Helicopter Decks

APRIL 2012

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FOREWORD

DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment, at sea and onshore. DNV undertakes classification, certification, and other verification and consultancy services relating to quality of ships, offshore units and installations, and onshore industries worldwide, and carries out research in relation to these functions.

DNV service documents consist of among others the following types of documents:
— Service Specifications. Procedural requirements.
— Standards. Technical requirements.

The Standards and Recommended Practices are offered within the following areas:
A) Qualification, Quality and Safety Methodology
B) Materials Technology
C) Structures
D) Systems
E) Special Facilities
F) Pipelines and Risers
G) Asset Operation
H) Marine Operations
J) Cleaner Energy
O) Subsea Systems

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

General

This document supersedes DNV-OS-E401, April 2011.

Text affected by the main changes in this edition is 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

— Ch.1 Sec.1 new text A202 regarding scope of this standard.
— Ch.1 Sec.1 Table B1 new reference.
— Ch.2 Sec.8 “Norwegian Civil Aviation Authorities Requirements” in previous edition of document deleted.
— Ch.3 update section A in line with OSS-101 and subsequent changes of OSS-201.
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# INTRODUCTION

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<th>PAGE</th>
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</tbody>
</table>
SECTION 1
INTRODUCTION

A. General

100 General
101 This standard is intended to provide requirements and guidance to the design of helicopter decks constructed in steel or aluminium, for mobile offshore units (MOUs), or offshore installations designed and built for installation at a particular offshore installation.

102 The requirements in this standard apply to units or installations with erected landing platform for helicopters or a landing area arranged directly on weather deck or supported by substructure anywhere on the unit or installation.

103 The standard is applicable to the design of complete helicopter deck structures including sub-structure and hull connections and reinforcements.

104 The standard has been written for general worldwide application. Governmental regulations may include requirements in excess of the provisions of this standard depending on the size, type, location and intended service of the offshore unit or installation.

Guidance note:
For Classed mobile offshore units (MOUs) relevant parts of statutory requirements, e.g. MODU Code and/or SOLAS will be applicable.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

200 Objectives and Scope

201 The objectives of this standard are to:
— provide an internationally acceptable standard of safety for helicopter decks by defining minimum requirements for the design, materials, construction, arrangement for safe helicopter operations and commissioning
— serve as a contractual reference document
— serve as a guideline for designers, suppliers, purchasers, contractors and regulators
— specify procedures and requirements for helicopter decks subject to DNV certification and classification.

202 The scope of this standard covers requirements for the helicopter deck structure, vessel safety, helicopter and refuelling and hangar facilities.
The scope excludes the NMD Helicopter deck regulations as applicable on Norwegian shelf. These are provided in DNV-OSS-201.

A 300 Organisation of this standard

301 This standard is divided into three main chapters:

Chapter 1: General information, scope, definitions and references.

Chapter 2: Technical provisions for helicopter decks for general application.

Chapter 3: Specific procedures and requirements applicable for certification and classification in accordance with this standard.

B. Normative References

B 100 General

101 The standards given in Table B1, Table B2 and Table B3 include provisions, which through reference in this text constitute provisions for this standard.

B 200 Offshore service specifications and rules

201 The offshore service specifications and rules given in Table B1 are referred to in this standard.

| Table B1 DNV Offshore service specifications and rules |
|----------------|----------------|
| Reference      | Title                        |
| DNV-OSS-101    | Rules for Classification of Offshore Drilling and Support Units |
| DNV-OSS-201    | Verification for compliance with norwegian shelf regulations |
| DNV-OSS-102    | Rules for Classification of Floating Production, Storage and Loading Units |
| Pt.6 Ch.1 Sec.2| Rules for Classification of Ships, - Helicopter Installations |
B 300 Offshore standards

301 The offshore standards given in Table B2 are referred to in this standard.

<table>
<thead>
<tr>
<th>Table B2  DNV Offshore standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
</tr>
<tr>
<td>DNV-OS-C101</td>
</tr>
<tr>
<td>DNV-OS-C201</td>
</tr>
<tr>
<td>DNV-OS-D101</td>
</tr>
</tbody>
</table>

B 400 Other references

401 The references given in Table B3 are referred to in this standard.

<table>
<thead>
<tr>
<th>Table B3 Other references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
</tr>
<tr>
<td>SOLAS requirements in force</td>
</tr>
<tr>
<td>Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU Code) in force</td>
</tr>
</tbody>
</table>

C. Informative References

C 100 General

101 The documents in Table C1 include acceptable methods for fulfilling the requirements in the standards. Other recognised documents may be used provided it is shown that they meet or exceed the level of safety of the actual standards.

<table>
<thead>
<tr>
<th>Table C1  DNV Recommended Practices and Classification Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
</tr>
<tr>
<td>DNV-RP-A201</td>
</tr>
<tr>
<td>DNV-RP-C203</td>
</tr>
<tr>
<td>DNV-RP-C205</td>
</tr>
<tr>
<td>Classification Note 30.1</td>
</tr>
</tbody>
</table>

D. Definitions

D 100 Verbal forms

101 Shall: Indicates requirements strictly to be followed in order to conform to this standard and from which no deviation is permitted.

102 Should: Indicates 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. Other possibilities may be applied subject to agreement.

103 May: Verbal form used to indicate a course of action permissible within the limits of the standard.

104 Can: Can-requirements are conditional and indicate a possibility to the user of the standard.

E. Abbreviations and Symbols

E 100 Abbreviations

101 The abbreviations given in Table E1 are used in this standard.

<table>
<thead>
<tr>
<th>Table E1 Abbreviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbreviation</td>
</tr>
<tr>
<td>CAA</td>
</tr>
<tr>
<td>DNV</td>
</tr>
<tr>
<td>ICAO</td>
</tr>
<tr>
<td>IMO</td>
</tr>
<tr>
<td>LRFD</td>
</tr>
<tr>
<td>MODU</td>
</tr>
</tbody>
</table>
### Table E1 Abbreviations (Continued)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>In full</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Offshore standard</td>
</tr>
<tr>
<td>OSS</td>
<td>Offshore service specification</td>
</tr>
<tr>
<td>RP</td>
<td>Recommended practice</td>
</tr>
<tr>
<td>SOLAS</td>
<td>International Convention for the Safety of Life at Sea</td>
</tr>
<tr>
<td>ULS</td>
<td>Ultimate Limit State</td>
</tr>
<tr>
<td>WSD</td>
<td>Working stress design</td>
</tr>
</tbody>
</table>

#### E 200 Symbols

201 The following units are used:

- **g** = gram
- **k** = kilo
- **m** = meter
- **cm** = centimetre
- **mm** = millimetre
- **t** = tonne
- **N** = Newton
- **s** = second.

202 The following Latin characters are used:

- **g** = acceleration due to gravity
- **p** = pressure
- **A** = area
- **L** = length between perpendiculars
- **M** = mass
- **P** = force
- **V** = velocity.

203 The following Greek characters are used:

- **σ** = stress
- **η** = usage factor.
CHAPTER 2

TECHNICAL PROVISIONS

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SECTION 1
STRUCTURAL CATEGORISATION AND SELECTION OF MATERIALS

A. Structural Categorisation

A 100 General
101 Selection of structural categories, material quality, and requirements for inspection of welds are following the principles and requirements given in DNV-OS-C101 Sec.4 or DNV-OS-C201 Sec.4.

A 200 Structural category
201 The main bearing parts of the helicopter deck with substructure shall in general be categorised as primary structure.

B. Material Selection

B 100 General
101 Material specifications shall be established for all structural materials. Such materials shall be suitable for their intended purpose and have adequate properties in all relevant design conditions. Material selection shall be undertaken in accordance with the principles given in DNV-OS-C101 Sec.4 or DNV-OS-C201 Sec.4.

102 When considering criteria appropriate to material grade selection, adequate consideration shall be given to all relevant phases in the life cycle of the unit.

B 200 Design temperatures
201 The helicopter deck including support structure shall be designed for service temperatures equal to the lowest daily mean temperature for the area(s) where the unit shall operate. Definition of mean temperature is given in DNV-OS-C101 Sec.4 or DNV-OS-C201 Sec.4.

C. Material Connections

C 100 Steel and aluminium connections
101 In areas exposed to green sea/sea spray, a non-hygroscopic material shall be applied between steel and aluminium in order to prevent galvanic corrosion. Bolts with nuts and washers shall be of stainless steel, quality A4-316 or equivalent.

102 Horizontal inertia forces in bolted connections may be required to be taken up by metal to metal stoppers with insulation tape in the gap.

103 Aluminium superstructures that are provided with insulating material between aluminium and steel shall be earthed to the hull. See Rules for Classification of Ships Pt.4 Ch.8.

104 For welded connections, any bimetallic connection flats shall be delivered from approved manufacturer with DNV certificates.
SECTION 2
DESIGN LOADS AND LOAD COMBINATIONS

A. General

100 General

101 The design loads and load combinations shall comply with the requirements listed in DNV Rules for Classification of Ships Pt.6 Ch.1 Sec.2 B combined with wind loads as specified in A200. It is to be noted that inertia forces with a 100 year return period shall be applied.

Guidance note:
For non-ship shaped units sea pressure on the helicopter deck can normally be excluded.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

A 200 Wind loads

201 The wind loads shall be calculated using ‘gust’ (3 s averaging time interval) wind velocities.

Guidance note:
When evaluating wind pressures the following listed one minute sustained wind velocities at 10 m above base is normally to be used as a basis for calculating the gust wind velocities:

\[ V_{1\text{min.}10} = 30 \text{ m/s for the landing condition} \]
\[ V_{1\text{min.}10} = 55 \text{ m/s for the stowed condition}. \]

For additional information regarding wind conditions, please see DNV-RP-C205.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

202 The wind pressure acting on the surface of helicopter decks shall be calculated using a pressure coefficient \( C_p = 2.0 \) at the leading edge of the helicopter deck, linearly reducing to \( C_p = 0 \) at the trailing edge, taken in the direction of the wind. The pressure may act both upward and downward.

203 For structures where vortex shedding may be of importance, vibration induced loads shall be taken into account.
SECTION 3
STRUCTURAL STRENGTH

A. Strength Requirements

A 100 Deck plating and stiffeners
101 DNV Rules for Classification of Ships Pt.6 Ch.1 Sec.2 C200 shall be complied with for requirements to helicopter deck scantlings for deck plating and stiffeners.

A 200 Girders and supporting structure
201 The scantlings shall normally be based on direct stress analysis. The basic allowable usage factor, $\eta_0$, is as follows (see DNV-OS-C201 for details):

--- Operational conditions: ---
Landing condition: $\eta_0 = 0.67$
Stowed condition: $\eta_0 = 0.80$

Guidance note:
When dimensioning the support structure part of the hull (e.g. integrated platform beams part of weather deck or deck beams below the supporting structure of separate platforms), the stresses from the loading of the helicopter deck should be combined with relevant global stresses. In operational landing conditions the still water hull bending stress should be applied, while for stowed conditions both still water and dynamic wave bending stress should be applied.

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A 300 Buckling
301 Buckling evaluations shall be carried out according to Classification Note 30.1 or equivalent internationally recognised codes and standards.
SECTION 4
MISCELLANEOUS

A. General

101 DNV Rules for Classification of Ships Pt.6 Ch.1 Sec.2 D shall be complied for requirements to safety nets, tie-down points and surface friction of helicopter decks.

102 In case of landing on a hatch cover section which is underlying in the packing joint, the strength or spacing of cleats shall be sufficient to keep the connection intact and tight.
SECTION 5
REQUIREMENTS TO VESSEL SAFETY (HELDK-S)

A. Safety Requirements

A 100 General

101 DNV Rules for Classification of Ships Pt.6 Ch.1 Sec.2 E shall be complied with for requirements to vessel safety.

Guidance note:
For operation onboard vessels with large storage tanks for hydrocarbons, e.g. FPSOs & FSOs, practical guidance for safe operations can be found in Guide to Helicopter/Ship Operations issued by the International Chamber of Shipping.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---
SECTION 6
REQUIREMENTS FOR HELICOPTER (HELDK-SH)

A. Safety (HELDK-SH)

A 100 General
101 DNV Rules for Classification of Ships Pt.6 Ch.1 Sec.2 F shall be complied with for helicopter safety.
SECTION 7
REQUIREMENTS FOR HELICOPTER REFUELLING AND HANGAR FACILITIES (HELDK-SHF)

A. HELDK-SHF

A 100 General

101 Units equipped to support helicopter operations may be given the notation HELDK-SHF provided the requirements listed in DNV Rules for Classification of Ships Pt.6 Ch.1 Sec.2 G300 and DNV-OS-D101 Ch.2 Sec.3 G are complied with.
A. General

101 Requirements to testing and certified products shall comply with the following references in DNV Rules for Classification of Ships:

a) Pt.6 Ch.1 Sec.2 A301 g)
b) Pt.6 Ch.1 Sec.2 A505
c) Pt.6 Ch.1 Sec.2 I.
CHAPTER 3

CERTIFICATION AND CLASSIFICATION

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GENERAL

A. Introduction

A 100 Application

101 As well as representing DNV’s recommendations on safe engineering practice for general use by the offshore industry, the offshore standards also provide the technical basis for DNV classification, certification and verification services.

102 A complete description of principles, procedures, applicable class notations and technical basis for offshore classification is given by the offshore service specifications for classification, see Table A1.

<table>
<thead>
<tr>
<th>Table A1 DNV Offshore Service Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>DNV-OSS-101</td>
</tr>
<tr>
<td>DNV-OSS-102</td>
</tr>
<tr>
<td>DNV-OSS-103</td>
</tr>
</tbody>
</table>

Guidance note:
It will be necessary to also comply with statutory unit/ installation safety regulations of the state in which the unit/ installation is registered, e.g. MODU Code and SOLAS, and helicopter safety operation demands by the operators or guidance in this respect by the helicopter registry authorities. This applies to e.g.:
- size, location and marking of helicopter deck
- obstacle free approach and take-off
- rescue and fire fighting equipment
- helicopter facility operation manuals.

A 200 Class designation

201 Offshore units and installations fitted with helicopter decks that have been designed, constructed and installed in accordance with the requirements of this standard under supervision of DNV may be given the class notation HELDK together with qualifiers as defined in Table A1.

<table>
<thead>
<tr>
<th>Table A1 HELDK class notation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class notation</strong></td>
</tr>
<tr>
<td>HELDK</td>
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202 The application of the different qualifiers is restricted as follows:
— The qualifier H can only be applied together with the qualifier S.
— The qualifier F can only be applied together with the qualifiers SH.
— The qualifier (N) can only be applied together with qualifiers SH or SHF.

A 300 Technical requirements

301 Technical requirements for HELDK shall comply with Ch.2, as applicable:
— Sec.1 to Sec.4 for notation HELDK
— Sec.5 Additional requirements for qualifier S
— Sec.6 Additional requirements for qualifier H
— Sec.7 Additional requirements for qualifier F.

For additional requirements for qualifier (N) see OSS-201, Ch.2, Sec.9.
A 400 Assumptions

401 Any deviations, exceptions and modifications to the designed codes and standards given as recognised reference codes shall be documented and approved by DNV.

402 Where codes and standards call for the extent of critical inspections and tests to be agreed between contractor or manufacturer and client, the resulting extent is to be agreed with DNV.

A 500 Documentation

501 Documentation for classification shall be in accordance with the NPS DocReq (DNV Nauticus Production System for documentation requirements) and DNV-RP-A201.