

Helicopter deck on offshore installations

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Foreword

The NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are as far as possible intended to replace oil company specifications and serve as references in the authorities' regulations.

The NORSOK standards are normally based on recognised international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian petroleum industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input to the international standardisation process. Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.

The NORSOK standards are developed according to the consensus principle generally applicable standards work and according to established procedures defined in NORSOK A-001.

The NORSOK standards are prepared and published with support by the Norwegian Oil and Gas Association and the Federation of Norwegian Industries.

NORSOK standards are administered and published by Standards Norway.

Introduction

This NORSOK standard is based on practical experiences accumulated from helicopter operations on the Norwegian continental shelf. A primary goal of this standard is to set the framework for maximising flight safety and regularity on offshore helidecks.

This standard has been written and revised by NORSOK committee EGC.

Main changes from first edition to second edition are in summary:

- general formatting and reformulation of text;
- inclusion of operational experience feedback from recent projects;
- new sections 5, 8, 13 and 15;
- updates on flight environment and turbulence;
- updates on LOS segment lines;
- updates on sub-zero conditions;
- updates on lowered walkway;
- updates on helideck drainage and passive fire suppression;
- updates on helideck lighting.

1 Scope

This NORSOK standard defines the basic requirements for design, arrangement and engineering of helicopter decks on offshore installations in the petroleum industry. This NORSOK standard covers fixed type installations, normally unmanned installations, floating installations, production, drilling and storage vessels.

2 Normative and informative references

The following standards include provisions and guidelines which, through reference in this text, constitute provisions and guidelines of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet or exceed the requirements and guidelines of the standards referenced below.

2.1 Normative references

NORSOK C-002, *Architectural components and equipment*

NORSOK M-501, *Surface preparation and protective coating*

NORSOK N-001, *Integrity of offshore structure*

NORSOK N-002, *Collection of met ocean data*

NORSOK S-001, *Technical safety*

NORSOK S-002, *Working environment*

EN 1090-3, *Execution of steel structures and aluminium structures, Part 3: Technical requirements for aluminium structures*

BSL D 5-1, (FOR 1181), *Bestemmelser for sivil luftfart (Regulation for civil aviation Norway)*

ICAO, *Annex 14*

2.2 Informative references

None.

3 Terms, definitions and abbreviations

For the purposes of this NORSOK standard, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

5:1 gradient

the falling 5:1 gradient is measured from the top of the lowered gangway railing (or safety netting) to the sea level within the 180° horizontal sector that passes through the centre of the helideck and outwards

3.1.2

can

verbal form used for statements of possibility and capability, whether material, physical or casual

3.1.3

de-icing

defined as removal of snow, ice and frost from a surface

3.1.4

D_H-value

the minimum permissible diameter of the helideck equal to the helicopter D-value multiplied by a factor of 1,25. In certain cases this factor may be increased to improve safety and landing margins, (see chapter 14)

3.1.5

D-value

the largest overall dimension of the helicopter with both rotors turning. Normally measured from the most forward position of the main rotor blade plane to the most rearward position of the tail rotor blade plane, (or fuselage when relevant)

3.1.6

helicopter landing officer (HLO)

the person in charge of the daily supervision of the helideck

3.1.7

helideck

dedicated helicopter landing area on offshore installations

3.1.8

helideck circle

normally a hypothetical circle, (unless the helideck itself is circular), circumscribing the landing area of the helideck with a diameter equal to the deck's D_H -value

3.1.9

helideck limitation list

a list used by pilots to describe any operational restrictions for a specific helideck

3.1.10

limited obstacle sector

defined as the 150° sector where obstacle are permitted within certain height limitations and distances

3.1.11

may

verbal form used to indicate a course of action permissible within the limits of this NORSOK standard

3.1.12

obstacle-free sector

defined as the 210° safe approach and take-off sector for helicopters with an unobstructed flight path above the helideck plane to a safe calculated distance for the helicopter the deck is dimensioned for, normally 500 meters

3.1.13

perimeter line

a white painted 300 mm wide line surrounding the helideck, where the outside edge marks the border of the safe landing area as defined by the helideck's D_H -value

3.1.14

helideck size marking

a whole number inscribed in the perimeter line at three positions with an angle spacing of 90°, marking the D-value for the largest helicopter the helideck is dimensioned for, rounded to the nearest whole number

3.1.15

run-off area

an extension from the helideck to a dedicated helicopter parking area and/or helicopter hangar(s)

3.1.16

shall

verbal form used to indicate requirements strictly to be followed in order to conform to this NORSOK standard and from which no deviation is permitted, unless accepted by all involved parties

3.1.17

should

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

3.1.18

touchdown circle (TD circle)

the yellow inner circle marking the pilots' aiming point for a safe touchdown of the undercarriage within the landing area. Correct touchdown allows for safe access, cargo handling and other required services on the helideck

3.2 Abbreviations

BSL	Bestemmelser for sivil luftfart (regulation for civil aviation)
CFD	computational fluid dynamics
DIFFS	deck integrated fire fighting system
FMS	foam monitor system
FPSO	floating production storage offloading
helideck	helicopter deck
HLL	helideck limitation list
HLO	helicopter landing officer
HTCC	helicopter traffic control centre
ICAO	International Civil Aviation Organisation
LED	light emitting diode
LOS	limited obstacle sector
LQ	living quarters
MTOM	maximum take-off mass
OFS	obstacle-free sector
TD Circle	touchdown circle
UPS	uninterrupted power supply
NVG	night vision goggles

4 General requirements

The provisions set forth in this NORSOK standard shall be complied with in all phases of planning, construction and operation of the helideck. It shall be read in conjunction with the regulation in force, and in particular the Norwegian Civil Aviation Authority (CAA) document BSL D5-1.

The helideck design and location shall be seen as an integrated part of the overall offshore installation design, and not as an isolated activity. This is due to the fact that there are several elements on, and around, an offshore installation that may severely affect safe helicopter operations, unless appropriate measures are taken to avoid, control or reduce any potential hazards. Perfect conditions at all times on a densely equipped petroleum platform or vessel may be hard to achieve, since there are likely to be some potential conflicting situations. In view of this the design approach shall be based on a rational evaluation and decision-making process to achieve the very best compromise when conflicting requirements occur.

The design process shall start at an early stage, and run in parallel with other design activities on the installation. The objective is to achieve a functional and safe helideck with safe approach and departure sectors that will facilitate high flight regularity under most operational conditions. Any potential flight limitation shall either be resolved, or registered as a limitation in HLL.

NOTE Poorly designed helidecks may cause serious helicopter operational restrictions with significant commercial and operational penalties.

5 Environmental effects

The immediate environment surrounding offshore installations may affect helicopter operations in various ways. Bad weather, buildings, structures, equipment, processes and systems may in certain circumstances induce unsafe conditions near the helideck that requires attention. Such conditions are typically:

- poor visibility (day and night);
- unfavourable wind directions;
- structure induced turbulence;
- thermal effects and turbulence caused by gas turbine exhausts, flares and diesel engine emissions;
- unburned hydrocarbon gas emissions from cold flaring;
- emissions from emergency blow down systems;
- helideck motion caused by ocean waves;
- poor visual points of references/visual cues;
- obstacles adjacent to the helideck.

These conditions rarely act independently of each other, and several may occur at the same time. An important task shall be to evaluate these conditions, examine cause and effect, and take necessary actions to provide optimal operational conditions at the helideck. An in-depth understanding of these phenomena and their potential impact is a key factor for a successful helideck design.

The environmental effects shall be correlated with the performance and the sensitivity of the relevant helicopter types to be used on the offshore installation.

The design shall take into account any impact caused by neighbouring installation(s).

5.1 Wind analysis

CFD analyses or wind tunnel tests shall be performed to describe the air flow and hot gas dispersion close to the helideck. A suitable model of the installation shall be built, where relevant environmental effects shall be simulated and evaluated for various conditions. The findings shall be correlated with practical experience data, historic wind data, and relevant information from the helicopter operator. Conclusions and recommendations shall verify and document that the helideck has been given an optimal location on the installation in question. Any possible problems or restrictions regarding helicopter operations shall be highlighted, to enable necessary corrective actions.

Similarly, CFD analyses or wind tunnel tests shall be performed when modifications on existing installations may affect flight performance on the helideck,

The volume of air space to be considered shall comprise the immediate air space surrounding the offshore installation that may induce unfavourable operational conditions at the helideck, and in the helicopter approach and departure sector. The helicopter landing and take-off committal points shall be deemed to be up to 20 meters above the helideck.

Mapping and visualisation of the wind velocity field shall be provided in the form of plots of velocity magnitude, vertical velocity component and vertical velocity fluctuations above the helideck. Vertical velocity fluctuations to be presented are 1,75 m/s and 2,4 m/s. Operational experience indicates that velocity fluctuation of 1.75 m/s will generate noticeable turbulence. This criterion should therefore normally not be exceeded. Flight limitations are likely at values exceeding 2,4 m/s.

NOTE The above values have been aligned with recommendations in CAP 437 7th and 5th editions, respectively.