Noble Denton marine services – marine warranty survey
FOREWORD

DNV GL service specifications contain procedural requirements for obtaining and retaining certificates and other conformity statements to the objects, personnel, organisations and/or operations in question.

© DNV GL AS November 2016

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

This service document has been prepared based on available knowledge, technology and/or information at the time of issuance of this document. The use of this document by others than DNV GL is at the user’s sole risk. DNV GL does not accept any liability or responsibility for loss or damages resulting from any use of this document.
CHANGES – CURRENT

This document supersedes DNVGL-SE-0080, December 2015.
Changes in this document are highlighted in red colour. However, if the changes involve a whole chapter, section or sub-section, normally only the title will be in red colour.

Main changes November 2016

• General
  — The whole document has been revised as the previous version referred to legacy entity documents that have been superseded by the issuance of DNVGL-ST-N001 and DNVGL-ST-N002.

Editorial corrections

In addition to the above stated changes, editorial corrections may have been made.
CONTENTS

Changes – current................................................................. 3

Section 1 Introduction and purpose........................................ 5
  1.1 General................................................................. 5

Section 2 Marine warranty survey services................................. 6
  2.1 General................................................................. 6
  2.2 Role of the marine warranty surveyor................................. 6
  2.3 DNV GL marine warranty surveyor approval and related activities................................................. 7
  2.4 Certificate of approval................................................ 8
  2.5 Statement of acceptability............................................. 9
  2.6 Scope of work leading to an approval................................ 9
  2.7 Limitations of approval.............................................. 10
  2.8 Repetitive and unattended operations........................... 13

Section 3 Technical and practical requirements........................... 14
  3.1 General................................................................. 14
  3.2 DNV GL’s marine warranty standards.............................. 14
  3.3 Other industry codes................................................ 14

Appendix A Supporting documents........................................... 15
  A.1 DNV document set.................................................. 15
  A.2 GL Noble Denton guidelines...................................... 16

Appendix B Code basis and environmental loading.................... 18
  B.1 Default motion criteria.............................................. 18
  B.2 Friction allowance when computing seafastening loads........ 18

Changes - historic............................................................. 19
SECTION 1 INTRODUCTION AND PURPOSE

1.1 General
This document provides a description of the process used by DNV GL Noble Denton marine services when providing marine warranty survey (MWS) services to evaluate whether a marine operation can be accepted for the purposes of insurance-related MWS. It addresses both project and MODU/MOU related MWS. The main deliverable of the MWS process is a certificate of approval (CoA) for marine operations or location approval for MOUs.
The industry best practice benchmarks for the MWS service are provided in documentation made available through the DNV GL Noble Denton marine services warranty standards wizard accessed via My DNV GL. This marine operations documentation may also be used as desired for non-MWS purposes, e.g. for activities such as inspection, oversight or owners representative.

Table 1-1 List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD/WSD</td>
<td>allowable stress design/working stress design</td>
</tr>
<tr>
<td>CoA</td>
<td>certificate of approval</td>
</tr>
<tr>
<td>HAZID</td>
<td>hazard identification analysis</td>
</tr>
<tr>
<td>HAZOP</td>
<td>hazard and operability study</td>
</tr>
<tr>
<td>LRFD</td>
<td>load resistance factor design</td>
</tr>
<tr>
<td>MODU</td>
<td>mobile offshore drilling unit</td>
</tr>
<tr>
<td>MOU</td>
<td>mobile offshore unit</td>
</tr>
<tr>
<td>MWS</td>
<td>marine warranty survey</td>
</tr>
<tr>
<td>NDT</td>
<td>non-destructive testing</td>
</tr>
<tr>
<td>OIM</td>
<td>offshore installation manager</td>
</tr>
<tr>
<td>PQP</td>
<td>project quality plan</td>
</tr>
<tr>
<td>RP</td>
<td>recommended practice</td>
</tr>
<tr>
<td>SoA</td>
<td>statement of acceptability</td>
</tr>
<tr>
<td>SoW</td>
<td>scope of work</td>
</tr>
<tr>
<td>TLP</td>
<td>tension-leg platform</td>
</tr>
<tr>
<td>VMO</td>
<td>Veritas Marine Operations (legacy DNV now part of DNV GL Noble Denton marine services business area)</td>
</tr>
</tbody>
</table>
SECTION 2 MARINE WARRANTY SURVEY SERVICES

2.1 General

2.1.1
This section provides an overview of the approach taken by DNV GL Noble Denton marine services when providing MWS services that are intended to result in a certificate of approval (CoA) for a marine operation for the purposes of marine insurance warranty.

2.1.2
In cases where document approval is required, a statement of acceptability (SoA) can be issued.

2.1.3
The marine warranty surveyor’s role is described together with the CoA and the steps necessary to achieve the issue of a CoA or SoA.

2.1.4
For the purposes of this document, DNV GL is the legal entity, trading under the DNV GL name, which is contracted to carry out the scope of work and issues a certificate of approval, a statement of acceptability, or provides advice, recommendations or design input as a consultancy service.

2.1.5
This document is applicable where either DNVGL-ST-N001 or DNVGL-ST-N002 are used as the basis for the design and planning. For projects started prior to DNVGL-ST-N001 or DNVGL-ST-N002 then either the legacy DNV or GL Noble Denton legacy set may be used in which case the December 2015 edition of this document (DNVGL-SE-0080) shall be used. Other standard(s) for the design and planning may be acceptable provided they meet the requirements of [3.3].

2.1.6
MWS services will be delivered by personnel with the abilities required by the internal competency scheme and who are either part of DNV GL Noble Denton marine services or acting on their behalf.

2.2 Role of the marine warranty surveyor

2.2.1
An insurance warranty is a clause in the insurance policy for a particular marine project, requiring the approval of one or more marine operations by marine warranty surveyors from a specified independent survey house, or one from a list of such survey houses. In most cases the assured employs the survey house though occasionally an insurance broker or the underwriters may do so.

2.2.2
The requirement is normally satisfied through the issuance of one or more certificates of approval. Responsibility for interpreting the terms of the warranty so that an appropriate scope of work can be defined
rests with the assured who may be the operator, owner or the owner’s contractor. The scope may include acceptance of procedures and equipment in advance of the issue of the certificates of approval and may also be extended to cover consultancy work as described in [2.3].

2.2.3

The surveyor usually attends during an operation to monitor the operations and agree any changes in procedures. In these cases the surveyor has no executive authority on the project, but when necessary shall submit recommendations to the assured’s representative to ensure that the project is run in a safe and proper manner, see [2.4.5].

2.3 DNV GL marine warranty surveyor approval and related activities

2.3.1

DNV GL marine warranty survey approval may be sought where a marine operation is the subject of an insurance warranty clause, or where an independent third party review covering an equivalent scope is required e.g. for self-insured operations.

2.3.2

DNV GL may also undertake other complementary roles that are not necessarily mutually exclusive to the MWS role, e.g. for self-insurance operations, or where a demonstrable level of independent assurance is required.

2.3.3

Services that are fully complimentary to the MWS scope include:

— on-hire/off-hire condition surveys related to the charter of vessels
— vessel audits
— vessel suitability surveys, and
— verification of aspects of a project that are not addressed, or not addressed in detail, by the MWS scope.

2.3.4

Other activities such as marine advisor or consultant (providing advice, recommendations, calculations and/or design input) could give rise to potential conflicts of interest where the submissions for MWS approval are developed by DNV GL as part of the scope. In such cases, it is normal practice that these are under the control of separate line management and it is required that the client makes the appropriate disclosures to, and obtains acceptance from, underwriters.

2.3.5

If the scope of work requires an individual warranty surveyor to approve his or her own work, e.g. as towmaster, this is only possible when the client has obtained the underwriters' acceptance prior to the work commencing.
2.4 Certificate of approval

2.4.1
A certificate of approval (CoA) is the formal document issued by the warranty surveyor when, in his or her judgement and opinion, all reasonable checks, preparations and precautions have been taken to keep risks within acceptable limits (see Sec.3), and an operation may proceed or a unit is suitable for operations at a location. It is the main deliverable of the approval process. It is expected that a signed copy of the CoA will be returned to the warranty surveyor to acknowledge receipt.

2.4.2
The CoA for a marine operation such as float-out, towage or installation will normally be issued when:
— all relevant documentation has been reviewed and accepted
— preparations on site and on vessel(s) involved have been satisfactorily carried out
— marine equipment has been surveyed and found acceptable
— a readiness meeting has been held, and
— the weather conditions and forecast weather are suitable for the operation to begin and, for weather restricted operations the forecast weather window is sufficient.

Agreement is required on the end-point of each certificate of approval. The end-point shall be a safe condition or when the CoA for a subsequent operation is issued. A safe condition is one where the object is considered to be exposed to a normal level of risk of damage or loss (the risk is similar to the risk expected for the in-place condition).

Note:
Unless specified otherwise in the CoA, a towage to a safe haven is deemed to be complete when it reaches the planned destination however the CoA ceases to apply when the approved tug(s) is/are disconnected and released from further activity (apart from when bunkering).

---e-n-d---o-f---n-o-t-e---

2.4.3
Normally a preliminary CoA for an MOU location will be issued in advance of the installation operation. Preliminary location CoA’s usually include recommendations for pre-installation activities such as debris surveys. They will normally be issued when all necessary site data has been reviewed and a site specific assessment has shown the MOU structure and foundations are suitable for operations at the proposed site.

Note:
For jack-ups, a full site specific assessment may not be required when one of the following alternative approaches shows acceptability. Comparison of the key parameters for the proposed operation against:

a) operating curves for the unit and considered acceptable by DNV GL Noble Denton marine services,
b) limiting criteria given in the approved operations manual where these are considered acceptable by DNV GL Noble Denton marine services,
c) known cases that are considered acceptable by DNV GL Noble Denton marine services.

As a minimum the referenced capabilities for metocean data, weight and CoG, leg length below hull, foundation fixity, and assessment code should be similar or more onerous.

---e-n-d---o-f---n-o-t-e---

Once the key site-specific assessment assumptions are confirmed post-installation by the rig (master, OIM, etc.) or by an attending surveyor, the final certificate will be issued. If the key assumptions are not confirmed then further evaluation will be undertaken to determine whether a final certificate can be issued, and to establish any related limitations or mitigations.
Note:
Whilst a final CoA can be issued without surveyor attendance, such attendance can be required by the client and/or the underwriter. When the location presents unusual challenges, DNV GL Noble Denton marine services may recommend that a surveyor attend.

---e-n-d---o-f---n-o-t-e---
Location CoA's address the installed situation only and do not address the marine operations for installing or removing an MOU from location.

Note:
In the event that an installation has not proceeded as expected e.g. there was a punch-through, DNV GL Noble Denton marine services are well-placed to offer assistance in mitigating such issues.

---e-n-d---o-f---n-o-t-e---

2.4.4
The warranty surveyor may be unable to issue a CoA due to inadequate procedures or equipment for the likely conditions.

2.4.5
Similarly, failure to follow the procedures, conditions and recommendations in the certificate of approval could lead to it being withdrawn, or to the issue of a non-conformance notice. In the event of a loss, the lack of a valid CoA means that the insurance warranty provisions are not met; this could therefore invalidate related aspects of the insurance policy and prevent or reduce payment by underwriters for any loss.

2.5 Statement of acceptability

2.5.1
A statement of acceptability (SoA) may be issued when the client requires documentary proof that DNV GL has completed the necessary reviews of procedures and supporting calculations and that subject to any stated limitations on the statement of acceptability, the procedures are considered acceptable. No surveys or site checks are required for a statement of acceptability. A statement of acceptability covers only the acceptability of the submitted documents. It does not imply approval of any proposed operation.

2.6 Scope of work leading to an approval

2.6.1
The overall requirements of the scope of work (SoW) are usually set out in the insurance warranty clause or a document referenced from it. The scope can be dependent on the level of risk that the underwriters perceive to be associated with the particular operation. Typically detail is added in the contract scope to ensure that the requirements of both the client and DNV GL are satisfied. The SoW typically includes:

— document reviews of engineering calculations, project plans and operations procedures
— meeting attendance
— participation in risk identification and reduction activities such as HAZIDs and HAZOPs
— surveys of the structure and equipment to be used (including vessels)
— review of equipment certificates, statutory documentation, etc.
— surveys to verify that satisfactory preparations have been made
— issuance of a certificate of approval
— attendance to witness critical operations.
2.6.2
The technical criteria that are used to ensure acceptable risk levels are given in Sec.3.

2.6.3
In addition to the more general risk level for each operation, the criticality of all aspects and documents can be considered. The premise for such approach should be further detailed in the SOW and/or the DNV GL PQP (project quality plan) for the project.

2.6.4
Early involvement of DNV GL is recommended (normally at the initial planning or design stage) to ensure adherence to the standard criteria as this will often save the time and expense of changing designs after construction has started.

2.6.5
In some cases risk assessments can be used to justify operation and/or project-specific deviations from the standard criteria provided that DNV GL agrees that the results are acceptable. When such risk assessments show that the risk levels are increased relative to those inherent in the standard criteria, the operation may be approved subject to disclosure by the client to, and agreement by, the underwriters.

  **Note:**
  To achieve a deviation on a separate operation and/or project a new risk assessment will need to be undertaken and agreed with DNV GL.

---e-n-d---o-f---n-o-t-e---

2.7 Limitations of approval

2.7.1 General

2.7.1.1 CoA's are issued subject to specific limitations, which are included in the wording. Some of these are specific to the type of marine operation under consideration. The limitations include the following:

2.7.1.2 A CoA is issued for a particular towage, voyage or operation only and is not to be deemed or considered to be a general statement of seaworthiness of vessels.

2.7.1.3 A CoA is issued based on external conditions observed by the attending surveyor of the structure, hull(s), machinery and equipment, without removal, exposure or testing of parts.

2.7.1.4 Any alterations to the surveyed items or agreed procedures after issue of the certificate of approval may render the certificate invalid unless the changes are accepted by DNV GL in writing. Any changes to the agreed procedure should be submitted through a management of change system. This should include a risk assessment and all information relevant to demonstrate the acceptability of the change.

2.7.1.5 No responsibility is accepted by DNV GL for the way in which a transportation is conducted after departure, or for the way in which an operation is conducted after commencement, this being solely the responsibility of the appropriate manager, master or superintendent.
Note:
When in attendance, the DNV GL MWS will bring any known deviations from the approved procedures to the attention of the client’s representative.

---e-n-d---o-f---n-o-t-e---

2.7.1.6 The CoA covers the surveyed items within the agreed scope of work only. It does not, for instance, cover any other cargo on board a vessel or barge, or any damage to the surveyed cargo as a consequence of inadequacy of any other cargo or its seafastenings, unless specifically included in the scope of work.

2.7.1.7 The CoA for any operation does not cover any moorings used:

— prior to the start of a transportation or operation
— at any intermediate shelter port or arrival port
— after completion of a transportation or operation

unless specifically approved by DNV GL. If approval of moorings is required, other than for the operation itself, specific approval should be requested.

2.7.1.8 A CoA for installation applies to the safety of the structure and associated equipment during the defined installation period. It does not imply that the completed jacket, platform or other installation will be fit for purpose.

2.7.1.9 The safety of personnel will not be specifically addressed unless our client requests this and the detailed requirements are included in the scope of work.

2.7.2 Piracy

In accordance with underwriter requirements, DNV GL will check that an anti-piracy plan exists for voyages through at-risk areas but will not verify the suitability of the plan, unless required to do so by the underwriters. Nevertheless, masters are advised to carefully consider their route and the risks presented before implementing all necessary measures in due time to reduce the likelihood of their vessel becoming a target.

Note:
The anti-piracy plan should be developed as part of the passage planning process taking into account previously reported incidents of piracy. DNV GL’s Noble Denton marine services is available to assist with risk analysis and guidance.

---e-n-d---o-f---n-o-t-e---

2.7.3 Structural Fatigue

2.7.3.1 General

Fatigue damage that could jeopardize the safety of a marine operation should normally be considered, however DNV GL Noble Denton marine services’ approval will include fatigue damage verification only when specifically included in the scope of work agreed with the client.

DNV GL expects that fatigue will be considered for project cargoes. It is often not practicable to assess the tow/transportation fatigue of MOUs (due to lack of knowledge of past history as well as the often limited time-frame available).

If fatigue is included in the warranty clause and it cannot be addressed, then the client should advise the underwriters accordingly.

2.7.3.2 Voyages

For DNV GL Noble Denton marine services to be able to issue a CoA for existing structures and MOUs where there is no fatigue analysis to demonstrate sufficient remaining fatigue life, a thorough NDT inspection of
fatigue-critical areas should be undertaken and the results submitted together with the details of repairs to any defects that were detected.

Note:
For jack-ups an inspection programme, including NDT, will be required if the unit has previously been subject to one or more transoceanic voyages and there has been no subsequent recent detailed inspection of the fatigue-critical areas. Typically, the inspection should include, as appropriate, the areas of legs from just below the lower guides to 2 bays above the upper guides, with the legs in any proposed voyage condition. It should also include the guide connections, the jack-house connections to the deck and connections of the spudcans or mudmats to the leg chords. New-build MOUs should normally have been verified for fatigue for the initial delivery voyage.

---e-n-d---o-f---n-o-t-e---

2.7.3.3 Jack-ups on location
For DNV GL Noble Denton marine services to be able to issue a CoA when a jack-up is intended to operate for a long period in water depths such that the same leg sections are within or near the guides, the effects of fatigue will be considered for the legs in way of the hull and in the splash zone as well as for the leg to spudcan or leg to mat connection.

Note:
This is to meet the requirements in clause 11.3.1 of ISO 19905-1:2016.

---e-n-d---o-f---n-o-t-e---

The effects of fatigue damage will be excluded from any certificate of approval for a location issued by DNV GL Noble Denton marine services unless specific instructions are received from the client.

2.7.4 Location approvals

2.7.4.1 The preliminary CoA for the location will be issued on satisfactory review of the proposed installed situation confirming suitability of the unit to survive at the location for the intended mode of operation and the activity specific operating limits and/or storm survival criteria, based on the information provided, see also [2.4.3].

2.7.4.2 DNV GL Noble Denton marine services can provide assurance by performing a "real time" spudcan penetration analysis during geotechnical site investigations. Note that DNV GL Noble Denton marine services can only confirm that a borehole has been progressed to sufficient depth on the basis of calculations performed by DNV GL Noble Denton marine services for the particular jack-up unit(s) being assessed.

2.7.4.3 After installation of a mobile unit subject to MWS, an installation report shall be presented to DNV GL Noble Denton marine services confirming the installation is in accordance with the assumptions made for the preliminary CoA for the location.
For moored units, the following information to be presented (usually in the form of a master’s report):
— Final position of the unit and bearing
— Mooring proof loading, see DNVGL-ST-N001 [17.9.2].
— Position and bearing of the anchors and final clearance with subsea assets
— Final position of the subsea-buoys if employed for clearances
— Make up of each mooring line
— As-built chain map and identification numbers of all the components
— Certificates of all the components
— Summary of any deviations from the approved arrangements, and validation of the arrangement with the deviations for the location.
For bottom-founded units, the following information to be presented:
— Final position of the unit and bearing; ideally the coordinates of each leg (where applicable).
— Load-penetration behaviour, including initial penetrations under dead-load and the final penetrations.
— Final air gap above chart-datum (where applicable).
— Summary of any deviations from the approved arrangements, and validation of the arrangement with the deviations for the location.

The final CoA for the location of an MOU will be issued by DNV GL Noble Denton marine services upon receiving and accepting the as-installed information listed above. For quayside and inshore locations, it is mandatory that a DNV GL Noble Denton marine services surveyor attends to issue the final CoA for the location.

## 2.8 Repetitive and unattended operations

### 2.8.1

Attendance by a marine warranty surveyor is not normally required for all repeats of identical operations unless specified by the insurance warranty or client, provided that DNV GL is kept informed of any variations, problems and potential problems. The attendances will be agreed at the start of each project and will typically include:

a) the first unique event
b) after significant changes in procedures for the operations
c) after change of vessel
d) after change of person in charge or OIM
e) an additional 10% of randomly selected repetitive operations.

### 2.8.2

Certificates of approval for any towage or transport, for which a DNV GL Noble Denton marine services’ surveyor does not attend the departure, will normally be issued in advance after the vessel (including barges/ MOUs etc.) and towing vessel(s) have been surveyed. It will be validated by email or other means after the actual departure weather and weather forecast have been agreed by the relevant DNV GL office.

### 2.8.3

DNV GL may require progress reporting for unattended operations, towages and transports e.g. daily or at specified mile-stones.

### 2.8.4

Statements of acceptability will normally be issued in advance, when required, for unattended lifts, load-outs or other operations when the procedures and calculations have been accepted.
SECTION 3 TECHNICAL AND PRACTICAL REQUIREMENTS

3.1 General

3.1.1
Normally the technical and practical requirements discussed in [3.2] would be used as the basis for assessing the acceptability of an operation or location. However, other standards may be acceptable, see [3.3].

3.1.2
A structural assessment of an innovative structure and/or material cargo during temporary stages may not always be available for review by DNV GL Noble Denton marine services due to confidentiality concerns. In such cases, after agreement with the underwriters and the client, DNV GL Noble Denton marine services may accept an official document from the designer stating maximum allowable loads from the seafastenings and allowable accelerations for the structure/cargo to keep within allowable stresses during voyage or installation. Alternatively, one of the parties may confirm that they will take responsibility in case of damage during load-out, voyage or installation.

Note:
If the design of the wind turbine blades is highly confidential and the client, manufacturer or designer is unwilling to submit transport or handling calculations then this approach can be taken.

---e-n-d---o-f---n-o-t-e---

Alternatively, DNV GL Noble Denton marine services may accept a statement from the certifying authority that the structure can safely withstand the required accelerations and loads for the load-out, voyage and installation provided that the load paths / allowable local forces for seafastening, lifting or load-out forces are given.

3.2 DNV GL’s marine warranty standards

3.2.1 General
DNV GL has set the industry standard for marine operations and marine assurance activities for the last 50 years. Our collective industry best practice and guidance documentation is referenced and used by a large proportion of clients and competitors alike all over the world. An overview of the legacy documents is in App.A and key features of their harmonisations are discussed in App.B.

This knowledge and experience has enabled us to develop our latest standards published during 2016:
— DNVGL-ST-N001 Marine operations and marine warranty
— DNVGL-ST-N002 Site specific assessment of mobile offshore units for marine warranty

In general, technical and practical requirements outlined in these two documents are directly applicable to marine assurance and/or advisory activities. They are also taken as the default in the absence of alternative client requirements for both assurance and advisory services.

3.3 Other industry codes
Other industry codes may be used in place of the above documents provided that they can be shown to achieve similar levels of safety.
APPENDIX A SUPPORTING DOCUMENTS

The legacy document sets described below formed the basis for the development of DNVGL-ST-N001 and DNVGL-ST-N002 (exception: 0021/ND which is replaced by DNVGL-SE-0122). In their final version, service delivery using the legacy document sets was governed by DNVGL-SE-0080 of December 2015. An overview of each of the legacy document sets is given below. The DNV-RP-H### documents will be revised in due course.

A.1 DNV document set

The DNV documents that related to marine operations consisted of a three-level hierarchy where:

1) Offshore service specifications presented the principles, procedures, scope (excluding technical requirements) and extent of DNV's offshore services. (Legacy DNV VMO MWS specific services are described in DNV rules for Planning and Execution of Marine Operations, Part 1 Ch.1.)

   Note:
   This has been replaced by this DNV GL service specification.

   ---e-n-d---o-f---n-o-t-e---

2) Offshore standards were issued as neutral technical standards to enable their use by national authorities, as international codes and as company or project specifications without reference to DNV's offshore services.

3) Recommended practices conveyed DNV's interpretation of safe and sound engineering practice for general use by the marine/offshore industry.

The main content in the offshore standards is shown below.

— DNV-OS-H101 – Marine Operations, General – The content is general requirements and recommendations for planning, preparations and performance of marine operations. Requirements to temporary mooring systems, stability, guide systems and vessels are included.

— DNV-OS-H102 – Marine Operations, Design and Fabrication – The content is general requirements and recommendations for selection of loads, design (verification) and fabrication of structures involved in marine operations.

— DNV-OS-H201 – Load Transfer Operations – The content is specific requirements and recommendations for marine operations involving load transfer without use of cranes, i.e. by use of (de)ballasting. Typical load transfer operations are loadout, float-out, lift-off, float-over and mating. Construction afloat is also covered.

— DNV-OS-H202 – Oct-15 – Sea Transport Operations – The content is specific requirements and recommendations for sea transports operations. Typical operations are towing of barges, vessels and self-floating objects as well as ship transportation of special cargoes.

— DNV-OS-H203 – Transit and Positioning of Offshore Units – The content is requirements and recommendations for positioning any type of offshore unit such as: Semi-submersible units, self-elevating units, drilling ships, floating productions and/or storage units, loading buoys, offshore installation vessels, and well intervention units. Transit of these units is also covered with additional requirements to DNV-OS-H202.

— DNV-OS-H204 – Offshore Installation Operations – The content provides specific requirements and recommendations mainly applicable for jacket installation operations. However, the principles and requirements given in the standard may be adopted for the installation operations of other types of objects.

— DNV-OS-H205 – Lifting Operations – The content is specific requirements and recommendations for well controlled onshore-, inshore- and offshore lifting operations, both in air and sub-sea. For subsea lifts DNV-OS-H206 gives additional requirements.

— DNV-OS-H206 – Subsea Operations – The content is specific requirements and recommendations for loadout, transport and installation of subsea objects. Typical objects covered are subsea structures, pipelines, umbilicals, bundles, cables, and risers.
In addition to the offshore standards, the DNV H-series codes include the following five RP’s which will be revised in due course:

- DNV-RP-H101 – Risk Management in Marine and Subsea Operations
- DNV-RP-H103 – Modelling and Analysis of Marine Operations
- DNV-RP-H104 – Ballast, Stability, and Watertight Integrity – Planning and Operating Guidance
- DNV-RP-H201 – Lifting appliances used for subsea operations

Note:
The VMO standard (DNV-OS-H-series) referred to applicable requirements in other DNV GL/DNV codes. The DNV codes will be/have been revised to DNV GL. These codes are:

- DNVGL-OS-C401 Fabrication and testing of offshore structures (July 2015)
- DNVGL-OS-E301 Positioning mooring (July 2015)
- DNV-OS-F101 Submarine Pipeline Systems (Oct. 2013)
- DNV-OS-F201 Dynamic Risers (Oct. 2010)
- DNV 2.22 Standard for Certification No. 2.22, Lifting appliances (June 2013)

---e-n-d---o-f---n-o-t-e---

A.2 GL Noble Denton guidelines

The GL Noble Denton guidelines were developed specifically for the purposes of providing clients and their designers and contractors with a clear description of the MWS process and the technical criteria and documentation required to comply with the process. An overview of each guideline is given below.

- 0001/ND – General Guidelines for Marine Projects, Rev 1.1
  These guidelines present material that is common to more than one of the other GL Noble Denton guidelines for the approval of marine projects.

- 0009/ND – Guidelines for Site Specific Assessments of Jack-Ups, Rev 10.1
  These guidelines are for the assessment of self-elevating platforms in the elevated condition. They address:
  - General feasibility studies, including optional checks for punch-through resistance and fatigue; such studies may result in a statement of compliance.
  - Assessment for specific locations; such studies may result in a certificate of approval.

- 0013/ND – Guidelines for Load-Outs, Rev 8.1
  These guidelines are for the loadout of items including offshore jackets, SPAR sections, modules, bridges and components from the shore onto floating or grounded barges and ships.

- 0015/ND – Concrete Offshore Gravity Structure Construction & Installation, Rev 5.1
  These guidelines are for the marine aspects of construction, towage and installation of offshore concrete gravity base structures (GBS) with a deck. They are intended to be applicable to deep draft structures, where much of the construction work is carried out afloat, as well as shallower draft structures where the construction of the GBS can be essentially completed in dry dock.

- 0016/ND – Seabed and Sub-seabed Data Required for Approvals of Mobile Offshore Units (MOU), Rev 8.1.
  These guidelines describe the seabed and sub-seabed data required by to assess the suitability of locations for independent leg and mat-supported jack-up units, other mobile units operating on the seabed, and anchor installation and performance assessments for floating units.

- 0021/ND – Guidelines for the Approval of Towing Vessels, Rev 10 (to become DNVGL SE 0122 Towing vessels approvability scheme).
These guidelines are intended to lead to an approval by for entry into the GL Noble Denton Towing Vessel Approvability Scheme. They also provide guidance for the approval of towing vessels for a specific tow and bollard pull tests. They do not cover the towage of specific vessels or barges, guidance for which may be found in 0030/ND.

— 0027/ND – Guidelines for Marine Lifting and Lowering Operations, Rev 11.2
These guidelines are for the design and approval of marine lifting operations, including subsea installations (but excluding pipelines and flowlines).

These guidelines are for the design and approval of the transportation and installation of steel offshore jacket structures.

These guidelines are for the approval of pipeline installation by laying, pulling or towing, would be based.

These guidelines are used for approval of specialised marine transportations, including:
— cargoes on ships or towed barges
— towage of self-floating marine and oilfield equipment, civil engineering structures and ships
but are not normally intended to apply to “standard” cargoes such as bulk liquids, bulk solids, refrigerated cargoes, vehicles or containers.

These guidelines are for the approval of float-over installation or removal of structures onto or from a host structure which may be:
— offshore pre-installed structures, e.g. jackets and concrete units, or
— offshore or inshore floating structures, e.g. TLPs, concrete units and semi-submersibles.

These guidelines are used for the approval of moorings, including:
— offshore catenary or taut leg moorings of mobile offshore units (MOUs)
— offshore catenary or taut leg mooring of floating offshore installations (FOIs)
— inshore mooring of MOUs and FOIs, e.g. for stacking
— temporary mooring of offshore installations in an afloat condition during construction, installation or decommissioning
— quayside mooring of MOUs and FOIs, e.g. during maintenance or conversion
— mooring of vessels during loadouts and installation operations.

— 0035/ND – Guidelines for Offshore Wind Farm Infrastructure Installation, Rev 1.1.
These guidelines are for the approval of the installation of offshore wind farms of various types. They mainly refer to other GL Noble Denton guidelines developed for similar operations, but provide alternatives which may apply to offshore wind farm installations.
APPENDIX B CODE BASIS AND ENVIRONMENTAL LOADING

DNVGL-ST-N001 allows for either a load and resistance factor design (LRFD) or an allowable/working stress design (ASD/WSD) approach. Alignment for load cases that include environmental loads has been achieved by different the metocean criteria requirements for the two different approaches.

For weather-restricted operations, this has been done by using smaller alpha-factors for the ASD/WSD approach compared to those required for LRFD. This means that to achieve a given limiting forecast operational criteria, the design environmental condition needed for the ASD/WSD approach needs to be higher than that for the LRFD approach. However, the resulting steel requirements will be similar because for the ASD/WSD approach, with the 1/3 increase in allowable stresses invoked, results in lower inherent safety factors, than the LRFD approach.

**Note:**

Here the safety factors are taken as the combined effect of the load and resistance factors for LRFD and the margin against yield in ASD/WSD. It should be recognized that the alignment will never be perfect because the LRFD safety factors are dependent on the environmental to gravity load ratio and also on whether the environmental loading is a linear or squared function of the environmental parameters.

For weather unrestricted operations, the metocean return periods for the ASD/WSD approach are greater than those required by the LRFD approach. Again, the resulting steel requirements will be similar because for the ASD/WSD approach, with the 1/3 increase in allowable stresses invoked, results in lower inherent safety factors than the LRFD approach.

In other areas, some difference between the approaches remains, including:

— default motion criteria
— friction allowance when computing seafastening loads

These are discussed in in the following sections.

**B.1 Default motion criteria**

The default motion criteria differ. The criteria for the ASD/WSD approach address a wide range of vessels. The basis for the criteria is empirical, however it has stood the test of time for unrestricted voyages worldwide. The default criteria for the LRFD approach are more theoretically based, and they are often more closely aligned with analytical results from standard analysis programs i.e. typically based on small-amplitude theory and assumed damping, rather than on non-linear analysis that accounts for deck-edge immersion and other effects. In the ASD/WSD approach to default motion criteria, friction is excluded when computing lateral seafastening loads, whereas friction is permitted in the LRFD approach.

**B.2 Friction allowance when computing seafastening loads**

As discussed in [B.1], the ASD/WSD approach does not allow seafastening loads to be reduced by the effects of friction when default vessel motions criteria are used. However, it is permissible to include the effects when following the LRFD approach. When default motions criteria are not used and the motions are calculated, both approaches allow friction to be taken into account. The friction coefficients differ, but so do the permitted areas with which they are associated, so that in most cases the resulting force reduction is similar.
CHANGES - HISTORIC

December 2015 edition

This is a new document.
Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16 000 professionals are dedicated to helping our customers make the world safer, smarter and greener.