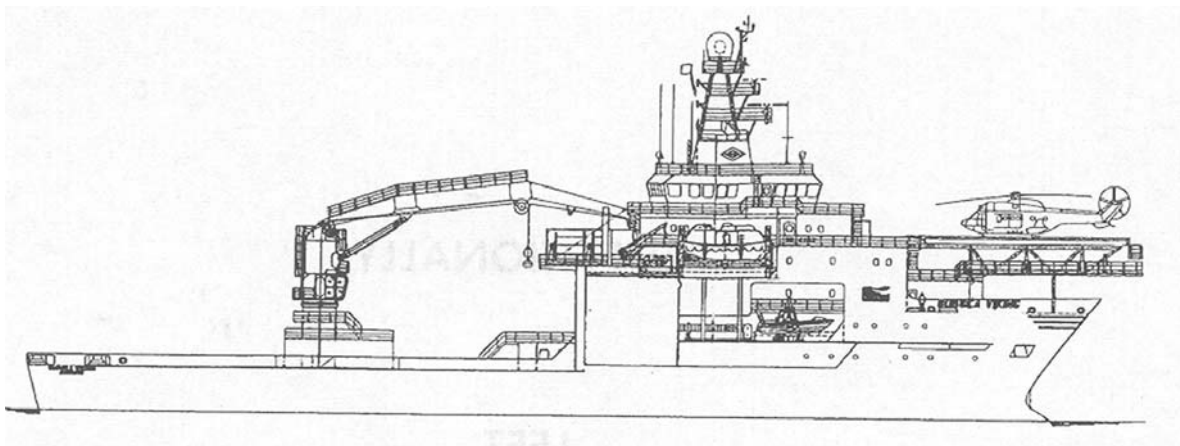




Standard Measuring Equipment for Helideck Monitoring System (HMS) and Weather Data

(HCA, Bristow Group, Bond Offshore, CHC)



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1 Purpose and intentions

The purpose of this document is to ensure uniformity of readings/registration of helideck movement and weather conditions.

This standard is an agreement between Bristow Group (Bristow Norway and Bristow UK), Bond Offshore Helicopters and CHC (CHC Norway and CHC UK), and shall apply to all Moving Helidecks operating on the UK and Norwegian Continental Shelves.

Further intentions are to establish National and International standards based on contents of this document.

2 Definitions

Moving helidecks:

A helideck mounted on a floating unit such as a Vessel, Floating Production Unit, Semi Submersible Rig or floating Jack Up Rig and other helidecks shall be considered to be an unstable/moving landing area if the pitch or roll exceeds 1 degree either side of the vertical and if the vertical movement of the helideck exceeds 2 metres.

Helideck Inclination:

is the angle between the absolute horizon and the plane of the helideck.

Average heave rate:

is the average speed of the helideck between the top and the bottom of a wave movement curve.

Maximum average heave rate:

is the average heave rate of the largest wave (peak value) within a 20 minute time frame in metres per second.

3 Classification of helidecks

There is no official classification method available for this purpose. The proposed classification contains three categories based on the actual floating unit's size, configuration and motion characteristics. It simplifies the current Helideck Certification Agency classification and is based on the current Norwegian classification. Limitations are defined by helideck pitch, roll and inclination and by helideck heave rate. A prime requirement is that the installations have measuring and monitoring equipment installed, and functional, in accordance with this document. Those installations which would normally fall into Category 1 or 2, but which either do not have the appropriate measuring or monitoring equipment installed, or whose equipment is inoperative, are automatically downgraded by one category (e.g. a Category 1 deck with inoperative equipment becomes a Category 2 deck). The category will be entered on the individual vessel/rig information plate in the North Sea Airway Manual or rig plate and the Company Helideck Limitation List (HLL).

Category 1: Semi-submersibles including floating jack ups and all large vessels including FPSOs and tankers. This category combines the existing HCA codes B and C and the Norwegian code A+.

Category 2: Small vessels, e.g. DSVs and seismic vessels, with a helideck that offers good visual cues. This would normally be a stern or midships deck offering a view of the structure of the vessel through at least 90° (assuming the vessel is steaming more or less into wind). This category combines the existing HCA code E and the Norwegian codes B+ and A.

Category 3: Small vessels with poor visual cues, such as a bow deck or a deck mounted above the bridge superstructure with the landing direction facing forwards (bow deck) or abeam (high deck). This category combines the existing HCA code D and the Norwegian code B.

NOTE: Small vessels will be categorized 2 or 3 on inspection by the HCA and their helideck certificate and associated Jeppesen or EAG data will reflect this (except that small vessels with midships decks will always be Category 2).

In addition, aircraft are divided into two types – heavy and medium. The heavy types are the AS332 series, EC225, SK61 and SK92. The medium types are the SA365N/AS365N2/N3, EC155, S76 series, B214ST and AW139.

Note that this does not constitute a helideck approval for a specific helicopter type on a specific helideck.

4 Operational Limitations

The proposed classification is defined in the table.

| AIRCRAFT CATEGORY | HELIDECK CATEGORY | | | | | | | | | | | | |
|----------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| | | 1 | | | | 2 | | | | 3 | | | |
| | | P/R | INC | H/R | H/A | P/R | INC | H/R | H/A | P/R | INC | H/R | H/A |
| HEAVY | DAY | ±3 | 3.5 | 1.3 | 5.0 | ±2 | 2.5 | 1.0 | 3.0 | ±2 | 2.5 | 1.0 | 3.0 |
| | NT | ±3 | 3.5 | 1.0 | 4.0 | ±2 | 2.5 | 0.5 | 1.5 | ±1 | 1.5 | 0.5 | 1.5 |
| MEDIUM | DAY | ±4 | 4.5 | 1.3 | 5.0 | ±3 | 3.5 | 1.0 | 3.0 | ±3 | 3.5 | 1.0 | 3.0 |
| | NT | ±4 | 4.5 | 1.0 | 4.0 | ±2 | 2.5 | 0.5 | 1.5 | ±1.5 | 2.0 | 0.5 | 1.5 |

Key:

P/R = Pitch and Roll (deg); **INC** = Helideck inclination (deg); **H/R** = Heave Rate (m/s); **H/A** = Heave Amplitude (metres) i.e. peak to trough distance.

For tanker mooring buoys the pitch and roll limits remain ±2° by day and ±1° by night (i.e. Category 3 heavy).

NOTE: Although both heave rate and amplitude figures are given, heave rate shall be used where available. The use of heave amplitude will be discontinued once helideck monitoring systems are updated to the latest standard.

5 Principles

Basic reference is made to:

- Norwegian Requirements in BSL D 5-1.8.2.
- UK guidelines in CAP 437

Reference is also made to:

- Sintef Report 22D114,199-11-09 "FPSO Helideck Motion Criteria"

The measuring equipment shall provide sufficient information to the operator to complete all sections of the standard Rig Report, provided for by the helicopter operators.

Measuring equipment sensors for helideck movement, wind and weather data shall be located in optimum positions in order to provide relevant information relating to the helideck.

All information shall be numerically displayed in relevant locations on the vessel or rig for easy communication with helicopters in flight and the helicopter land base operations. The system shall facilitate transmittal of electronic data to the helicopter land base operation, which in turn can eliminate the need for a separate Rig Report to be submitted.

6 Accuracy of measurements

The monitoring system (sensors and data programs) shall be checked and verified for correctness on the system field location, strictly in accordance with the manufacturer's procedures. A verification report showing the correctness of the system shall be provided to both the owner of the installation and to the helicopter operators, after first installation.

The accuracy of the system shall be checked and verified whenever deemed necessary, but at least once every 3 years. A verification report shall be issued and distributed as described above, after each periodic control.

The dynamic accuracy of the data produced by the Helideck Monitoring System concerning motion shall be:

Pitch / Roll / Inclination: $< \pm 0.1^\circ$ RMS (Root Mean Square) in the range 0 to $3,5^\circ$ and
Heave Rate: $< \pm 0.1$ m/s RMS (Root Mean Square) in the range 0 to 1.3 m/s

The accuracy concerning the meteorological data shall be in compliance with NORSOK N-002 Collection of Metocean Data and NORSOK C-004 Helicopter deck on offshore installations

Measuring helideck motion

See paragraph 9 for Motion Severity Index calculation

6.1 Maximum Pitch

The equipment shall be capable of measuring helideck pitch in degrees up and down from zero, with zero being the absolute horizontal level. It shall be possible to read the historic maximum angles over the past 20 minutes, direct and, if possible, graphically. The graphical presentation shall cover 20 minutes of data and alternatively 3 hours for trend determination. The graph and the associated maximum value over the last 20 minutes shall be updated at least at 1 minute intervals. In maritime terms maximum pitch consists of trim + pitch.

6.2 Maximum Roll

The equipment shall be capable of measuring helideck roll in degrees right/starboard and left/port, with zero being the absolute horizontal level. It shall be possible to read the historic maximum angles over the past 20 minutes, direct and, if possible, graphically. In maritime terms maximum roll consists of list + roll.

6.3 Maximum Helideck Inclination

The equipment shall be capable of measuring the maximum helideck inclination in degrees to the absolute horizon over the past 20 minutes, direct and, if possible, graphically.

6.4 Maximum Heave (Vertical Movement)

The equipment shall be capable of measuring vertical helideck movement from top to bottom, with readings in metres. The maximum heave (total vertical movement) of the helideck is the maximum top to bottom value in one cycle (one movement curve) over the past 20 minutes.

It shall be possible to read the historic maximum value over the past 20 minutes direct and graphically. The graphical presentation shall cover 20 minutes of data and alternatively 3 hours for trend determination. The graph and the associated maximum value over the last 20 minutes shall be updated at least at 1 minute intervals.

6.5 Heave Period

The equipment shall be capable of measuring the time between helideck movement summits in seconds (i.e. based on a wave curve the measurement starts and ends in the zero up crossing point). The graphical presentation shall cover 20 minutes of data and alternatively 3 hours for trend determination. The graph and the associated maximum value over the last 20 minutes shall be updated at least at 1 minute intervals.

6.6 Maximum Average Heave Rate

The equipment shall be capable of measuring the vertical movement rate of the helideck in metres per second.

The heave rate measured shall be the mean vertical rate for a movement range from top to bottom within one cycle over the past 20 minutes. The Maximum Average Heave Rate value is calculated directly from the Maximum Heave and the associated Heave Period described above in accordance with the following formula:

Maximum Average Heave rate m/sec = Maximum Heave divided by $\frac{1}{2}$ of the associated Heave Period.

It shall be possible to read the historic maximum value for the past 20 minutes direct and graphically. The graphical presentation shall cover 20 minutes of data and alternatively 3 hours for trend determination. The graph and the associated maximum value over the last 20 minutes shall be updated at least at 1 minute intervals.

6.7 Traffic light on display

The “traffic light” on the display indicates when one of the parameters above has reached a threshold. As long as all the measured parameters are within limits it should show a green light, and when a limit is passed it should show a red light. This function may be coupled to a light system on the helideck that shifts between green and red in parallel to the traffic light. This is to enable the flight crew to see the status of the helideck from the cockpit on landing and when parked on the helideck.

7 Heading of Helideck/Vessel

The heading of the helideck and the vessel shall be stated in degrees relative to magnetic North.

8 Weather data

For Wind Severity Index see paragraph 9.

Data for this section may be assessed by the use of other equipment than the HMS system, but must be of a standard that has a possibility to deliver data to the HMS system (Ref. Chap. 6, Norsok standards N-002 and C –004).

8.1 Wind Direction

Wind direction shall be stated in degrees relative to magnetic North.

Displayed wind direction shall have the options to show real time wind direction, 2-minute mean wind direction and 10-minute mean wind direction.

8.2 Wind Speed

Wind speed shall be stated in knots.

Displayed wind shall be configurable to show real time wind, 2-minute mean wind with gusts exceeding ten knots of the mean wind, and 10-minute mean wind with gusts exceeding 10 knots for 3 seconds or more of the mean 10 minute wind.

8.3 Visibility

Horizontal visibility shall be stated in metres.

8.4 Temperature/Dewpoint

Temperature/dew point temperature shall be stated in degrees Centigrade.

8.5 Air Pressure

Air pressure shall be stated in hPa as QNH, meaning; altitude adjusted for height and temperature relative to sea level.

8.6 Cloud

Cloud shall be stated as few/scattered/broken/overcast (FEW/SCT/BKN/OVC) in feet above the surface.

8.7 Logging system

The system should be able to log all data for 30 days. The historic data should be available by configuring the date and time to the period of interest.

9 Future System Upgrades

CAA studies and trials have been ongoing for some time to develop a safer Helideck limits system based on the same pitch, roll and heave rate limits for landing but on helideck acceleration and wind speed to safeguard the helicopter whilst on deck. This system has started initial trials and will become the required standard on successful completion of these trials. Vessel and installation operators are therefore advised to ensure that any new equipment they procure will be compatible with the future standard.

9.1 Motion Severity Index (MSI)

The Measure of Motion Severity is a function of the ratio of horizontal (lateral and longitudinal) to vertical accelerations of the helideck. This parameter is measured continuously and a statistical program is used to predict the most likely maximum value that should occur in the next 20-minute period, based on measurements in a 20-minute moving window. This statistical value is the MSI.

This system requires accurate helideck motion measuring equipment (as defined above) with anemometer interface, with the additional ability to calculate the helideck accelerations and define the MSI. All equipment producers should be able to provide equipment meeting this specification.

Due to accuracy requirements on the acceleration measurements the motion sensing equipment has to be mounted directly under the helideck centre. Alternatively the motion sensing equipment can be mounted in the accommodation below the helideck within a maximum distance of 4 meters from the helideck centre. If a longer distance is used the MSI calculation will be affected.

On existing systems that does not have a dedicated Motion Reference Unit placed as above, the need of an additional unit will not be necessary until MSI is introduced.

9.2 Wind Severity Index (WSI)

The WSI will be the 10 minute mean wind speed, corrected to correspond to the height of the helideck

9.3 Helicopter Operating Limits

Individual helicopter MSI/WSI operating limits will be calculated using computer modelling and based on trials and safety assessments. The MSI/WSI will cover the

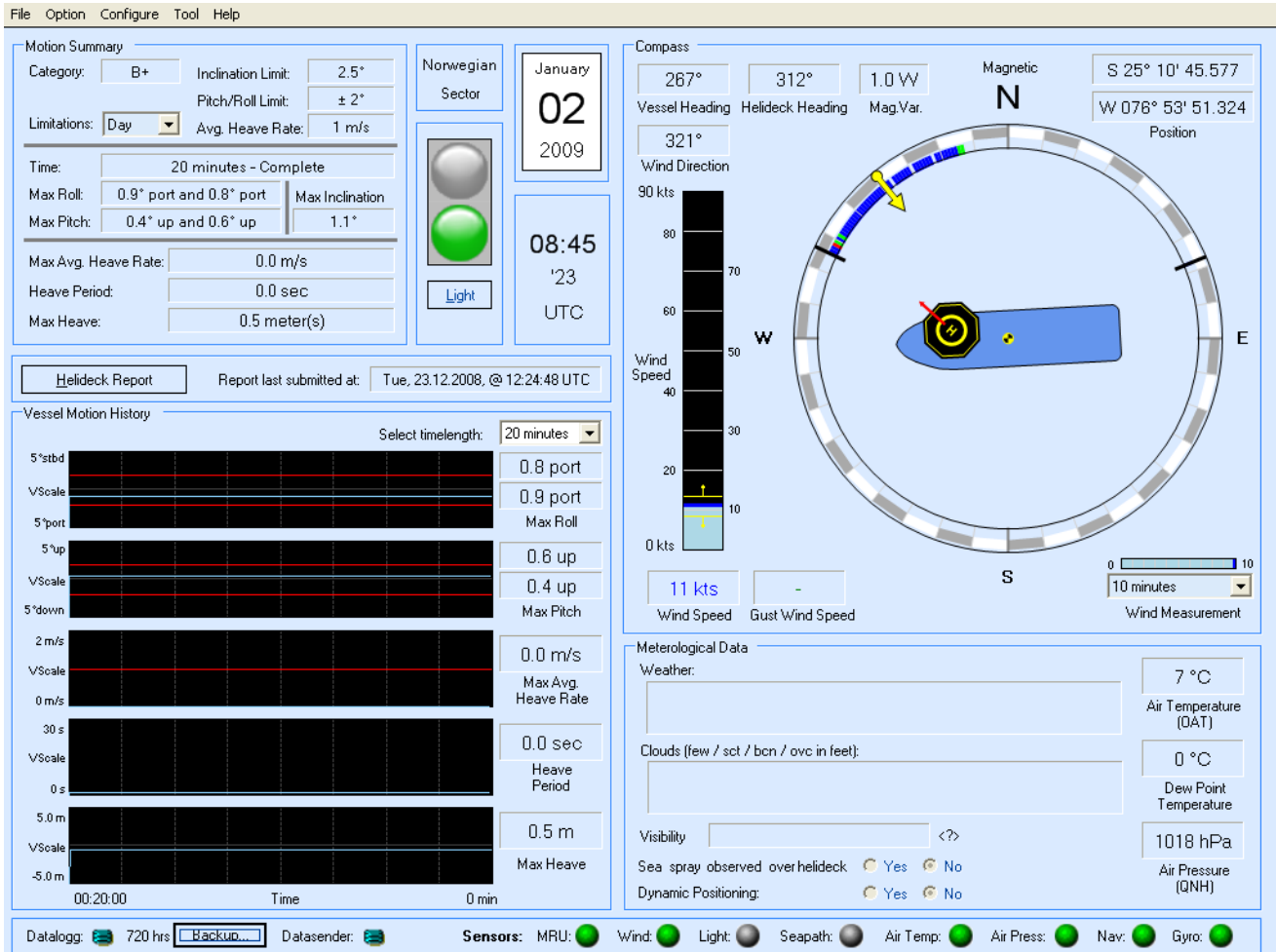
on-deck stability case, leaving pilot judgment within the current pitch, roll and heave rate limits for the landing itself.

Limits will be supplemented with a revision of the current traffic light system for Radio Operators/HLOs to control on-deck handling procedures to mitigate against post landing changes e.g. wind direction and/or vessel heading changes

This will be a common standard agreed by UK and Norway. The on-deck scheme is independent of helideck location on the vessel and of the vessel type, although the vessel categorization for landing will be unaffected.

10 Attachment 1: Helideck Movement and Weather data display

Data Display layouts shall be approved by the Helicopter Operators. A typical layout is attached:



11 Attachment 2: Logistics Information display

Data Display layouts shall be approved by the Helicopter Operators. A typical layout is attached:

The screenshot shows a software window titled "Logistic Information - Petrojarl I" with a close button (X) in the top right corner. The form is organized into several sections:

- Fuel available:** Radio buttons for YES (selected) and NO.
- Helifuel amount:** A text input field containing "12345" followed by the label "Litres".
- NDB:** A text input field containing "13.56" followed by "kHz".
- Identification Code:** A text input field containing "ABC".
- VHF:** A text input field containing "109.56" followed by "kHz".
- Actual position:** "Latitude:" followed by a text input field containing "N 63° 26' 31.356" and "Longitude:" followed by a text input field containing "E 10° 24' 12.196".
- Routing:** Four text input fields labeled "1:", "2:", "3:", and "4:" containing "XXA -8/+9", "XXB -9/+11", "XXC -4/+5", and "XXD -0/+8" respectively.
- Return load:** A text input field containing "14" followed by "Passengers".
- Total weight:** A text input field containing "5123" followed by radio buttons for kg (selected) and lbs.
- Luggage (incl. in total):** A text input field containing "512" followed by radio buttons for kg (selected) and lbs.
- Cargo (incl. in total):** A text input field containing "1234" followed by radio buttons for kg (selected) and lbs.
- Remarks:** A large text area containing the text "ashkjhasjkajsj asdklajsikasdjak askjdakl ajksj asdj".
- Footer:** "Information was last submitted at:" followed by a text box containing "17.Oct.2003 08:01'33 GMT" and three buttons: "Print", "Submit", and "Cancel".

12 List of known motion measurement equipment producers

| | | |
|---|---|---|
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