074 – Offshore Norge, recommended guidelines – helideck manual

Translated version

FOREWORD

These guidelines are recommended by the Norwegian Oil and Gas Aviation Forum and Operations Committee. They also approved by the director general.

The responsible manager in Norwegian Oil and Gas is the special adviser operations, who can be contacted via the Norwegian Oil and Gas switchboard at +47 51 84 65 00.

These guidelines have been prepared in cooperation with the helicopter operators on the Norwegian continental shelf – Bristow Norway AS and CHC Helikopter Service AS – and are owned by the Norwegian Oil and Gas Association.

Norwegian Oil and Gas Association
Fjordpiren, Laberget 22
NO-4068 Stavanger
Phone: +47 51 84 65 00
Website: www.norskoljeoggass.no
E-mail: firmapost@norog.no

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REVISION HISTORY

Summary:

By and large the whole manual has been updated, but the following revisions are significant:

Chapter 1.1 Purpose. Minor updates.

Chapter 1.2 Management system and responsibilities. New title and updated in accordance with new regulations.

Chapter 1.4 References. Updated with reference to new regulations.

Chapter 2.4 Recommended practice for helideck management. New chapter.

Chapter 3.4 Special duties and responsibilities of the HLO. Minor updates plus the introduction of status lights.

Chapter 3.5 Clothing and personal protective equipment for helideck crew. The whole chapter has been updated.

Chapter 3.6 Staffing the helideck. Traceability requirement introduced.

Chapter 3.7 Helideck report. New version of helideck report V3.3.

Chapter 3.8 Helideck monitoring system. Definition replaced by updated version in the regulations.

Chapter 3.9 Notifying and reporting incidents in helideck operations. The whole chapter has been updated and refers to requirements in the regulations.

Chapter 4.1.3 Non-slip protection. “Friction” has been replaced with “Non-slip protection”.

Chapter 4.2.4 Status lighting. New section.

Chapter 5.2.4 Loading the cargo compartments. New section.

Chapter 6.3.5 Returning product to the plant. New section.

Chapters 6.11.3-6.12.4. Restored, since these sections were accidentally deleted in the previous version.

Chapter 7.5.1 Flights to normally unmanned facilities. Hard hat and gloves are carried into the helicopter, but do not necessarily need to be worn.

Appendix E2 SAR Queen. New appendix.

Appendix E3 Sikorsky S-92. New images of sliding door for SAR machine.

Appendices EX H155 and EC155. Deleted in their entirety.

Appendix F Takeoff and landing. Manning time after takeoff reduced to 10 minutes.

Appendix I Offshore refuelling systems. The whole appendix has been updated.

1 INTRODUCTION

1.1 Purpose

The purpose of these guidelines is to ensure uniform and standardised operation of the helicopter deck (helideck) and to take care of the safety of helicopter operations on the helideck. They should be used by both helideck owner and helicopter operator. The guidelines have been developed to ensure conformity with legislation, statutory regulations and guidelines/ standards relevant for helideck operations.

They specify responsibilities for managing the helideck, operations on the helideck, and requirements for helideck crew and equipment – including refuelling plant.

The guidelines cover fixed and mobile facilities as well as offshore service vessels used in petroleum operations on the Norwegian continental shelf (NCS).

1.2 Management system and responsibilities

The helideck owner is responsible for:

- ensuring conformity with the requirements in section 5 concerning the management system in the Norwegian regulations on helicopter aviation – use of offshore helidecks (BSL D 5-1)
- integrating management of helideck and helideck operations in an established management system to ensure that these guidelines and regulatory requirements are observed
- ensuring that technical installations on the helideck, radio/communication, navigation and meteorological equipment and refuelling plant comply with the applicable regulations
- ensuring that the HLO, helideck crew, radio operator/communication officer and relevant personnel are competent and in conformity with applicable regulations.

The helicopter operator has an independent responsibility for using only helideck which they find to be suitable for use and which conforms as a minimum to the requirements in BSL D 5-1.

1.3 Definitions and abbreviations

- Helideck owner – the responsible owner and operator of the helideck on fixed installations, mobile units or vessels
- HLO – helicopter landing officer
- HMS – helideck monitoring system
- MRU – motion reference unit
- Manifest – official document which specifies the names of the passengers, their employers, the weight of passengers, baggage and cargo, and the destination
- NCS – Norwegian continental shelf
- Night conditions – when the sun is more than six degrees below the horizon.
- Safedeck – designed with surface drainage which prevents accumulation of fuel by allowing it to drain away, and thereby prevents it from maintaining a possible fire in the enclosed piping system beneath the deck

1.4 References

Chapter XIII, sections 73-77 of the activities regulations on emergency preparedness.

Section 70 of the facilities regulations.

Norwegian Civil Aviation Authority (CAA-N), regulations for civil aviation
- BSL A 1-3 Regulations on reporting obligations related to aviation
- BSL D 1-7 Regulations on carriage of cargo in aircraft
- BSL D 5-1 Regulations relating to helicopter aviation – use of offshore helidecks
- BSL G 7-1 Regulations relating to the aeronautical meteorological service on the NCS.

Norwegian Maritime Authority (NMA)
Regulations for helidecks on mobile offshore units, FOR-2021-03-18-815

Norwegian Oil and Gas 002 recommended guidelines for safety and emergency response training, which prescribe training requirements for helideck personnel.

2 HELIDECK MANUAL

These guidelines specify responsibilities on the helideck as well as requirements for helideck crew and equipment to ensure that operations there are conducted in a safe and secure manner.

The helideck manual is intended to help achieve safe execution of helideck operations on the NCS by ensuring uniform standards and behaviour.

2.1 Approval of mobile and fixed facilities

Before being used on the NCS, the facility's helideck and refuelling plant must be approved by the relevant government regulators and the relevant helicopter operator. The relevant regulators for fixed facilities are the Petroleum Safety Authority Norway (PSA) and the CAA-N. Where mobile units are concerned, they are the flag state or alternatively the NMA assisted by the CAA-N. See chapter 3 of the helideck manual.

2.2 Inspection and supervision

The helideck owner is responsible for ensuring that maintenance as well as routine inspection of the helideck and refuelling plant are carried out. Inspections must be documented.

The helideck operator conducts periodic inspections. The PSA, with technical support from the CAA-N, conducts supervision of the operator's system/facility on its own initiative.

2.3 Maintenance programme

A maintenance programme for the helideck with equipment and refuelling plant must be established and implemented.

2.4 Recommend practice for helideck management

A need to establish a recommended best practice for helideck management has been identified through the committee for helicopter safety on the NCS. Its purpose is to help ensure that the helideck complies with regulatory requirements, that it is operated prudently, that relevant procedures are established, that its operation is integrated with the helideck owner's management system and that interaction with the helicopter company/pilot is taken care of.

The following areas are considered to have special value in ensuring good helideck management by the helideck owner.

a. Ensure compliance with the regulations. Failing to accord with relevant legislation and statutory regulations may have significant consequences both by reducing the level of safety and through the costs of remedying nonconformities. Imposing operational restrictions on using the helideck as a compensatory safety measure could also have substantial operational and cost consequences. The helideck owner should therefore ensure aviation-related technical clarifications are secured when planning, designing and executing such facilities as
   i. new facilities with helideck
   ii. modifications during the facility's operational life
   iii. shutdown and removal of the facility.

   The company's technical aviation adviser should be involved to advise the helideck operator and owner during these processes on order to ensure conformity with the regulations/other relevant requirements.
b. Ensure that management of the helideck and helideck operations are integrated in the helideck owner's management system, including follow-up and closure of helideck nonconformities.
c. Ensure that the helideck owner has access to competent and experienced technical personnel who can advise on management and decisions related to the helideck and helicopter operations.
d. Follow up incidents, participate in investigations and contribute to continuous improvement related to the helideck.
e. Ensure reporting of incidents to the authorities and regulatory bodies in accordance with these guidelines.
f. BSL D 5-1 deals with the helideck as a system, while the helideck owner breaks it down into technical disciplines. Fragmentation of responsibility should be avoided.
g. The helideck owner should have a system to ensure experience transfer between the various facilities.
h. Where use of a third-party helideck is planned, the contracting company should ensure that the helideck and its personnel satisfy applicable requirements on the NCS, including familiarity with and use of these guidelines.
i. The helideck owner should have an internal quality assurance process for management of the helideck, including operational conditions.
j. Applications for exemptions which relate to the provisions of BLS D 5-1 must generally follow a parallel course, where the helideck owner together with the helicopter operator risk-assess the circumstances and where harmonised and identical applications are submitted by the helicopter operator to the CAA-N and by the helideck owner to the PSA. The PSA will then seek technical assistance from the CAA-N.

3 HELIDECK CREW – TRAINING AND DUTIES

3.1 Training of helideck crew

Helideck crew must have received the training prescribed in Norwegian Oil and Gas 02 recommended guidelines for safety and emergency response training.

Training provided pursuant to these guidelines must be viewed in relation to the training and drills conducted by the operator or employer. The detailed requirements for implementing the training and drills build on section 23 of the activities regulations.

Training materials for helideck personnel are available on the Norwegian Oil and Gas website.

3.2 Experience

The table below presents the courses and work experience required to qualify for the roles as trainee, heliguard, fireguard and HLO.

Role	Courses required	Experience required	Comments
Heliguard and fireguard	Valid HLO basic or refresher course (see guideline 002)	Must have participated in at least 20 helicopter landings and takeoffs under the guidance of an experienced HLO before becoming fully qualified for independent duty. If the level of flight activity on the helideck is low, and achieving 20 landings/ takeoffs is difficult, arrangements should be made for secondment to a deck with greater activity.	Personnel with such training but who have not served in these posts over the past two years must be given a practical review of the relevant helideck and refuelling plant under the guidance of an experienced HLO.
HLO	Valid HLO basic or refresher course (see guideline 002)	Served regularly as a qualified heliguard/ fireguard for at least one year.	Personnel with such training but who have not served in these posts over the past two years must be given a practical review of the relevant helideck and refuelling plant under the guidance of an experienced HLO.
Trainee	Valid HLO basic or refresher course (see guideline 002)	No requirement.	A trainee supplements the normal helideck crew. On certain facilities and vessels involved in petroleum operations, both the number of crew on board and the frequency of helicopter landings and takeoffs will be so low that it would be impossible in practice to achieve a sufficient number of landings/takeoffs over a reasonable period (one year) to qualify a complete helideck crew. Where such facilities/conditions are concerned, it will be acceptable that the third member of the helideck crew serves as a trainee – providing the person concerned, after completing an HLO course, takes a one-day practical course in landing/takeoff at a heliport under professional guidance.

3.3 Physical suitability

Helideck crew must be able to respond immediately to a possible helicopter accident until dedicated response personnel are in place. Responsibility for seeing to it that helideck crew are physically and mentally suited for this role rests with the operator company. Members of the helideck crew must have documented knowledge of using smoke diving equipment.

3.4 Responsibilities and duties of the HLO

The HLO is responsible for day-to-day leadership of work on the helideck during helicopter arrivals/departures, and for keeping the offshore installation manager (OIM) informed in writing at regular intervals about the status of the helideck as well as its equipment and services. That includes ensuring that:

- necessary measures are taken to prevent unauthorised people being on the helideck before takeoffs/landings
- the deck is kept clear of loose objects, snow and ice, flammable substances, etc

- necessary personnel are in place and in readiness
- the helideck crew is informed about special conditions before a helicopter arrives, particularly where an unfamiliar helicopter type is involved, the helicopter's specific door and cargo compartment configuration, and for special operations
- all equipment and instruments are in place and in full working order
- all crane operations in the vicinity of the landing area have ceased and the cranes are correctly positioned in relation to the unobstructed approach and departure sectors – see section 4.1.7 for details of lighting
- manually activated red repeater status lights are used if it becomes necessary to close the helideck, providing the facility has such lighting
- possibly dim the status lights at the request of the pilot if they are too bright
- ensure passengers are kept in the safe zone during landing/takeoff and are given guidance during disembarkation and boarding – see appendix B on helicopter danger zones, which describes the safe zone for the various helicopter types
- ensure passengers have put their survival suits on correctly
- ensure that the number of passengers corresponds with the manifest
- the passengers have fastened their seat belts
- ensure before takeoff that no loose objects are to be found either inside or outside the helicopter/ on the outside of the helideck
- handover to the next shift is made.

Before landing, the HLO must maintain contact with the helicopter pilot and inform them whether the deck is cleared for landing. See appendix D on phraseology.

The HLO must report all nonconformities on the helideck immediately to their immediate superior/the OIM, and ensure that the helicopter operator is informed of the position.

The HLO must position themselves so that they can observe landing/takeoff as well as possible and closely monitor these operations. They must immediately inform the pilot by radio or visual signals if any abnormal conditions are noted or if conditions arise which require the helideck to be closed. These could include gas leaks or other hazards. Pilots must be notified immediately by radio or by hand signals, both when approaching or when the helicopter is standing on the deck, if such conditions arise. The threshold for radio use should be low and without requirements for possible phraseology or language. All the same, warnings should primarily be given in English if this can be done without loss of time. It is possible to use both stationary and portable radios if power is lost. The procedure can replace the requirement for status lights on fixed manned facilities pursuant to BLS D 5-1.

3.5 Clothing and personal protective equipment for helideck crew

Every individual forming part of the helideck crew during takeoff and landing must have direct access to a set of gear which conforms with the following European norms (EN).

EN 469	Protective clothing for firefighting (must also fulfil requirements Xfa, Y2 and Z2)
EN 659	Protective gloves for firefighting
EN 443	Hard hats for firefighting
EN 15090	Boots for firemen (alternatively EN 354 or EN 345)
EN 14116	Balaclava helmet (alternatively EN 11612 or EN 533)
EN 137	Smoke diving equipment (minimum of two (2) sets for distribution)

When this gear is not in use, it must be stored in a dedicated locker, ready to be donned rapidly, in the immediate vicinity of the helideck.

This locker or the nearest door(s) must be coloured red and labelled: “Brannbeskyttelse” and “Fire protection”.

In addition to the necessary number of fire protection sets, the locket must contain:

- at least two lifelines with a minimum length of 30 metres
- two sets of fire blankets.

On helidecks without remotely operated extinguishing systems, the helideck crew member stationed by the foam monitor must wear all the fire protection gear listed above with the exception of the smoke diving equipment.

Fire protection gear must be worn by all members of the helideck crew during takeoff and landing when a possible hazard is considered likely to arise on the helideck.

General requirements for clothing and equipment.

Coverall/jacket and trousers	EN ISO 11612	Protective clothing
Rainwear	EN ISO 14116	Protective clothing
Outermost clothing	ISO 20471	Hi-vis protective clothing
Safety boots	ISO 20345	Minimum class S2
Hearing protection	EN 352	Hearing protectors
Gloves	EN 388	Protective gloves against mechanical risks
Eye protection	EN 166	Eye protectors

The HLO’s outerwear must be labelled front and back with the letters ”HLO”, or by an armband with marking, so that they can readily be identified by the helicopter crew.

3.6 Staffing the helideck

The helideck must normally be staffed by at least three people:

- **HLO**
- **heliguard**
- **fireguard.**

The HLO is the superior of the heliguard and fireguard.

The facility/company must have a system for tracing which person is functioning at any given time as the HLO. This is intended to ensure traceability for each landing and takeoff.

The fireguard operates the fire extinguishing equipment on the helideck and works with the heliguard during unloading and loading of the helicopter’s passengers and cargo. As and when required, the fireguard can assist the heliguard in connecting/disconnecting fuel hoses.

The heliguard is responsible for unloading and loading of the helicopter’s passengers and cargo and also supports the fireguard and HLO during emergencies.

These personnel are collectively termed the helideck crew.

During takeoff/landing, at least one person, wearing fire protection clothing as specified in section 3.5 with the exception of smoke diving equipment, must be posted by the remote control unit for the helideck’s fire extinguishing system/foam monitor or by the most appropriate foam monitor on the helideck given the prevailing weather conditions.

During refuelling with the engine running, the helideck crew must comprise (see also section 6.11 and appendix J):

- **operator of the refuelling plant**
- **operator of the pistol grip nozzle**
- **fireguard.**

The HLO can be one of these three. The fireguard must be clothed as described for takeoff and landing.

Exceptionally, extra personnel without a training course and/or experience can serve if required on the helideck. They must be briefed by the HLO and supervised by a member of the helideck crew during helicopter operations.

3.7 Helideck report

- Not later than one hour before the helicopter is due to depart from land, the facility must provide the helicopter operator with updated information on helideck status and flying conditions.
- This must be provided on the dedicated helideck report form from Norwegian Oil and Gas. A different form can be used by agreement between and the acceptance of the helideck operator and the helicopter operator.
  - The report is valid for up to six hours if the information does not change. A new report is not necessary
  - The report must be sent as an e-mail attachment in PDF format.
- The following must be entered in the e-mail's subject field:
  <name of facility, "helideck report" date, flight number>
  No other text must be inserted in this field.
- The flight number is only included if the report is valid for a specific flight or the fields for logistical date in the report have been completed.
  Examples:
  "Troll A, helideck report 13.08.10"
  or "Åsgard B, helideck report 13.08.10, HKS477".

NB! For facilities with a moving helideck:

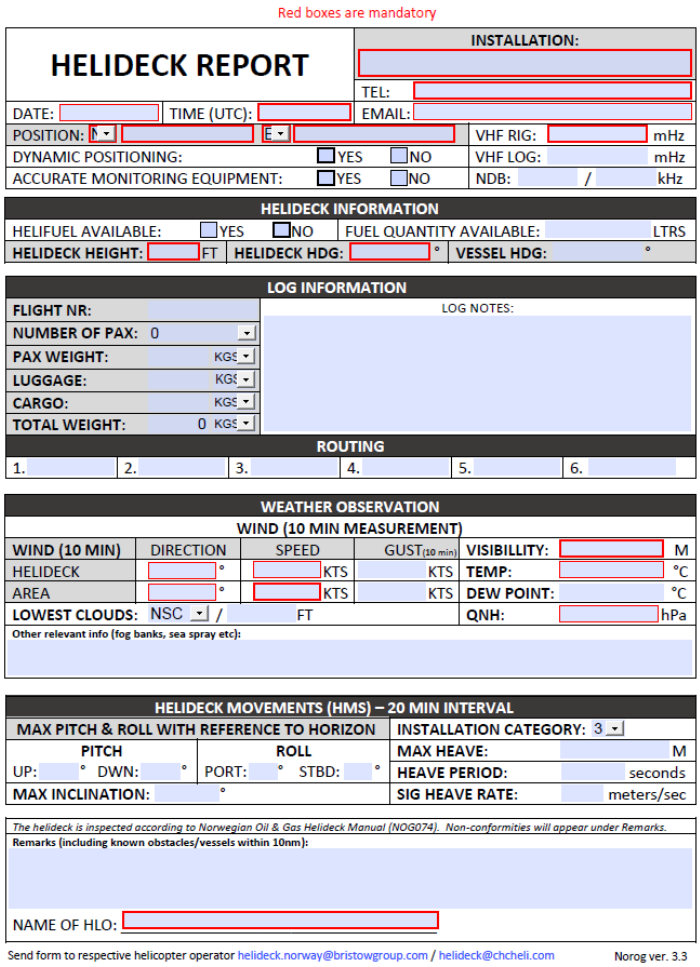
- the HLO/radio operator must be able to verify that the HMS conforms with the applicable version specified in appendix K
- a screen dump of the HMS image must be submitted together with the helideck report
- the HLO/radio operator must know where data from the motion reference unit (MRU) can be read off (values for helideck motion must only be entered if the HMS is out of operation (read off directly from the MRU)).

The completed form is mailed to the relevant helicopter operation using the following e-mail addresses.

- **Bristow Norway**: helideck.norway@bristowgroup.com
- **CHC Helikopter Service**: helideck@chcheli.com

These addresses are used only for submitting helideck reports, and no response will be given to other queries.

See the interactive helideck report on the Norwegian Oil and Gas website and guideline 074 (this manual).



Red boxes are mandatory

HELIDECK REPORT

INSTALLATION:
TEL:
DATE: TIME (UTC): EMAIL:
POSITION: N E VHF RIG: mHz
DYNAMIC POSITIONING: YES NO VHF LOG: mHz
ACCURATE MONITORING EQUIPMENT: YES NO NDB: / kHz

HELIDECK INFORMATION

HELIFUEL AVAILABLE: YES NO FUEL QUANTITY AVAILABLE: LTRS
HELIDECK HEIGHT: FT HELIDECK HDG: ° VESSEL HDG: °

LOG INFORMATION

FLIGHT NR:
NUMBER OF PAX: 0
PAX WEIGHT: KGS
LUGGAGE: KGS
CARGO: KGS
TOTAL WEIGHT: 0 KGS
LOG NOTES:

ROUTING

1. 2. 3. 4. 5. 6.

WEATHER OBSERVATION

WIND (10 MIN MEASUREMENT)

WIND (10 MIN)	DIRECTION	SPEED	GUST(10 min)	VISIBILLITY:	M
HELIDECK	°	KTS	KTS	TEMP:	°C
AREA	°	KTS	KTS	DEW POINT:	°C
LOWEST CLOUDS:	NSC / FT			QNH:	hPa

Other relevant info (fog banks, sea spray etc):

HELIDECK MOVEMENTS (HMS) – 20 MIN INTERVAL

MAX PITCH & ROLL WITH REFERENCE TO HORIZON — INSTALLATION CATEGORY: 3

PITCH		ROLL			
UP: °	DWN: °	PORT: °	STBD: °	MAX HEAVE:	M
				HEAVE PERIOD:	seconds
MAX INCLINATION: °				SIG HEAVE RATE:	meters/sec

The helideck is inspected according to Norwegian Oil & Gas Helideck Manual (NOG074). Non-conformities will appear under Remarks.

Remarks (including known obstacles/vessels within 10nm):

NAME OF HLO:

Send form to respective helicopter operator helideck.norway@bristowgroup.com / helideck@chcheli.com Norog ver. 3.3

3.7.1 Filling in the form

The form is self-explanatory, but additional information will pop up when the cursor is placed over a writable field. Further explanation on individual items is provided below.

Dynamic positioning
Check YES or NO to indicate if the vessel is dynamically positioned (DP).
If the DP system is active: YES.
If DP is inactive, moored, anchored, free-floating with or without steerage way, or fixed installation: NO.

Accurate monitoring equipment (HMS)
Check YES or NO to indicate whether the facility/vessel has an operational HMS.
If the helideck moves (ie, not a fixed/tension-leg platform) and the HMS is operative: YES.
If the HMS is not operational or the helideck is fixed (ie, a fixed/tension-leg platform): NO.

Log info
Logistical data must be entered unless local procedures mean they are reported differently. Logistical data should be entered as fully as possible, even if the return load is not entirely clear when the form is submitted, in order to give the pilot the best possible basis for planning the flight. The information will then be updated on arrival.

Should several destinations be involved, proposed routes should be entered in the ROUTING fields along with passenger exchange (pax on/off), ie **1: XXA -8 /+9, 2: XXB -9 /+11.**

NB: Updated information on relevant weather conditions, helideck motion and log info (ie, return load) for the facility must be provided to the helicopter on initial radio contact. See also appendix I on radio communication.

Helideck nonconformities
All nonconformities on the helideck and with helideck operations must always be entered on the form.

Examples: vessels within the 500-metre zone, equipment nonconformities, temporary objects on the obstacle-free zone, nonconformities from standard helideck procedures, gas flaring, other information which could be considered significant for the pilots.

Weather observations
All weather information fields must be completed, but with some exceptions dictated by local procedures.

- If the facility is covered by the helicopter flight information service (HFIS), QNH and cloud base can be left out.
- If the facility is covered by a local Metar service, "see Metar" can be entered in the cloud base field.

Wind
Wind direction must be reported in degrees relative to magnetic north and wind speed in knots. Anemometer positions are specified as the height and distance in metres relative to the edge of the helideck.

Other relevant information
Enter other relevant information on weather conditions, such as fog banks, variable winds, rain or snow, thunder/lightning, varying visibility in different directions and so forth.

Sea spray observed over the helideck
Check YES or NO to indicate whether sea spray has been observed over the helideck in the prevailing weather conditions.

HELIDECK MOVEMENT
Max pitch UP/DOWN with reference to the horizon
The largest pitch movement up/down over the past 20 minutes measured in degrees with reference to the horizon.
Max roll starboard/port with reference to the horizon
The largest roll movement starboard/port over the past 20 minutes measured in degrees with reference to the horizon.
Max helideck inclination
The largest measured helideck inclination over the past 20 minutes measured in degrees with reference to the horizon.
Max heave (top to bottom)
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.
Heave period
The time in seconds between the tops of two waves. If measuring equipment is not available, the pilots will use a standard heave period of 10 seconds for manual calculation of the average heave rate.

Significant heave rate
Vertical movement of the helideck in metres per second.

3.8 Helideck monitoring system (HMS)

Moving helideck
The helicopter companies and the CAA-N require facilities and vessels with movable decks to carry equipment able to measure pitch, roll, inclination and heave rate at the helideck.

Measuring equipment for moving decks (HMS)
The helicopter companies have developed a standard which specifies the minimum requirements for the necessary measuring equipment in order to make helicopter flights to/from a moving helideck.

See appendix K: Standard helideck monitoring system.

Red flashing (repeater) lights around the helideck must be activated automatically when specified limits for motion are exceeded, exactly like red traffic lights presented on an HSE screen.

3.9 Notifying and reporting incidents in helideck operations

Responsibility for reporting incidents during helideck operations rests with the helideck owner (HLO on duty). An overview of the regulatory requirements for reporting is provided below, but it is recommended that the HLO uses the report form in this manual (appendix L) in the first instance and sends this, as agreed within their own company, either directly to the helicopter owner's operations centre or to the technical aviation adviser in their own company, who can assist with onward transmission as well as further reporting to the CAA-N/PSA as required. This can either be combined with reporting in their own company's reporting system for HSE incidents, or serve as a supplement to this.

Pursuant to Norwegian aviation, maritime and petroleum legislation, the HLO and the helideck crew are responsible for reporting incidents on the helideck and in connection with landing/ takeoff. Internal reporting is handled through the operator/shipping company's incident system. The helicopter flight information service (HFIS) offshore can initiate notification in accordance with local procedures. The helicopter owner/operator/shipping company is required to register reports, assess criticality and if necessary notify/report to the relevant regulator/government agency. Pursuant to the reporting requirements, the latter are the CAA-N, the PSA and the NMA. Notifying and reporting can be done by the HSE department/operating department/government relations contact acting on behalf of the operator/shipping company.

Where the CAA-N is concerned, electronic reporting makes use of the NF-2007 form via the Altinn/Eccairs 2 portal. The aviation system requires reports to be submitted within 72 hours. Possible onward notification to the Norwegian Accident Investigation Board is handled by the CAA-N.

Pursuant to BSL A 1-3 and sections 5 and 9 of BSL-D 5-1, the helideck owner is responsible for notifying aviation accidents, serious aviation incidents, serious technical faults, incidents with dangerous goods in aircraft and collisions between aircraft and birds to the CAA-N.

The reporting regulation (EU) 376/2014) specifies which incidents qualify for mandatory (article 4) or voluntary (article 5) reporting. See sections 1-2, paragraph 1 and 12-10 of the Norwegian Aviation Act, and the detailed list in appendix IV to regulation (EU) 2015/1018, see section 2 of BSL A 1-3.

Examples of reportable incidents are provided in the guidelines to BSL D 5-1.

The helideck owner is responsible for notifying and reporting hazards and accidents, providing information about follow-up of hazards and accidents, and reporting accidents which have given rise to fatalities or personal injury pursuant to sections 29-31 of the PSA's management regulations.

Pursuant to section 9 of BSL D 5-1, relevant helideck incidents must be reported by the helideck owner to the helicopter operator involved if the incident involves its helicopter. Appendix L to the helideck manual can be used for this purpose. The report form is filled out by helideck crew and transmitted to the helicopter owner from the helideck owner. This is intended to ensure learning for and improvement of aviation safety.

The helicopter operator has a corresponding duty to notify the CAA-N about registering and handling of all incidents on the helideck if its helicopter has been involved.

Individual workers can report directly through Altinn to the CAA-N if particular conditions make that appropriate.

4 HELIDECK AND EQUIPMENT

This section is informative in character and describes:

- the helideck in general
- equipment components and guidelines on helicopter safety in the regulations.

The CAA-N sets minimum standards for helidecks, equipment and personnel. These can be found in BSL D 5-1. The following sections primarily present extracts of key provisions in this BSL.

4.1 The helideck in general

4.1.1 Obstacles in the departure and approach sectors

No obstacles rising above the level of the helideck are permitted on or in the immediate vicinity of the deck in the 210° departure and approach sectors.

Exceptions are:

- the safety curb
- perimeter lighting and floodlights as well as status and repeater lights rising no more than 25 centimetres above the level of the helideck
- outer edge of the safety net
- individual obstacles necessary for deck operation (foam monitors, signs) rising no more than 25 centimetres above the level of the helideck
- alternative lighting up to 25 millimetres in height.

4.1.2 180° obstacle-free sector

In connection with approach and departure, the person responsible for the helideck must see to it that no vessels, floating structures or other types of obstructions are close to the sea surface within a 180° sector out to a minimum distance of 500 metres from the helideck. If this sector cannot be made obstacle-free, that must be notified on the helideck report and by radio on arrival, so that the helicopter crew can make their assessments.

4.1.3 Non-slip protection

The helideck must have a non-skid surface which prevents the helicopter sliding. Non-slip protection must be adequate in relation to the prevailing weather conditions and the helicopter type in use, and must accord with the applicable regulations.

4.1.4 Landing net

The helideck must be equipped with a landing net. Its size will be determined by the largest helicopter used.

This net is normally dimensioned for a large helicopter, with a minimum size of 15 by 15 metres. The net mesh must be sized to avoid snagging the helicopter's undercarriage.

The net must be fastened every 1.5 metres. To ensure that it is kept sufficiently taut, at least 50 per cent of the attachment points must have a tightening mechanism. The net must be so taut that it cannot be lifted more than 25 centimetres from the underlying surface. The attachment points must have a torque corresponding to about 200-250 kilograms of tension.

The guy lines attaching the net must be included in the daily check of the helideck before helicopter operations on those days when flights are anticipated.

A particularly careful check must be made for wear on the underside of the attachment points for the guy ropes on the net and the helideck.

A net is not required on facilities where the helideck surface comprises individual profiles with special non-slip arrangements (Safedeck).

The landing net requirement can be waived on a non-moving helideck if it is suitably designed and if a system is in place to prevent helicopter slipping. This waiver does not apply if snow and ice are present on the helideck. See the guidelines to the regulations for further conditions.

4.1.5 Visual aids

These cover windsocks, markings and illumination of the helideck. A 2.4-metre windsock is to be preferred to the smallest version of 1.2 metres, since visibility from the air is often marginal and worsened by bad weather/night darkness.

4.1.6 Windsock

This must be

- easily visible
- installed in a location subject to minimum turbulence from surrounding structures
- single (orange) or dual coloured: orange/white, red/white or black/white
- conically shaped and sufficiently large (standard size: inner diameter 60 centimetres, outer diameter 30 centimetres, length 2.4 metres)
- illuminated for night flying.

4.1.7 Identification

The helideck must be marked with the name of the facility, clearly visible from all approaches above the level of the helideck.

4.1.8 Lighting

Helidecks to be used for night flying and/or in conditions of reduced visibility must meet the following requirements.

- Have satisfactorily shielded floodlighting to prevent pilots being blinding in the approach and landing phase. The floodlights are used at the pilot's request.
- Be marked with perimeter lighting comprising green lights equally spaced at intervals not exceeding three metres.
- Perimeter lighting must not be visible below the level of the helideck. Lights must not rise more than 25 centimetres above the deck level. Floodlighting and perimeter lighting must be connected to the facility's emergency power supply and switchover time in the event of a failure of mains power must not exceed 10 seconds.
- The highest point on the derrick, crane booms/cabins or other obstacles which represent a hazard for flying must carry red warning lights which are visible from all position. Alternatively, the obstacle can be floodlit. Pay special attention to ensuring adequate illumination of the flare boom from all sides, particularly if its flame is extinguished or small. Also pay special attention to ensuring that cranes which have been temporarily parked do not project over the facility's reported highest point (information on the airport datasheet).
- Derrick and booms must also be fitted with red lights positioned at levels corresponding to each third of their total length/height measured from their highest point.
- At least one light at each level must be visible from all directions.

4.1.9 Operating equipment

The helideck must at all times possess all the equipment required for its operation, such as:

- chocks for placing before and after the main wheels on both sides of the helicopter
- ropes for securing a parked helicopter
- scales for weighing baggage/cargo (must be available on the facility)
- de-icing and snow clearing equipment.

4.1.10 Rescue equipment

The following rescue equipment must be available in the immediate vicinity of the helideck:

- two fire axes
- three stainless steel knives (for cutting seat belts)
- two hand torches/flashlights (explosion-proof)
- one crowbar
- one wire cutter
- one hacksaw with spare blades
- one hammer
- one cutting chisel
- one set of sheet metal shears
- one bolt cutter
- one jack with a minimum lift of 0.5 tonnes.

This equipment must be stored in an easily accessible manner, visible and in a safe place, preferably a sealed locker or chest. If the locker or chest can be locked, the key must be placed

behind a breakable window. The locker or chest must be coloured red and labelled “Nødutstyr” and “Emergency equipment”.

The following must be kept in a suitable place close to the emergency equipment locker/chest:

- one metal hook with a three-metre metal shaft
- a lightweight ladder about three metres long .

4.1.11 Communication equipment

Personnel forming the helideck’s minimum staffing must be equipped with portable two-way VHF radios able to communicate with the helicopter crew and the radio operators on the facility.

4.1.12 Signage

Clearly visible signs must be placed on access routes to the helideck which prohibit

- being on the deck during takeoff and landing
- moving behind helicopters parked on the helideck with their rotors engaged
- exits from the helideck must be clearly marked EXIT, and this text must be visible in the dark.

4.1.13 “Helideck closed” marker

A helicopter must not normally land before receiving a “deck cleared” message from the HLO. But this could nevertheless happen in emergencies or because of a misunderstanding. The assumption is therefore that a helideck not marked as closed can be landed on without danger to the helicopter or personnel on the ground. To safeguard against this, the helideck must be marked as closed if landing would have unacceptable consequences.

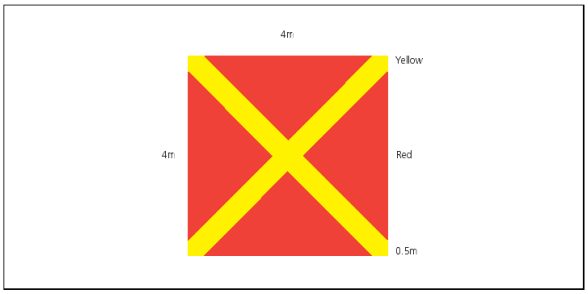
This marker must be used

- if landing on the deck would be hazardous – because of work in progress involving loose objects, structural weaknesses, obstacles like wires stretched over the landing area and so forth. NB! Does not normally apply to crane operations because the crane will be clearly visible to the pilots
- if landing would represent a hazard to personnel working or present on or close to the helideck
- if another facility with a helideck is near at hand, such as a flotel/drilling rig, and only one of the helidecks is to be used.

NB! The marker must not be displayed merely because the helideck is unstaffed or because of general equipment faults/downtime.

A temporarily or permanently closed helideck is marked pursuant to an internationally accepted standard, with a diagonal yellow cross on a red background. This is painted on the deck or on canvas which can be laid out and secured. The marker is positioned over the H in the centre of the helideck.

When the helideck is marked as closed, the green perimeter lights must be turned off. AM/SAR helicopters will also not land when the helideck is marked as closed, unless otherwise agreed.



4.2 Safety equipment

This section provides a generalised description of safety equipment available on facilities. The type of equipment can vary from facility to facility. Specific information on the equipment found on a particular facility is provided in the local operational manuals.

4.2.1 Alarm system

It must be possible to activate the alarm system from the helideck or its immediate vicinity. The activation button for the alarm system must be clearly marked.

4.2.2 Fire and general alarms

Alarm buttons are located at the helideck's fire posts. These must be used only in emergencies, such as a fire in a helicopter or on the helideck.

4.2.3 Fire alarm boxes (FABs)

FABs for activating fire pumps are located by the helideck. Throwing the switches in these boxes will start the pump(s), and notifies the control room which FAB has been activated.

4.2.4 Status lights

A visual warning system must be available to provide immediate information on potential hazards to pilots and helideck personnel during approach and landing. A hazardous condition is considered to include a fire or gas alarm, or the helideck exceeding specified motion limits. These conditions must automatically activate the system, and helideck personnel must also be able to activate it manually.

The status lights must be positioned at several points around the helideck and must flash a very bright red with a uniform frequency which attracts attention during an approach and while on the deck. Activated lights will communicate a uniform understanding which allows the helicopter crew to choose to abort a landing or to initiate takeoff earlier than planned. Should the warning system be activated, it will immediately be necessary to make active use of radio communication to clarify the position and, furthermore, to reach agreement with the pilots on necessary measures to protect safety.

Status lights can be replaced by an alternative procedure on manned facilities without moving helidecks. Compliance with this procedure can replace the use of status lights for the present.

4.3 Firefighting equipment

Official requirements for fire protection of the helideck can be found in regulations issued by the PSA, the NMA and the CAA-N. See section 1.5

The HLO must ensure that the firefighting equipment always complies with the regulatory requirements and is ready for use.

Any nonconformity must be reported to their immediate superior.

NB! The helideck's fire extinguishing system must not be activated before the helicopter has landed. Its pilots could otherwise lose their deck reference.

4.3.1 Fire water system

A fire water system must be installed.

4.3.1.1 Purpose and effects

Water can be used to control and/or extinguish a fire in the following ways:

- acts as a dilutor when vaporised in the fire zone
- vapour reduces the oxygen content in the air current mixture by one-third.
- absorbs heat when vaporising
- can be used to cool adjacent areas to prevent the spread of flames or improve access to the fire area.

4.3.1.2 Application

Water is the best extinguishing agent for fires in woodwork, paper or waste, and good for further damping down where hand-held extinguishers have been used.

4.3.1.3 Equipment

A 1.5-inch hose is standard with equipment for firewater/hosing down.

Alternatively, the foam equipment can be used to apply water only.

4.3.1.4 Use

- Water should be applied to oil fires in the form of a fine spray.
- It must never be applied to electrical fires until the power supply has been disconnected.
- Water must be applied as a fire spray when used for cooling down.
- With most fires, the water jet must be directed at the base of the flames.

4.3.2 Foam systems

4.3.2.1 Purpose and effects

Foam can control and/or extinguish a fire in one or more of the following ways:

- serving as a smothering agent
- if applied in sufficient quantities, reducing the oxygen supply to prevent air influx

- acting as a dilutor
- when driven into a fire zone, vaporises and in certain circumstances reduces the oxygen content in the air current mixture by a third
- absorbing heat through the vaporisation process
- if applied sufficiently thickly, protecting potentially explosive substances exposed to a fire by absorbing heat and insulating.

Fires involve flammable liquids can be extinguished by laying down a thick foam carpet. This must have the right consistency and thickness, and be maintained for long enough.

4.3.2.2 Application

Foam should be applied in the largest possible quantities in order to cover the whole fire surface.

Foam is appropriate for all types of fires, except electrical ones.

4.3.2.3 Equipment

A helideck normally has three foam monitors and three hose reels. The exceptions are certain older models which only have two monitors and two reels (only two fire posts). On newer helidecks with pop-up systems, a possible solution is also to have only reels and dual-agent skids – in other words, no monitors.

Foam is produced by combining these three components in a turbulent condition:

- water
- air
- foam concentrate.

This is normally achieved by injecting the concentrate under pressure in the water stream.

Foam production normally begins 20 seconds after the equipment is turned on.

4.3.2.4 Use

The fixed foam system is operated from permanently installed release cabinets for firefighting. After use, the foam piping must be thoroughly flushed with water to remove remaining foam solution.

Note that using excessive water will break down the foam.

4.3.3 Dry powder system

4.3.3.1 Purpose and effect

The effect of using very fine dry powder is to halt the fire's chain reaction by introducing a large quantity of fine powder particles into the atmosphere.

NB! When fighting a fire with dry powder, vaporisation through the powder could permit re-ignition from hot metal, smouldering insulation and so forth.

4.3.3.2 Application

Dry powder is effective against most types of fires, particularly electrical ones, since it is non-conductive.

When used to extinguish a petrochemical fire, re-ignition is highly likely to occur unless possible ignition sources are removed.

Foam must be used to prevent re-ignition.

4.3.3.3 Equipment

The equipment involves a gas cartridge propellant, with the powder driven out by internal overpressure.

This overpressure is created by discharging a CO_2 cartridge inside the extinguisher.

4.3.3.4 Use

The powder will normally start discharging within 15 seconds of activating the fixed equipment. The units should be directed at the base of the flames and, if possible, in the direction of the wind.

All hoses must be cleaned of powder residues immediately after use in order to remove powder/lumps which could later block the hose/piping.

4.3.4 Maintenance

All rescue and safety equipment must be maintained in good working order and be ready for use at all times. Maintenance, periodical testing and inspection must be conducted in accordance with established procedures.

5 OPERATIONS

This part of the manual describes operational restrictions and the helideck crew's routine duties during helicopter operations.

The duties of each helideck crew member for takeoff and landing and on stopping/starting the rotor/engines are presented step by step in appendices F and G.

Operations related to the refuelling plant and refuelling are described in chapter 6 on aviation fuel and appendix J on the procedure for helicopter refuelling with the rotor running.

See also section 7.4 on refuelling in strong winds.

5.1 Operation of the helideck

5.1.1 Using anti-collision lights as signals to the helideck crew

Anti-collision lights are powerful rotating red beacons on top and bottom of the helicopter.

Once the helicopter has landed and is ready to be unloaded, its anti-collision lights are switched off. This signals that the helideck crew can approach in order to do their work. See appendix B for danger zones.

Immediately before departure or when conditions require it, the pilot will turn on the anti-collision lights. This signals that the helideck crew must leave the helideck immediately. The HLO gives the thumbs-up signal when all personnel (including the HLO) have left and all objects are removed.

5.1.2 Using the chocks

This procedure applies to all helicopters with a wheeled undercarriage during operations on fixed facilities, mobile rigs and vessels.

Standard hand signals must be used. See appendix A.

Exemptions from this procedure include helicopters in shuttle traffic with both pilots in the cockpit and MedEvac. Chocks can then be used at the pilot's discretion.

Standard procedure:

- The chocks must be put in place as soon as the anti-collision lights are switched off.
- They are placed in front of and behind both main wheels.
- Both pilots must remain in the cockpit until the chocks are in place.
- The chocks are removed when both pilots are in their respective seats and the pilot has signalled "chocks away".

5.2 Cargo in the helicopter

5.2.1 General

The restrictions described in this section apply to all types of helicopters and supplement official requirements (Easa OPS).

Passenger baggage must not exceed 10 kilograms per item. Cargo sent by helicopter should not exceed 15 kilograms per package. Heavier items must be split up if possible. Exceptions may be made for priority consignments. These must then be specially labelled (as heavy cargo, with the weight listed on each package) and the facility/destination notified.

5.2.2 Passenger/cargo manifest

When passengers, baggage and/or cargo are to carried by helicopter, a passenger/cargo manifest must always be completed and accompany the helicopter.

The completed passenger/cargo manifest is to be considered an official document which may be subject to inspection.

The standard weight per passenger, including survival suit, is 211 pounds (96 kilograms) for men and 174 pounds (79 kilograms) for women.

The weight of cargo/baggage comes in addition.

The manifest must contain the following information:

- full names of passengers
- their employer(s)
- weight of passengers
- weight of baggage (per person)
- weight of cargo/baggage
- description of the contents of each package of goods
- destination.

When cargo is to be sent ashore from a facility, the HLO is responsible for checking the cargo manifest and ensuring that it accompanies the consignment.

The HLO is responsible for checking that the number of people on board corresponds with the passenger manifest and for delivering the manifest to the helicopter crew.

When loading a Super Puma, the pilot must be told the total weight in cargo compartment 3.

5.2.3 Placing both cargo and passengers in the helicopter cabin

The general rule when transporting passengers is that cargo must not be placed in the cabin.

Exemptions include:

- priority consignments only
- cargo must not be placed in front of (blocking) the cabin door(s)
- cargo must not block the main emergency exits in that part of the cabin where passengers are seated
- cargo must not be placed in such a way that passengers lack direct access to alternative escape routes (push-out windows). Passengers cannot be placed in a seat where the adjacent push-out window is blocked or where cargo prevents free access to the nearest push-out window
- cargo cannot be placed in the centre aisle, except piping up to 10 centimetres in diameter
- cargo must not obstruct access to emergency equipment
- cargo must be secured in accordance with the strictest official requirements
- as a primary rule, cargo must be placed in front of passengers in the cabin.

5.2.4 Loading the cargo compartments

Correct loading pursuant to the certification and approval of the individual helicopter is crucial in relation to the machine's weight and balance. Via the flight manifest, the pilots must be told how much weight the facility is planning to place in the helicopter so that its calculated fuel consumption and total payload are correct. Pay special attention to the division of the cargo compartments in a Sikorsky S-91, where compartments 1 and 2 (shelf) have a weight limit of 136 kilograms (300 pounds).

It is recommended that the facilities observe the following guidelines:

- maximum load 13 packages of 10 kilograms apiece in compartments 1+2
- assess each package in terms of size and weight
- the heaviest baggage is loaded in compartments 3 and 4
- take the time required when loading a helicopter
- pay special attention if the flight is split between two or more facilities.

5.2.5 Baggage-free cabin

Passengers are not allowed to bring hand baggage into the cabin. All forms of bags, briefcases, portfolios and so forth are regarded as hand baggage. Magazines, newspapers and paperbacks are exempted.

5.2.6 Transporting cargo in passenger seats

The following restrictions apply if baggage must be placed in a passenger seat:

- no more than one package weighing a maximum of 80 kilograms per seat (NB! single packages weighing up to 15 kilograms can be placed in a sack with a total weight of 80 kilograms)
- external dimensions must be smaller than the height and width of the seat
- in addition to the seat belt, the cargo must always be secured with a strap, cargo net or other approved method
- cargo must not be placed in seats adjacent to the helicopter's main emergency exits.

5.2.7 Transport of passengers and cargo

Pursuant to Easa Part OPS Helicopter ORO.GEN.110(j) and Easa AMC1 SPA.DG.105 (a) and (f), transport of passengers and goods by helicopter requires that the personnel involved in the operation have the necessary awareness training with dangerous goods.

This is intended to ensure that personnel are able to spot dangerous goods in passenger baggage and to identify/spot unlabelled cargo which could be dangerous goods.

Training requirements
Personnel categories requiring awareness training with dangerous goods are:

- the person checking in passengers, baggage and cargo and who also compiles the passenger/cargo manifesto for the flight
- helideck personnel involved in loading/unloading passengers and cargo from the helicopter offshore.

This course must be repeated every 24 months and requires a separate test. It forms part of the Norwegian Oil and Gas basic and refresher courses for HLOs.

The following supplementary course is also required for transport of dangerous goods.
If a facility/vessel may send dangerous goods by helicopter, Iata regulations require that a dedicated person responsible for reception, packing and documentation has taken an Iata dangerous goods course. This course must be repeated every 24 months to retain its validity. Similarly, test results from the course must be available on the facility/vessel at all times.

If dangerous goods are to be transported by helicopter from an offshore facility/vessel, the following must be available on the facility/vessel:

- dedicated person (shipper/packer)
- latest version of the Iata dangerous goods regulations (DRG)
- shipper's declaration forms
- check lists – radioactive and non-radioactive
- nature of transaction code (Notoc) forms
- UN specification packages
- inner packages which match the UN specification markings
- absorbent and cushioning material
- dangerous goods labelling
- stock of spill kits.

5.2.8 Transport of fish

To avoid corrosion and/or damage to baggage, the following restrictions apply to fish transport:

- fish must be packed in water-tight containers

- they must be frozen and packed in sufficient plastic or the like to prevent damage in the event of possible thawing.

5.2.9 Personal locator beacon (PLB)

Where PLBs issued to passengers are to be left behind in the helicopter, the HLO is responsible for checking that departing passengers do not take their beacon with them.

If PLBs are left behind on the facility, the heliport responsible for their day-to-day supervision must be informed.

5.3 Communication

This part of the manual presents procedures and guidelines for communication between the helideck crew and the helicopter pilots. See also the guidance in appendix H.

5.3.1 Language

All communication in the aviation sector normally takes place in English. It could be appropriate to communicate in Norwegian if English-language skills are limited and both sides speak Norwegian.

5.3.2 Responsibilities

The HLO must report that the helideck is cleared for landing as well as providing safety-related information, such as the deck being out of use owing to an alarm, undercarriage not lowered, loose objects which might have hit the rotor, oil or fuel leaks or helicopter faults (loose covers and so forth). The HLO cannot assume control of the airspace or exercise control of helicopter traffic.

5.3.3 Establishing radio communication

Before radio communication is established, the following must be done:

- check that the correct frequency is being used
- listen first to ensure than existing communication is not interrupted
- clarify what is to be communicated.

A radio station which hears a call without identifying the call sign of the station being called must not respond until the call sign is repeated and understood.

If a station is called without catching the caller's call sign, the following phrase must be used: "Station calling, this is Statfjord B HLO, say again your call sign".

5.3.4 Helicopter's call sign

The helicopter's call sign can be, for example, Bristow, Helibus, Shuttle or Rescue, together with specific numerals for the flight.

5.3.5 Radio failure

Although modern radio equipment is reliable, the possibility of a failure in radio communication between helicopter and helideck cannot be excluded.

In practice, radio failure will be suspected if the helicopter fails to respond when called or if the frequency falls silent.

If radio failure is suspected, contact must be made with another member of the helideck crew or the radio operator to ensure that the helicopter pilot receives the information.

In exceptional circumstances, hand signals can be used to indicate that the helideck is cleared for landing.

5.3.6 Phraseology

Specific words and expressions – known as standard phraseology – are used in radio communication between helicopter and ground station in order to help understanding. Making the greatest possible use of standard phraseology is recommended.

Appendix D on phraseology provides a list of standard English expressions and their Norwegian equivalent.

5.3.7 Frequencies

The information frequency for the helicopter service is used for:

- deck clearance
- wind direction and strength
- other possible information which could be significant for flight safety.

Where two frequencies are used, all communication will take place on the **logistics frequency** (which requires a different fixed radio).

6 AVIATION FUEL – GENERAL

These guidelines cover the minimum requirements for using equipment to supply fuel to the helicopter. It is important that the helideck crew are well acquainted with these guidelines and the associated safety requirements.

6.1 Purpose

This chapter presents guidelines for operations with as well as checks and handling of Jet A-1 aviation fuel.

6.1.1 Personnel duties

Each facility is responsible for having a preventive maintenance programme covering the plant in safety and environmental terms, and for ensuring that the measures adopted comply with applicable regulations. The most important duties for personnel using the plant are to deliver the right fuel quality at all times, to keep the product free of water and polluting solids, and to refuel in a safe, secure and efficient manner

Day-to-day supervision of refuelling operations rests with the HLO. They must see to it that all work is done safely and in accordance with applicable procedures and instructions. All checks relating to operations must be logged.

6.2 Sampling and checking

6.2.1 General

Jet A-1 must be subject to quality assurance from refinery to consumer, with traceability at every stage pursuant to relevant guidelines.

Samples must be taken by competent personnel with the correct procedures and equipment. It is important that colour-blind people do not do water-detector tests. All sampling must be logged.

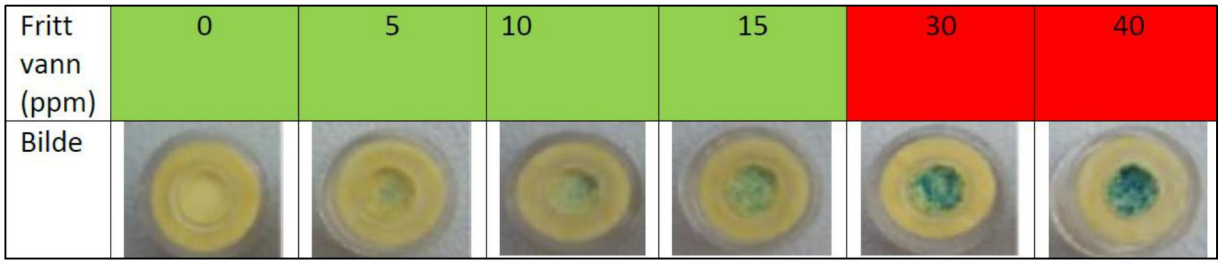
6.2.2 Water

Water can occur in fuel in two forms:

- as fine/small droplets which have precipitated from the fuel and which can be removed in the filter separator, with any remaining water absorbed in the filter monitor
- as molecules loosely attached to the fuel molecules.

Water attached to fuel molecules cannot be removed by these methods.

This is nevertheless not insignificant for the fuel, despite occurring only in minute quantities. Such fine dispersal can arise during the passage of the water and fuel through a pump or microfilter. Visual inspection will normally reveal finely dispersed water. But experience shows that the turbine fuels used by aircraft may present borderline cases which defeat the human eye. The Shell water detector has been developed to deal with these. It comprises an unbreakable five-millilitre injection syringe and a plastic detector capsule containing water-sensitive paper. The test provides a positive indication of finely dispersed water at a concentrations of 30 parts per million (ppm). The capsules may also change appearance slightly at concentrations as low as five ppm.



The examples above with 0.5, 10 and 15 ppm of free water all represent acceptable and approved tests. The two on the right, specifying 30 and 40 ppm of free water, are not approved and require further settling and/or draining.

6.2.3 Visual inspection

For the fuel sample to be accepted, it must be the correct colour, visually clear and transparent, and free of particles and dispersed water at normal temperatures. The colour of Jet A-1 varies from watery white to straw yellow. See also the section on visual check.

Undissolved water will appear as droplets on the inside wall of the sampling container or as water at its bottom. It may also fog the sample/render it opaque. Particles and other visual pollution generally comprises rust, sand or dust, either suspended in the fuel or as sediment at the bottom of the container.

When using the permanently installed sampling containers, discharging the fuel sample to the outer container rim will automatically create a cyclone motion which causes particles and large water droplets to accumulate at the bottom of the container.

It is therefore important that samples taken from the portable tanks are vigorously rotated to create a cyclone effect of this kind.

Satisfactory result
When none of the above-mentioned signs are visible, and the sample is clear without sediment.

Unsatisfactory result
The sample is not clear and transparent, showing that water or pollution is present.

If the sample contains sediment and/or free water

- further samples are taken until the fuel is clear and free of water (clear and bright)
- if a sample contains finely dispersed water, a settling time of one hour per metre of tank depth is allowed before conducting a new purity test
- this process will continue until the sample is completely free of water or sediment (clear and bright, satisfactory test result).

The following points provide guidance for conducting a visual check of fuel samples.

- Colour: jet fuel can vary from completely clear (like water) to straw yellow.
- Water: free water will normally reveal itself as droplets on the wall or in the bottom of the sample container (free floating), and can also occur as a misty cloud in the fuel (emulsified).
- Particles: largely comprise small specks of rust, sand, dust or scale from hoses and equipment, and settle at the bottom of the sample container.
- Clear and bright: this term is independent of the natural fuel colour. “Clear” indicates that no sediment or emulsion is present. “Bright” refers to the clear, bright appearance of the fuel when completely clean. If particles or water are found, new samples must be taken until the sample is clear and bright.
- Control check: this check comprises a visual check plus fuel density and is carried out to be certain that the quality is correct and that the fuel has not deteriorated or become polluted during storage. The result of this sample is compared with the values on the certificate. When the actual weight has been corrected to the standard value (15°C), the variation must be no more than 0.003 kilograms per litre. If it is bigger, the product must be quarantined and withheld from delivery until the reason for the variation has been established and a new approval given.

If nonconformities are detected in the form of technical problems with the plant, competent personnel must be summoned.

6.3 Tests and inspections

Use Shell’s water detector to check samples taken from Jet A-1 helicopter fuel. If a detector changes colour, it is extremely important that the procedure described below is followed to remove pollutant(s) from the fuel. The detector comprises the following components:

- an unbreakable five-millilitre injection syringe
- a plastic detector capsule containing water-sensitive paper.

Alternatively, an approved EI 1596 water sensor can replace the Shell water detector test.

6.3.1 Storing Shell water detector capsules

The capsule lid should be screwed on as soon as possible after removal from the container to avoid the risk that the paper might be discoloured by air humidity. As a consequence, capsules must not be left lying around loose or kept in the pockets of clothing.

Maximum storage time for a detector capsule is nine (9) months from the production date.

- the expiry date will be stamped on one side of the storage box
- it will also be stamped on each capsule, and must be strictly observed.

Unused capsules must be stored dry indoors in their container until they are to be used.

6.3.2 Procedure for a water detector test

- Check that the capsules have not passed their expiry date (shown on box/container).
- Have a sample of at least 3.5 litres ready in a clean and clear container.
- The sample must be rotated vigorously until a cyclone effect arises in the container, causing particles to accumulate in the bottom of the container and possible water particles to be dissolved into the fuel. This happens automatically in the sealed sampling containers.
- Attach the capsule to the syringe and immediately immerse both in the sample
- The plunger is withdrawn until fuel reaches the five-millilitre mark.
- Take care that the plunger is not withdrawn until the syringe is immersed in the liquid, otherwise air humidity will create an indication in the detector capsule and lead to a faulty reading.
- Possible water droplets in the fuel will be absorbed by the paper fibres, releasing and spreading the colouring and thereby creating a distinct colour change.
- If this colour change occurs, the fuel is contaminated with water and must therefore not be used. The part of the paper protected by the plastic remains unaffected. A possible colour change between the outer and inner (wet) or measured areas provides a positive indication that finely dispersed water is present.
- A generally light pastel colour over the whole central part of the capsule or no colour at all can be accepted. A light yellow pastel colour with dark specks or spots indicates that some water droplets remain suspended in the fuel and may be above the maximum permitted concentration of 30ppm.
- Further precipitation, emptying and separation are needed to remove this water so that the concentration falls below 30ppm. Large and dark specks or generally darker colour in the centre of the capsule naturally mean even more water in the fuel, which must be removed before the fuel can be safely used in a helicopter.
- When testing just before and after refuelling, allow the pilot to wet the detector after the test to see that the colour changes to green as a check that the capsule is not defective.
- Avoid touching the test area to prevent a faulty test result.

On occasions other than refuelling:

  - wet the detector even after the test to confirm a colour change
  - a capsule must be used only once and then discarded.

6.3.3 Draining, sampling and checking

Drainage and product sampling – routines at the plant.

Drainage samples must be taken regularly to check that storage tanks and delivery equipment are free of particles and water.

The sample is taken directly from the lowest point in the tank or filter arrangement.

If an unusually large quantity of water is detected, the system must be taken out of service and competent personnel who make an annual inspection of the refuelling system summoned to assist in investigating the cause of the contamination.

The equipment must be drained to remove water and particles at the following intervals:

- daily from storage tank, filter separator and filter monitor before the day's first delivery
- filter housing, before and after each delivery
- storage tank and filter housing, after heavy rain and storms.

Drainage must be conducted with full liquid flow from the tank sump, and filter housings must only be drained with the system pressurised. Liquid must be drained to clean, clear glass containers with a minimum capacity of 3.5 litres for a visual check. If this gives an unsatisfactory result, new samples must be taken by drainage until a satisfactory visual check is achieved. Should unusually large quantities of free water or particles be found, or no satisfactory visual check can be obtained, the system must be taken out of service and an immediate investigation launched to identify the cause of the pollution.

6.3.4 Sampling and inspection

Daily (every morning), conducted by the HLO

- Take a 3.5-litre sample from the tank currently in use.
- Take a 3.5-litre sample from the filter housing with the system pressurised.
- All samples are checked with the Shell water detector unless a new standard is adopted which can do away with the requirement for a water detector test.
- The accepted 3.5-litre sample from the storage tank must be retained for 24 hours. It must not be exposed to sunlight. If two tanks are used in one day, the samples from both must be retained for 24 hours. The samples must be labelled.
- Conduct a visual inspection of the equipment for damage and leaks.
- When transferring fuel, read off and note the pressure difference over the filter housing in the log book for the helicopter refuelling system.
- If an incorrect maximum value for the pressure difference is shown by the filter monitor, the maximum value for new filter technology must be added.
- Earth cables: daily check for good mechanical contact with the unit and possible damage.
- Check of hose strainers in pressure filling connectors and the pistol grip nozzle.
- All sampling and inspections must be logged.

Weekly, conducted by the HLO

- If the system is out of operation for more than a week, take a 3.5-litre sample from the pistol grip nozzle in addition to the other sampling.
- Alternating the pump used on a weekly basis is recommended in order to spread wear and tear between pumps A and B.
- Take a 3.5-litre sample (until the sample is acceptable) from portable tanks in storage.
- Drain the air-separator collector glass.
- When pumping fuel, read off the differential pressure and note the result in the weekly pressure difference log for the separator and monitor (see appendix). If the maximum pressure difference for the filter separator, and possibly the monitor, is exceeded, the filter elements must be replace (only step 1 for the filter). The maximum pressure difference is 15 psi for the separator and 22 psi for the monitor.

- Inspect all earth cables (for portable tanks, supply cabinet and pistol grip nozzle). In the event of actual or suspected faults, maintenance personnel must be summoned. The refuelling plant must not be used if faults are found or suspected in its earthing system.
- Once a week, differential pressures for the separator and monitor must be read off while pumping at the selected delivery volume. The result must be logged.

Monthly, conducted by the HLO

- Check the delivery hose for damage and log the result, see section 6.6 plus appendix.
- Function-test the piston-type differential pressure manometer to check that it operates correctly. This is done by opening the three-way valve connected to the meter. It is only necessary to check that the piston moves freely throughout its length, and visually ensure that it resets correctly. Log the inspection (see appendix).
- Check the filter strainers in the pressure hose connectors and pistol grip nozzles. In each monthly inspection of the filter strainer, the relevant hose must be pressurised for at least one minute.
- Inspections at longer intervals than the above form part of each facility's own maintenance system.

6.3.5 Returning product to the plant

Clean and water-free Jet A-1 accumulated during draining and sampling can be returned to a drain tank for re-use or to a slop tank as waste.

Jet A-1 in the drain tank must be given time to settle and all free water must be drained off before the fuel is transferred to a stationary Jet A-1 tank or the same Jet A-1 tank it was taken from originally.

The drain tank must be protected against contamination. This can be done by preventing access to the tank and/or by installing signs.

6.3.6 Sampling during delivery to the helicopter

- A 3.5-litre sample must be taken from the filter monitor or pistol grip nozzle before delivery and checked visually, including water-detector testing. Possible water must be drained off and a new sample taken until a satisfactory water detection test is achieved.

- A 3.5-litre sample must be taken from the pistol grip nozzle or the intake side of the filter monitor immediately after the delivery is completed in order to confirm quality and to conduct a visual water-detector check.

If more than a hint of water is found, or the water detector shows a clear colour change, a new sample must be taken. The pilots and the helicopter company must be informed immediately. No more fuel must be supplied until the cause has been identified and corrected.

6.4 Specific gravity (density) measurement

The specification for Jet A-1 places its specific gravity (density) in the 0.775- 0.840kg/l range. This must be checked on reception offshore. Specific gravity is measured with a hydrometer and a thermometer (which could be incorporated in the hydrometer). Testing must be conducted in a well-lit area protected from rain and wind. The hydrometer is inserted slowly and carefully into the fuel in order to avoid it breaking or getting wetted above the flotation level. Check that no air bubbles attach to the submerged surface. The hydrometer must be allowed to float freely.

Allow the hydrometer to float for three-four minutes so that its temperature and motion stabilise. Then push the hydrometer carefully down two marks on the scale and release it. Once the hydrometer has restabilised, read off the specific gravity.

Since the fuel will creep a little up along the thermometer, the level shown on the scale will be above the actual value. Look along the surface of the fuel and read off the lowest level shown. Read off to the nearest 0.001kg/l and log the product's specific gravity. Shake the hydrometer and take two-three further readings to confirm the result.

Thereafter read off the temperature. Note both temperature and specific gravity as direct readings from the hydrometer. Use these data to correct the specific gravity to 15°C using the density conversion table (ASTM-IP table 53) or the conversion unit for fuel density (the Aristo 60 208 circular plastic slide calculator from Germany). Note the specific gravity corrected to 15°C. NB! A slide calculator will get worn over time and thereby give false readings. If one is used, it must be inspected regularly for possible wear and tear. Specific gravity corrected to 15°C must be within +/- 0.003kg/l of the specific gravity corrected to 15°C documented in the upper part of the transport certificate for the aviation fuel.

If an electronic density meter is utilised, the manufacturer's user manual and calibration instructions must be observed. If the specific gravity is not within the specified limits, the guidelines for faulty fuel must followed and the fuel possibly returned.

6.5 Basic requirements for lab samples

Samples to be certified by a laboratory must be taken from an outlet which provides direct access to the space where the liquid is stored.

Before sampling, the equipment must be thoroughly rinsed and containers washed at least three times in the product being sampled. The containers must be thoroughly dried before use.

A container must not be filled completely. About five per cent of its volume must remain so that the liquid can expand. Approved containers must be used, and should be labelled and preferably sealed.

Containers must be sealed and labelled immediately after filling, with the following information:

- date and time
- sample taken by (signature)
- facility/vessel
- tank number
- batch number.

Documentation for all samples must be logged. Attach a copy of the transport certificate for the relevant product.

6.5.1 Containers

Containers for lab samples
Glass, metal or approved plastic containers for lab or duplicate samples must be new or approved by the lab, and completely clean. See ASTM D 4306 for suitable products.
Metal containers must be approved and preferably lined internally with epoxy. All containers, even if new, must be rinsed at least three times in the product to be sampled.

Containers for visual samples
Clean, transparent containers must be used, with a minimum capacity of 3.5 litres and a wide opening which accepts a threaded lid. If a bucket is used for drainage, it must be made of stainless steel or possibly coated internally with white enamel and have approved earthing.

6.6 Hoses for aviation fuel – approval and inspection

Each hose must have a permanent identification number as well as a log of inspections and checks. This must specify the dates and years of manufacture and of entering service as well as information on inspection findings and maintenance

Maximum storage life is two years. Hoses have a maximum life of eight years if pressure-tested and inspected annually in accordance with API 1529/ISO 1825/EI 1529. Both these periods must be calculated from the date of manufacture. In the absence of annual pressure testing, the hose has a maximum service life of two years.

Before being used, new hoses must be flushed in accordance with API 1529/ISO 1825/EI 1529 and then pressure tested. The product used for flushing must be returned to a slop tank in the process of being filled or settling.

All supply hoses must undergo routine inspection and checks.

Hoses must be kept under observation during refuelling. Should weaknesses or faults be detected, delivery must be halted and the hose replaced.

Hoses can be inspected/checked as follows. Pull the hose all the way out and apply full pump or operational pressure with the delivery connector shut. When the hose is under pressure, check for exterior damage, leaks or other signs of weakness. When inspecting a long hose (under full pressure), the recommended approach is to form a vertical loop and then roll this slowly along the full length of the hose. Special attention must be paid to any signs which indicate that the hose connectors are beginning to loosen. With the hose fully extended, release the pressure and inspect for soft spots. Special attention must be paid to that part of the hose about 45 centimetres from the connectors, since it is particularly liable to weaken. This section must be checked for faults by applying pressure around the area to identify soft spots, bubbles and so forth.

6.7 Pressure filling connectors

During refuelling, all connectors must be checked for leaks. Leaking connectors must be taken out of service. Repairs and adjustments must be logged and carried out by authorised personnel.

6.8 Pistol grip nozzles

Pistol grip nozzles must be subject to general inspection for each delivery. If leaks are identified during use, the nozzle must be taken out of service. Repairs and adjustments must be logged.

6.9 Reception of fuel and reception checks

Tanks must be inspected and approved before being filled on land, and an inspection certificate issued by the fuel distributor. The HLO must check that labelling and traceability of the tank agree with the documents.

Check that the transport certificate for aviation fuel specifies the following: type, quantity, batch number, date, tank serial number, specific gravity, verified free of solid particles and water, inspector's signature.

On receipt of fuel

- Check that the seals on the manhole, inspection hatches and connectors are intact, and that the seals have the same unique numbers entered in the transport certificate. Also check that all dust covers are in place and intact.
- Check that the tank cradle/tank have their respective approvals, which can be read from the tank's data plate.
- Check for damage to hatches and valves, particularly protective hatches and packing rings.
- Check that seals are intact and the tank type is labelled.
- Check whether the fuel tank ID number on the seals matches the inspection certificate.

6.9.1 Settling time

Once a tank has been positioned stably, the fuel must be given sufficient time to settle before sampling begins. Settling time is three hours per metre of fuel depth.

If the sample contains sediment or free water, new 3.5-litre samples must be taken until they no longer contain sediment or free water. The following tests must be conducted:

- rotation test (rotate the sample strongly before making a visual check
- clear and bright test (visual check)
- Shell water detector.

Criteria for accepting a sample are that it:

- passes the clear and bright test
- is free of water
- is free of pollutants.

If one or more of these criteria are not met, a further settling time of one hour per metre of fuel depth is allowed. All the specified tests must then be repeated.

In certain cases, it may be necessary to extend the settling time and drain off larger volumes before an approved sample can be achieved.

Note the final test results (from the final settling time) and sign the recipient's copy of the transport certificate.

Both fuel reception and the test results must be noted on the aviation fuel transport certificate.

Helicopter fuel must not be used until the above-mentioned procedures have been conducted and satisfactory test results obtained.

6.9.2 Non-approved fuel

Before returning fuel which fails to meet the requirements for purity, specific density or water detection, allow it a further settling time before sampling and testing at least three more times.

Check the equipment/instruments (try a new set if available) and ensure that the tests are being conducted in accordance with the procedures.

If the test results remain uncertain, let another person conduct the tests on their own. If this confirms the unsatisfactory/uncertain results, a superior must be informed.

When the fuel and/or tank cradle fail to meet the specified standard, note the following at the foot of the aviation fuel transport certificate:

- details of the fuel and/or deficiencies with the tank cradle
- name of the facility
- date
- signature of reporter.

Return the completed original certificate to the cartridge on the tank cradle.

Label the transport tank as specified below and enter the following in the cargo manifest:

- non-approved fuel
- from: (name of facility)
- to: (fill out).

6.9.3 Using fuel directly from a transport or storage tank

Depending on plant design on the various facilities, fuel received can either be transferred from the transport tank to fixed (stationary) storage tanks or stored in the actual transport tank by connecting this to the fuel system.

6.9.4 Fuel in the transport tank

If the transport tank is used for storage, an earth cable must be attached to the tank cradle. This must also be attached during the transfer of the tank contents to permanent (stationary) storage tanks. The tank is connected to the pump's manifold system with the aid of a pliable/flexible hose (corrugated steel pipe) which connects to the coupling on the transport tank. Alternatively, a hose approved to EI 1529/ISO 1825 can be used. Only one tank at a time must be connected to the pump's manifold system.

6.9.5 Transferring fuel between transport and storage tanks

The following tests must be conducted to verify fuel quality when transferring it from the transport tank frame to the storage tank and/or between different storage tanks, including transfer from the recirculation/sample tank:

- visual check
- water-detector test of a 3.5-litre sample taken from the tank frame/tank's drain point.

Make sure that the tank to receive the fuel has sufficient volume to accept it. When transferring from the tank frame

- connect an earth cable to the transport tank
- connect to the transfer hose and open the tank valve
- start transferring fuel, which must be led in and not allowed to fall freely into the tank
- when the transfer is complete, disconnect the dry connection (hose) and earth cable.

Procedures after the fuel has been transferred:

- make a visual check
- allow a settling time of one hour per metre of fuel depth in the tank

- then take a 3.5-litre sample from the tank's drain point and conduct a water-detector test
- if the sample contains sediment and/or free water, new samples must be taken until they show no sediment/free water
- this process must be repeated until satisfactory results are achieved
- if the samples remain unsatisfactory after the fourth settling time, investigations/ corrective measures must be adopted.

6.9.6 Labelling and replacing tanks

To avoid confusion over which tanks are in use, they must be labelled to show their status. The following texts must be used:

- tank has been received and stored since ____ (date)
- tank in use
- tank settling
- tank empty.

NB! Also applies to transport tanks used for storage/supply.

6.10 Old fuel stocks

As far as possible, surplus fuel stocks should not be stored offshore. They should be run down if the period between replenishments is expected to be lengthy.

If fuel has been stored for six months from the filling date, a 3.5-litre drainage sample must be taken in a special container. This is sent to an approved lab for quality control. Should the sample show that the fuel meets the required specifications for use, the fuel can be used in the normal manner.

Using old fuel is prohibited until the sample results are available and approval has been received from the fuel supplier/lab.

If the results are satisfactory, the stocks can be used but must be re-tested every three months.

Fuel whose samples are not approved must be returned to land as "non-approved", see section 6.9.2

6.10.1 Returning transport tanks

All connectors and covers on transport tanks must be sealed before return to land. The unique ID number for each seal must be entered on the transport certificate. Check that the protective cover has been placed over the hose connector. Do not put other waste substances or contaminants in these tanks in order to simplify filtration and re-use of the fuel.

6.11 Fuel delivery/refuelling

6.11.1 Refuelling personnel

Refuelling must be carried out by competent personnel who are well trained in the procedures for and operation of the refuelling system. Sufficient crew must be deployed to ensure safe operation and to act correctly in the event of an emergency. They must be familiar with the location and functioning of the emergency stop buttons.

Appendix J outlines the duties of each member of the helideck crew, step by step, when refuelling.

6.11.2 Earthing between helicopter and refuelling equipment

The helicopter, supply cabinet, pistol grip nozzle/pressure filling connectors must be connected throughout the refuelling operation in order to conduct electricity so that no electrical potential (voltage difference) can arise between them.

Earthing between the helicopter and supply cabinet must be in place before any hose is connected to the helicopter or the fuel tank cover is opened. Earthing must remain in place until all hoses have been disconnected and the tank cover is replaced.

NB! Only authorised earthing connection points on the helicopter are to be used.

6.11.3 Refuelling procedures (general)

- Refuelling is forbidden in the presence of heavy local thunderclouds.
- The hoses must be laid out in a way which prevents damage. Avoid kinking or twisting the hoses. Pressure filling connectors or pistol grip nozzles must not be dragged along the ground. Dust caps must be in place when connectors/nozzles are not in use.
- During refuelling, the delivery unit must be checked for leaks, the differential pressure on the filter monitor kept under observation and logged, and the other instruments read off and monitored.
- Fuel spills are a fire hazard and harmful to the environment. Hot helicopter engines may be an ignition source, and particular care must be taken during refuelling. If a spill occurs, refuelling must be halted and the necessary measures taken in accordance with local provisions/routines.
- If air intrusion in the plant is expected, the following procedure must be followed:
    1. the first 200 litres are filled with a gravity pistol
    2. possibly transfer 200 litres to the recycling tank before refuelling starts if such a system is installed on the plant.

6.11.4 Refuelling with the helicopter's engines running

Refuelling a helicopter with the engines running (hot refuelling) makes very stringent demands on safety routines. The refuelling plant's delivery station must be manned in order to manage it.

6.11.5 Defuelling a helicopter

Defuelling is conducted with the same safety procedures and personnel as refuelling.

The HLO must ensure that:

- returned fuel is a known quality and type (Jet A1)
- the quantity of fuel returned and where it is returned from are logged
- returned fuel is allowed to settle and drained of free water and particles before it is ready for a new delivery.

Defuelled fuel must as a minimum be passed through a filter water separator.

Fuel defuelled through a water separator or monitor filter can be redelivered without prior settling and draining.

6.11.6 Refuelling with passengers on board

Refuelling can be conducted with passengers aboard by agreement between pilot and HLO, and must follow the standard procedure (see appendix J) will the addition of:

- the pilot and HLO must be present and continuously monitor the operation
- the pilot must give the passengers a safety briefing before refuelling begins
- passengers must not have their seat belts on during refuelling
- doors must be closed on the same side as the refuelling
- doors must be open on the opposite side to the refuelling
- escape routes must be planned, accessible and known to everyone concerned
- the helicopter operator's procedure for refuelling with passengers on board must be available and known to the helideck crew
- the facility's procedures must be known to the helicopter crew.

6.12 Overview of the necessary documentation

Results from all checks, refuellings and samples must be logged in updated documents which are easily accessible. Digital documentation is approved as long as its quality is as good as or better than the forms listed in appendix C.

The documentation must be retained for at least a year. Its minimum content is listed below.

6.12.1 Documentation – quality control

- The helicopter refuelling log features requirements for daily sampling/inspection.
- Use is also made of the filter/differential pressure log and the transport log for helicopter fuel.

6.12.2 Documentation – maintenance

- Log for recording all work done by every unit of the equipment
- Log for testing pressure refuelling connector/pistol grip nozzle
- Log for inspecting and testing hoses
- Log for calibrating flow meter
- Log for calibrating pressure manometer
- Log for tank inspection and cleaning
- Log for filter equipment – inspection and maintenance
- Log for the strainer in manual pistol grip nozzles – inspection and replacement

Documentation for the performance of these duties must normally be found in the facility's preventive maintenance programme. See appendix C for forms.

6.12.3 Signature/retention time

All documentation must be signed by the person doing the work. Documentation must be retained for at least three months for daily checks, for at least a year for weekly and monthly checks, and for at least three years for checks made at longer intervals and for all non-routine incidents.

6.12.4 Change of location

Remaining fuel must be gauged and the quantity noted when the facility moves to a different departure base and/or when a rig changes helicopter operator. The measured quantity must be

reported in writing to the relevant owner of the fuel as soon as possible and no later than five days after arriving at the new location.

7 SPECIAL PROCEDURES AND OPERATIONS

This chapter covers special procedures/operations utilised on specific facilities and helicopter types, under special conditions and so forth. They are therefore not covered elsewhere in the manual.

7.1 Emergencies

Action taken must accord with emergency procedures for the facility.

7.1.1 Basic principles

Teamwork
Helideck crew must work together as a team when tackling emergencies. Discuss how various emergencies on the helideck will be tackled and conduct drills on responding to these in order to identify rapid countermeasures, forms of collaboration and effective action.

Reactions in emergencies
Use common sense when reacting to emergencies.

Normal response sequence:
- assessing the extent of the emergency and securing personal escape route
- calling for help/sounding the alarm.

Respond to the emergency by
- locating its source
- extinguishing/eliminating
- rescuing personnel/reducing risk
- preventing further spread.

Maintain a fire watch to prevent re-ignition/repetition.

7.1.2 Fire in helicopter/on helideck

Initial response
- if refuelling is under way, halt it immediately
- activate fixed firefighting equipment
- sound the alarm
- don fire protection equipment (the fireguard will already be wearing this)
- determine the fire source(s).

Responsibilities

HLO	Sounds the alarm/notifies. Confers with pilot and coordinates response. Where possible, confers with the pilot before starting to use fire-extinguishing equipment.

Heliguard	Works with the fireguard and the HLO to extinguish the fire and reduce the danger.
Fireguard	Operates the fire-extinguishing equipment.

Fire/search and rescue team

If the blaze is extensive, the facility's fire/search and rescue team will be involved in extinguishing it and will take over responsibility from the helideck crew.

Rescue

In some cases, the helicopter crew/passengers can be rescued before the fire gets too big.

If a rescue operation appears possible, it should be attempted. However, the fire-extinguishing equipment must be used to cover personnel making this effort.

Should the helicopter cabin have to be entered to rescue people, crew must:

- use smoke diving equipment
- keep as low as possible on entering
- keep below smoke and fumes, where the largest oxygen supplies will be found.

Fire watch

When the fire is extinguished, crew should maintain a fire watch at the site to prevent re-ignition. The foam carpet must be maintained to the extent required.

7.1.3 Crashing on the helideck

Because the helicopter has no wings, the engine(s) and fuel tanks are located in the immediate vicinity of the cabin.

In the event of a crash, this means that:

- rotor blade components may be flung around
- the helicopter is less like to remain standing vertically
- it is easier to drag hoses around a helicopter, and sheltered areas under the fuselage are considerably smaller
- the rapid effect could be crucial because the cabin, engine and fuel tanks are so close together.

<u>Should a helicopter crash on the helideck, the fireguard must:</u>

- activate the fire pumps/sound the alarm
- cover the helideck with foam
- extinguish possible fire(s)
- ensure the fire watch is maintained, particularly with regard to fuel spills which could run down to lower decks on the facility.

<u>Rescue</u>

The design of helicopter doors and hatches is relatively simple and they are unlikely to jam. If jamming does occur, they must be forced open.

If more forcible methods are needed to enter the helicopter, cutting must be confined to specific points – such as emergency exits and windows.

Use the rescue equipment listed in chapter 4.1.10.

If the helicopter is lying on its side, those on board must be supported when their seat belts are released.

NB! Helideck crew must have detailed knowledge of the helicopter types as described in the illustrations in appendix E.

Choke/turn off the engines when

- the helicopter is in a normal position and
- the pilots have been put out of action and
- the engine(s) and rotor are still running
- turn off the engine(s) with the helicopter's emergency stop handle (AS332) or three red buttons on the instrument console (S-92)
- remember that the rotor blades move closer to the deck as their rotational speed drops, which can pose a major hazard for personnel on the deck.

7.1.4 Crashing into the sea

Alerting
Ensure that the radio operator/control room are notified.

The radio operator/control room will handle further notification in accordance with the facility's internal procedures.

Helideck crew will respond in accordance with the facility's emergency response plan.

7.1.5 Forewarned emergency landing

Preparations
If the helicopter has warned that it has problems and needs to make an emergency landing on the helideck, preparations must be made for tackling this.

Ensure that the radio operator/control room are informed, and that the correct alarms have been activated.

The emergency response team must be mobilised in accordance with the facility's internal procedures.

All members of the helideck crew must don fire protection gear and smoke diving equipment.

Dry powder equipment
Prepare the fixed powder extinguishing hose for immediate use. See chapter 3. Stand in a sheltered area with this equipment at the ready.

7.2 Safedeck helideck

7.2.1 General description

A Safedeck is designed with surface drainage which prevents accumulation of fuel by

allowing it to drain away, and thereby prevents it maintaining a possible fire in the enclosed piping system beneath the deck.

7.3 Boarding/disembarking in high winds

7.3.1 General

The upper limit for regular passenger transport is 60 knots including gusts.

The wind on the helideck may deviate from the stated wind measurements.

The helideck's surroundings may give rise to lee and/or funnel effects as well as turbulence, which can radically alter the wind field.

These local conditions will differ on the various facilities and also vary with the wind direction.

7.3.2 Risk-reducing measures

When winds in excess of 50 knots are forecast, each facility will seek to reduce wind exposure for the passengers.

Relevant measures could include:

- careful evaluation in selecting the exit/access least exposed to the wind
- the heliguard and fireguard will help passengers to and from the helicopter
- passengers carry only one item of baggage to leave a hand free
- the heliguard and fireguard will handle all baggage on the helideck.

Reinforcing staffing on the helideck can be relevant in such circumstances. The HLO will continuously assess conditions on the deck and, in consultation with the helicopter pilot, determine how best to ensure passenger safety.

If the HLO determines that passenger safety can no longer be maintained in a fully acceptable manner, they can halt helicopter operations on their facility. The OIM or equivalent must be informed.

7.4 Refuelling in high winds

In special circumstances/emergencies, it could be necessary to refuel a helicopter in winds stronger than 60 knots. Special precautions must then be taken.

The pilot will brief the helideck crew about any special procedures to be followed or precautions to be taken.

The HLO should summon qualified helideck personnel to reinforce the helideck crew.

7.5 Flights to normally unmanned facilities

7.5.1 General

In this context, an unmanned facility is one with an operational helideck which accords with the regulations but with no personnel on board when the helicopter lands/takes off.

Flying to unmanned facilities should be kept to a minimum and conducted in daylight.

No transit passengers must be on board the helicopter.

Should there be personnel on the facility, staffing and operation will be as for a manned facility. The exception is if the helicopter is returning empty to collect a group which has previously been put down on the same facility.

When flying to an unmanned facility, the helideck crew should comprise at least three, but at least two, qualified heliguards. One of these is the HLO, while the other is designated the fireguard. Both must have documented knowledge of the facility's helideck and equipment.

The helideck crew must wear approved survival suits during transit to/from the unmanned facility, and should preferably be seated by the door for rapid exit/entry. Personal firefighting equipment (not a smoke-diving set or extra cylinders) are taken into the helicopter cabin when flying to unmanned facilities. Hard hat and gloves do not have to be worn during transport. The helideck crew leave the helicopter first, prepare the helideck and don firefighting equipment (if necessary) before passengers exit and cargo is unloaded.

Landing/takeoff must be observed from the parent facility or a standby vessel, either visually or via video monitoring of the helideck.

As on manned facilities, inspection forms and maintenance routines must be in place.

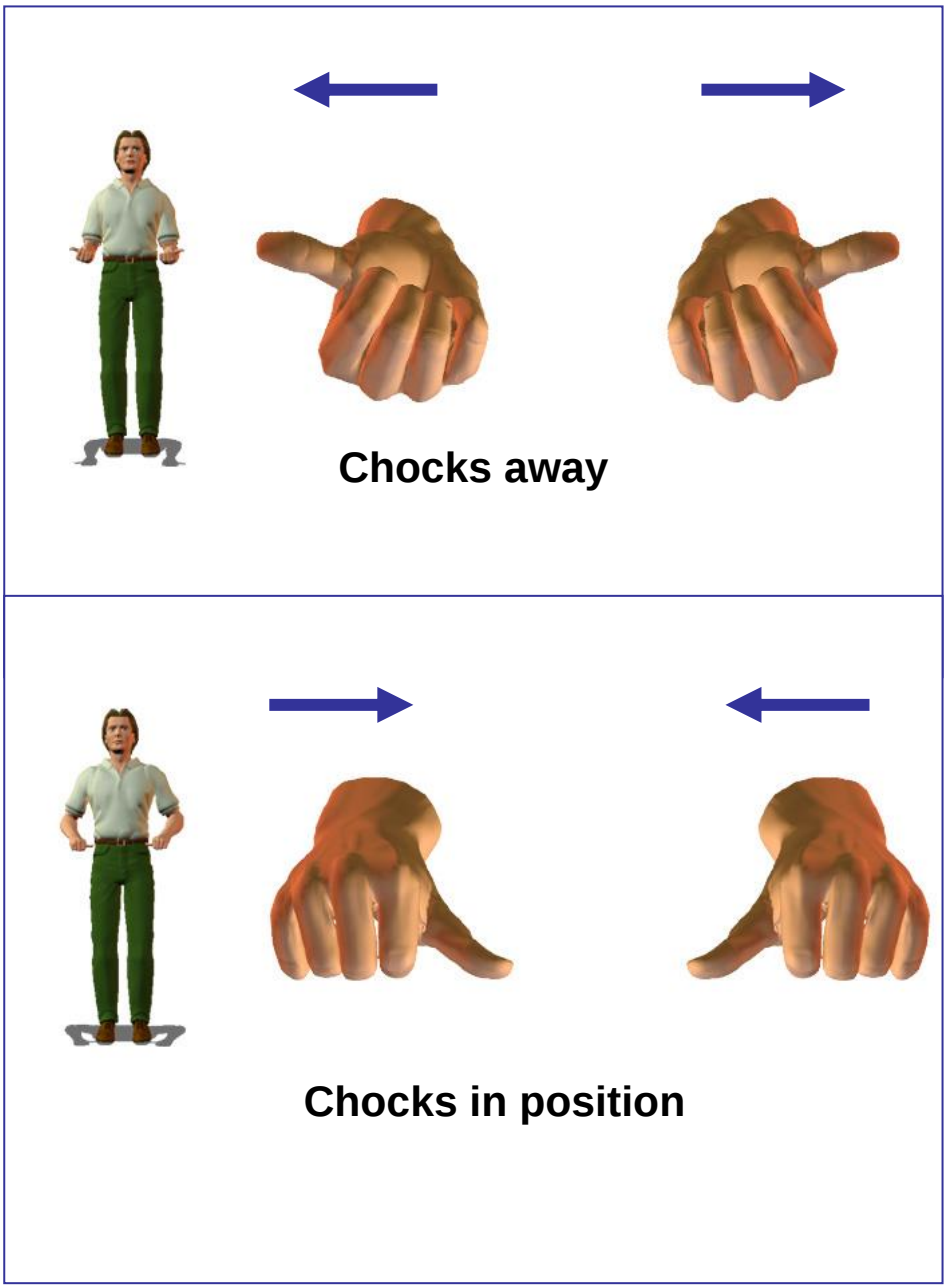
Where mobile facilities are concerned, motion data (pitch, roll and heave) must be available on the parent facility in accordance with the HMS standard.

Helideck crew and the helicopter must be in radio contact with the parent facility or standby vessel throughout the helicopter operation where camera monitoring from the parent facility is not established and where the nature of the operation otherwise requires this.

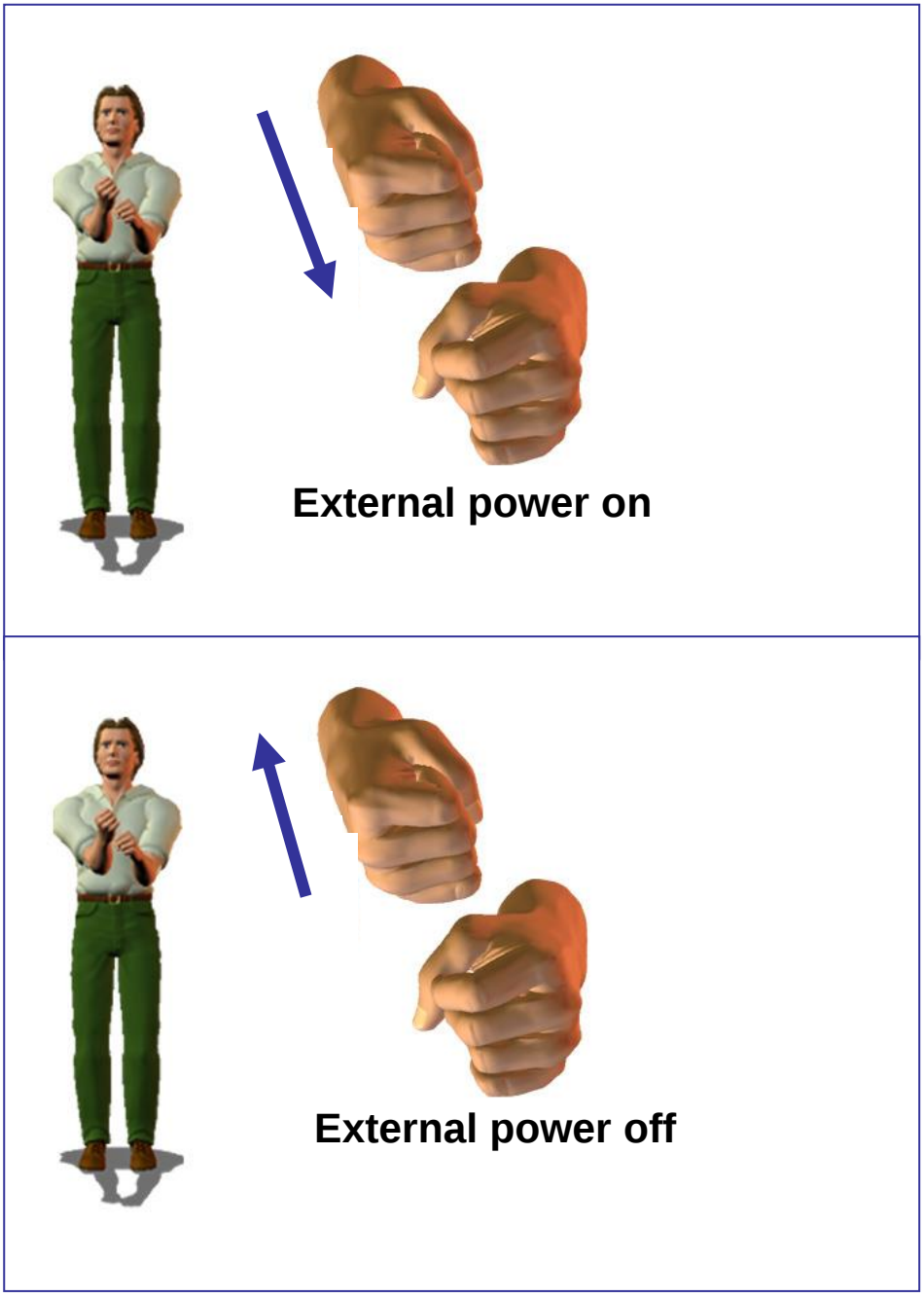
During night flying, the helideck's perimeter lighting, red obstacle lights and general facility lights must be on.

APPENDIX A – HAND SIGNALS

HAND SIGNALS 1



HAND SIGNALS 2



HAND SIGNALS 3

Start engine no 1

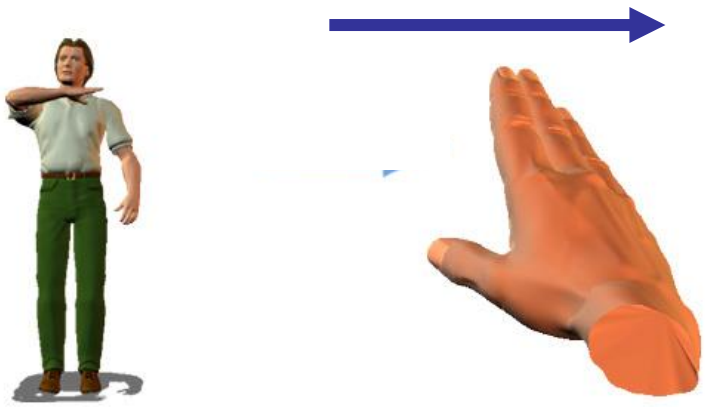
Start engine no 2

HAND SIGNALS 4

Start rotor

OK

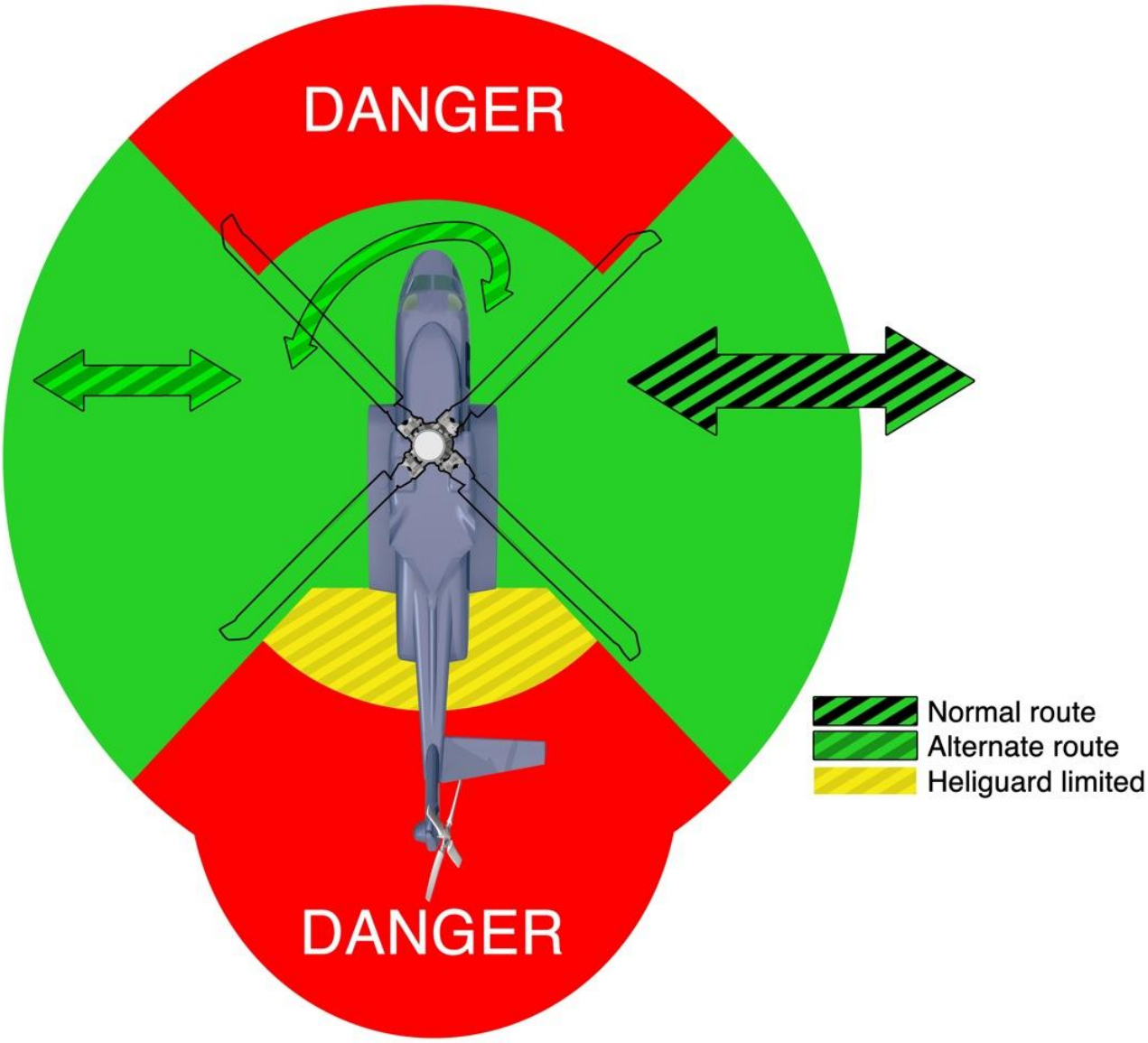
HAND SIGNAL 5



Shut down, or stop refuelling

APPENDIX B – HELICOPTER SAFETY ZONES

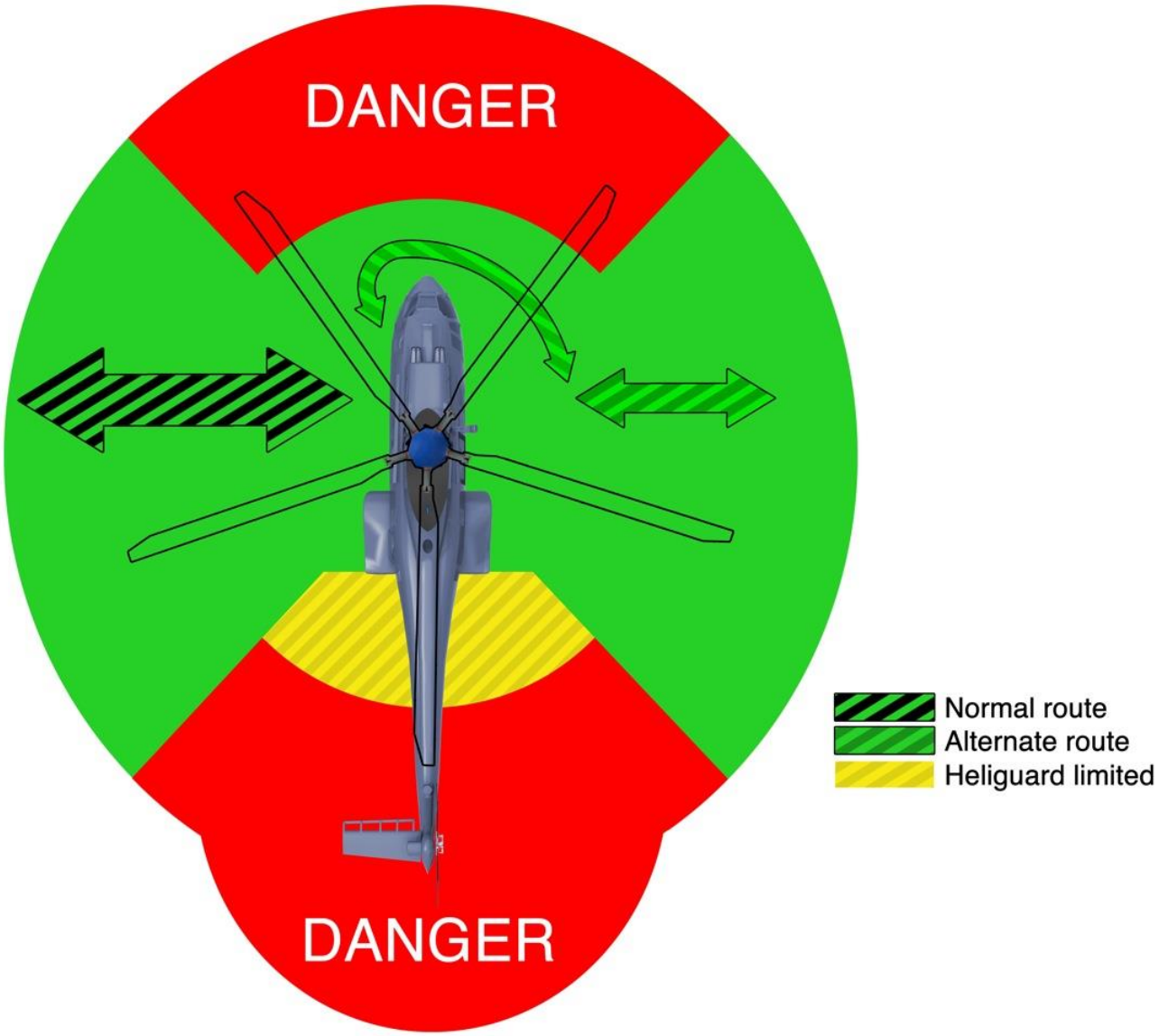
SIKORSKY S-92



Alternate route to be used only under HLO supervision.

See alternative access in appendix G for procedures.

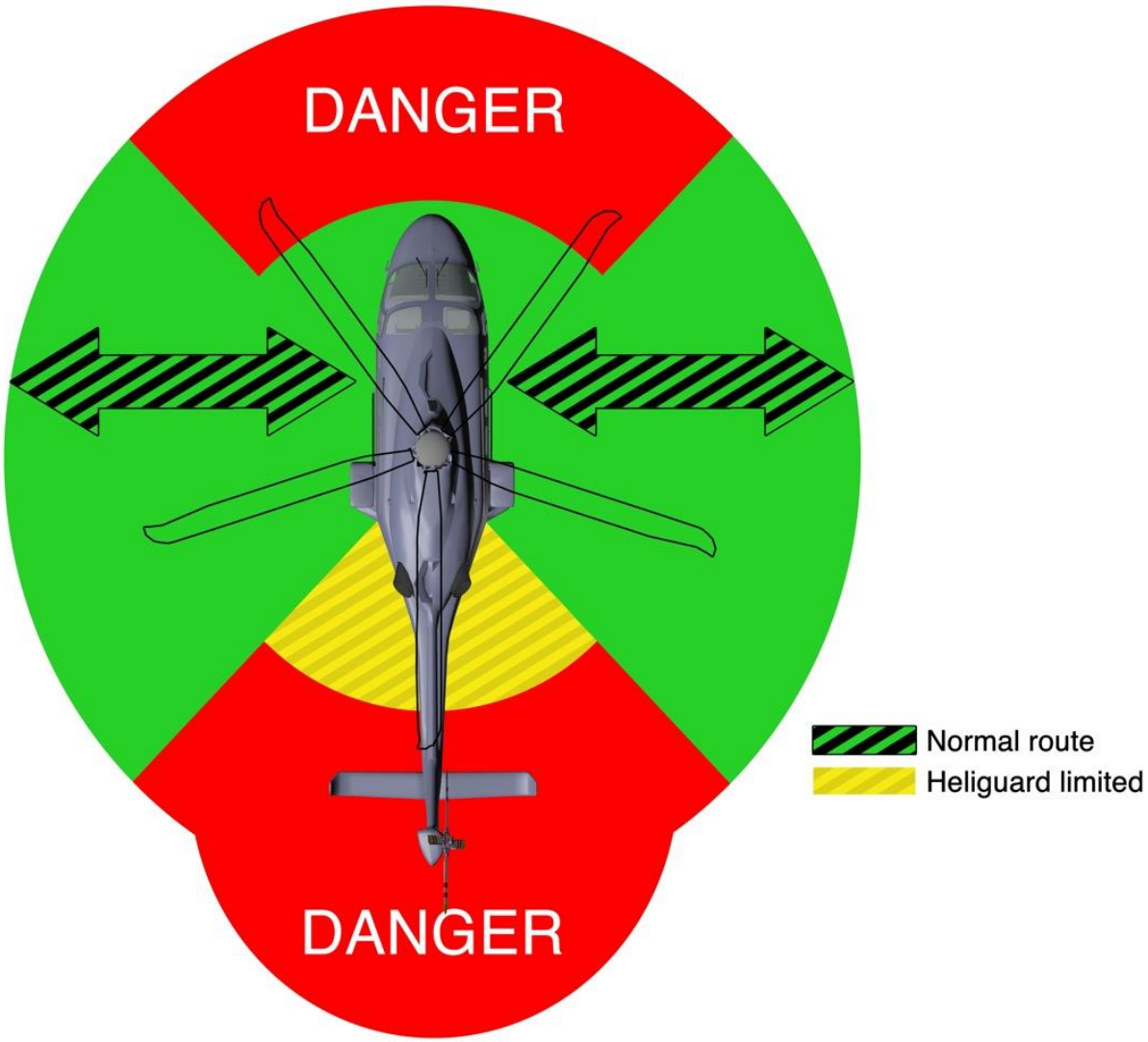
Airbus Super Puma



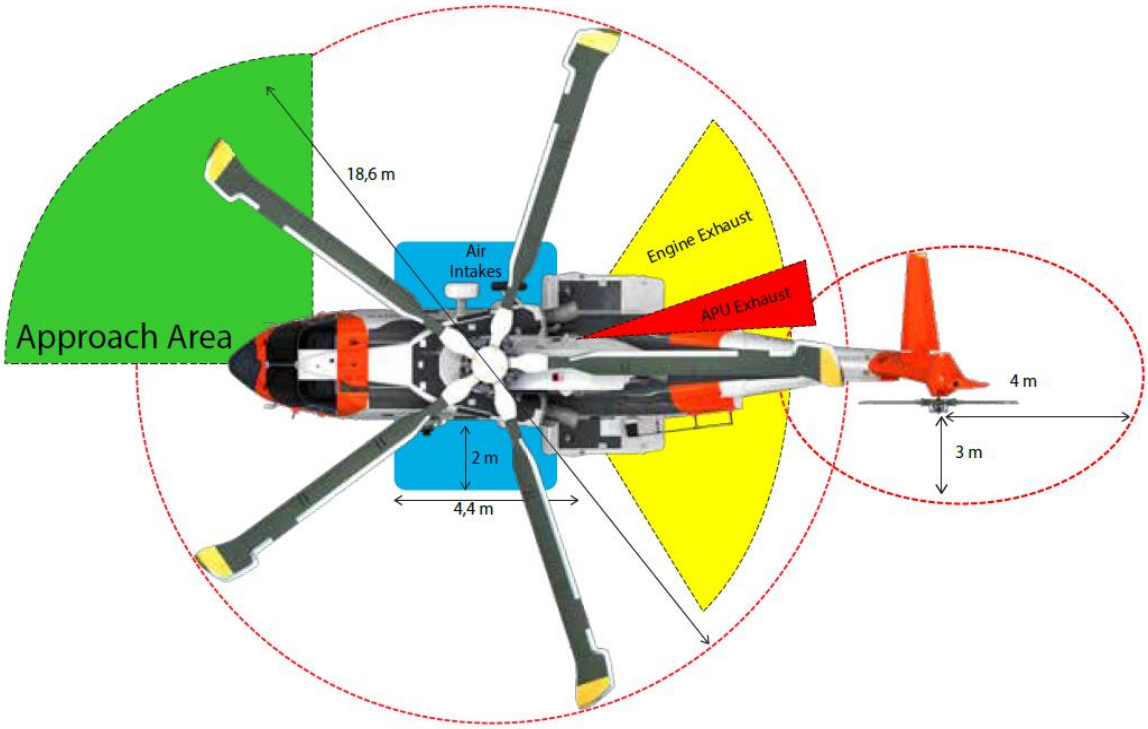
Alternate route to be used only under HLO supervision.

See alternative access in appendix G for procedures.

AgustaWestland AW139



SAR Queen


18,6 m
Air
Intakes
Engine Exhaust
APU Exhaust
Approach Area
4 m
3 m
2 m
4,4 m

APPENDIX C – FORMS FOR HELICOPTER FUEL

Filter water separator/filter monitor follow-up log

Facility:_____ Year:_____

Name/type, filter water separator _____

Elements type 1 Number _____ Date installed _____

Elements type 2 Number _____ Date installed _____

Name/type, filter monitor _____

Elements Number _____ Date installed _____

Functional test differential pressure	
Monitor	Separator
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Psi Bar

Max monitor 22

Max separator 15

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
24																																																					
22																																																					
20																																																				
18																																																				
16																																																				
14																																																				
12																																																			
10																																																			
8																																																			
6																																																			
4																																																			
2																																																			

Helicopter fuelling log

APPENDIX C – FORMS FOR HELICOPTER FUEL

Rig/facility: Recipient of the form

Date	Flight no	Helicopter company	Registr letters (call sign)	Litres filled	Water sample		Pilot's signature	Daily inspection						Total sampled volume per day	HLO sign
					Before filling	After filling		Water/purity test			Diff pressure filters		Inspection hoses, connectors, nozzles, earth cables		
								Tank OK	Separator OK	Monitor OK	Monitor daily	Separator weekly*			

Hose inspection and test journal

Manufacturer:_____ Hose identification no:_____

Hose type:_____ Length:_____

Production date: _____ Diameter:_____

Hose with connector: Factory installed Locally installed (check one)

Date in service from:_____ Location:_____

Test date	Inspection interval		Test result	Signature
	Monthly	Annually		

Use one sheet for each hose in service or in storage.

Inspection and cleaning log – fuel tank Jet A-1

Facility:_____

Tank no:_____ Capacity:_____

Stainless steel/type of interior surface treatment:_____

Date of inspection:_____

Inspection point	Signature of inspector
Approximate volume supplied since last inspection/cleaning	
Describe the condition at the last inspection: water or pollution, condition of the bottom plates and possible surface coating	
Describe the work done during cleaning	
Describe work or modifications carried out. Take account of changes in inclination or drain point	

Transport log helicopter fuel Jet A-1

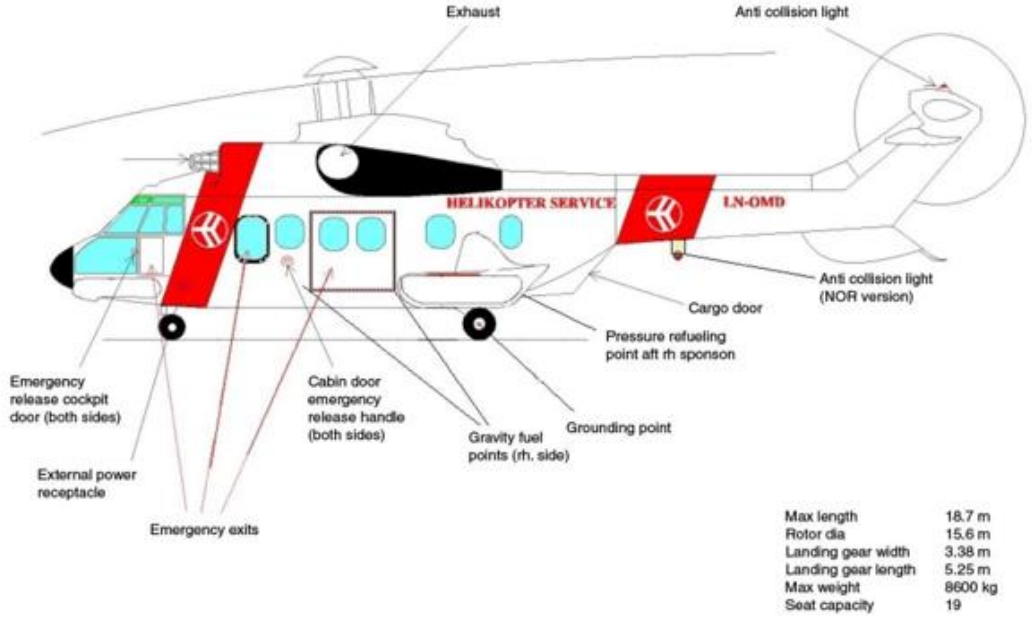
Facility/vessel										**Year**			
Receipt of transport tank										**Return of transport tank**			
Date	Transport certificate no	Tank no	Seals OK?	Drainage samples			Volume received		Sign	Date	Returned fuel volume	Sealed	Sign
				Free of water		Particles	From certificate	Measured					
				Visual	Detector								

APPENDIX D - PHRASEOLOGY

Specific words and phrases – known as standard phraseology – are used for radio communication in the aviation sector to achieve easier understanding. Making the greatest possible use of this phraseology is recommended. A list of standard English expressions with an explanation in Norwegian is provided below.

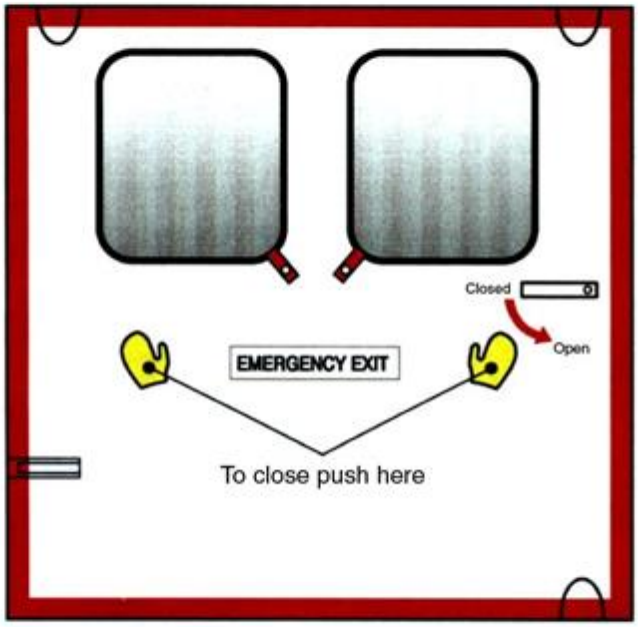
ABORT LANDING/TAKEOFF	Abort landing or takeoff. Repeated 3 times if a dangerous situation is detected.
ACKNOWLEDGE	Confirm that my message has been received and is understood.
AFFIRM	Yes, or allowed.
APPROVED	Approved.
BREAK	Indicates separation between messages.
CANCEL	Cancel the last issued clearance.
CONFIRM	Confirm.
CORRECTION	Correction, I have said something wrong ...
DECK IS CLEAR	The deck is ready for landing.
DISREGARD	Forget, disregard.
GO AHEAD	Go ahead.
HOW DO YOU READ	How do you read?
I SAY AGAIN	I say again.
MONITOR	Listen to the frequency.
NEGATIVE	No, not allowed, error.
PASS YOUR MESSAGE	Pass your message.
READ BACK	Read back.
ROGER	I have received the message (not as an answer)
SAY AGAIN	Repeat all or part of the transmission.
SPEAK SLOWER	Speak slower.
STANDBY	Wait.
VERIFY	Investigate and confirm.
WILCO	I have understood and will act accordingly.

APPENDIX E1 – AIRBUS SUPER PUMA L/L1



Super Puma

Procedure for opening and closing of cabin doors



Open cabin door:

Pull the handle out and turn down to open position.
The door shall be fully released from the door frame.
Move the door forward to be "locked in open position".

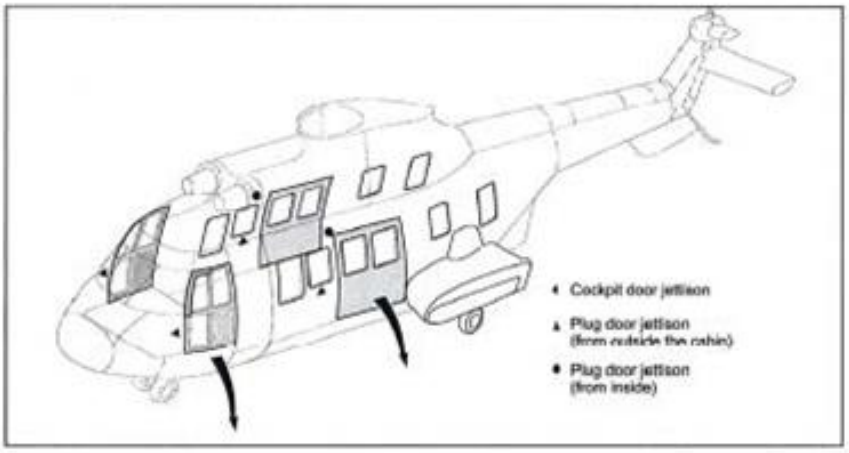
Close cabin door:

Rotate the door handle downwards and the door will release from "locked in open position".
Lead the door to stop in aft position.
Push the door into the door frame and the door handle automatically moves to mid position.
Rotate the door handle to closed position.

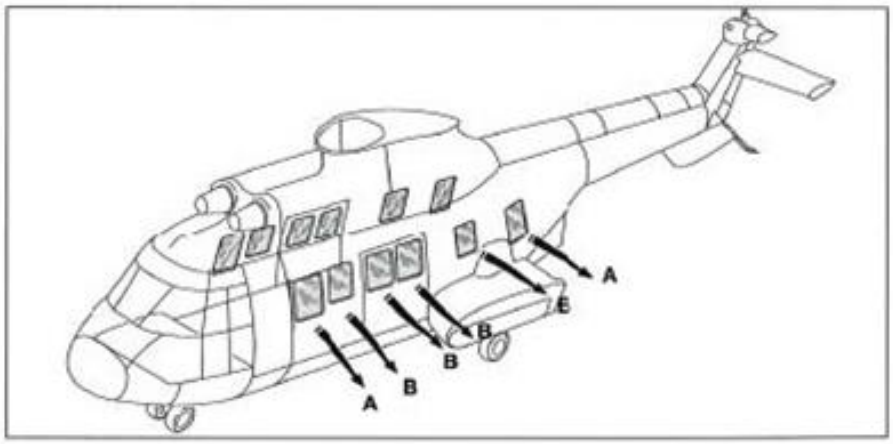
Lights in the cockpit indicates if the cabin doors are open.

Opening the cockpit emergency exit: Turn the emergency release handle **in front** of the cockpit door downwards until the door releases from the hinges and falls free (see fig).

Opening the cabin emergency exit: Pull the handle in front of the cabin door until the door releases from the hinge tracks and falls free (see fig).



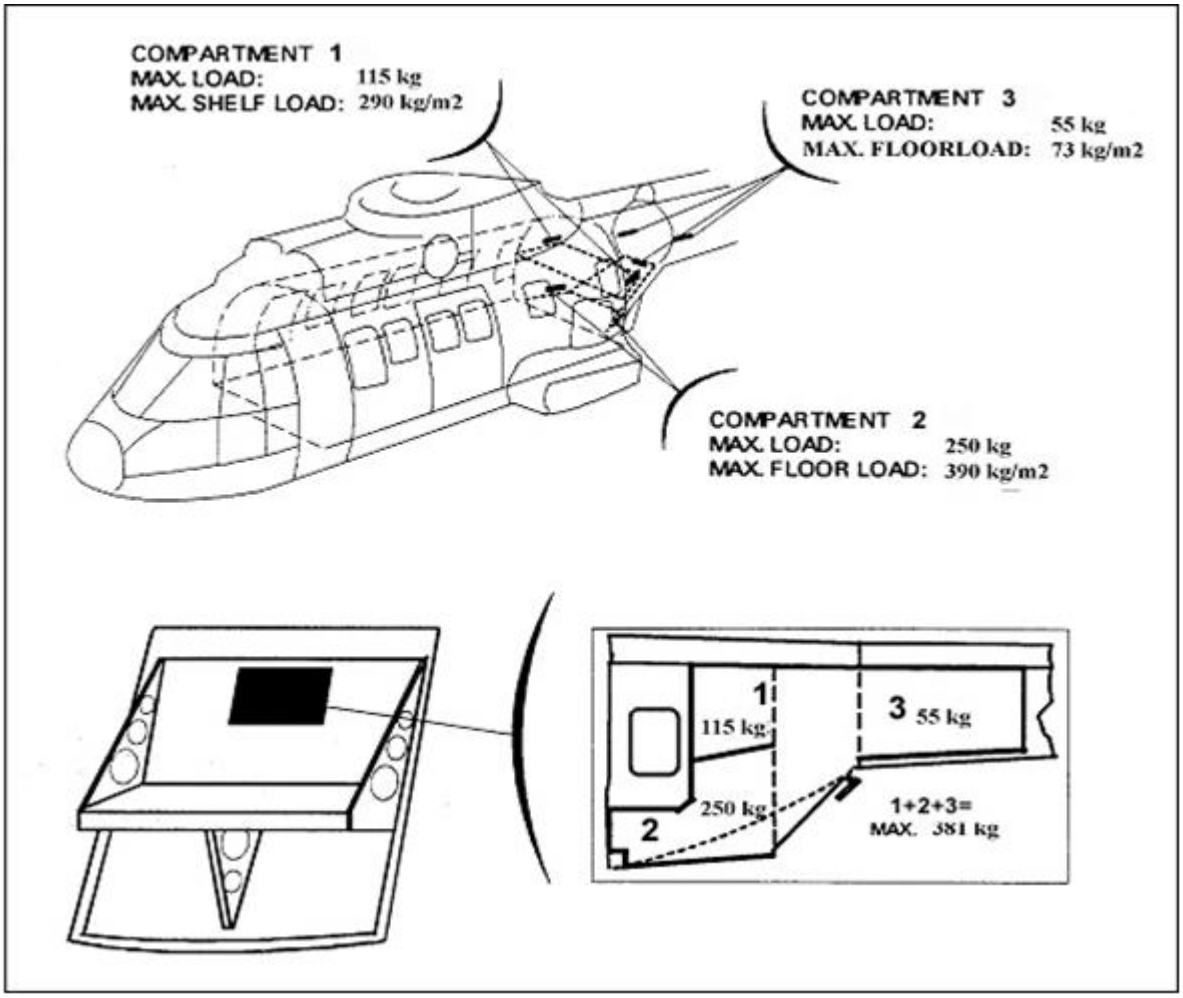
Main emergency exit doors



A: 4 x "type 4" emergency exits
B: 8 x normal windows

Window jettison

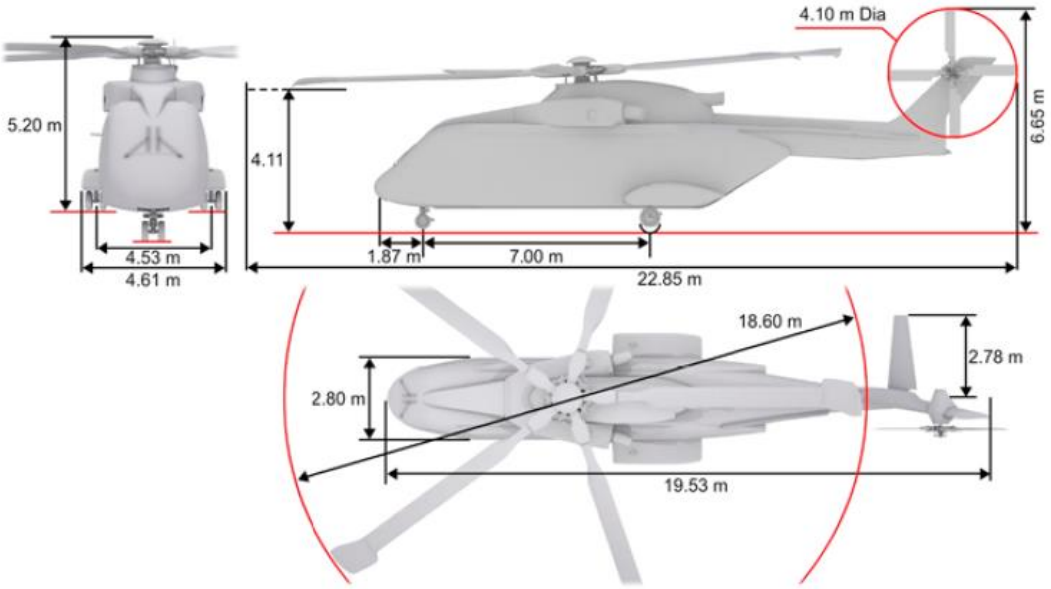
CARGO COMPARTMENTS

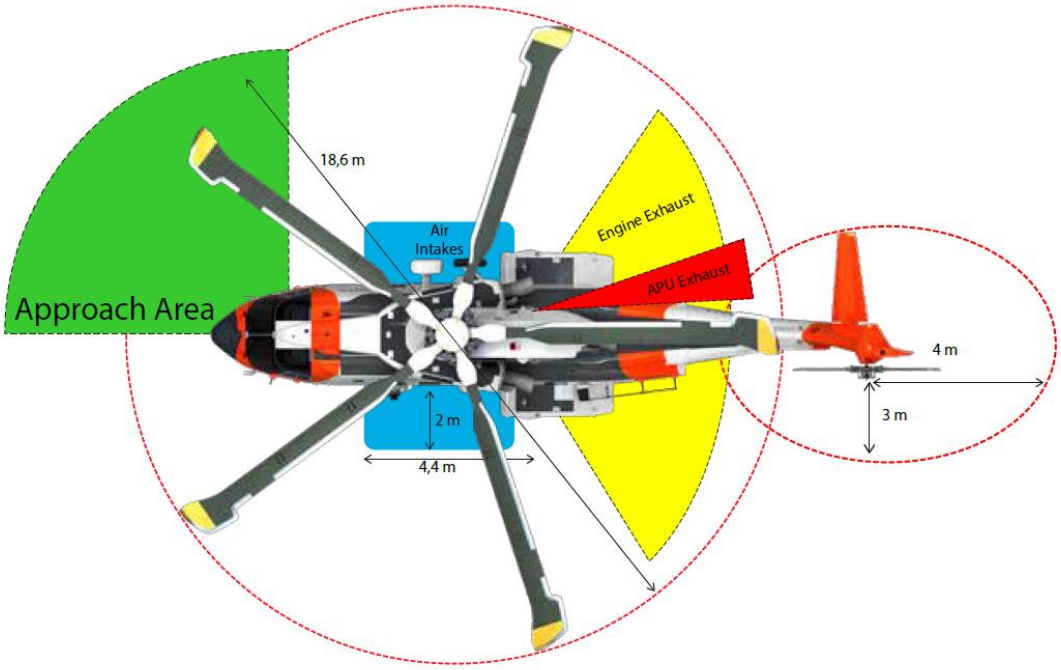


APPENDIX E2 – AW 101 SAR QUEEN

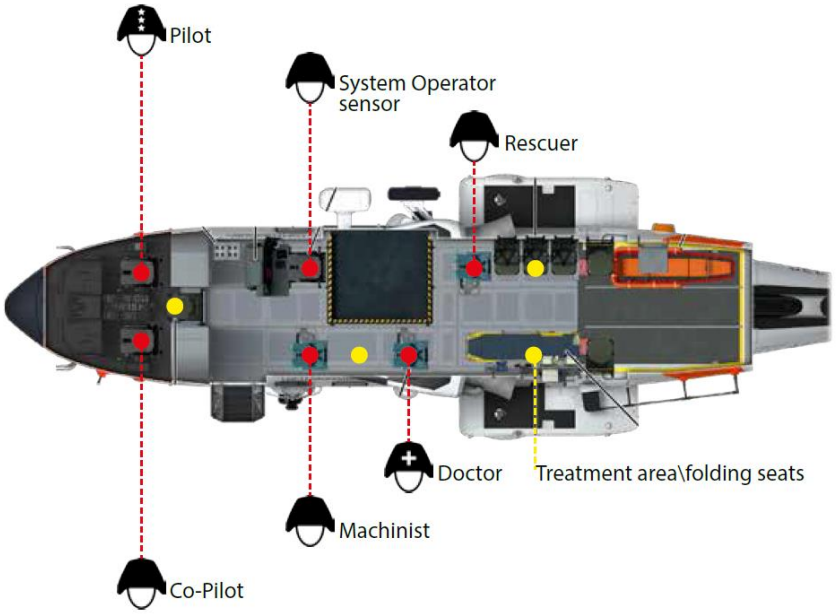
Length:	19.53m
Length (including rotor):	22.85m
Width:	4.61m
Total width (rotor):	18.60m
Height:	6.65m
Weight:	5 500kg
Max takeoff weight:	15 600kg
Max speed (cruise speed):	154kt (285km/h)
Coverage:	about 500 kilometres
Max fuel capacity:	5 135 litres
Small/large extra tank:	649/1 389 litres
Crew:	6
Max pax:	20
Engine:	3 General Electric GE CT7-8E
Engine power:	3 x 2 500 shp.

Refuelling on offshore helidecks by normal pressure refuelling.


4.10 m Dia
5.20 m
4.11
6.65 m
4.53 m
4.61 m
1.87 m
7.00 m
22.85 m
18.60 m
2.78 m
2.80 m
19.53 m


18,6 m
Air
Intakes
Engine Exhaust
APU Exhaust
Approach Area
4 m
3 m
2 m
4,4 m

Crew of six people. Can carry a total of 20 people.
Folding seats and stretcher can be placed on the floor and in the wall stand



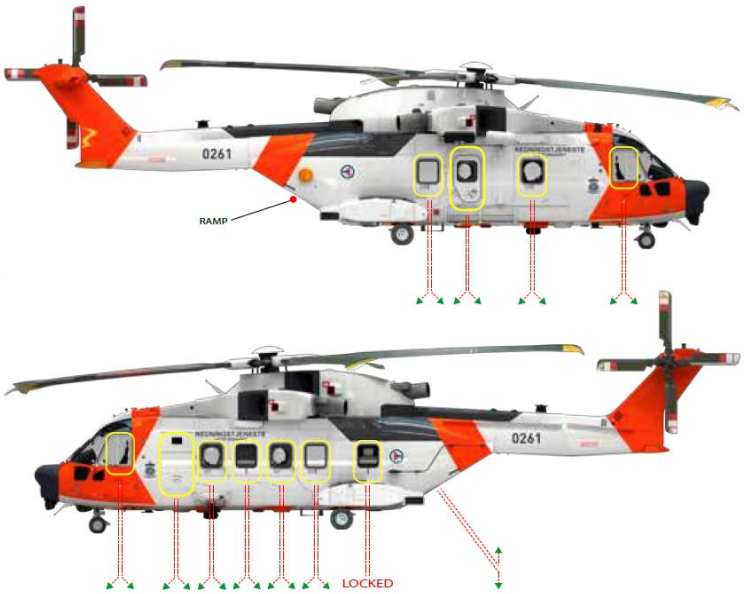
EMERGENCY EXIT

Opening all emergency exits can be done from both inside and outside.

Note: Rear left window emergency exit is inaccessible due to storage of medical equipment, and oxygen bottles attached to the inside of the helicopter.

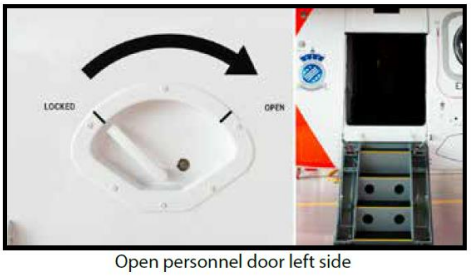
Due to the fuel pipes in the fuselage, it is not recommended to cut through the fuselage.

Ramp: Manual opening from hatch on right side of helicopter marked "MECHANICAL RAMP RELEASE"



OPEN EMERGENCY EXIT

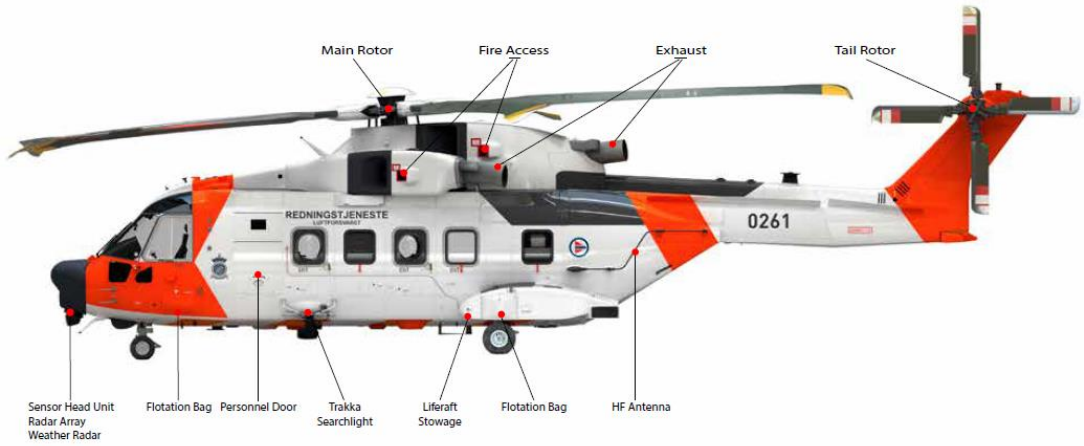
Open emergency exit in door, right side

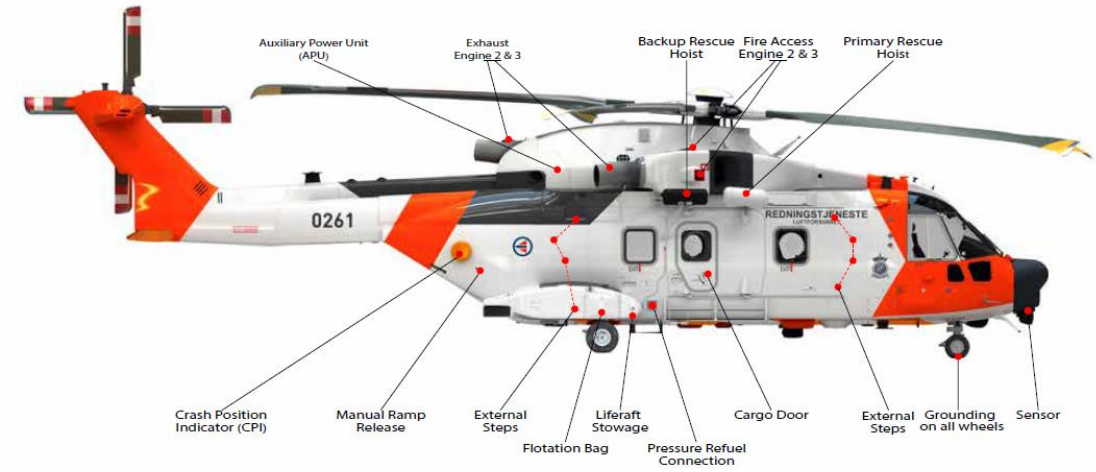


Open personnel door left side


Open emergency exit windows
(Pull strap, push window inside)

Open emergency exits, pilot seating

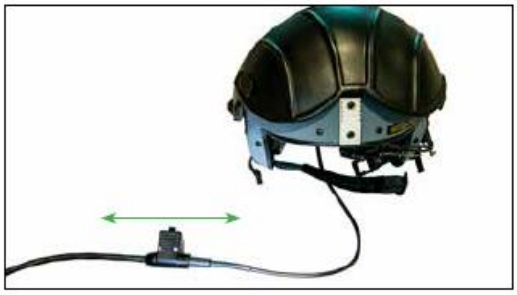




EVACUATION

Fig.1. Release mechanism safety belt
All seats are equipped with safety harness. To release the safety belt, turn the trigger to the right or to the left. Figure 1.

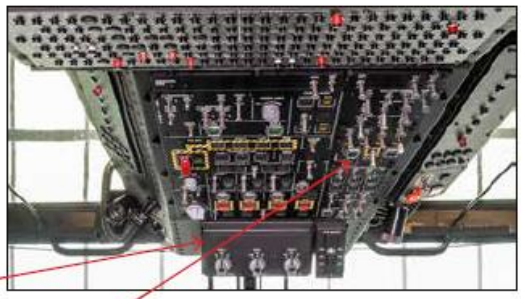
Fig.2.The cable is released by pulling the cables apart.
The pilots are also attached to the seat with a helmet cable at the back of the neck. To eject this, pull the cables from each other at the coupling point as shown in Figure 2



EMERGENCY SHUTDOWN

To perform emergency shutdown on the AW101, turn off the motors and power supply. These panels are located in the "Overhead display" between the pilots.

1. Turn OFF Engine 1,2 and 3
2. Turn OFF Generator 1 and 2, APU and battery switch



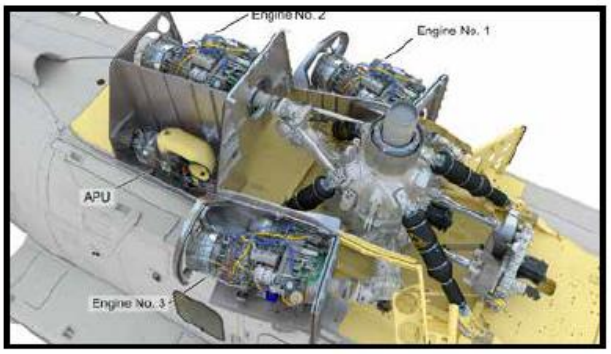
1. Shutdown motor

2. Shutdown the power

ENGINE

The AW 101 is equipped with three engines and an APU (Auxiliary Power Unit)
The engines are located under the main rotor. Engine number one is on the left, engine number two is in the middle and engine number three is on the right. The APU is located on the right side of the second engine.

(The APU is a gas turbine engine. The primary task is starting the engines. It is also used on the ground for supplying electrical, hydraulic and pneumatic systems to the AW101.)



ENGINE FIRE AND FIRE ACCESS

All engine covers have fire extinguishers in case of engine fire. Extinguishing media should be directed to these hatches for efficient flushing into the engine compartment.

(The AW101 is equipped with automatic fire detection system in the engines. They react to heat or flames. Each engine and APU are separated in their respective fire zones. In the event of an indication of fire, the system can be activated by the pilots from the "overhead panel".

The fire extinguishing liquid (HFC-125) is colorless, odorless, non-corrosive and leaves no residue. It becomes a dangerous substance after decomposition at high temperature.

Left side

Fire access

Right side

APPENDIX E3 – SIKORSKY S-92

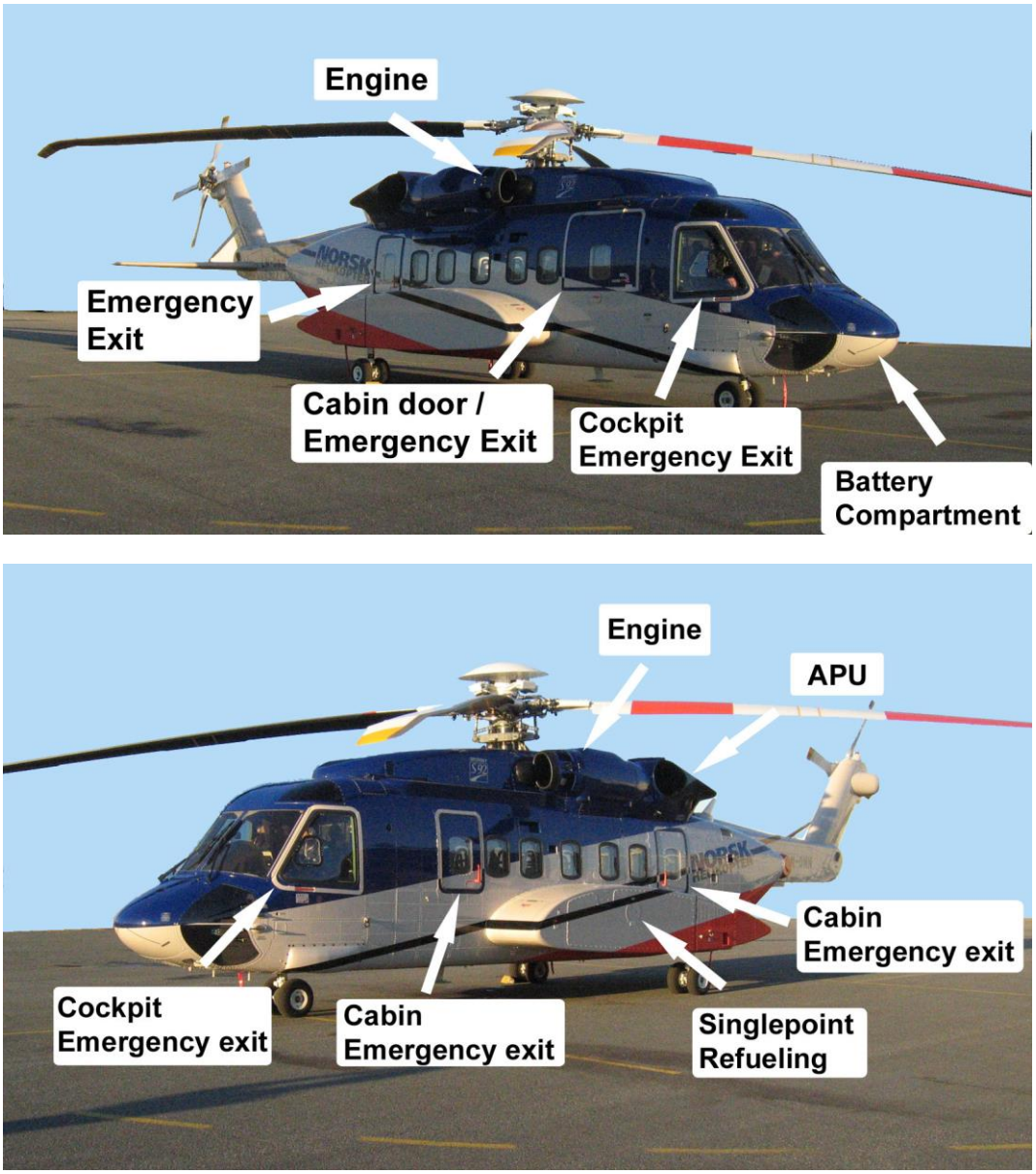


Fig. S-92A overview

General:

The S-92A is a twin turbine engine helicopter with a main rotor and a tail rotor. The cabin has 19 passenger seats and positions for two pilots in the cockpit. Entrance to the cabin is on the right-hand side of the fuselage via a door in front of the sponson. The cockpit is accessed from the cabin.

Access to the cargo compartment is via a ramp door facing aft under the tail section, and has no opening to the cabin.

The two engines and a turbine auxiliary power unit (APU) are located on the upper part of the helicopter. A battery is located in the nose section.

The aircraft has four cabin and two cockpit emergency exits. All exits can be opened from the outside.

CABIN DOORS

Cabin door

The cabin has one access door which consists of one upper and one lower part. The upper door comes in two variants: a clamshell door which opens upwards and a sliding door which opens by sliding aft. The lower door opens downwards and functions as a stair to the cabin when opened (airstair door).

Upper cabin door – clamshell

To open the clamshell door:
Rotate handle from locked to open position and pull door open. Opening will be aided by gas struts.
Secure the door in the fully open position by operating the locking levers on the gas struts.

To close the clamshell door

NB! The lower airstair door must be closed first, before the upper clamshell door.

- Unlock both upper door struts by depressing the locking levers.
- Pull the door down and keep the door handle in the open position while firmly closing the upper door.
- Turn the handle to the lock position and ensure the lock pins are engaged.

Fig. Upper cabin door – clamshell

Upper cabin door – sliding

To open the sliding door

- Rotate handle from locked to open position until the door releases.
- Grasp the forward edge of the door and slide aft until it locks in the fully open position.

NB! Do not use the handle to slide the door.

Fig. Upper cabin door – sliding

Fig. Upper cabin door SAR – sliding

To close the sliding door

NB! The lower airstair door must be closed first, before the upper sliding door is locked.

- Release the open lock for the upper sliding door by pulling the red toggle located in the forward lower edge of the door. See fig.
- Take hold of the forward edge of the door and slide the door forward with the handle in the OPEN position.
- When the door is approximately half closed, check that the exterior handle is still in the OPEN position, place two hands on the door on either side of the window and push the door firmly forward and inward into the closed position.
- Check that the door is fully closed at the forward and aft edges, and turn the handle clockwise to the LOCK position.

NB! Do not use the exterior handle to pull the door and do not move the handle from the OPEN position until the door is fully closed.

Fig. Locking toggle sliding door

Lower cabin door – Airstair door

NB! The upper door MUST be open before opening and closing the lower door. The door opens downwards and dampers will help to restrict door movement.

To open the lower cabin door

- Ensure the upper door is open.
- Rotate handle from locked to open position and lower the door.

To close the lower cabin door

- Ensure the upper door is open.
- Check that the internal operating handle in the edge of the door is in the stowed position and that the lock bolts at the forward and rearward edges of the door are fully retracted.
- Take hold of the lower edge of the door and raise it until the forward suspension cable is folded down against the door (the door will be approximately horizontal) and press the cable into the retention clip on the inside of the door panel.
- The handrail will be stowed automatically as the door is closed.
- Raise the door to the vertical position and check that the exterior handle is in the OPEN position.
- Hold the door by the upper edge with two hands placed at the forward and aft edges and push the door firmly into the closed position. Rotate handle to locked position.

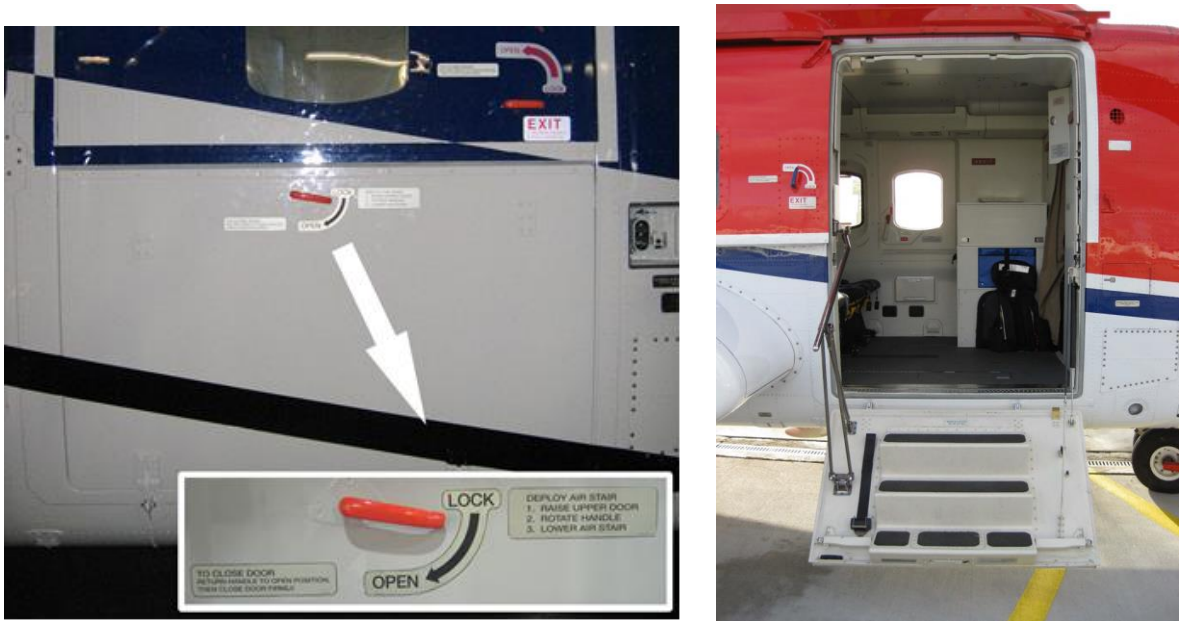


Fig. Lower cabin door – Airstair

Emergency exits

Cabin emergency exits

The cabin has three emergency exits in addition to the normal exit. The three cabin emergency exits are not hinged to the aircraft. When operating the handle, the emergency exit will be forced out at the bottom and then slide out of the frame at the top.

WARNING

SUPPORT THE HATCH DURING THIS PROCEDURE. FAILURE TO DO SO COULD CAUSE HATCH TO FALL AND CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

To open the emergency exit

- Rotate handle towards the open position and remove the emergency exit.

Fig. Cabin emergency exit

Cockpit emergency exits

The two cockpit emergency exits are not hinged to the aircraft. When operating the handle, the emergency exit will be forced out at the bottom and then slide out of the frame at the top.

WARNING

SUPPORT THE HATCH DURING THIS PROCEDURE. FAILURE TO DO SO COULD CAUSE HATCH TO FALL AND CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

To open the emergency exit

- Push red button to release handle.
- Rotate handle towards open position and remove the emergency exit.

Fig. Cockpit emergency exit

Push-out cabin windows

The cabin windows in the fuselage are of a push-out type from inside the cabin.

Grounding points

The helicopter must be electrically connected to earth during refuelling. Only approved connectors must be used in the dedicated ground receptacles in the fuselage.

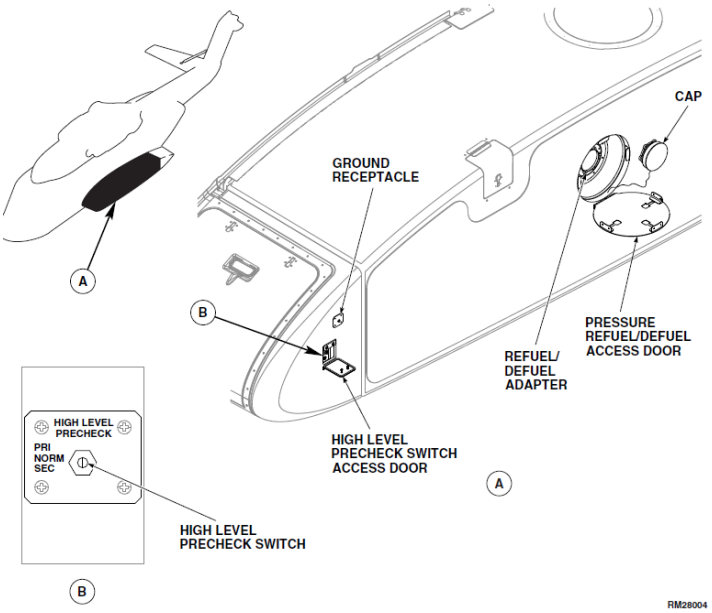


Fig. Ground receptacle point

ENGINE AND APU FIREFIGHTING

The engine and APU compartments are protected through the onboard fire extinguishing system.

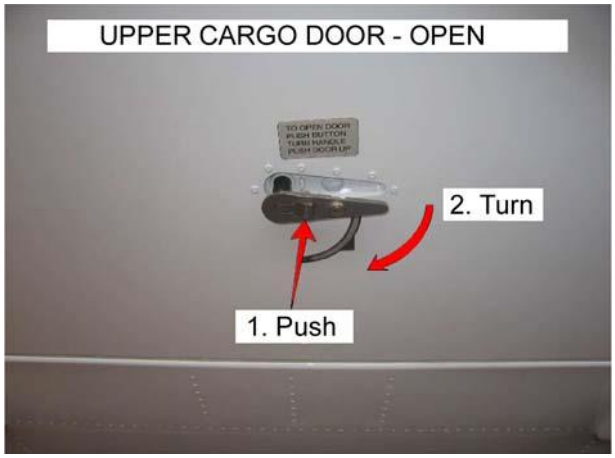
CARGO COMPARTMENT

The cargo area of the Sikorsky S-92A is located in the aft section of the helicopter fuselage. Access to the area is made through an upper cargo door and a cargo ramp. The upper door has to be opened/closed manually, while lowering/raising the ramp is hydraulic and controlled by a toggle switch on the ramp control panel, which is located on the right hand inside wall of the cargo compartment. The control panel also holds switches for interior and exterior lighting and a receptacle to connect to the helicopters intercom system.

Upper cargo door is opened in the following steps

- Push the door handle centre button to release the handle from its recessed position.
- Turn the handle clockwise and leave it in the open position.
- Push and hold the door in upper position.
- Turn handle counter clockwise to locked position.
- Push handle into the recess by pushing the handle ends.

WARNING: A protruding handle may cause injuries to personnel during loading and unloading of the cargo area.



UPPER CARGO DOOR

Cargo ramp is lowered in the following step
WARNING: The cargo ramp should not be lowered all the way to the surface as this might cause resonance in the helicopter.

- Toggle and hold the switch marked [RAMP] on the [RAMP CONTROL PANEL] from centre position and downwards to [LOWER] position until the ramp is approx. 4 - 8 inches above the surface, then release.

RAMP CONTROL PANEL

Cargo area lighting is turned ON in the following steps

- Toggle the switch labelled [BAGGAGE] on the [RAMP CONTROL PANEL] upwards to [ON] position to light up the internal cargo area.
- Toggle the switch labelled [CARGO] on the [RAMP CONTROL PANEL] upwards to [ON] position to light up the external cargo area.

Closing the cargo area
After loading the cargo, perform the following steps

- Close cargo net snap latches and tighten cargo net.
- Verify that the weight is within limits.

Closing the cargo area is a two-step process. First, the cargo ramp must be raised, and then the upper cargo door has to be closed.

Cargo ramp is raised in the following steps
WARNING: Check that no foreign objects or personnel are interfering with ramp closure.

- Toggle and hold switch labelled [RAMP] on the [RAMP CONTROL PANEL] upwards to [RAISE] position until the ramp is fully closed, then release.

Cargo area lighting is turned OFF in the following steps

- Toggle the switch labelled [BAGGAGE] on the [RAMP CONTROL PANEL] downwards to [OFF] position to turn off the internal cargo area light.
- Toggle the switch labelled [CARGO] on the [RAMP CONTROL PANEL] downwards to [OFF] position to turn off the external cargo area light.

Upper cargo door is closed in the following steps:

- Push the door handle centre button to release the handle form its recessed position.
- Support the door and turn the handle clockwise and leave handle in open position.

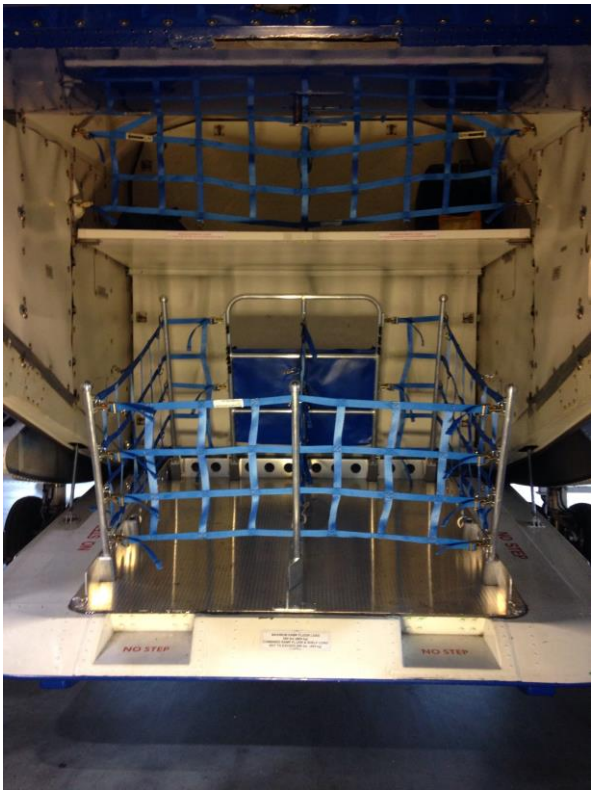
NOTE: The upper cargo door is equipped with dampers to reduce door closing speed.

- Pull upper door to rest on the ramp and turn handle counter clockwise to closed position.
- Push handle into the recess by pushing the handle ends.
- Check area and notify the crew that loading is complete and that the area is clear.

THERE ARE TWO TYPES OF CARGO STORAGE ARRANGEMENT IN USE!

TYPE 1. COMPARTMENT WITH ONE SHELF AND ONE BIN

The cargo compartment is equipped with one shelf on the cabin bulkhead and a storage bin on the ramp. Each is divided in two compartments by a cargo net.



The following limitations apply, and must under no circumstances be exceeded:

Shelf (Room 1 + 2):	136 kg (300 lbs)
Bin (Room 3 + 4):	404 kg (890 lbs)
Shelf + Bin	**404 kg (890 lbs)**

Total weight of cargo in the bin and on the shelf <u>combined</u> must not exceed 404 kg (890 lbs)

The baggage volume must not exceed the height of the ”fence” on the ramp to avoid crushing when the ramp is moved to the upper position, see dotted line in picture.

TYPE 2. COMPARTMENT WITH TWO SHELVES

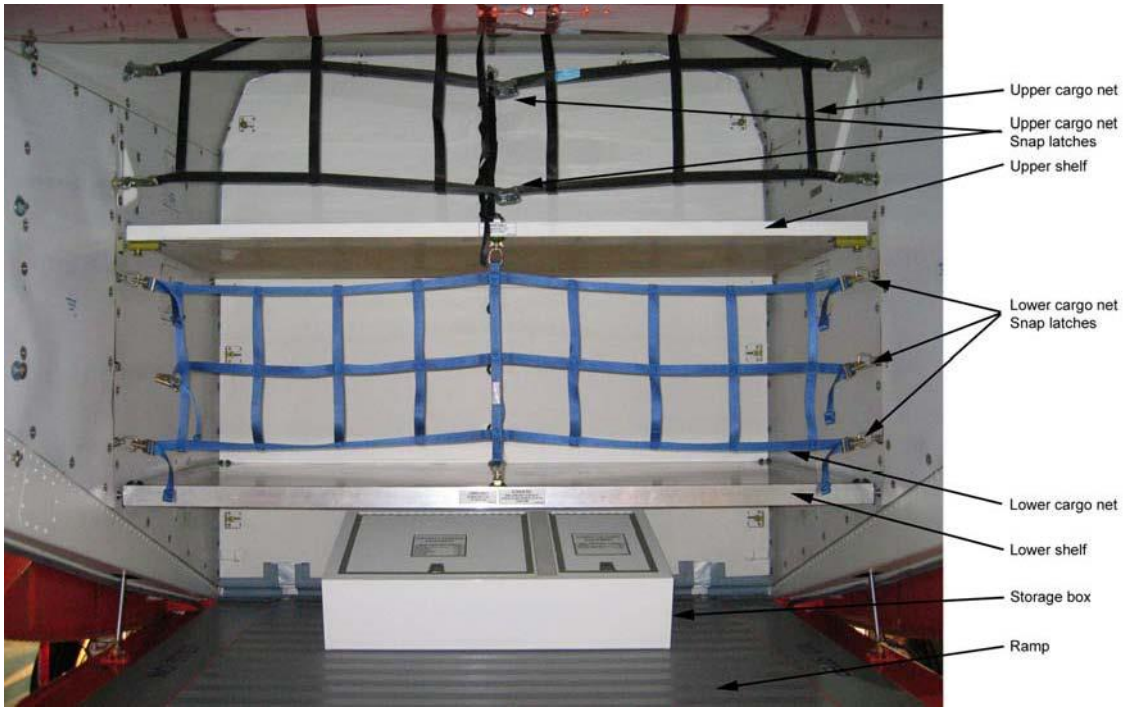
This type of cargo arrangement consists of two shelves, one upper and one lower. Each shelf is divided into two compartments by a cargo net with snap latches. The compartments are named 1, 2, 3, and 4.

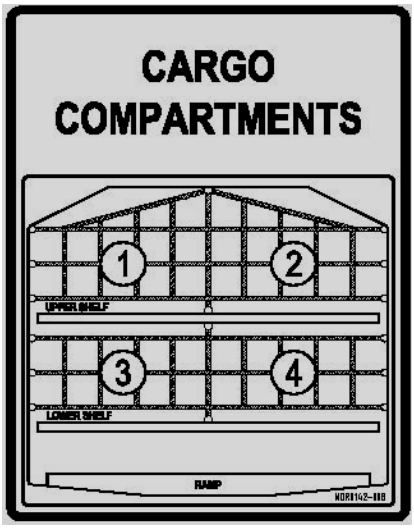
In addition to the shelves, a cargo storage box is installed on the ramp. This box is divided into two compartments. One is for the aircraft parking and mooring equipment and the other for cargo-related equipment, such as cargo attachment rings and jack straps. Each of these compartments is labelled with a decal describing the compartment contents.

The storage box must always be installed when the lower shelf is installed.

When cargo is loaded directly onto the ramp, the lower shelf and storage box must be removed and the cargo secured to the ramp.

Decals are also installed on the shelves and above the ramp control panel. These decals describe the cargo compartment areas and weight limitations.





CARGO COMPARTMENT DECAL

The following weight limitations apply and must in no circumstance be exceeded:

Upper shelf total (Areas 1 + 2):	136 kg (300 lbs)
Lower shelf total (Areas 3 + 4):	317 kg (700 lbs)
Cargo ramp:	453 kg (1 000 lbs)
1+2+3+4+ramp <u>combined</u>	**453 kg (1 000 lbs)**

Total weight loaded on the ramp plus upper and lower shelves <u>combined</u> must not exceed 453 kg (1000 lbs)!

CAUTION

Please note that the Sikorsky S-92A rotor downwash is very strong! Comparable to hurricane-force winds.

During takeoff and landing it is very important that loose objects located on or in close proximity to the helicopter deck are secured in a proper way. Baggage and cargo stored in trolleys must be secured with cargo nets.

Personnel should also be aware of residual strong downwash when boarding and disembarking from the helicopter. A pair of glasses and other loose items might come loose in these conditions if not secured properly.

Please contact the crew if additional information is required.

APPENDIX E4 – AGUSTAWESTLAND AW139

AW139 IN THE OFFSHORE CONFIGURATION

ACCESS

The cabin is accessed via sliding doors on both sides

OPERATOR

Blueway Offshore Norge AS – Bygdøy allé 2 – P O Box 573 Sentrum – NO-0101 Oslo – Norway
Tel: +47 6712 5400 – Fax: +47 6712 5401 – E-mail: info@bluewayoffshore.no - Reg enterprise no: 994 104 586

CARGO

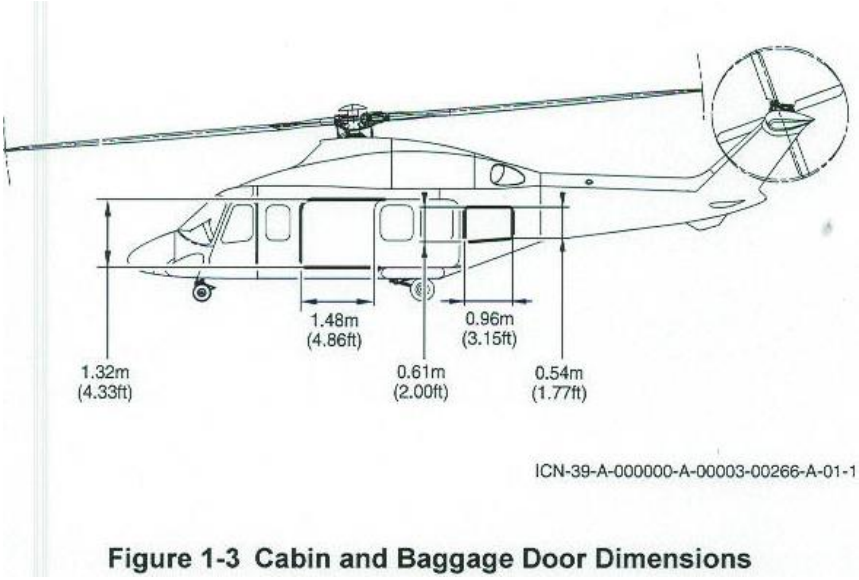
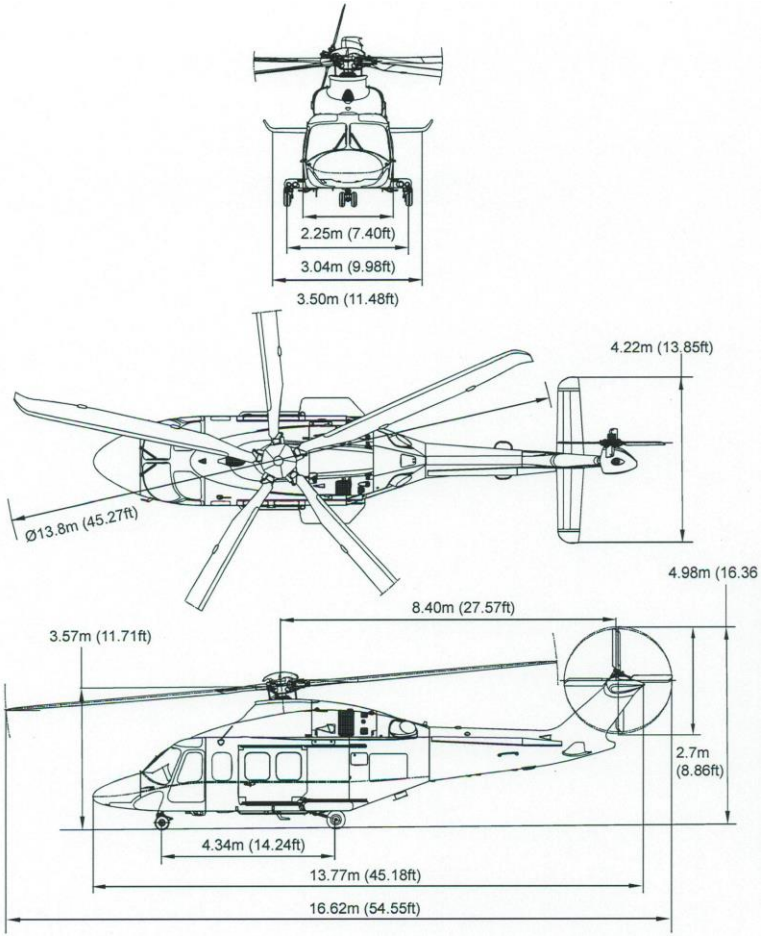


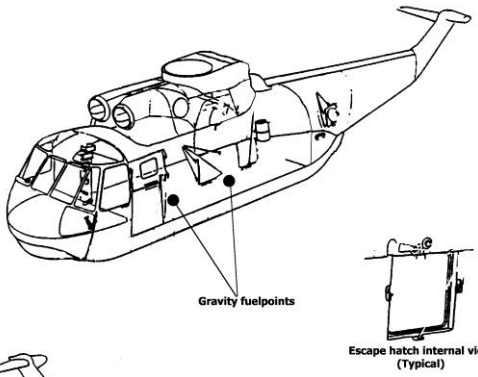
Figure 1-3 Cabin and Baggage Door Dimensions

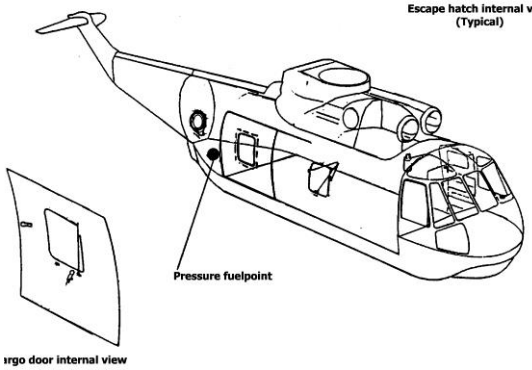
The cargo compartment has access via one door on each side of the fuselage.

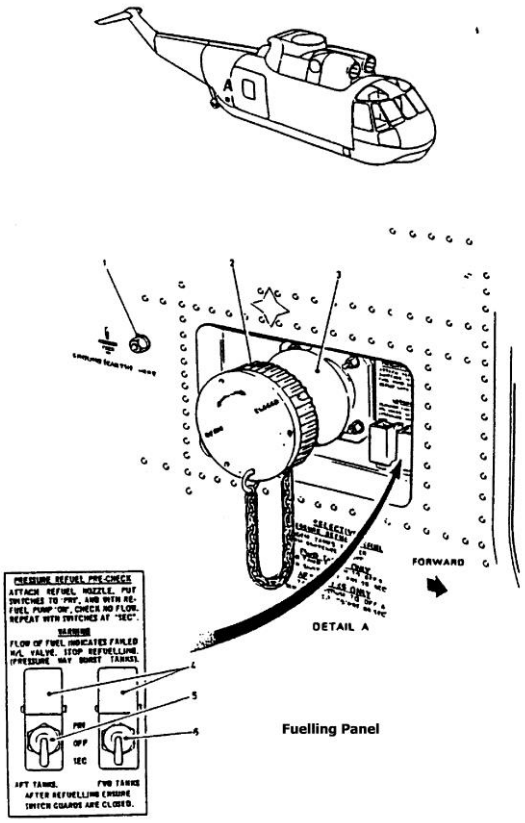
DIMENSIONS



APPENDIX E5 – WESTLAND SEA KING







APPENDIX F – HANDLING THE HELICOPTER DURING TAKEOFF AND LANDING

This appendix provides a step-by-step description of the commonest operations on the helideck for a crew of three:

- helicopter landing officer (HLO)
- heliguard
- fireguard.

The HLO is in charge of the heliguard and fireguard. The division of duties between heliguard and fireguard is tailored to local conditions in order to ensure safe and efficient operation. Other duties may be assigned as and when required.

During the period the helideck is staffed (from 20 minutes before landing to 10 minutes after takeoff), the HLO must have no other duties.

Operations are described on the assumption that exit stairs from the helideck exist. On facilities where these are not available, approved alternative exit routes are used.

This procedure builds on the principle of seeking to achieve optimal safety through standardisation across the companies on the NCS and through freeing the HLO from as many assignments as possible.

The helicopter companies specify that, during helicopter operations, the HLO must have a full overview of the helideck area, be in visual contact with the pilot, and be able to manage/control the operations in such a way that potential dangers are picked up and eliminated effectively.

In addition to provisions specified in the procedures, the pilot must be informed if the HLO leaves his post.

.

Helicopter arrival

From: the HLO is informed by the radio operator/communication officer that a helicopter is expected

Until: the helicopter is standing still on the deck with the rotor in motion and the chocks in place.

Operation: in good time before the helicopter's expected arrival

HLO	HELIGUARD AND FIREGUARD DUTIES
1. Verifies helicopter time of arrival 30 minutes before the notified time. 2. Musters on the helideck at least 20 minutes before arrival. 3. Verifies that any possible standby vessel in the vicinity is informed of the helicopter's arrival, and that no vessels are within 500 metres in the 180° zone or, if higher than the helideck, the 210° zone. 4. Informs the helicopter of possible vessels within 1 000 metres. Obtains information on the arriving helicopter, including estimated time of arrival, cargo amount and location, number of passengers and possible fuel requirements. With difficult weather conditions/special cargoes, assesses the need for and requisitions extra personnel. 5. Ensures that the day's inspection of helideck and refuelling plant has been completed, and that the findings are satisfactory. 6. Furthermore, checks that the helicopter's landing area is cleared of obstacles and loose objects. 7. Briefs heliguard and fireguard, and possibly allocates duties to them.	1. Muster at least 15 minutes before arrival. 2. Prepare cargo for dispatch. 3. Check and prepare firefighting equipment. 4. Possibly receive the manifest and information about the number of arriving and departing passengers. 5. Don required equipment and portable VHF.

Operation: five minutes before the helicopter's expected arrival

HLO	HELIGUARD	FIREGUARD
1. Ensures crane operators are informed. 2. Monitors radio communication between helicopter pilot and facility (possibly the helicopter flight information service (HFIS)). 3. Ensures that the passengers are ready and waiting in a secure zone without access to the helideck. Physical barriers to be used.		1. Ensures that the fire monitors are aimed and adjusted.

Operation: immediately before helicopter lands and during landing

HLO	HELIGUARD	FIREGUARD
1. Ensures that all the cranes have ceased operation. Peripheral crane operations are permissible, but the pilot must be informed. 2. Notifies the pilot via VHF that the helideck is cleared for landing, and warns if any sea spray has been observed on/over the deck. 3. Takes up a safe position by the most suitable stairway, preferably on the upwind side, with a view over the helideck. NB! Check that the undercarriage is down. 4. Monitors continuously, and reports possible abnormal conditions immediately.	1. Stands in a safe position in visual contact with the HLO.	1. Stands at the upwind fire post, alternatively at the remote control unit. Stays at full alert and with the alarm system switch within reach.

Operation: after landing

HLO	HELIGUARD	FIREGUARD
1. After the anti-collision lights have been switched off, signals the heliguard that entry to the helideck is now permitted. 2. Can take a set of chocks and position these on the main wheels, and can receive/deliver the manifest from/to the pilot. 3. Takes up a position within the safe rotor zone which ensures eye contact with the pilot and provides a full overview of the helideck.	1. At the HLO's signal, brings chocks, enters the helideck and positions these on the main wheels (chocks must be placed on both sides).	1. Remains at the fire post until the chocks have been put in position on both sides.

Helicopter on the helideck

From: the helicopter is standing still on the deck with the rotor in motion and the chocks in place

Until: loading the helicopter with passengers and cargo has been completed and the the helideck is cleared.

Operation: disembarking and unloading

HLO	HELIGUARD AND FIREGUARD DUTIES
1. Remains in the best position for eye contact with the pilot and for maintaining a full overview of the helideck. 2. While the helicopter has its rotor engaged, all movement by people will primarily take place at a 90° angle to the helicopter's longitudinal axis and then outside the rotor disc. See appendix B.	1. Install possible railings required at the exit. 2. Open cargo compartment hatches, unload baggage and cargo. 3. Place baggage outside the cabin door or together with cargo on the baggage trolley. 4. Open the relevant cabin door and let the passengers out. They will take their baggage with them to the exit as directed. NB! Only one cabin door is opened, so that loose objects do not blow out of the helicopter. Ensure that the passengers keep a tight hold on any light objects.

Operation: boarding of passengers and loading

HLO	HELIGUARD AND FIREGUARD DUTIES
1. Checks that the heliguard is ready to receive passengers and then gives the signal to the fireguard at passengers can enter the helideck. 2. Directs/signals the passengers to the safe boarding route (outside the rotor disc) up to the heliguard. 3. Remains in the best position for eye contact with the pilot and for maintaining a full overview of the helideck.	1. On the HLO's signal, collect boarding cards at the stairwell and point the way to the helicopter. Signal to the HLO that the numbers tally. 2. Lead the passengers safely to the helicopter and show where baggage is to be placed. NB! In high winds, take care with light bags/cargo. 3. Stow the baggage and close cargo compartment hatches. 4. Check that all the passengers have fastened their seatbelt and pulled the zip on their survival suit all the way up. 5. Before takeoff, ensure that no loose objects are to be found in or outside the helicopter. 6. Close the cabin door. 7. NB! Cabin cargo must be taken on board and secured before the passengers are allowed to board. When loading a Super Puma, inform the pilot of the total weight in cargo compartment 3.

Helicopter takeoff

From: heliguard clears the helideck

Until: two minutes after helicopter takeoff.

Operation: preparing for takeoff

HLO	HELIGUARD	FIREGUARD
1. Signals the heliguard to remove the chocks on the left-hand side. Removes the chocks on the right-hand side. 2. When the helideck is ready and the fireguard in position, gives a clear "thumbs up" to the pilots. 3. Monitors takeoff and radio communication, and reports possible abnormal conditions immediately. 4. Ensures that nobody leaves their post until two minutes after takeoff. Furthermore, ensures that everyone remains in readiness for another eight minutes or until the helicopter has landed on another facility.	1. At the HLO's signal, removes the chocks on the left-hand side. 2. Stays then at their post until two minutes after takeoff, listens to the VHF in case a possible return to the facility by the helicopter is reported. 3. Then remains in readiness at the direction of the HLO.	1. Dons full fire protection gear. 2. Takes position at the upwind fire post, alternatively at the remote control unit. 3. Stays at their post until two minutes after takeoff, listens to the VHF in case a possible return to the facility by the helicopter is reported. 4. Then remains in readiness at the direction of the HLO.

Alternative access

Procedures for alternative disembarking and boarding with guidance from helideck crew

This procedure will be used if the normal procedure cannot be used because access to the helideck on the same side as the helicopter entrance is prevented.

Operation: disembarking around the nose of a S-92A/Super Puma

HLO	HELIGUARD AND FIREGUARD
1. Moves towards the nose of the helicopter from the side, retaining eye contact with the pilots and a view to each side, and takes position about one metre from the front of the nose and well inside the rotor tip. 2. Directs passengers from the heli/fireguard standing at the cabin door around the nose towards the baggage and/or the heli/fireguard standing at the edge of the helideck. See appendix B on helicopter danger zones.	1. Open the cargo compartment and place the baggage about 90° in relation to the helicopter on the opposite side from the cabin door or on the baggage trolley. 2. A heli/fireguard opens the cabin door and directs the passengers towards the HLO standing in front of the nose. 3. The other heli/fireguard takes position at the end of the line of baggage on the edge of the helideck and directs passengers to the nearest exit.

Operation: boarding around the nose of a S-92A/Super Puma

HLO	HELIGUARD AND FIREGUARD
1. Takes position about one metre from the front of the nose and well inside the rotor tip, while retaining eye contact with the pilots and a view to each side. 2. Checks that the heli/fireguard is in position alongside the cabin door, ready to receive the passengers. Then gives the all-clear to the heli/fireguard standing at the stairway to admit the passengers to the deck. 3. Directs the passengers along the safe route between themself and the helicopter nose, and towards the heli/fireguard at the cabin door. 4. Returns to their normal position on the helideck outside the rotor zone when the passengers are on board, and secures a full overview of the helideck.	1. A heli/fireguard takes position at the door to the helicopter cabin. 2. The other heli/fireguard takes position at the stairway being used. 3. When the HLO gives the signal, they collect and count boarding cards at the stairway. The heli/fireguard directs passengers towards the HLO. 4. The heli/fireguard positioned outside the cabin door points out where baggage is to be placed and directs passengers on board.

APPENDIX G: HELICOPTER SHUTDOWN/START-UP

From: helicopter on deck, passengers have left both helicopter and helideck and the anti-collision lights have been turned back on

Until: the rotor has stopped and the anti-collision lights have again been turned off.

Operation: preparations

HLO	HELIGUARD	FIREGUARD
Stands in the safe zone with a full overview of the helideck and the wind at their back.	Stands in the safe zone at the stairway.	Maintains fire watch.

Operation: shutdown

HLO	HELIGUARD	FIREGUARD
The helideck can be entered when rotor has stopped and the anti-collision lights are turned off. Secures help to tie down the rotor blades and the helicopter as required.	At the HLO's request, helps to secure the rotor blades and helicopter.	At the HLO's request, helps to secure the rotor blades and helicopter.

Helicopter start-up

From: helicopter on the helideck with pilots on board and anti-collision lights turned on

Until: helicopter has both engines running and the rotor turning, the anti-collision lights are turned off, and the helicopter is ready to receive passengers and cargo.

Operation: preparations

HLO	HELIGUARD	FIREGUARD
Maintains eye contact with the pilot and a full overview of the helideck. No passengers should be on board during start-up unless the pilot so wishes.	Stands at the stairway so that they have an overview of the helideck.	Fireguard stands at the relevant fire post/remote control unit wearing fire protection suits.

Operation: start engines

HLO	HELIGUARD	FIREGUARD
Stands in the safe zone in front of the helicopter. Helps the fireguard when necessary.		Stands on the specified side of the helicopter with access to extinguishing agents in order to observe engine start-up. Portable powder extinguishers must be available on the helideck. (When changing position after no 1 engine has started and the rotors are turning, must walk outside the rotor disc to the next engine). In the event of fire in or under the helicopter, alerts the pilot/HLO by walkie-talkie or by giving the "shut down" signal. Starts to extinguish the fire.

Operation: final start-up stage, passenger boarding and loading/takeoff without passengers

HLO	HELIGUARD	FIREGUARD
At the pilot's signal (anti-collision lights off), starts boarding passengers and loading cargo, removes chocks. When the heliguard is ready, signals the fireguard that boarding can commence. Counts the number of passengers after boarding to verify against the manifest.	Takes position and signals the HLO that boarding can commence.	Goes to the stairway to await the HLO's signal to start passenger boarding.

APPENDIX H – GUIDANCE FOR RADIO OPERATORS

EXCHANGE OF LOGISTICS INFORMATION

About 20 minutes before the estimated time of arrival (ETA), the helicopter will establish contact with the radio operator/bridge to update/obtain information on:

- position, as well as heading and speed where relevant
- weather conditions
- helideck motion
- return load
- obstructions in the vicinity (within 500 metres) of the approach/ departure sectors
- fuel requirements.

The facility should have dispatched a helideck report to the heliport an hour before the planned time of departure from land. This report is carried by the helicopter crew during the flight. Only changes from the report submitted earlier therefore need to be updated.

POSITION

Position must always be stated in latitude and longitude with the following format:
N dd mm. mm E ddd mm. mm
d = degrees
m = minutes and decimals of minutes
The heading of the facility is stated in degrees (magnetic north).
Speed is stated in knots.

WEATHER CONDITIONS

If visibility is better than 10 kilometres and the cloud base higher than 1 000 feet, reference can be made to the helideck report provided earlier. Wind direction and speed as well as the QNH must always be reported. If visibility and the cloud base are below the values given above, a verbal update must be provided to the helicopter crew in the following format.

- Wind direction, in degrees
- Wind speed with gusts, in knots
- Visibility, in metres or kilometres
- Clouds/cloud base (FEW/BKN/OVC), in feet above sea level
- Relevant temperature, in degrees Celsius
- Dew point temperature (if available), in degrees Celsius
- QNH, in hectopascals
- Possible squalls or other weather phenomena of interest to the helicopter crew.

HELIDECK MOVEMENT

If deck movement is smaller than plus/minus one degree (less than one degree to any side in relation to the horizon), and vertical movements (heave) are smaller than two metres, the helideck can be considered stationary. Details do not have to be provided in such cases.

In the case of facilities with a helideck monitoring system (HMS), it should be sufficient to report "we have a GREEN deck on HMS", unless the helicopter crew requests details.

RETURN LOAD
This is specified in the following format (about 20 minutes before landing).

For each departure
Number of passengers/passenger weight/baggage weight/weight of possible cargo/total weight

Example

Helibus 123, your return load will be:

- From Balder lifting with 14 pax/pax weight 1 359 kilograms/baggage 140 kilograms/cargo 12 kilograms/total weight 1 511 kilograms
- From Ringhorne lifting with 16 pax/pax weight 1 578 kilograms/baggage 164 kilograms/cargo eight kilograms/total weight 1 750 kilograms
- From Jotun A lifting with 18 pax/pax weight 1 795 kilograms/baggage 198 kilograms/no cargo/total weight 1 993 kilograms

OBSTRUCTIONS IN THE VICINITY (WITHIN 500 METRES) OF THE APPROACH/ DEPARTURE SECTORS
This information is exchanged for two reasons:

1. to verify that lack of obstructions is maintained pursuant to chapter V – obstacles of BSL D 5-1.
2. to give the helicopter crew a better mental picture under marginal weather conditions of what to expect when they emerge from the clouds.

FUEL REQUIREMENTS
This information is exchanged now so that the HLO can prepare for refuelling when the helicopter is on the helideck.

Example of communication

Helicopter: *Seaway Falcon*, this is Helibus
Facility: Helibus, this is *Seaway Falcon*
Helicopter: We are on our way to you, and have an ETA (estimated time of arrival) of 23 (minutes past the hour)
Facility: You will be here at 23. Are you ready to receive the details?
Helicopter: We are ready. Go ahead
Facility: Our position is N 59 31.35 E 006 46.55
We have a heading of 300 degrees
Our speed is five knots
Weather in the area:
Wind from 270 degrees, 25 knots, gusting 35 knots
Visibility three kilometres
We have broken (BKN) at 800 feet
Temperature eight degrees
Dew point five degrees
QNH 989 hectopascals

A shower has just passed us
The HMS shows green deck
Return load:
You will be lifting with 19 pax/pax weight 1 895 kilograms/baggage 100 kilograms/freight 10 kilograms/total weight 2 005 kilograms.
We have one trawler lying 500 metres due south of us, heading south. No other vessels in the area.
Do you require fuel on arrival?

Helicopter: All received. We copied QNH 989. Negative refuel.

Facility: We copied negative fuel. *Seaway Falcon*.

CHANGES TO WEATHER CONDITIONS

If weather conditions change, whether it be visibility, cloud base, helideck movement or any other aspect which could be of interest to the helicopter crew, this must be reported immediately over the radio.

APPENDIX I – SPECIFICATION FOR OFFSHORE REFUELLING SYSTEMS

INTRODUCTION

This specification is applicable for all fixed and floating installations operating on the Norwegian continental shelf (NCS). Specific requirements from the Norwegian Civil Aviation Authority (CAA-N – BSL D 5-1), the Norwegian Maritime Authority (NMA) and the Petroleum Safety Authority Norway (PSA), as well as relevant class regulations, must be complied with. Relevant Norsok standards should be adhered to.

This specification is based on the requirements set by the Norwegian Offshore Helicopter Operators for offshore helicopter refuelling systems. A refuelling system must be approved by the helicopter operator before first use, and regularly thereafter. Revisions of this document are done on an "as necessary" basis. Proposals for revisions must be forwarded to Norwegian Oil and Gas and the Norwegian Offshore Helicopter Operators for comments and advice.

GENERAL INFORMATION

The helicopter refuelling system shall be designed to be a self-contained, fully functional unit, including a local control panel, capable of operating in a standalone mode. Its design may include an interface to facilitate remote monitoring of the system.
The system design shall include no threaded connections on any wetted components. Exceptions are allowed for connection to the delivery fuel hose, nozzles, dry-break coupling, gauges, air eliminators, sample valves, instruments and instrument fittings.
A complete system description, including a theory of operation, and operating instructions shall be developed by the system designer and provided to the system end user.

MATERIALS

All components in contact with fuel and all pipework shall be of stainless steel. Graphite packings shall have a stainless steel ring on the inner and outer edges. No copper alloys, cadmium plating, galvanised steel or plastic materials are permitted. Aluminium exceptions are dry-break couplings, nozzles, hose couplings and instruments.
Grade marking: all filter units must be marked with their relevant standard and modification status.

DESIGN CRITERIA

- Norwegian Maritime Authority (NMA)
- Petroleum Safety Authority Norway (PSA)
- Class requirements shall be followed where applicable
- Norsok standards in accordance with customer requirements
- **Transportable tanks**: DNV 2.7-1 and IMO/IMDG requirements. Conform to the dangerous goods code, type 1 or 2
- **Storage and recycle tanks:** ASME VIII or equivalent
- **Filter water separators**: In accordance with EI 1581, specification and qualification procedures for aviation jet fuel separators. Filter vessel design in accordance with EI 1596
- **Secondary filter:** in accordance with one of the following:
  a) EI-certified new technology dirt defence filter EI 1599 with electronic water sensor EI 1598,
  b) EI-certified new technology water barrier filter EI 1588. (NB! certification pending),
  c) EI 1583 aviation fuel filter monitors with absorbent type elements (this standard is valid on existing systems until the new types of secondary filter units are commercially available, but not later than **30 June 2022**)

- **Refuelling hose:** type C, grade 2, semi-conducting, meeting the latest editions of EN ISO 1825 and EI 1529 C
- **Vessel movements**, wind and explosion loads and dropped object resistance must be calculated and documented during construction of the system
- All **pressure indicators** connected to the system shall have isolation and bleed valves
- No **flow** in any process line shall exceed seven metres per second.

SYSTEM DESCRIPTION

An offshore helicopter refuelling system consists of the following subsections.

Fuel storage tank. This tank feeds the pump module, and may either be a fixed storage tank or a transport/transit tank.

Pump module. The pump is fed with fuel from the connected delivery tank and pumps the fuel to the dispensing module on the helideck.

Dispensing module. The module contains the delivery hose, the secondary fuel filter, the flow meter and the system control panel.

Filter/water separator. This is the primary filter unit installed in either the pump module or the dispensing module.

Secondary filter unit. This unit shall detect any water and stop impurities still present in the fuel. The flow of fuel shall be cut once a certain amount of water has been exceeded.

Recycling module. The unit contains a small tank to collect and settle fuel samples and a pump to return the fuel, via a filter, to the storage tank.

Sampling cabinet. A cabinet for central analysis of the fuel samples. Lines from the different sampling points terminate in sampling jars in the cabinet. The jars are later drained to slop or into a recycling module.

SYSTEM REQUIREMENTS

Tank base with laydown skid

The skid may hold either a fixed storage tank or one or several transport/transit tanks, depending on the system design. A drip tray shall be installed and be able to collect and hold, as a minimum, the whole content of the tank in use. The drip tray shall be equipped with a suitable drain connection to allow for effective draining of the drip tray.

To protect the deluge system/pump unit from damage during tank handling, a guide/ buffer frame should be fixed to the base of the skid.

Transportable tanks should be properly secured to a solid base on moving vessels.
An ss helix convoluted EN 1825 suction hose with a 2.5-inch dry-break coupling shall be used to connect a transit tank in use to the pump unit. The other end should be sized to fit the (pump) unit inlet flange (ANSI 150lbs).

The base frame shall be bonded from two different locations. All tanks installed on the laydown skid shall be bonded.

Deluge system

A deluge system shall be installed in accordance with the design criteria.

The tank in use shall have a protective deluge system in accordance with the class requirements, NMA or a minimum of 10 litres per cubic metres per minute.

A calculation report (hydraulic calculation) for the deluge system shall be calculated and documented.

Fire detection: in accordance with class requirements or customer specification.

Transit tanks
Transit tanks shall be constructed to satisfy DNV 2.7-1 and IMO/IMDG requirements and be in stainless steel. They shall also conform to the dangerous goods code.

Transit tanks shall have a suitable dipstick of stainless steel or fibreglass material.

A valve with provisions for remote operation shall be mounted directly on the tank outlet. When connected to the pump module, the tank outlet valve on the tank in operation shall be capable of remote closure from the helideck (dispenser unit) by a powered actuator.

The outlet/fill connection shall be flanged with a three-inch internal valve terminating at a 2.5-inch self-sealing coupler with dust cap. The tank outlet shall be at least 150 millimetres higher than the lowest point of the tank.

The drain connection shall be equipped with minimum 1.5-inch internal valve terminating in a plugged ball valve, preferably one-inch. The plug shall be installed on the end to prevent the ingress of dirt and moisture.

To permit the use of four-litre sample jars, the sample point should be designed with sufficient access (250 millimetres), space and height to accommodate the standard four-litre sample jar. The sample line from tanks shall be a minimum of ¾-inch.

A stainless 2.5-inch emergency pressure/vacuum relief valve with weatherproof anti-flash cowl shall be fitted.

Fixed storage tanks
Fixed storage tanks shall be constructed to suitable standards (such as ASME VIII). The tank shall slope 1 on 30. The sump shall be fitted with a ¾-inch minimum sample line which has both a ball valve and a self-closing ball valve at the sample point.

The outlet should preferably be designed as a stainless floating suction device with a bonded wire pull assembly fitted to the top of the tank. Alternatively, a stack pipe extending at least 150 millimetres above the lowest point of the tank could be installed.

Make sure the drain point on stationary tanks on mobile units (such as rigs/FPSOs) is able to drain the tank sump as the vessel's movement/position varies.

The tank inlet/outlet valve should be capable of operation from both helideck (dispenser unit) and from another point at a safe distance from the tank.

The tank shell must be properly bonded.

Each chamber shall be equipped with a minimum 500-millimetre quick-release hinged hatch to allow physical access.

Each chamber shall be equipped with a sight glass/content gauge to determine the tank content.

A closed-circuit sampler connected to the sample point is recommended.

A combined pressure/vacuum relief valve shall be installed on each closed chamber of the tank.

Pump module
A 60 mesh Y-strainer shall be installed at the inlet of the pump unit.

The pump shall be air or electrically driven, equipped with a positive displacement vane pump or centrifugal pump with a head pressure suited to the installation. The nominal flowrate shall be 225 litres/minute. The pump unit should be constructed to meet EX zone 1. The pump shall be equipped with a relief valve routed to the pump suction side.

The pump unit shall be connected to one tank or chamber only at a time.

A check valve must be installed on the discharge side of the pump.

An emergency stop valve (for pneumatically-driven systems) or emergency stop panel (electrically-driven) shall be installed.

Block/ball valves should as a minimum be installed on the pump unit inlet and outlet flange.

A pressure gauge must be installed on the pump discharge side.

A device shall be installed for automatic pump stop at a pre-set time after start.

A device which automatically stops the pump at tank low level shall be installed in the system. This is to avoid air being drawn into the system.

A drip tray able to collect spillage shall be installed. It shall be equipped with a suitable drain connection to allow for effective draining of the drip tray.

Filter water/separator
A filter water separator in accordance with the EI 1581 specification, sized to suit the pump capacity, shall be installed either in the pump unit or in the dispensing unit.

The filter/water separator shall also be fitted with:
- a differential pressure gauge for monitoring the condition of the elements
- an air eliminator which automatically vents any air entering the vessel
- a pressure relief valve
- a closed circuit sampler connected to the sample point (recommended)
- a self-closing valve on the 12 millimetre (minimum) drain connection.

Dispensing module

Product/flowmeter
The product/flowmeter must be sized to suit the flow rate and the counter must be resettable.

Nozzles
Fuel delivery to aircraft must be available with both pressure and gravity refuelling. Both types of nozzles must be provided with bonding cables and dust caps to prevent the ingress of water and dirt.

Pressure: the pressure nozzle shall be fitted to the hose-end pressure control unit. The nozzle shall be equipped with a surge controller rated to a maximum of 35 psi. It shall be equipped with a 100-mesh stainless steel cone strainer, and a bonding wire with jack plug/clip.

Gravity: the gravity nozzle shall be fitted with a stainless 100-mesh strainer, a bonding wire and a clip. It shall be connected to the hose with a quick release adapter.

Hose reel and fuel hose
A fire safe/antistatic ball valve shall be installed in front of the hose reel. The 30-metre (nominal length) 1.5-inch delivery hose should be an approved type C semi conducting type in accordance with EN ISO 1825 or EI 1529 C.

Clamp type couplings must be used at hose terminations.

Secondary fuel filter
The filter may have three different designs.

a) Aviation fuel filter monitor with absorbent type elements, EI 1583 standard. This solution requires an automatic differential pressure cut-off switch, or a procedure to monitor and record the filter differential pressure during refuelling. This standard is valid until superseded by
b) EI-certified new technology dirt defence filter EI 1599 with electronic water sensor, EI 1598 standard, or
c) EI-certified new technology water barrier filter, EI 1588 standard.

The secondary filter unit shall also be equipped with:
- a differential pressure gauge or transmitter for monitoring the condition of the elements
- an air eliminator which automatically vents any air entering the vessel
- a pressure relief valve
- a closed circuit sampler connected to the sample point
- a self-closing valve on the 12-millimetre (minimum) drain connection.

Bonding equipment
A "ground current" indicator, approved for the purpose, shall be installed to restrict the pumps being operated until the ground indicator has approved the continuity. A spring-loaded bonding cable reel sized for 30-metre cable and bonding clip shall be installed. A steady yellow Ex lamp installed outside on top of the dispensing cabinet shall indicate when the helicopter is properly bonded.

Recycle module (not a requirement)
The recycle tank shall have a slope of minimum 1 on 30. The tank shall be equipped with an inspection hatch in order to clean the tank properly. The tank shall be designed in accordance with TBK, ASME, BS or other appropriate code. The same rules apply for this unit as for the pump and dispensing unit. If a pump is included, it shall be of a flanged, positive displacement vane-type pump or centrifugal pump.

Recycle tanks should not be more than 300 litres in volume.

The return line to the storage tank should be routed so as to avoid any water traps forming in the line.

The transfer pump must be a separate unit with low capacity and limited pressure to allow ullage air to escape safely from the receiving fixed or transport tank through the P/S valve.

The line to the receiving tank shall be equipped with a separate suitable five-micron filter or filter separator.

The recycle tank outlet line shall be routed to the tank in use and should be connected to the outlet valve or hose, or to the sample outlet. The hose may be connected with a Tee for a semi-permanent connection.

Sampling cabinet (not a requirement)
The inlet lines from the sample points must be dimensioned to ensure a high drainage flow (minimum diameter 12 millimetres), but a line should not hold more than the drained volume to avoid stagnant fuel.

The cabinet shall provide ample shelter from wind and rain and should be designed with space for one person to conduct sampling, and with access to all installed equipment.

APPENDIX J – HELICOPTER REFUELLING WITH ROTOR RUNNING

Refuelling with passengers on board can be agreed between pilot and HLO, and must comply with the requirements specified in section 6.11 and the standard procedures. See this appendix.

HLO	HELIGUARD	FIREGUARD
1. Remains in position with an overview of the whole helideck. When the fireguard has connected the earth cable and is in position (beside the HLO), they take over the job of securing the helideck. 2. Goes with the pilot to the refuelling cabinet to check the fuel sample. 3. Verifies that the earthing light is on, the counter is set to zero and that the fuel hose is connected to the helicopter. 4. When the fireguard signals, pushes the button to start refuelling.	1. Waits until the helideck is free of passengers and pulls out the fuel hose. When the fireguard has connected the earth cable, earths and connects the fuel hose to the helicopter before opening the connector valve. 2. Remains in position at the helicopter refuelling point.	1. Pulls out the earth cable and earths the helicopter. The fireguard can assist the heliguard with connecting/ disconnecting fuel hoses as required. 2. Takes position beside the HLO in front of the helicopter, with a clear view of the pilot, heliguard and fuel cabinet. Portable powder extinguisher must be available on the helideck. 3. Takes over the job of securing the helideck. 4. On signal from pilot, signals the HLO that refuelling can begin.

Completion of refuelling

HLO	HELIGUARD	FIREGUARD
1. On signal from fireguard, halts refuelling from the cabinet. 2. Takes new fuel sample. This is checked by the pilot, who signs the fuel log. 3. Goes up to the helideck, stands beside the fireguard and takes over security of the helideck from them. 4. When the heliguard is ready, signals to the fireguard that boarding can begin.	1. On signal from the fireguard to halt refuelling, closes the connector valve on the fuel hose. 2. The fuel hose with earthing is disconnected, and the hose is rolled up on the reel.	1. On signal from the pilot to halt refuelling, signals this immediately to the HLO and heliguard 2. Remains in position until the HLO is in place to take over deck security. 3. Disconnects the earth cable and rolls it onto its reel.

NB! Some helicopter types use their own automatic shut-off system for fuel.

APPENDIX K – HELIDECK MONITORING SYSTEM (HMS)

Standard measuring equipment

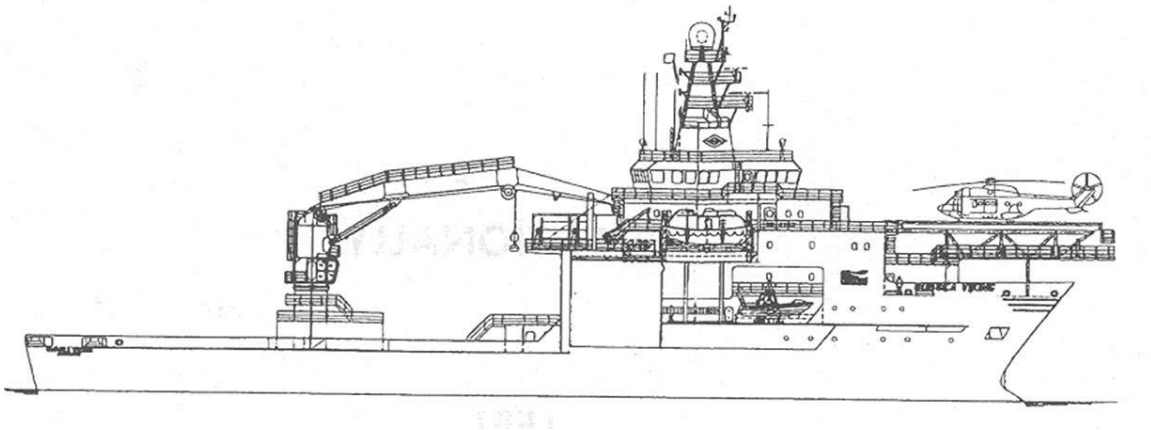
for

helideck monitoring system (HMS)

and

weather data

Norwegian Oil and Gas
Bristow Helicopters Norway
CHC Helikopter Service



REVISIONS

Name	Date	Changes
Rev 9.1.No	10 March 2015	- Introduction of significant heave rate method
Rev 9.2.No	1 May 2017	- Clarification of significant heave rate calculation to include hysteresis and deck status - System accuracy and verification - General update of all chapters

1. PURPOSE AND INTENTIONS

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

These standards are valid on the NCS as mandated by the Norwegian Oil and Gas helideck manual managed under an agreement between Norwegian Oil and Gas and the helicopter operators.

Further intentions are to establish national and international standards based on the 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, floating jack-up rig, and other helidecks shall be considered to be an unstable/moving landing area if:

- the pitch or roll exceeds one degree, and
- the heave amplitude of the helideck exceeds two metres, and/or
- the heave rate exceeds 0.3 metres/second.

Pitch and roll (P/R)

Pitch and roll angles relative to the absolute horizon. The roll axis is parallel with the helideck heading.

Helideck inclination (Inc)

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

Heave amplitude (HA)

The vertical movement of the helideck.

Significant heave rate (SHR)

The average of the one-third highest values of instantaneous heave rate recorded in the previous 20-minute monitoring period. This can more conveniently be calculated by: *Significant heave rate (m/sec) = 2 x rms (root mean square) of the instantaneous heave rate.*

3. CLASSIFICATION OF HELIDECKS

No official classification method is available for this purpose. The proposed classification contains three categories based on the relevant floating unit's size, configuration and motion characteristics. Limitations are defined by helideck pitch, roll and inclination and by the helideck heave rate. A prime requirement is that the facilities have measuring and monitoring equipment installed and functional, in accordance with this document. Those facilities 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 (eg, 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 the 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.

Category 2

Small vessels, such as DSVs and seismic vessels, with a helideck which offers good visual cues. This would normally be a stern or amidships deck offering a view of the structure

of the vessel through at least 90° (assuming the vessel is steaming approximately into wind).

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).

> *Note: Small vessels will be categorised 2 or 3 on inspection and their helideck documentation will reflect this (except that small vessels with amidships 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, AW189 and S92. The medium types are the EC155, EC175, AW139, S76 series, and Bell 525.

> *Note: This does not constitute a helideck approval for a specific helicopter type on a specific helideck.*

4. OPERATIONAL LIMITATIONS

The classification is defined in this table.

AIRCRAFT CATEGORY		HELIDECK CATEGORY											
		1				2				3			
		P/R	INC	HR	HA	P/R	INC	HR	HA	P/R	INC	HR	HA
HEAVY	DAY	±3	3.5	1.3	5.0	±2	2.5	1.0	3.0	±2	2.5	1.0	3.0
	NT	±2 *	2,5 *	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	±3	3.5	1.0	4.0	±2	2.5	0.5	1.5	±1.5	2.0	0.5	1.5

P/R = Pitch and roll (deg)
INC = Helideck inclination (deg)
HR = Significant heave rate (m/s)
HA = Heave amplitude (m)
(*) Semi submersibles category 1 helidecks are limited at night to P/R: +/- 3.0° and inclination: +/-3.5°.

Notes:

a) Category 3 vessels (bow-mounted helideck) operating with the helideck downwind are automatically upgraded to category 2.
b) Category 2 vessels (stern helideck) operating with the helideck upwind are automatically downgraded to category 3.
c) Vessels with midships helidecks are normally category 2.
d) Where the heave rate is available and within the limits, HA is for information only and is not part of the calculations on helideck availability.
e) The table above is not applicable for operations to and from single-point mooring buoys (SPMs). These are considered to be fixed facilities. Limitations are given on the helideck information plate.
f) Night landings on category 2 and 3 helidecks which are moving position (for example, seismic surveying or towing) should be avoided. If night landings are unavoidable, the following applies:

- the minimum weather requirement is a visibility of 5 000 metres
- the ship must be manoeuvred out of the wind by 30 degrees to improve visual cues for landing
- further risk mitigation may be imposed by the helicopter operator.

5. PRINCIPLES

Basic requirements are contained in:

- Norwegian requirements in BSL D5-1.8.2
- ISO 19901-1: 2015 Petroleum and natural gas industries – Specific requirements for offshore structures – Part 1: Metocean design and operating considerations
- Norsok C-004 Helicopter deck on offshore installations
- Norsok T-100 Telecom subsystems

The measuring equipment shall provide sufficient information to the operator for them to complete all sections of the standard helideck report provided for by the helicopter operator. The last page of the helideck manual contains the helideck report template.

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.

Helideck heave data shall be representative for the centre of the helideck. It is recommended that the motion sensor be located within four metres of the helideck centre for new designs in order to meet a possible future requirement for measuring the motion severity index (MSI).

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

6. ACCURACY OF MEASUREMENT

The HMS shall at all times comply with the system accuracy requirements given below. The system shall be properly maintained and a record of all certificates, verification reports and maintenance history shall be available to appointed helideck inspectors on request.

System accuracy

The dynamic accuracy of the data produced by the HMS concerning motion shall be:

Pitch/roll/inclination: <± 0.1° RMS (root mean square) in the range from 0° to 3.5° and heave rate: < ± 0.1 m/s RMS in the range from 0 to 1.3 m/s

The accuracy of the meteorological data shall comply with:

- ISO 19901-1: 2015 Petroleum and natural gas industries – Specific requirements for offshore structures – Part 1: Metocean design and operating considerations

Any temporary deviation from above owing to performance degradation or equipment failure shall be reported to the helicopter operator with a plan for corrective action.

Verification

The HMS should undergo initial and periodic in-field verifications in accordance with the system manufacturer's procedures and recommended intervals.

The complete HMS (sensors and programmes) shall be checked and verified. A qualified field service engineer, trained and certified, shall perform the system verification. All test instruments, including the motion measurement verification equipment located at the centre of the helideck during the test, shall have traceable calibration certificates with details included in the verification report.

Recommendations from the motion sensor manufacturer should be incorporated in the system test procedures. Motion measurement verification intervals should be in accordance with the sensor's manufacturer's procedure, but at least every three years.

The motion range measured during the verification tests shall be relevant to the typical operational conditions for the facility and a minimum of five test periods with a minimum duration of 20 minutes shall be conducted.

A verification report documenting the correctness of the system shall be issued to the owner of the facility. This should be done after initial installation, each motion sensor replacement and each periodic control. The results should be displayed in an unambiguous way (graphical or other visual display) to allow easy interpretation.

The owner/operator of the facility shall ensure retention of the verification data for a minimum of three years to enable traceability.

Maintenance

All parts of the HMS shall undergo periodic inspection and preventive maintenance as defined by the HMS manufacturer, including sensor swap-out with factory overhaul or with calibrated units. Periodic maintenance shall only be done by trained personnel.

7. MEASURING HELIDECK MOTION

All helideck motion parameters shall be reported to one decimal place.

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 historical maximum angles over the past 20 minutes directly and, if possible, graphically. The graphical presentation shall cover 20 minutes of data and alternatively three hours for trend determination. The graph and the associated maximum value over the previous 20 minutes shall be updated at a minimum of one-minute intervals. In maritime terms, maximum pitch consists of trim plus pitch.

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 historical maximum angles over the past 20 minutes directly and, if possible, graphically. The graphical presentation shall cover 20 minutes of data and include three hours for trend determination. The graph and the associated maximum value over the previous 20 minutes shall be updated at a minimum of one-minute intervals. In maritime terms, maximum roll consists of list plus roll.

Maximum helideck inclination

The equipment shall be capable of measuring the maximum helideck inclination in degrees to the absolute horizon over the past 20 minute directly and, if possible, graphically. The graphical presentation shall cover 20 minutes of data and alternatively three hours for trend determination. The graph and the associated maximum value over the previous 20 minutes shall be updated at a minimum of one-minute intervals.

Maximum heave amplitude

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 directly and graphically. The graphical presentation shall cover 20 minutes of data and alternatively three hours for trend determination. The graph and the associated maximum value over the previous 20 minutes shall be updated at a minimum of one-minute intervals.

Heave period

The equipment shall be capable of measuring the time between helideck movement summits in seconds (ie, based on a wave curve where the measurement starts and ends at the zero up crossing point). The graphical presentation shall cover 20 minutes of data and alternatively three hours for trend determination. The graph and the associated maximum value over the previous 20 minutes shall be updated at a minimum of one-minute intervals.

Significant heave rate (SHR)

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

The significant heave rate shall be updated at a minimum of one-minute intervals, using a moving 20-minute window. The SHR value is calculated directly from the instantaneous heave velocities sampled at 2Hz intervals or more in accordance with the following formula:

2 x RMS (root mean square) of the instantaneous heave rate.

It shall be possible to read the historic maximum value for the past 20 minutes directly and graphically. The graphical presentation shall cover 20 minutes of data and alternatively three hours for trend determination. The graph and the associated maximum value over the previous 20 minutes shall be updated at a minimum of one-minute intervals.

8. HEADING AND POSITION DATA

The heading of the helideck and the vessel shall be stated in degrees relative to magnetic north. Vessel position shall be reported using WGS84 coordinates in the following format: “deg° min’ sec” N/S/E/W”. The HMS shall be connected to a gyro and a position monitoring system if the parameters are a variable. Manual setting of magnetic declination is possible, but shall be checked after vessel/rig movement.

9. WEATHER DATA

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

Wind direction

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

The wind direction display shall have the option to show real-time wind direction, two-minute mean wind direction and 10-minute mean wind direction.

Wind speed
Wind speed shall be stated in knots.

Displayed wind shall be easily selectable to show real-time wind, two-minute mean wind with gusts exceeding 10 knots of the mean wind, and 10-minute mean wind with gusts exceeding 10 knots for three seconds or more of the mean 10-minute wind.

Visibility
Horizontal visibility shall be stated in metres.

Temperature/dewpoint
Temperature/dew point temperature shall be stated in degrees Celsius.

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

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

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.

10. HELIDECK MOVEMENT AND WEATHER DATA DISPLAY
Data display layouts shall be approved by the helicopter operators. The display must indicate which HMS standard the complete system is compliant with (eg, HMS Rev 9.2.No). The user of the display must be able to control the setting of the following configuration parameters: night/day, large/medium aircraft, and helideck category 1/2/3 (for those with variable classification).

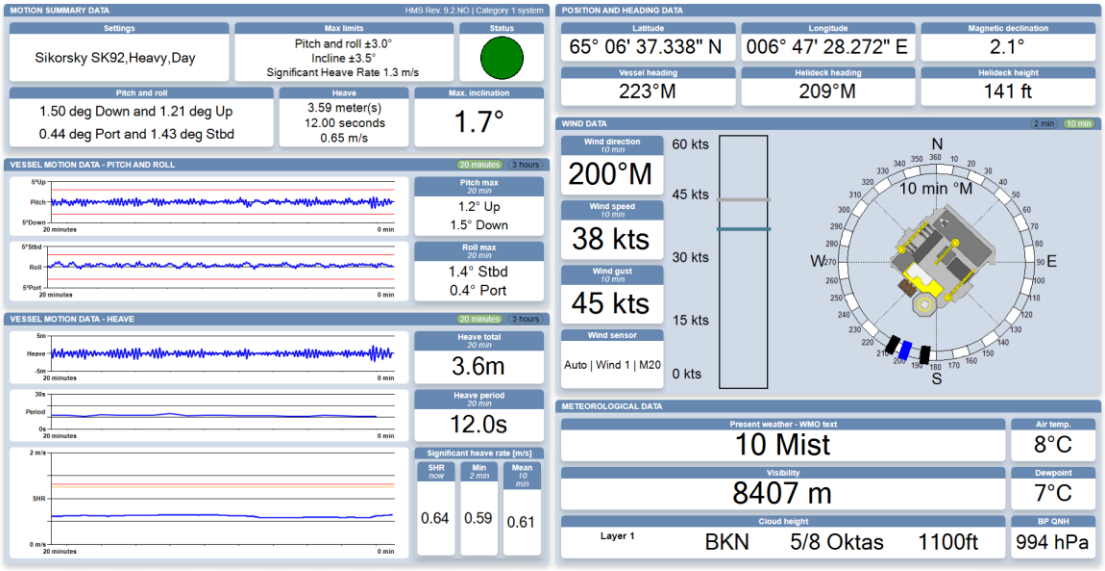
It is important to use the notification SHR for all HR data on the display to avoid ambiguity with historical calculation methods.

Traffic light on display
The “traffic light” on the display indicates when one of the following parameters has reached a threshold: roll, pitch, inclination or SHR. As long as all the measured parameters are within or at their limit, it should show a green light. When a limit is exceeded, it should show a red light.

Owing to the nature of the SHR signal, the following trigger logic should be applied to the SHR input to the helideck motion status.

- The helideck motion status becomes RED if:
    - the HR limit is exceeded and
    - all the records in the previous two minutes have also exceeded the HR limit (or, equivalently, the minimum SHR in the previous two minutes has exceeded the HR limit).
- Once the deck motion status is RED, it becomes GREEN again only if:
    - the SHR falls below 95 per cent of the HR limit, and
    - the mean of records for the previous 10 minutes is below the HR limit.

Typical layout:



11. LOGISTICS INFORMATION DISPLAY

Data display layouts shall be approved by the helicopter operators. The layout shall, as a minimum, include all data from the *standard helideck report* used on the NCS which is not already covered by the *helideck movement and weather data display.*

APPENDIX L – REPORTING FORM

Place: Date: Time:

Operation of aircraft – helicopter	
Collision or near-collision between an aircraft and another aircraft or an obstacle	☐
Collision or near-collision between an aircraft and birds	☐
Collision or damage caused to aircraft by equipment or vehicle on the helideck	☐
Failure to observe clearance, instructions or relevant information	☐
Incident caused by airstream from a jet engine or rotor	☐
Breach in or failure of communication between personnel on helideck and aircraft	☐
Emergency call sent – Mayday or Pan	☐
Security	
Illegal entry, attack on aircraft, bomb threat, sabotage or hijacking	☐
Passengers or unauthorised people unsupervised on the helideck	☐
Technical safety system	
Obstacles related to helideck and unannounced helicopter operations	☐
Substantial deficiencies in markings or signs on the helideck	☐
Substantial deficiencies in lighting of the helideck and obstacles	☐
Inadequate marking of obstacles or hazards in the helideck's manoeuvring areas	☐
Rescue and firefighting services not available in accordance with requirements	☐
Deficiencies, faults or inadequacies in de-icing/preventing ice formation on the helideck	☐
Handling of passengers, baggage and cargo	
Substantial contamination of the aircraft from baggage or cargo	☐
Incorrect handling, loading or manifest of passengers, baggage or cargo	☐
Faulty stowing and securing of baggage or cargo	☐
Transport of dangerous goods in contravention of applicable rules, incorrect marking, manifest and packing	☐
Excess weight in cargo compartment *	☐
Work on ground and aircraft servicing	
Open doors, baggage ramp, hatches, covers and handles, missing fuel caps, etc *	☐
Oil/hydraulic leak from helicopter to helideck *	☐
Discovery of loose objects/foreign objects (FOD) on the helideck	☐
Handling of fuel	
Refuelling with contaminated or wrong type of fuel	☐
Refuelling wrong fuel quantity affecting the aircraft's performance, weight and balance	☐
Substantial spills/leaks of fuel during refuelling	☐
Other incidents	
Human performance directly contributed or could have contributed to an accident	☐

Course of events	
Name:	Position/role: