be surveyed. The foundations of the tensioners shall be surveyed and NDT shall be carried out.

15.3.29 Thickness measurements shall be taken and compared with the min. strength thickness. Pressure vessels shall be surveyed internally e.g. by borescope. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed.
Compressors shall be run, tested and the record of overhaul of the relief valves shall be checked.
Where fitted, anti-recoil valves (e.g. Olmsted/slingshot valves) shall be overhauled and tested.
Tensioning system to be function tested. Pistons shall be fully extended to allow examination of the surface condition of the piston rod.

15.3.30 For cylinder type/direct acting tensioners the foundations shall be NDT checked. Turn down sheaves shall be examined and NDT checked.

15.3.31 The control system shall be tested to prove that riser break and/or riser tensioning cylinder break indicators are in order.

15.3.32 Where a top tension system is fitted (e.g. on a self-elevating unit or a floater with a surface BOP) the system shall be surveyed. The hang off support points on the units structure are to be NDT inspected. The hydraulic system shall be surveyed and the control panel checked.

15.3.33 Hoisting system
NDT of main hoisting system, lifting appliances and deadline anchor shall be carried out.
Thickness measurements may be required. API RP 8B may be used as reference. If hoisting system is of a bolted design, all bolts shall be torque checked over a 5 year period.
Lifting appliances shall be load tested, as specified in DNVGL-OS-E101. Limit switches and safety functions to be tested. NDT to be carried out as deemed necessary. Runway beams to be examined. On the guide track check for wear, bent members, carry out NDT of structural supports and check for wear of rollers on the dolly. Review alignment reports.

15.3.34 For main structural parts of main hoisting system and lifting appliances where NDT is normally carried out, this NDT may be omitted if it can be documented that the following conditions are fulfilled:
— Accumulated fatigue damage is less than the calculated fatigue life of the component at the end of the 5 year period, based on logging of actual load cycles.
— Fatigue calculations and logging of load cycles are evaluated by DNV GL.
— The fatigue calculations shall comply with DNVGL-OS-C101 Ch.2 Sec.5. The calculations should include the design fatigue factors (DFF).
— There is no history of cracks in the particular area.
— The remaining fatigue life is sufficient for the period until next complete survey.

If NDT has been omitted at one complete survey then it normally shall be done at the next complete survey.

**Guidance note:**

If NDT is to be omitted the logging equipment and the fatigue calculations should be made available for review at the fourth annual survey or earlier.

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15.3.35 Function test hydraulic cylinder based hoisting system. Pressure test pipework and cylinders to maximum allowable working pressure. Thickness measurements shall be taken and compared with the minimum strength thickness. Main control valve blocks shall be overhauled, unless equivalent solution can be documented and accepted.

15.3.36 The crown saver and floor saver functions shall be tested.

15.3.37 NDT of high stressed areas on the riser spider to be carried out. Review overhaul report.

15.3.38 NDT of the main structural parts of main hoisting system shall be carried out. Thickness measurements may be required. API RP 8B shall be used as reference. Any deviations from API RP 8B are to be agreed with the OEM and DNV GL.

15.3.39 **Pipe & riser handling**

Load testing, function test of limits/safety functions and NDT shall be carried out as required. Runway beams to be surveyed.

15.3.40 Anti-collision functions of the pipe handling system with the top drive to be confirmed.

15.3.41 The gripper function/head shall be specially surveyed.

15.3.42 Spot checks of safety devices and emergency stop functions shall be carried out. Emergency manoeuvring system to be tested. Loss of main power battery back-up pipe handling magnets to be tested.

15.3.43 **Well control equipment handling**

NDT for main structural parts of main hoisting system and lifting appliances shall be carried out. Thickness measurements may be required. API 7L may be used as guidance.

15.3.44 Lifting appliances shall be load tested, as specified in **DNVGL-OS-E101**.

15.3.45 Movable lifting appliances for well control equipment handling shall be load tested, including travelling the full length of supporting rails (or similar). The hooks are to be NDT checked. The condition of the hoisting and transport system shall be confirmed. NDT may be required on the support structure for the well control equipment hoist/transport system.

However, where the well control equipment is supported at its base, i.e skidded handling device without lifting capabilities, these need not be overload tested.

15.3.46 Emergency manoeuvring system to be tested.
15.3.47 Safety features
Safety features (i.e. emergency stop, brakes, slack wire detection, limit switches, etc. as applicable) on winches to be tested. Personnel protection shielding on winches to be surveyed.

15.3.48 Hydrocarbon handling systems
NDT to be carried out on critical areas if found necessary. High pressure lines including manifolds shall be pressure tested to the maximum allowable working pressure.

15.3.49 Function testing of remote operated valves and chokes to be carried out. Opening of valves (approx 10%) for internal inspection by the surveyor shall be carried out. All choke valves (manual or remote) to be opened for internal inspection.

15.3.50 Pressure vessels shall be surveyed internally. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. Pressure testing to the maximum allowable working pressure shall be performed. Calibration certificates for all safety valves shall be presented.

15.3.51 Foundations to be visually surveyed and NDT checked as required.

15.3.52 Bulk storage
Pressure vessels shall be visually surveyed internally. Pressure vessel related equipment, such as valves, pipes, etc., shall be examined. As found necessary pressure testing to the maximum allowable working pressure shall be performed. Calibration certificates for all safety valves shall be presented.

15.3.53 Foundations to be visually surveyed and NDT checked as required.

15.3.54 A function test of the bulk control system shall be carried out.

15.3.55 Piping systems for bulk transport including flexible hoses shall be pressure tested to the maximum working pressure. Thickness measurements shall be taken and compared with the min. strength thickness. Flexible hoses shall be visually surveyed internally. The routing of the relief line from the safety valve shall be surveyed. The system for ensuring the relief line is unobstructed shall be checked.

15.3.56 Bulk storage, well intervention fluid mixing and circulation systems
Thickness measurements of the piping systems shall be taken and compared with the min. strength thickness. Flexible hoses shall be visually surveyed internally. Piping systems including flexible hoses and manifolds shall be pressure tested to the maximum allowable working pressure.

15.3.57 The mud pump system maintenance records shall be reviewed with particular attention to the power transmission system from the electrical motor to the pump. The bearing clearances on the crankshaft shall be reviewed. The records of mud pump discharge safety valve testing shall be reviewed. Documentation of replacement mud pump modules shall be reviewed. Where pulsation dampers are welded, NDT shall be carried out of any welding (e.g. circumferential weld on the damper body). Records of pre-charge pressure shall be reviewed.

15.3.58 10% of the standpipe manifold valves shall be opened for inspection, thickness check and NDT of welds. If the standpipe is heat traced then check for corrosion under the tracing.

15.3.59 Records for replacement of the rotary/mud hoses to be reviewed. Thickness measurements of the gooseneck on the standpipe shall be taken and compared with the min. strength thickness.
15.3.60 Degasser shall be surveyed internally visually. Thickness measurements to be taken as deemed necessary.

15.3.61 Dump valves in the mud return system shall be confirmed operable, thickness checks of mud pits shall be carried out. On the trip and active tank the level alarms shall be confirmed to be in order.

15.3.62 Manriding and miscellaneous lifting equipment
Personnel hoisting equipment and utility winches for lifting purposes shall be load and function tested as specified in DNVGL-OS-E101 Ch.2 Sec.6 [5]. Safety devices described in DNVGL-OS-E101 Ch.2 Sec.8 [3] to be tested. Foundation of equipment to be NDT inspected. Adjustment of the regulator for the tension/lifting capacity to be checked. Emergency recovery to safe position within 10 minutes to be confirmed.

16 Hull monitoring system

16.1 Application
The requirements in this sub-section apply to units with class notation HMON.

16.2 Objective
The purpose of the survey is to ensure the maintenance of the hull monitoring system as specified for the class notation.

16.3 Annual survey
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [14].

17 Noise, vibration and comfort rating

17.1 Application
The requirements in this sub-section apply to units with the class notations VIBR respectively COMF-MOU.

17.2 Vibration

17.2.1 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.

17.2.2 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.

17.3 Comfort rating

17.3.1 Alterations and modifications
If approved arrangements, equipment or procedures are altered, up dated documentation shall be resubmitted for approval.
17.3.2
Measurements shall be made 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.

17.3.3 Renewal survey
The renewal survey shall be based on measurement surveys according to predefined programmes.

17.3.4 Logbooks of the inspections and measurements as described in DNVGL-OS-A301 Ch.3 Sec.2 [4] shall be examined.

18 Winterization

18.1 Application
These requirements apply to units with the following class notation Winterized.

18.2 Annual survey

18.2.1 The anti-icing, de-icing and anti-freezing measures applied on board shall be subject to a general survey to confirm continued satisfactory performance, including the review of the on board 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.

18.2.2 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 unit's corrosion under insulation management programme shall be reviewed and re-assessed based on the survey findings.

18.2.3 The stability records on board shall be reviewed to confirm that unit is adequately monitoring/accounting for potential and actual ice loadings on an ongoing basis.

18.2.4 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.

18.2.5 The electrical heat tracing systems shall be generally surveyed, with particular attention to the insulation resistance values.

18.2.6 The anti-skid coating on exposed deck surfaces shall be surveyed.

18.2.7 The drainage arrangements for meltwater/washdown water on exposed decks shall be surveyed, with particular attention to the anti-freezing arrangements for the drains.

18.2.8 The drying arrangements for the compressed air systems shall be surveyed.

18.2.9 The personal lifesaving appliances shall be subject to general surveyed to confirm that their storage arrangements are suitable for cold-climate conditions.
18.2.10 The information on board related to snow/ice dropped object incidents/near misses since the last annual survey shall be presented to the attending surveyor for assessment.

18.2.11 The information on board 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.

18.2.12 For units with the qualifier Polar, the ice searchlight shall be function tested.

18.2.13 For units with the qualifier Polar, the annual survey requirements for class notation Clean shall be carried out, as applicable.

18.3 Complete survey
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.

19 Environmental notations

19.1 Ballast water management systems

19.1.1 Application
The requirements in [19.1] apply for units with the notation BWM and/or Clean.

19.1.2 Annual, intermediate and complete surveys
Annual, intermediate and complete surveys shall be carried out i.a.w. DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [22].

19.2 Clean or Clean(Design)

19.2.1 Application
The requirements in [19.2] apply to units with class notation Clean.

19.2.2 Annual, intermediate and complete survey
Annual, intermediate and complete surveys shall be carried out i.a.w. DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [16].

19.3 Recycling

19.3.1 Application
These requirements in this sub-section apply for units with the class notation Recyclable.

19.3.2 Surveys
Initial, complete, additional and final surveys shall be carried out in line with DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [35].

19.3.3 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].
19.4 Vapour control systems (VCS)

19.4.1 Application
These requirements apply for units with the class notation VCS.

19.4.2 Renewal surveys
Renewal surveys shall be carried out i.a.w. DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [15].

20 Integrated software dependent systems

20.1 General

20.1.1 Application
The requirements in this subsection apply to units with the class notation ISDS.

20.1.2 Objective
The purpose of the survey is to ensure the confidence that has been built into the unit is maintained.

20.1.3 Modifications
The owner shall 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.

20.2 Annual survey

20.2.1 The effective implementation and continuous maintenance of the activities required by DNVGL-OS-D203 phase E, operation, shall be assessed.

20.2.2 Any changes, introduced after the latest assessment, to the systems within ISDS scope shall be addressed. An impact analysis of changes shall be reviewed and confirmed. Any follow up activities shall be agreed.

20.2.3 Updated records shall be kept and made available for review by the attending surveyor i.a.w. DNVGL-OS-D203 Ch.3 Sec.1 [3.2].

20.3 Complete survey
The complete assessment will have a specific focus on identified process areas or activities. These areas or activities shall 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.

21 Non-self-propelled units

21.1 Application

21.1.1 The requirements in [21.2] apply to units with special feature notation Non-self-propelled.

21.2 Annual survey

21.2.1 Extent of surveys of the following items shall be restricted to the main safety aspects of:
— propeller shafts (tailshafts)
— thrusters
— motors and other equipment for propulsion
— steering gear.

21.2.2 For these items the scope of classification is to ensure that the equipment does not pose a threat to the unit by its presence on board when in use. This means the watertightness should be considered and the safety of the equipment for people working in the vicinity is taken care of. The operation of the equipment is of secondary importance.

22 Self-propelled self-elevating units

22.1 Application

22.1.1 The requirements in [22.2] apply to self-elevating units with special feature notation Self-propelled.

22.2 Annual, intermediate and renewal survey

22.2.1 The extent of the survey shall cover propeller shafts (tailshafts), thrusters, motors and other equipment for propulsion and steering gear as defined for main class in Sec.1 and Sec.2.

23 Tailshaft monitoring

23.1 General

23.1.1 Application
The requirements in [23] apply to units with class notation TMON.

23.1.2 General requirements
A tailshaft condition monitoring arrangement may be granted for oil lubricated tailshafts that are monitored to ascertain the condition of the tailshaft system during operation, and that fulfils the requirements in DNVGL-RU-SHIP Pt.6 Ch.9 Sec.5 provided a successful initial survey is carried out.

In such cases the Society 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 units 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 (see 23.2.1 d).
23.2 Annual survey

23.2.1 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 on board checking of the water content in the oil, submitted lubricating oil samples to an accredited laboratory every 3 months is acceptable (see [23.2.1] d) below).
   
   ---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---
   — 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 be 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.

24 Offshore bow loading

24.1 Application
The requirements in this subsection apply to units or installations with class notation Bow loading.

24.2 Complete periodical survey

24.2.1 Spaces and zones used in connection with bow loading shall be surveyed with respect to general cleanliness and maintenance.

24.2.2 Valves and piping, including inert gas purge pipes shall be externally surveyed. Opening up and/or pressure testing may be required if found necessary by the surveyor. Condition of spray-shield and collecting tray in way of connector shall be in order.

24.2.3 Instrumentation, automation and communication equipment in bow control station shall be surveyed, tested and verified to be in order.
24.2.4 Ventilation of gas-free spaces shall be verified to be in order.

24.2.5 Electrical equipment in gas-dangerous spaces shall be surveyed.

24.2.6 Emergency disconnection systems, automatic and manual, shall be surveyed and tested as far as possible.

The bow loading area shall be surveyed with respect to fire and explosion hazards and is to include survey of: fire extinguishing equipment, protective measures, preventing structural elements initiating sparks, ventilation of bow control station and bow loading connector room, emergency escape routes from bow control station, interlock functions for the mooring and loading systems.

24.2.7 It shall be verified that the required operation manual is in order.

25 Crude offloading system

25.1 Application
The requirement in this subsection applies to units and installations with class notation Offloading.

25.2 Survey arrangement
A maintenance system shall be implemented for systems and equipment covered by the Offloading notation. The survey may take advantage from records therein.

25.3 Complete survey

25.3.1 General
— Verify that the 'Offloading manual' for operation and maintenance is in order.
— Survey spaces and areas used in connection with offshore offloading with respect to general housekeeping/cleanliness, spillage drain and bunds arrangement, and spray-shield and collecting tray in way of connector.

Survey general condition of access within area and to main escape routes.

25.3.2 Examine condition of ventilation system of:
— offloading control station
— any room kept non-hazardous by overpressure ventilation, including associated alarms and door tightness.

25.3.3 Piping and valves
— Survey valves and piping externally. Open up and perform pressure testing of valves and piping as deemed necessary.
— Survey condition of piping system for inert gas purging and drain lines.

25.3.4 Control and safety systems
Test control and monitoring system, including field instrumentation for pressure and tension values.

25.3.5 Test isolation valve immediate upstream hose reel and its activation from control, system and overall ESD system.
25.3.6 Communication system
— Test communication between remote and local control stations.
— Test, if possible, communication between the offloading control station and the receiving shuttle tanker.

25.3.7 Disconnection
— Survey and test the mooring line and hose emergency disconnection systems, automatic and manual as far as possible.
— Test that automatic disconnection includes closing of end coupler valve and shut down the crude oil transfer pumps.
— Test the manual back up emergency disconnection system.

25.3.8 Hose and hawser
— survey general condition of hose and hawser
— survey hose reel locking mechanism
— survey interlock functions for the mooring and loading systems.

25.3.9 Ignition prevention
Survey protective measures preventing structural elements initiating sparks.

26 Production plant

26.1 Application
The requirements in this subsection apply to units or installations with class notation PROD.

Guidance note:
These requirements are also applicable for class notations PROD(LNG) and PROD(LPG).

26.2 Maintenance
A maintenance programme shall be implemented for non-static equipment covered by the PROD notation.

Guidance note:
It is recommended to follow OEM recommendations for maintenance. The maintenance recommendations should normally be confirmed appropriate (by the OEM) for the specific environment and operations of the applicable equipment.

Maintenance tasks and intervals shall be available in CMMS, and the maintenance shall be followed up and reported in the CMMS.

Guidance note:
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.

If condition based maintenance of equipment is carried out as part of the maintenance, this shall be approved as part of a separate survey arrangement. Machinery condition based maintenance (CBM) for more information.
26.3 Annual survey

26.3.1 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.

26.3.2 Pressure vessels, heat exchangers, high pressure or capacity pumps, and compressors shall be externally surveyed. Safety valves and instrumentation systems shall be surveyed and tested in operating condition as found necessary by the surveyor.

Guidance note:
Opportunities to carry out survey and testing during owner’s scheduled shutdowns may also be utilised.

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26.3.3 Piping systems including flexible pipes shall be surveyed.

26.3.4 Pressure relief and depressurising valves shall be surveyed and tested.

26.3.5 Survey of accessible parts of the following structures shall be carried out to confirm structural integrity and condition of securing arrangement:
— main structural elements and load transfer points in large support structures, modules or skids
— base frames for equipment
— flare or ventilation structures
— support for flare structure
— supports for conductors and risers
— pipe racks and pipe supports.

26.3.6 The process and utility safety systems and the subsea control system for wellhead shutdown shall be surveyed during operation and tested for correct functioning as found necessary by the surveyor with particular emphasis on:
— safety related instrumentation and valves (PSD)
— shutdown sequence and logic (C&E)
— interconnection with emergency shutdown system
— alarm system
A review of the maintenance manual or test log may be an acceptable survey method provided a satisfactory recording system and an acceptable maintenance procedure exist.

26.3.7 Drainage system for produced liquids for hazardous areas shall be surveyed.

26.4 Complete survey

26.4.1 Pressure vessels and heat exchangers shall be subjected to internal surveys. Examination of related equipment such as valves, piping and fittings shall be carried out.

26.4.2 High pressure or capacity pumps and compressors shall be visually surveyed without dismantling. Opening up to be carried out if found necessary. Review of the maintenance system records is an acceptable survey method provided a satisfactory recording system and acceptable maintenance procedure exist.
26.4.3 Examination of flare piping and flare tip shall be carried out.

26.4.4 As basis for the survey of special and primary structure a programme for NDT of structural components shall be established.

26.4.5 Function test of safety devices and instrumentation listed in [26.3.6] shall be carried out.

26.5 Alternative survey scope

As an alternative to the survey scope in [26.3] and [26.4] a Risk Based Inspection (RBI) plan, see [26.5.1], can be implemented for static mechanical equipment or equivalent. For non-static equipment, a maintenance programme is required to be in place, see [26.2]. In addition, inspection during operation and function test of safety devices and instrumentation, see [26.3.6] and [26.4.5], shall be carried out.

26.5.1 Risk based inspection (RBI)

The inspection plan shall be based on an RBI analysis. An inspection programme shall be developed based on the RBI analysis, and yearly inspection plans shall be established based on the inspection programme. The inspection plan shall be documented, reported and followed up in an inspection management system/application.

The RBI analysis and corresponding inspection programme shall be updated yearly, and upon serious findings. The RBI analysis shall be updated based on inspection and maintenance history, in addition to modifications and operational changes.

Guidance note:
The RBI analysis and inspection management, including establishing inspection plan, reporting and updating RBI analysis, shall be performed according to DNVGL-RP-G101 Risk based inspection of offshore topsides static mechanical equipment or equivalent. 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.

26.5.2 Approval process

The RBI analysis, corresponding inspection programme and inspection plan shall be submitted to the Society for approval yearly. Findings/conclusions from the previous year’s inspections shall be submitted to the Society for yearly review.

The Society will define the survey scope based on the yearly inspection plan and history from previous inspections.

26.5.3 Annual survey

The annual survey shall include the following:
— inspection scope based on the RBI plan
— verification of owner’s inspections according to the RBI plan
— survey scope as described in [26.3.6].

26.5.4 Complete survey

The complete survey shall include the following:
— inspection during operation and function test of safety devices and instrumentation, see [26.4.5]
— survey scope as described in [26.4.1] and [26.4.3].
27 Regasification

27.1 Application
The requirements in this subsection apply to units with class notation REGAS.

27.2 Annual and complete survey
See DNVGL-RU-SHIP Pt.7 Ch.1 Sec.6 [37].

28 Renew - upgrade of self-elevating units

28.1 Application

28.1.1 The Renew notation may be assigned to self-elevating units where assessments and upgrades in accordance with the requirements of this section have been carried out.

28.1.2 This notation applies for self-elevating units planned for structural design life extensions and system upgrades.

Guidance note:
The notation is independent from the execution of a 5-yearly renewal survey. Notwithstanding, it may be advantageous to plan for a parallel approach where the upgrades and life time extensions are performed during the renewal survey.

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28.1.3 The notation is applied with the qualifiers as listed in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renew</td>
<td>As per objective description (see [28.1.2])</td>
<td>(YYYY)</td>
<td>Year when the notation was requested</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Structure)</td>
<td>Scope of notation covers structural integrity as described in [28.2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Systems)</td>
<td>Scope of notation covers jacking and safety systems as described in [28.3] (voluntary)</td>
</tr>
</tbody>
</table>

28.1.4 If the notation shall be maintained, unit shall be subject to the follow up as defined in [28.6].

28.1.5 The standards applied for the Renew notation shall be of the revision in force at the date the notation was requested (see also Ch.1 Sec.3 [2.1].

28.2 Objective and scope
The objective of the Renew(Structure) notation is to indicate that the legs, spudcans and jacking houses has been reassessed with respect to fatigue and ultimate strength in the elevated survival condition, taking into account the current condition of the unit, using up to date calculation tools. In order to minimise future thickness diminution, the corrosion protection system shall be refurbished as found necessary.

The objective of the Renew(Systems) is to signify that the jacking and safety systems comply to the applicable rules and standards in force at the date of issuance of the notation.
28.2.1 Scope - Structure
The scope of the notation covers the following main structures of the unit:
— legs
— spud cans
— leg-to-hull interface (including jack house).

28.2.2 Scope - Systems
The scope may be further extended to the jacking system and the following safety systems:
— fire and gas detection
— fire protection and extinguishing
— emergency shutdown systems
— PA and GA system.

Guidance note:
It is underlined that not all safety related components and systems are covered by the notation. Examples are life saving equipment (as covered by statutory requirements/ MODU code) and constructional fire protection.

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28.3 Documentation requirements

28.3.1 General
A general overview of the document to be submitted to document compliance to the notation is listed below.

28.3.2 Structure
i) general arrangement
ii) main scantling drawings of hull, legs, spudcans and jack houses
iii) corrosion protection arrangement
iv) jacking system specification
v) thickness measuring and survey reports
vi) global strength analysis
vii) historical operational records including metocean data, soil conditions (leg footing penetrations and moment fixities), water depths and air gaps
viii) original design basis (i.e. design philosophy documents) and operating manual.

28.3.3 System
The documentation for the safety and jacking systems to be upgraded shall follow DNVGL-OS-D101 Ch.3 Sec.1 [2] and DNVGL-OS-D101 Ch.2 Sec.5 where applicable.
For jacking systems, a failure mode and effect analysis (FMEA) according to DNVGL-OS-D202 Ch.3 Sec.1 Table 4 shall be carried out.

Guidance note:
In case the systems have been upgraded in recent years, the above may be replaced by the records connected to these upgrades, e.g. previous approval letters, certificates and design basis applied.

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28.4 Renew(Structure) scope

28.4.1 Survey
The special and primary areas of structures shall be inspected based on renewal survey requirement of Sec.1 [4].

Guidance note:
The requirement may be combined with 5-yearly renewal survey and can be exempted in case the renewal survey has been performed less than one year ago.

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28.4.2 Ultimate limit state
The strength of legs, spudcans, leg to hull interface and the capacity of the leg-to-hull holding (i.e. fixation) system shall be documented based on DNVGL-OS-C104 taken into account measured thicknesses.

Guidance note:
1) The scope of measurements required to obtain a sufficient basis as input to the analysis should be made in agreement with class and will be depending on the condition of the unit.
2) The existing environmental limitations as defined for the unit may be modified to meet the requirements to ultimate strength.

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28.4.3 Fatigue limit state

28.4.3.1 Assessment
The legs, spudcans, and leg to hull interface shall be documented for a minimum remaining fatigue life of 10 years taking into account previous operational history. The calculations shall incorporate the effect of corrosion throughout the life time and shall be based on DNVGL-OS-C104.

Guidance note:
The in service survey scope may be adjusted based on the findings of the fatigue analysis.
Gross scantlings may be utilised in the calculation of hull structural strength, provided a corrosion protection system in accordance with DNVGL-OS-C101 Ch.2 Sec.9 is installed and maintained.

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28.4.3.2 Modification and local improvements
Suitable measures shall be made for all items where the fatigue analysis have revealed a remaining expected fatigue life less than the required extended life time.

Guidance note:
Measures to improve fatigue life may consist of local improvements of geometry to reduce stress concentrations, cropping and replacing or local improvements of welds.

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28.4.4 Corrosion

28.4.4.1 Corrosion margins
Thickness diminutions shall be assessed and meet the requirements of DNV GL class guideline, DNVGL-CG-0172 Thickness diminution for mobile offshore units.
A corrosion margin taking into account corrosion for the future operation according to DNVGL-CG-0172 shall be added to structural members which are substantially corroded.
28.4.4.2 Corrosion protection system

Structural members within the scope of the notation with a coating condition FAIR or lower as defined in Ch.2 Sec.1 [3.2.11], shall be cleaned and protected against further corrosion in accordance with DNVGL-OS-C101 Ch.2 Sec.9.

28.5 Renew(Systems) scope

28.5.1 Survey
The systems shall be surveyed based on renewal survey requirement of Sec.1 [5].

Guidance note:
The requirement may be combined with 5-yearly renewal survey and can be exempted if the renewal survey has been executed less than one year ago.

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28.5.2 Safety systems
The safety systems as listed in [28.2.2] shall be upgraded to the applicable offshore standard. Existing, earlier upgraded systems may be accepted provided their compliance to the latest standards can be documented, i.e. by a gap analysis between design standards as applied vs existing standards.

Guidance note:
For existing systems, gaps with no/minor impact on safety should be further documented as equivalent solution.

Gaps with a major impact should be compensated by system upgrades.

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28.5.3 Jacking system

28.5.3.1 Analyse
Jacking systems shall be evaluated against their remaining life cycle and capacity taking into account inspection results, in particular:

— wear
— cracks
— overall condition.

When the evaluation indicates an operational use beyond 80% of the rated life of the jacking system, the limiting environmental conditions and pinion capacity shall be re-established, alternatively the applicable components shall be replaced.

28.5.3.2 Upgrades
The jacking control system shall be upgraded to the following safety critical requirements in case GAP analysis shows non-compliance (based on IMO MODU Code 2009 and DNVGL-RU-OU-0104 Ch.5 Sec.1 [6.6]):

— The jacking system shall be operable from a central jacking control station.
— The jacking system shall include the following control and monitoring arrangements, when applicable:
  — Remote indication and alarm if a brake is not released when power applied to the motors. The brake alarm shall be given by an independent mechanical sensor.
  — Remote indication and alarm for overheating of an electric motor.
  — A permanent remote indication of loads during jacking and retrieval shall be provided. For a lattice leg unit the load per chord is as a minimum to be presented. Alarm signal to be given when maximum load is exceeded.
  — Audible and visible alarm to indicate out-of-level (indication of inclination).
  — Audible and visible alarm to indicate rack phase differential (RPD) (if applicable).
— Indication of power consumption.
— A communication system should be provided between the central jacking control and a location at each leg.

### 28.5.4 Additional systems

Additional systems upgraded will be listed in the appendix to class provided these comply to the latest applicable offshore standard and are covered by the classification scope of the unit.

**Guidance note:**
For an overview of systems as covered by the class scope, see DNVGL-RU-OU-0104 Ch.2.

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### 28.6 Retention

The retention of the Renew notation for units in operation follow the principles and requirements of this chapter with the following remarks:
— The special provisions for ageing units in Ch.2 Sec.1 [5] are not applicable for the period covered by the structural assessments from [28.4] (e.g. 10 years).
— The In-service inspection scope as described in Sec.1 [1.2] shall be adjusted based on the assessment results.
— Requirements of periodical surveys related to a unit’s age as described in Sec.1 will be adjusted based on the actual replaced/upgraded parts.

### 29 Battery power

#### 29.1 Application

The additional class notation Battery applies to battery installations in battery powered or battery-hybrid units. The qualifier (Safety) applies to units with large lithium-ion batteries installed, superseded by qualifier (Power) where batteries are used as propulsion power. For additional definitions and requirements, see DNVGL-RU-SHIP Pt.6 Ch.2 Sec.1.

#### 29.2 Surveys

Surveys related to Battery notations are incorporated in the main class surveys for machinery and systems. The surveys shall be carried out as part of the main class annual and renewal surveys. The scope of the surveys shall be as described in DNVGL-RU-SHIP Pt.7 Ch.1 Sec.2 and DNVGL-RU-SHIP Pt.7 Ch.1 Sec.4 for the relevant notation.
APPENDIX A TERMS AND CONDITIONS
1 Definitions and General

“Affiliate” – shall mean any subsidiary, parent, ultimate holding company or a subsidiary of such parent or ultimate holding company. For the purpose of this definition, “subsidiary” and “holding company” shall have the meaning as assigned to them under the Companies Act relevant to the applicable law set out in Clause 17 herein;

“Contract” – shall mean the contract entered into between the Customer and DNV GL including these General Terms and Conditions and the DNV GL Rules. The above listed documents shall be interpreted as one agreement and in case of any ambiguities or contradictions between the various documents, the documents shall take precedence in the order they are listed above;

“Claim” or “Claims” - shall mean any and all claims, losses (including pure economical losses), demands, taxes, liens, liabilities, judgments, awards, provisional injunctions, remedies, debts, damages, injuries, costs, legal and other expenses, or causes of action of whatsoever nature, and in whatever jurisdiction the foregoing may arise;

“Consequential Loss” - shall mean loss and/or deferral of production, lost productivity (disruptions), loss of product, loss of use, loss of time to any vessel or loss of hire, loss of business opportunities and contracts, loss of goodwill, loss of data, loss of revenue, profit or anticipated profit (if any), losses arising from liabilities or indemnities under other contracts, in each case whether direct or indirect and whether or not foreseeable at the commencement of the Work;

“Customer” – shall mean the person and/or company which has requested DNV GL’s service and has entered into a contract/agreement for services;

“Customer Group” – shall mean (i) the Customer and its Affiliates; (ii) the Customer’s other contractors (other than DNV GL), suppliers and subcontractors (of any tier) and their respective Affiliates; and (iii) the respective directors, officers, managers, agents, employees (including agency personnel) and representatives of the persons and entities mentioned under (i) and (ii) above as well as any other person or entity acting on its/their behalf;

“Deliverable” – the deliverable(s) which is(are) to be provided to the Customer by DNV GL according to the Contract;

“DNV GL” – shall mean for the purposes of these General Terms and Conditions, the company with which the Customer has entered into the Contract being DNV GL or any of its branches and subsidiaries (as the case may be);

“DNV GL Group” – shall mean (i) DNV GL, all its direct and indirect owners and its Affiliates; (ii) DNV GL’s subcontractors (of any tier) and their Affiliates; and (iii) the respective directors, officers, managers, agents, employees (including agency personnel) and representatives of the persons and entities mentioned under (i) and (ii) above as well as any other person or entity acting on its/their behalf;

“DNV GL Rules” – shall mean all provisions and/or requirements adopted by DNV GL as the basis for Classification at any point in time;

“Variation” – additional work to the Work originally agreed in the Contract;

“Work” – the services provided to Customer by DNV GL which are expressly set out in the Contract including any Variation and any Deliverable.

These General Terms and Conditions shall be incorporated in the Contract and shall override and exclude any terms and conditions sought to be imposed by the Customer. No amendment and/or variation to these General Terms and Conditions and no additional terms put forward by the Customer shall be considered binding or valid unless set out in writing and duly signed by the authorised representatives of both parties.

The respective latest version of the General Terms and Conditions as well as the applicable DNV GL Rules, as made available on www.dnvgl.com shall apply to all work rendered by DNV GL, including those rendered within the scope of DNV GL’s statutory functions as recognised organisation or similar, even if no written Contract was concluded.

2. The Work and execution of Work

2.1 The Work shall be carried out in accordance with the Contract, the provisions of these General Terms and Conditions, the DNV GL Rules, the international conventions and/or EU regulations applicable to the relevant Work and/or flag administration requirements. The same shall apply in the absence of a written agreement between the parties. The Work performed by DNV GL is performed under the basic assumption that other parties involved, including but not limited to the Customer’s other contractors and suppliers, fulfill their individual obligations and provide correct and complete information. DNV GL shall, upon completion of the relevant certification process and the Work, but subject to any relevant findings from its assessment or inspections, issue the Deliverable, provided always that DNV GL in its sole professional discretion finds that the applicable requirements are fulfilled.

2.2 When providing services DNV GL does not assess compliance with any standard other than the applicable DNV GL Rules, international conventions, EU Regulations and/or flag administration requirements and other standards, to the extent agreed in writing.

2.3 Any terms, conditions, duties or warranties otherwise incorporated or implied by law are hereby expressly excluded in full or to the fullest extent permitted by the applicable law. The remedies set forth in Clause 6 shall therefore be the sole remedies for any discrepancies, errors or omissions whatsoever regarding the Work.

2.4 DNV GL will provide suitably qualified personnel to carry out the Work. Unless otherwise agreed, DNV GL may at any time substitute personnel assigned to the Work, provided that any replacement personnel are suitably qualified.

2.5 A confirmation given or certificate issued by DNV GL shall not substitute the role of and/or release the Customer Group or any other parties involved from its contractual or legal obligations towards any third parties and/or the Customer (as the case may be). Maintenance of the validity of such confirmation or certificate, for example through the process of regular surveys in the case of ship classification, is the responsibility of the Customer.

2.6 DNV GL may, without prejudice to any other rights available to DNV GL, at any time recall, suspend, withhold, withdraw and/or reissue any Deliverable with immediate effect, suspend or withdraw any vessel from class and/or suspend further performance of any services if in DNV GL’s sole and unfettered opinion: (i) Customer fails to provide any necessary information or documentation for the purpose of maintaining the Deliverable and/or class; or (ii) Customer fails to comply in due time with conditions or instructions issued by DNV GL; or (iii) Customer fails to pay any fees or other sums due to DNV GL; or (iv) any relevant discrepancies, errors or omissions in the basis for the Deliverable is detected; or (v) Customer misrepresents DNV GL’s business name, trademark or Deliverable on which such name or trademark is used.

2.7 DNV GL may retain or withhold any service, certificate or other deliverable to the Customer in respect of all outstanding payments (whether related or not) arising out of the entire business relationship with the Customer, regardless of whether one or more vessels owned or managed by the Customer are affected.
3 General Obligations

3.1 Customer agrees that DNV GL’s performance of the Work requires DNV GL to be granted access to and the right to inspect all relevant sites, equipment, machinery and facilities and all relevant, correct and complete documents and information. For this purpose, Customer shall in a timely manner, without conditions, make all necessary arrangements and provide DNV GL with all reasonably necessary access to the above mentioned information and sites. Unless it is explicitly agreed as part of the Work to identify discrepancies, errors, inconsistencies or omissions in the information provided by the Customer Group, Customer shall be responsible for the correctness of the information it provides and DNV GL is entitled to rely on the accuracy and completeness of such information for the performance of the Work.

All Deliverables provided by DNV GL are based on the information, documentation and/or physical items made available by Customer to DNV GL up to the date of issuance of the Deliverable, and Customer acknowledges and agrees that any statement made by DNV GL in the Deliverable is a statement reflecting the situation at the time of issuance only.

3.2 Should the Customer fail to provide DNV GL with the required access or information at the agreed times, DNV GL may suspend the performance of the Work pending receipt of the Customer’s instructions for access and/or necessary information. DNV GL shall have the right to have a representative present at any such suspension and the Customer will be responsible for DNV GL’s fees and other wasted costs and expenses incurred by DNV GL.

3.3 Customer acknowledges and agrees that it has read and understood the requirements in the applicable DNV GL Rules, international conventions, EU Regulations and/or third party administration requirements of and other standards applicable to the Contract and agrees to abide by them.

3.4 Failure by Customer in fulfilling the obligations set out in this Section 3 is to be considered a material breach of this Contract.

4 Health, Safety and Environment (HSE)

4.1 Both DNV GL and the Customer shall employ reasonable standards for promoting safety, health and environmental protection and for ensuring safe working environments for all personnel.

4.2 Customer shall inform DNV GL without undue delay of: (i) any actual or potential HSE risk which Customer is aware of and which is reasonably relevant to the performance of the Work; and (ii) any of Customer’s implemented or planned measures against such risks that Customer requires DNV GL personnel to adhere to.

4.3 Whenever DNV GL’s performance of the Work involves visits to work on Customer controlled facilities or sites, Customer is responsible for the adequacy, stability, safety and legal compliance of the working environment, including reasonable measures to mitigate or control relevant risks. DNV GL or its personnel is entitled to refuse to carry out any activity, or visit any area or site, if DNV GL or its personnel in their sole discretion consider that relevant risks are unacceptable or not adequately addressed, contained or otherwise mitigated. Any such decision shall suspend both parties’ obligations under the Contract without any liability or penalties until the parties have agreed on how to proceed.

5 Variations to the Work

Customer may in writing request DNV GL to perform a Variation. DNV GL shall not be obliged to execute any Variations until a written agreement with the Customer regarding the remuneration and the potential schedule impact of the Variation has been signed, which shall be an integral part of this Contract.

6 Re-performance

Any documented error or defect in the Work will be rectified by DNV GL within a reasonable period of time at DNV GL’s sole cost, provided said error or defect is not attributable to Customer or Customer Group and DNV GL is duly notified of said errors or defects within twelve (12) months after delivery or completion of the Work, whichever occurs first.

7 Taxes and Remuneration

7.1 Each party is solely responsible for paying any and all taxes, duties or similar government charges to which the competent public authority wherever such charges are levied and/or imposed on the activities of the party.

Any and all prices, fees, rates or remuneration are agreed as stated exclusive of any form of sales taxes, value added tax, goods and services tax and/or any other similar taxes including any surcharges levied thereon which may be applicable.

7.2 Customer shall effect payment as agreed in the Contract to DNV GL for the Work, including any Variations, to DNV GL’s bank account stated on the invoice within thirty (30) days of the date of the invoice.

Work performed by DNV GL shall be invoiced in accordance with the tariffs of DNV GL or on the basis of a suitable percent or unit as included in the offer or in the Contract. In addition thereto, DNV GL will charge any extra expenses incurred in connection with the services rendered (e.g. travelling or other expenses and, where applicable, any value added/tax).

Customer accepts invoices sent by electronic means.

Additional expenses which are incurred by DNV GL in connection with the performance of the Work, and for which DNV GL is not responsible, for instance, as a result of poor organisation on the part of the Customer or of repetition of tests and extra time spent, will be charged separately at the respective current cost rates.

7.3 In case of late payments, DNV GL is, in addition to the remedies set forth in Clause 2.5, entitled to charge a late payment interest according to the applicable law of this Country, or 6% per annum pro rata, whichever is the higher.

7.4 All payments shall, subject to Clause 7.5, be made in cleared funds, without any deduction or set-off and free and clear of and without deduction for or on account of any taxes, levies, imports, duties, charges, fees and withholdings of any nature now or hereafter imposed by any governmental, fiscal or other authority save as required by law.

7.5 If and to the extent Customer has to withhold taxes or other government charges according to mandatory laws, Customer shall withhold and deduct such amounts from payments to DNV GL and pay the amount to the competent tax authority or any other relevant governmental body, as the case may be, within the time allowed or the minimum amount required by law. Customer shall indemnify and hold DNV GL harmless from any and all financial responsibility or sums found to be due arising out of the non-payment, late-payment or payment to the non-competent tax authority or any relevant governmental body.

Customer shall inform DNV GL about such withholding, any change in the rate or the basis of the withholding and the availability of any formal procedure resulting in an authorisation to make a payment without a withholding prior to making the payment. Customer and DNV GL shall cooperate in completing any procedural formalities necessary for the Customer to obtain authorisation to make payment without a withholding.

Within ten days of making either the withholding or any payment required in connection with that withholding, the Customer shall deliver to DNV GL a withholding tax certificate, official receipt or evidence reasonably satisfactory to DNV GL that payment has been made to the competent tax authority or any other competent governmental body. Customer shall cooperate with DNV GL and shall use reasonable efforts, at no cost to DNV GL, in seeking any double tax treaty relief, other exemptions and refunds available following from such withholdings.

7.6 Section 7.1 to 7.5 shall apply accordingly in case an Affiliate provides the Work.

7.6 No disputes arising between DNV GL and the Customer shall interfere with prompt payment of invoices by the Customer. Any rights of lien or retention in favour of the Customer, statutory or otherwise, are hereby excluded. The Customer shall have no right to set-off any sums including sums in respect of counter-claims, unless such counter-claim is undisputed or has been finally adjudicated upon by the courts.

8 Confidentiality

8.1 Each party as recipient agrees to keep confidential any information it receives from the other party as disclosing...
party in the course of the Contract which, by denotation or reasonable circumstances, is considered confidential to the disclosing party. The recipient shall treat such received information with reasonable care and diligence, not disseminating or disclosing it to third parties without the disclosing party’s prior written consent, provided however that each party may share such information with its officers, employees, affiliates, subsidiaries, subcontractors, suppliers or professional advisors who are subject to confidentiality obligations reflecting the principles herein.

8.2 The obligations set forth in Clause 8.1 shall not apply to any information which: (i) is or becomes known to the recipient from a third party without any confidentiality obligation to the disclosing party; (ii) is or becomes generally available in the public domain through no act or failure to act on the part of the recipient; (iii) has demonstrably been developed by the recipient independently from this Contract; (iv) is requested to be disclosed by any competent court, governmental agency, flag state administration, other relevant public authority in accordance with applicable law, course order or other public regulation; (v) is disclosed to the registered owner and/or ultimate owning company of a vessel without changing the general nature of confidentiality of such information in vessel-related or (vi) is required to be disclosed by the applicable stipulations of the International Association of Classification Societies (IACS).

8.3 Customer acknowledges that DNV GL is bound by an obligation to give the EU Commission or anyone acting on its behalf, access to information in accordance with applicable EU requirements, and that Customer shall give the EU Commission unrestricted access to ships for the purpose of inspection.

8.4 DNV GL Group shall have the right to use for statistical, analytical and internal training purposes, any material, information or know-how generated in the course of the Work.

8.5 The obligations in this section shall survive the completion of the Work or termination of this Contract and shall continue so long as the relevant information remains confidential.

9 Assignment and Subcontracting

9.1 This Contract, including any Deliverable issued as a result hereof, is specifically related to the Customer and no rights, obligations, interests, benefit or Deliverable deriving here from shall extend to any other (third) party without the prior written consent of DNV GL. Customer is not entitled to grant to any third party any right of use in respect of any Deliverable without the prior written consent of DNV GL. The Contracts (Rights of Third Parties) Act 1999 shall not apply to this Contract.

9.2 DNV GL may at its discretion subcontract parts or all of the Work to any other company within the DNV GL Group. The DNV GL Group shall have the benefit of, and shall be entitled to enforce against the Customer the rights, exclusions, limitations of liability and indemnities set out in the Contract.

9.3 DNV GL is only responsible for the Work it has performed directly or through its subcontractors.

10 Intellectual Property Rights

10.1 For the purpose of this Contract, each party shall remain the sole owner of any of its intellectual property and rights thereto existing prior to the date of this Contract and, except as expressly set out in this Contract, nothing herein shall imply any transfer or grant of rights to any such intellectual property or rights thereto.

10.2 Customer shall hold a restricted, global and royalty free license to use the Deliverables or the results of the Work for their agreed or common purpose, including the right to use and valid certificates or similar documents in accordance with the applicable requirements.

10.3 Subject to the confidentiality obligations set out in Clause 8 above, all intellectual property rights in the information and data created in connection with this Contract shall vest in DNV GL. In particular, DNV GL shall hold the copyright to all certificates and similar documents issued under this Contract. Nothing herein shall be deemed to limit DNV GL Group rights according to Clause 8.4.

10.4 The Customer warrants that it holds all necessary rights to material and information submitted for the purpose of the Work. The Customer shall indemnify and hold harmless DNV GL from any Claim. DNV GL might suffer or receive as a consequence of any infringement of third party rights.

10.5 DNV GL is continuously improving its services to the industry to safeguard life, property and the environment. The customer acknowledges that DNV GL shall hold a right to use and process any information, data or databases generated or collected throughout the Work in an anonymized form, for its own competence building, research or business purposes.

11 Force Majeure

11.1 Neither party shall be in breach of this Contract, nor liable for any failure or delay in performance of the Work and the cause of such failure or delay is attributable to events beyond the reasonable control of the affected party, including but not limited to armed conflict, terrorist attack, civil war, riots, toxic hazards, epidemics, natural disasters, extreme weather, fire, explosion, failure of utility service, labour disputes, breakdown of infrastructure, transport delays, or any other public restrictions following any of the incidents above, or any other force majeure occurrence.

11.2 In the event of a force majeure occurrence, the affected party shall notify the other party without undue delay of the particulars of the situation and the estimated duration. Either party shall be entitled to terminate the Contract with immediate effect should the force majeure occurrence endure for more than thirty (30) days.

12 Indemnifications

12.1 Each party shall indemnify and hold harmless the other party from and against all Claims arising while carrying out the Work in respect of: (i) bodily injury, sickness, disease, or death of any of its employees or other representatives; and (ii) loss or damage to the property of the other party. This provision shall apply whether or not the Claim is contributed to by the negligence of the other party. Both parties shall maintain insurances for such liabilities, cf. Clause 14, to make this knock-for-knock provision effective.

12.2 The Work including any advice and information provided by DNV GL to the Customer as a part of the Work, shall be for the Customer only. The Customer shall ensure that any other member of the Customer Group and/or any third party is aware that the Work is intended for the Customer only and it is understood and agreed that nothing expressed herein is intended or construed to give any person, firm or corporation, other than the signatories hereto any right, remedy or claim hereunder or under any provisions herein contained. The Customer shall indemnify and hold harmless the DNV GL Group from and against Claims brought by the Customer Group (other than the Customer) in connection with the Work or any advice and information, in whatever form it may be given, which has been provided by DNV GL to the Customer.

12.3 The Customer shall be responsible for and shall save, indemnify, defend and hold harmless the DNV GL Group from and against all Claims in respect of pollution or contamination emanating from the assets, equipment, facilities or property of Customer Group whether owned, hired, leased or otherwise provided by the Customer Group and arising from, relating to or in connection with the performance or non-performance of the Work, irrespective of cause and whether or not resulting from or contributed to by any negligence, breach of duty (statutory or otherwise), breach of contract, breach of warranty and/or strict liability of any member of the DNV GL Group.

12.4 Customer shall indemnify and hold harmless DNV GL from and against any Claims in respect of: (i) Customer’s breach of Section 3 (General Obligations); (ii) any abuse of the Deliverable issued under this Contract.

12.5 The Customer’s obligations to indemnify DNV GL Group set out above in Clause 12.2, 12.3 and 12.4, shall apply in respect of any Claims regardless whether such Claims against DNV GL Group are based on breach of contract, direct action, breach of duty (statutory or otherwise), tort (including
Appendix A


Fleet in service — DNV GL AS

14.1 Both parties shall maintain adequate insurance coverage for general and professional liabilities and their relevant personnel under the Contract, for such amounts and on such terms as are standard in their respective industries and with underwriters who are in good standing. Such insurance policies shall contain a waiver of subrogation.

15 Fair Business Practice, Anti-bribery and Compliance

15.1 The parties shall conduct their respective business activities in a fair, ethical, and lawful manner in accordance with all applicable laws and generally accepted codes of conduct (including but not limited to the DNV GL code of conduct), avoiding any unacceptable activities, including but not limited to acceptance of or acquiescence in extortion, bribery, use of child labour, breach of human rights, or the imposition of unreasonable work conditions.

15.2 Customer shall indemnify and hold harmless DNV GL from any breach of Clause 15.1.

15.3 Both parties may terminate this Contract with immediate effect, without any liability or penalties, if a member of DNV GL Group or Customer Group are or become subject to sanctions or penalties imposed by a national government, the United Nations, the European Union or similar organizations related to the Work which is provided hereunder, if the Work could be considered to be illegal or in conflict with applicable law for the respective party, its subcontractors and/or its subcontractor’s parent companies.

16 Term and Termination

16.1 This Contract shall remain in full force and effect until all Deliverables are delivered, or the Work is otherwise completed and paid for in full unless terminated earlier by mutual agreement or in accordance with Clause 15.3 or Clause 16.2 below.

16.2 Each party may terminate this Contract by written notice to the other party under the following circumstances:

(i) if the other party commits a material breach of this Contract and fails to rectify such breach within 10 (ten) working days after receipt of the other party’s written notice;

(ii) if the other party becomes insolvent, is unable to pay its debts as they fall due, or is subject to bankruptcy proceedings, administration, receivership, dissolution, liquidation, winding-up or otherwise discontinues its business; or

(iii) for convenience after serving the other party a written notice 30 (thirty) days prior to termination.

16.3 In the event the Contract is terminated by the Customer in accordance with 16.2 (iii) prior to completion of the Work, irrespective of cause, DNV GL shall be entitled to: (i) the agreed remuneration for the Work rendered up to the date of termination; (ii) all costs incurred by DNV GL up to and including the termination date; and (iii) 10% of the remuneration agreed in respect of Work which has not been provided. In the event of termination, DNV GL shall be entitled to retain any payment, deposit or advance of any fees made by the Customer prior to the date of termination up to the amount to which DNV GL is entitled.

16.4 In the event of termination of the Contract, the rights and obligations of DNV GL and the Customer included in Clauses 1, 3, 6, 7, 8, 10, 11, 12, 13, 17 and 18 shall remain in full force and effect.

17 Law and Jurisdiction

17.1 This Contract shall be governed by and construed exclusively in accordance with the laws of Norway, without regard to principles of conflicts of law.

17.2 The parties shall use their reasonable efforts to resolve any claim or dispute arising in relation to this Contract by negotiations within a reasonable time. Should the parties fail to resolve any claim or dispute by negotiations, the dispute shall be exclusively subject to the jurisdiction of the courts of Oslo, Norway.

18 Severability

Should any provision of these General Terms and Conditions be held to be invalid or unenforceable, such shall not affect the validity or enforceability of any other part or provision of these General Terms and Conditions. Such provision shall be amended to the extent necessary to make the provision valid and enforceable, while keeping as strictly and closely as possible to the original wording and purpose of the provision.
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 establish reasonable assurance that the required Rules is built in, observed and maintained. Classification does not imply any guarantee that the requirements are met.

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 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 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 The rules does allow use of advanced survey arrangements, alternative scope and evaluation of equivalence as alternatives to the traditional periodical survey requirements. These may include such as Classification for smarter operations concept, use of sensor data, condition based maintenance, etc.

2.6.5 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.

2.6.6 The register of Units classed with DNV GL is available for supplying information on 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.

The periodical survey fees shall include support to the customer such as pre and post survey meeting (as applicable), rule interpretations, Direct Access to Technical Experts (DATE) service, fleet responsible and rig coordinator support related to periodical surveys (except what is specified as additional work below).

For example, the following tasks are considered as additional work (note: this list is not exhaustive):

- Class activities related to (such as meetings, surveys, audits, exemption handling and/or documentation review):
  - closing or postponement of conditions of class, conditions of authority and/or memo to owner (MO)
  - damage, repairs, conversions, modifications and new installations
  - specific shelf or coastal state requirements other than relevant class notations
  - assessment of equivalent arrangements
  - flag applications (UWILD, POB increase, etc.)
  - postponement of class and statutory surveys
  - use of novel/alternative survey methods/techniques

- Surveys of equipment sent ashore for refurbishment, e.g. drilling equipment and thrusters

- Meetings, surveys or inspections carried out by a service supplier not approved by DNV GL, such as radio-experts and divers, requiring DNV GL attendance

- Additional surveys required due to sub-standard conditions

- Re-issuance of certificates, issuance of class declarations, etc.

- Advisory work in general, such as for instance HSE studies, risk analysis, development of RBI/RCM programmes, etc.

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 SPECIAL CONSIDERATIONS FOR CONVERSIONS

For special considerations for conversions of existing oil tankers to offshore production and storage units or installations, see DNVGL-RU-OU-0102 App.B.
APPENDIX D MOORING EQUIPMENT ACCEPTANCE STANDARD GUIDANCE - MOBILE MOORING

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: DNVGL-RP-E304
— for chain: as stated in [2.4].

2 Anchor and mooring 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 \(23.25D\) 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 to 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.

3 Survey requirements - mooring chain failure

3.1 Inspection scope and acceptance criteria
In case of a mooring chain failure, the inspection shall reveal if the break is due to overload, and to what extent this overload affect the function and/or capacity of the chain. If the inspected chain links do not reveal any findings outside the normal acceptance criteria for chain as per this appendix and DNVGL-OS-E302, the failed link is assumed a local damage and the remainder of the chain is accepted for further use.

Inspection requirements:
— Extent of chain subject to inspection: 10 links on each side of the break, or as agreed on a case by case with the Society.
— Inspection required: 100% CVI, 100% NDT, dimensional control

In addition to the failed link, also other areas on the mooring chain assembly may have sustained damage as part of the incident. An evaluation regarding inspection of other areas shall always be done based on the failure scenario. See Ch.3 Sec.4 [2.1.5] for further details.
About DNV GL
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, technical assurance, software and independent expert advisory services to the maritime, oil & gas and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping our customers make the world safer, smarter and greener.