Safety Regulation Group

Civil Aviation Authority

CAP 437

Offshore Helicopter Landing Areas - Guidance on Standards

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Foreword

1 This publication has become an accepted world-wide source of reference. The amendments made to the fifth edition incorporate the results of valuable experience gained from CAA funded research projects conducted with the support of the UK offshore industry into improved helideck lighting, helideck environmental effects and operations to moving helidecks. In particular the Sections concerning helideck environmental effects and helideck lighting have been considerably revised; in respect of helideck lighting, this is to ensure that UK good practice adequately reflects the changes incorporated into amendment no. 3 to the International Standards and Recommended Practices, ICAO Annex 14 Volume 2 (amendment no. 3 dated 25/11/04) of the Convention on International Civil Aviation.

2 Since October 2001, UK CAA has been participating in the Group of Aerodrome Safety Regulators (GASR) Helideck Working Group comprising National Aviation Authorities from Norway, Denmark, Holland, Ireland and Romania. The group has been working towards the harmonisation of offshore helicopter landing area 'requirements' in North Sea Europe. A number of changes proposed for the fifth edition have been taken to encourage a 'level playing field' amongst member States, and so provide the basis for common offshore helicopter landing area 'requirements' throughout the North Sea based on the technical content of CAP 437.

3 CAP 437 gives guidance on the criteria required by the CAA in assessing the standard of offshore helicopter landing areas for world-wide use by helicopters registered in the United Kingdom. These landing areas may be located on:

- fixed offshore installations;
- mobile offshore installations;
- vessels supporting offshore mineral exploitation;
- other vessels.

4 In this publication the term 'helideck' refers to all helicopter landing areas on fixed and mobile installations and vessels unless specifically differentiated. The term 'offshore' is used to differentiate from 'onshore'.

5 The criteria described in CAP 437 form part of the guidance issued by the CAA to United Kingdom helicopter operators which is to be accounted for in Operations Manuals required under United Kingdom aviation legislation and by the Joint Aviation Requirements (JAR OPS 3). Helideck operations on the UK Continental Shelf (UKCS) are regarded as being 'unlicensed landing areas', and offshore helicopter operators are required to satisfy themselves that each helideck to which they operate is fit for purpose and is properly described in their Operations Manual. UK offshore helicopter operators have chosen to discharge this duty of care by accepting Helideck Landing Area Certificates (HLAC's) based on inspections undertaken by the Helideck Certification Agency (HCA) formerly known as BHAB Helidecks (see Glossary of Terms). The HCA procedure for the authorisation of helidecks is thus designed to enable helicopter operators to ensure that offshore helidecks to which their helicopters fly are suitable for purpose. The Helideck Certification Agency acts on behalf of the interests of all of the UK offshore helicopter operators and, as the single focal point for helideck matters in the UK, ensures that a level playing field is maintained between the offshore helicopter operators who have each given an undertaking to use the HCA system of authorisation in a Memorandum of Understanding (MoU) and by publishing relevant material in their company Operations Manuals.

6 If an offshore helideck does not meet the criteria in CAP 437, or if a change to the helideck environment is proposed, the case should be referred to the HCA in the first instance, prior to implementation. It is important that such changes are not restricted to consideration of the physical characteristics and obstacle protected surfaces of the helideck. Of equal, and sometimes even more importance, are changes to the installation or vessel, and to adjacent installation or vessel structures which may affect the local atmospheric environment over the helideck (and adjacent helidecks) or on approach and take-off paths.

7 This procedure described for authorising the use of helidecks in the UKCS is co-ordinated by the Helideck Certification Agency in a process which is supported by the United Kingdom Offshore Operators' Association (UKOOA); the British Rig Owners' Association (BROA); and the International Association of Drilling Contractors (IADC) members' individual owner/operator safety management systems. HCA provides secretarial support to the Helideck Steering Committee, with representation from all offshore helicopter operators in the UK. The Helideck Steering Committee functions to ensure that commonality is achieved between the offshore operators in the application of operational limitations and that non compliances, where identified, are treated in the same way by each operator. HCA publishes the Helideck Limitations List (HLL) which contains details of all authorised helidecks including any operator-agreed limitations applied to specific helidecks in order to compensate for any failings or deficiencies in meeting CAP 437 criteria; so that the safety of flights is not compromised. In the case of 'New – Builds' or major modifications to existing Installations that may have an effect on helicopter operations, the CAA has published guidance on helideck design considerations in CAA Paper 2004/02, and is available to assist with the interpretation and the application of criteria stated in CAP 437. However, it is important that HCA are always consulted at the earliest stage of design to enable them to provide guidance and information on behalf of the helicopter operator so that the process for authorising the use of the helideck can be completed in a timely fashion. Early consultation is essential if maximum helicopter operational flexibility is to be realised and incorporated into the installation design philosophy.

8 Although the process described above is an industry-agreed system, the legal responsibility for acceptance of the safety of landing sites rests with the helicopter operator (see Appendix D). The CAA accepts the process described above as being an acceptable way in which the assessment of the CAP 437 criteria can be made. The CAA, in discharging its regulatory responsibility, will audit the application of the process on which the helicopter operator relies. As part of such an audit, the CAA will review HCA procedures and processes and assess how they interface with the legal responsibilities and requirements relating to the offshore helicopter operators.

9 The criteria in this publication relating to fixed and mobile Installations in the area of the UKCS provide guidance which is accepted by the Health and Safety Executive (HSE) and referred to in HSE offshore legislation. The criteria are guidance on **minimum** standards required in order to achieve a clearance which will attract no helicopter performance (payload) limitations. CAP 437 is an amplification of internationally agreed standards contained in the International Civil Aviation Organization Annex 14 to the Convention on International Civil Aviation, Volume 2, 'Heliports'. Additionally it provides advice on 'good practice' obtained from many aviation sources. 'Good Practice', naturally, should be moving forward continuously and it should be borne in mind that CAP 437 reflects 'current' good practice at the time of publication. There may be alternative means of meeting the criteria in the guidance and these will be considered on their merits.

10 Additional criteria are given relating to vessels used in support of offshore mineral exploitation which are not necessarily subject to HSE offshore regulation and also for tankers, cargo, passenger and other vessels.

11 The United Kingdom Offshore Operators Association (UKOOA) has published Guidelines for the Management of Offshore Helideck Operations and the Health and Safety Executive (HSE) has published Offshore Helideck Design Guidelines endorsed by the Offshore Industry Advisory Committee – Helicopter Liaison Group (OIAC-HLG). The CAA has assisted in the compilation of both guidance documents; it is recommended that offshore duty holders consult both documents which have been produced for industry to compliment the technical material described in CAP 437.

12 As guidance on good practice, this document applies the term “should” when referring to a recommended practice or ICAO standard, and the term “may” when a variation or alternative approach could be acceptable to the CAA. The UK HSE accepts that conformance with CAP 437 will demonstrate compliance with applicable offshore regulations. CAP 437 is under continuous review resulting from technological developments and experience; comments are welcome on its application in practice.

13 It can be seen from the above that major changes have taken place to the way in which helidecks are cleared for operations. Such changes are reflected in UK Aviation law based on JAR-OPS 3 (Joint Aviation Requirements – Commercial Air Transportation [Helicopters]) and in associated guidance. The CAA should be contacted on matters relating to interpretation and applicability of this guidance and Aviation Law.

Glossary of Terms and Abbreviations

Aiming Circle	Described in other publications as 'landing circle' or 'touch down marking'; the aiming point for normal landing, so designed that the pilot's seat can be placed directly above it in any direction with assured main and tail rotor clearances.
ANO	The Air Navigation Order 2005 (as amended).
Class Societies	Organisations that establish and apply technical standards to the design and construction of marine facilities including ships.
D-Value	The largest overall dimension of the helicopter when rotors are turning. This dimension will normally be measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane (or the most rearward extension of the fuselage in the case of Fenestron or Notar tails).
D-Circle	A circle, usually imaginary unless the helideck itself is circular, the diameter of which is the D-Value of the largest helicopter the helideck is intended to serve.
FOD	Foreign object debris/damage.
Helideck	A landing area on an offshore installation or vessel.
Helideck Certification Agency "HCA" formerly known as BHAB Helidecks	The Helideck Certification Agency is the certifying agency acting on behalf of the UK offshore helicopter operators that audits and inspects all helidecks on offshore installations and vessels operating in UK waters to the standards and guidelines laid down in CAP 437. In the text of this document the term 'Helideck Certification Agency' is used in relation to the UK system for clearing helidecks for helicopter operations. Outside UK, where this system is not in place, the term should be replaced by 'Helicopter Operator(s)'
HLAC	The Helideck Landing Area Certificate issued by the Helideck Certification Agency (HCA), and required by UK offshore helicopter operators, to authorise the use of a helideck.
HLL	Helideck Limitation List formerly known as the Installation/Vessel Limitation List (IVLL); published and distributed by the HCA in UKCS **or** other JAA National Authority accepted bodies in other North Sea States.
ICAO	International Civil Aviation Organization.
ICP	Independent and competent person as defined in the Offshore Installations (Safety Case) Regulations 1992 who is selected to perform functions under the verification scheme.
Landing Area	A generic term referring to any area primarily intended for the landing or take-off of aircraft.
LOS	Limited Obstacle Sector. The 150° sector within which obstacles may be permitted, provided the height of the obstacles is limited.

NAI	Normally Attended Installation.
NUI	Normally Unattended Installation.
OFS	Obstacle-Free Sector. The 210° sector, extending outwards to a distance of 1000 metres within which no obstacles above helideck level are permitted.
Perimeter D Marking	The marking in the perimeter line in whole numbers; i.e the D-Value (see above) rounded up or down to the nearest whole number. See also Chapter 4 paragraph 2.2.
Run-Off Area	An extension to the Landing Area designed to accommodate a parked helicopter; sometimes referred to as the Parking Area.
SLA	Safe Landing Area. The area bounded by the perimeter line and perimeter lighting. N.B. The construction of the OFS and LOS segments (see below) should ensure that the main rotor will not risk conflict with obstacles when the nose of the helicopter is butted-up to, but not projecting over, the perimeter line. Thus the pilot, when landing in unusual circumstances, has confidence that he can touch down provided that all wheels are within the SLA and the nose of the helicopter is not projecting over the nearest perimeter line ahead. It should be noted, however, that only correct positioning over the aiming circle (see 'Aiming Circle' above) will ensure proper clearance with respect to physical obstacles **and** provision of ground effect **and** provision of adequate passenger access/egress.
UKCS	United Kingdom Continental Shelf (Geographical area).
Verification Scheme	A suitable written scheme as defined in the Offshore Installations (Safety Case) Regulations 1992 for ensuring the suitability and proper maintenance of safety-critical elements.

Chapter 1 Introduction

1 History of Development of Criteria for Offshore Helicopter Landing Areas, 1964-1973

In the early 1960s it became apparent that there would be a continuing requirement for helicopter operations to take place on fixed and mobile offshore installations. Various ideas were put forward by oil companies and helicopter operators as to the appropriate landing area standards for such operations. In 1964, draft criteria were published which used helicopter rotor diameter as a determinant of landing area size and associated obstacle-free area. In the light of experience and after further discussions, the criteria were amended and re-published in 1968. These criteria were then, and still are, based upon helicopter overall length (from most forward position of main rotor tip to most rearward position of tail rotor tip, or rearmost extension of fuselage if 'fenestron' is used). This length is commonly referred to as 'D' for any particular helicopter as the determinant of landing area size, associated characteristics, and obstacle protected surfaces.

2 Department of Energy and the Health and Safety Executive Guidance on the Design and Construction of Offshore Installations, 1973 Onwards

2.1 In the early 1970s, the Department of Energy began the process of collating guidance standards for the design and construction of 'installations' – both fixed and mobile. This led to the promulgation of the Offshore Installations (Construction and Survey Regulations) 1974, which were accompanied by an amplifying document entitled 'Offshore Installations: Guidance on the design and construction of offshore installations' (the 4th Edition Guidance). This guidance included criteria for helicopter landing areas which had been slightly amended from those issued in 1968. During 1976 and 1977, the landing area criteria were developed even further during a full-scale revision of this Guidance document, following consultations between the Civil Aviation Authority, the British Helicopter Advisory Board and others. This material was eventually published in November 1977 and amended further in 1979. This latter amendment introduced the marking of the landing area to show the datum from which the obstacle-free area originated, the boundary of the area, and the maximum overall length of helicopter for which operations to the particular landing area were suitable. The first edition of CAP 437 was published in 1981, amended in 1983 and revised in December 1993 (2nd edition) and October 1998 (3rd edition). Following a further amendment in January 2001, a 4th edition of CAP 437, incorporating the new house style, was placed on the Publications section of the CAA website at www.caa.co.uk in September 2002. Since the early 1990's changes have been introduced which incorporate the results of valuable experience gained from various 'helideck' research programmes as well as useful feedback from the Helideck Certification Agency (formerly BHAB Helidecks) following several years experience in carrying out helideck inspections; changes also include the latest helideck criteria internationally agreed and published as Volume II (Heliports) of Annex 14 to the Convention on International Civil Aviation.

2.2 In April 1991 the Health and Safety Commission and the Health and Safety Executive (HSE) took over from the Department of Energy the responsibility for offshore safety regulation. The Offshore Safety Act 1992, implementing the Cullen recommendations following the Piper Alpha disaster, transferred power to HSE on a statutory footing.

HSE also took over sponsorship of the 4th Edition Guidance and Section 55 'Helicopter landing area' referring to all installations.

2.3 Since April 1991, HSE has introduced four sets of modern goal setting regulations which contain provisions relating to helicopter movements and helideck safety on offshore installations. These update and replace the old prescriptive legislation. The provisions are as follows:

	Regulations	Covers
1.	The Offshore Installations (Safety Case) Regulations 1992 (SCR) (SI 1992/2885)	**Regulation 2(1)** defines a major accident and this includes the collision of a helicopter with an installation. **Regulation 2(1)** defines safety-critical elements (SCEs) and **Regulation 2(7A)** refers to a verification scheme for ensuring by means described in **Regulation 2(7B)** that the SCEs will be suitable and remain in good repair and condition. Helidecks and their associated systems are deemed to be SCEs. **Regulation 8** requires that a safety case should demonstrate that hazards with the potential to cause a major accident have been identified, their risks evaluated and measures taken to reduce personal risk to the lowest level that is reasonably practicable.
2.	The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER) (SI 1995/743)	**Regulation 6(1)(c)** requires a sufficient number of personnel trained to deal with helicopter emergencies to be available during helicopter movements. **Regulation 7** requires the operator/owner of a fixed/ mobile installation to ensure that equipment necessary for use in the event of an accident involving a helicopter is kept available near the helicopter landing area. Equipment provided under **Regulation 7** must comply with the suitability and condition requirements of **Regulation 19(1)** of PFEER. **Regulations 9, 12 and 13** make general requirements for the prevention of fire and explosion, the control of fire and explosion which would take in helicopter accidents. **Regulation 17** of PFEER requires arrangements to be made for the rescue of people near the installation from helicopter ditchings.

	Regulations	Covers
3.	The Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (MAR) (1995/738)	**Regulation 8** requires people to co-operate with the Helicopter Landing Officer to enable him to perform his function referred to in **Regulation 13**. **Regulation 11** requires comprehensible instructions to be put in writing and brought to the attention of everybody to whom they relate. Circumstances where written instructions might be needed include helideck operations (particularly if involving part-time helideck crew). **Regulation 12(b)** requires arrangements which are appropriate for health and safety purposes, to be in place for effective communication between an installation, the shore, aircraft and other installations. Arrangements must also be in place for effective communication where a helicopter is to land on or take-off from an installation aboard which there will be no person immediately before landing or after the take-off, between a suitable offshore installation with persons on board or where there is no suitable installation, suitable premises ashore. **Regulation 13** requires the operator/owner of a fixed/mobile installation to ensure that a competent person is appointed to be in control of helideck operations on the installation (i.e. the Helicopter Landing Officer), is present on the installation, is in control throughout such operations and procedures are established and plant provided as will secure so far as is reasonably practicable that helideck operations including landing/ take-off are without risks to health and safety. **Regulation 14** requires the duty holder to make arrangements for the collection and keeping of meteorological, oceanographic and information relating to the movement of the offshore installation. This is because environmental conditions may affect helicopter operations and the ability to implement emergency plans. **Regulation 19** requires the operator/owner of an offshore installation to ensure that the installation displays its name in such a manner as to make the installation readily identifiable by sea or air; and displays no name, letters or figures likely to be confused with the name or other designation of another offshore installation.

	Regulations	Covers
4.	The Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996 (DCR) (SI 1996/913)	**Regulation 11** – Helicopter Landing Area requires the operator/owner of a fixed/ mobile installation to ensure that every landing area forming part of an installation is large enough and has sufficient clear approach/departure paths to enable any helicopter intended to use the landing area safely, to land and take-off in any wind and weather conditions permitting helicopter operations and is of a design and construction adequate for its purpose.
HSE has published guidance documents on SCR, MAR and DCR and in the case of PFEER, combined guidance and an Approved Code of Practice.		

2.4 In February 2005 UKOOA published "Guidelines for the Management of Offshore Helideck Operations" (Issue 5) preceded in 2004 by an HSE publication "Offshore Helideck Design Guidelines" which was sponsored by HSE and the CAA, and endorsed by the Offshore Industry Advisory Committee – Helicopter Liaison Group (OIAC-HLG).

3 Applicability of Standards in Other Cases

3.1 For vessels engaged in supporting mineral exploitation (such as crane or derrick barges, pipe-laying vessels, fire and rescue vessels, seismic research vessels, etc), which are not classed as 'offshore installations' and so are not subject to a verification scheme, the CAA recommends the application of the same standards for the helicopter landing areas contained in this CAP. Compliance with this recommendation will enable helicopter operators to fulfil their own legal obligations and responsibilities (see Appendix D).

3.2 On other merchant vessels where it is impractical for these standards to be achieved, for example, where the landing area has to be located amidships, the criteria to be used are included in Chapter 9 of this publication. Also in that Chapter is guidance applicable to vessels involved on infrequent helicopter services in parts of the world other than the UKCS, or which may require facilities for helicopter winching activities only. Whilst this material covers the main aspects of criteria for a helicopter landing or manoeuvring area, there may be operational factors involved with these vessels such as air turbulence; flue gases; excessive helideck motion; or the size of restricted amidships landing areas, on which guidance should be obtained from the helicopter operator or the Helideck Certification Agency and from other competent specialists.

4 Review of CAP 437

Between 1992 and 1995 a programme of offshore installation helideck inspections was carried out. The inspections were carried out jointly by the CAA's Aerodrome Standards Inspectorate and the Health and Safety Executive (Offshore Safety Division). Experience gained during these inspections was incorporated, where relevant, into the 2nd and 3rd edition text.

5 Worldwide Application

5.1 It should be noted that references are made to United Kingdom legislatory and advisory bodies. However, this document is written so that it may provide useful guidance on minimum standards applicable for the safe operation of helicopters to offshore helidecks throughout the world.

5.2 The guidance is therefore particularly relevant to UK registered helicopters operating within **and outwith** the UKCS areas; whether or not they have access to the Helideck Certification Agency (HCA) process. In cases where the accepted HCA process is not applicable or available and where reference is made to Helicopter Certification Agency in this document it can be substituted by the phrase 'the helicopter operator' – who should have in place a system for assessing and authorising the operational use of each helideck. Within Europe, under the control of the Joint Aviation Authority (JAA) through Joint Aviation Requirements (JAR-OPS 3), authorisation of each helideck is a specific Requirement (JAR-OPS 3.220) and guidance on the criteria for assessment is given in an 'acceptable means of compliance' (AMC) to this Requirement.

5.3 Outside UKCS other European helicopter operators have in place systems which comply with the JAR-OPS 3 Requirement but which may not utilise the HCA process in favour of a more local system which satisfies the National Authority. Throughout the range of operations covered by JAR-OPS agreement has been made to share all helideck information between helicopter operators by the fastest possible means.

5.4 Other helicopter operators, who operate outside the areas covered by the JAA and who are using this guidance document, are recommended to establish a system for assessing and authorising each helideck for operational use. It is a fact that many Installations and vessels do not fully comply with the criteria contained in the following Chapters. A system for the assessment of the level of compliance **plus** a system for imposing compensating operational limitations is the only way of ensuring that the level of safety to flights is not compromised.

Chapter 2 Helicopter Performance Considerations

1 General Considerations

1.1 The guidance for helicopter landing areas on offshore installations and vessels results from the need to ensure that United Kingdom registered helicopters are afforded sufficient space to be able to operate safely at all times in the varying conditions experienced offshore.

1.2 The helicopter's performance requirements and handling techniques are contained in the Rotorcraft Flight Manual and/or the operator's Operations Manual.

1.3 Helicopter companies operating for public transport are required to hold an Air Operator's Certificate (AOC) which is neither granted nor allowed to remain in force unless they provide procedures for helicopter crews which safely combine the space and performance requirements mentioned above.

2 Safety Philosophy

2.1 Aircraft performance data is scheduled in the Flight Manual and/or the operations manual which enables flight crew to accommodate the varying ambient conditions and operate in such a way that the helicopter has sufficient space and sufficient engine performance to approach, land and take off from helidecks in safety.

2.2 Additionally Operations Manuals recognise the remote possibility of a single engine failure in flight and state the flying procedures and performance criteria which are designed to minimise the exposure time of the aircraft and its occupants during the short critical periods during the initial stage of take-off, or final stage of landing.

2.3 The CAA is currently researching the effects upon helicopter performance and control created by the offshore helideck environment in order to establish whether there is a need for additional procedures and/or revised criteria (see Chapter 3, Section 2).

3 Factors Affecting Performance Capability

On any given day helicopter performance is a function of many factors including the actual all-up mass; ambient temperature; pressure altitude; effective wind speed component; and operating technique. Other factors, concerning the physical and airflow characteristics of the helideck and associated or adjacent structures, will also combine to affect the length of the exposure period referred to in Section 2 above. These factors are taken into account in the determination of specific and general limitations which may be imposed in order to ensure adequate performance and to ensure that the exposure period is kept to a minimum. In many circumstances the period will be zero. It should be noted that, following a rare power unit failure, it may be necessary for the helicopter to descend below deck level to gain sufficient speed to safely fly away, or in very rare circumstances, to land on the water. In certain circumstances, where exposure periods would otherwise be unacceptably long, it will probably be necessary to reduce helicopter weight (and therefore payload) or even to suspend flying operations.

Chapter 3 Helicopter Landing Areas – Physical Characteristics

1 General

1.1 This Chapter provides guidance on the physical characteristics of helicopter landing areas (helidecks) on offshore installations and vessels. It should be noted that where a Verification Scheme is required it should state for each helicopter landing area the maximum size of helicopter in terms of D-value for which that area is certificated or verified with regard to strength and size in accordance with these requirements. Where these criteria cannot be met in full for a particular size of helicopter, the verifying agency should liaise with the Helideck Certification Agency (HCA) on any operational restrictions that may be considered necessary in order to compensate for deviations from and non-compliance with these criteria. The Helideck Certification Agency will inform the helicopter operators of any restrictions through the Helideck Limitations List (HLL).

1.2 The criteria which follow are based on helicopter size and mass. This data is summarised in Table 1 below.

Table 1 D-Value and Helicopter Type Criteria

Type	D-value (metres)	Perimeter 'D' marking	Rotor diameter (metres)	Max weight (kg)	't' value	Landing net size
Bolkow Bo 105D	12.00	12	9.90	2400	2.4t	Not required
Bolkow 117	13.00	13	11.00	3200	3.2t	Not required
Agusta A109	13.05	13	11.00	2600	2.6t	Small
Dauphin SA 365N2	13.68	14	11.93	4250	4.3t	Small
EC 155B1	14.30	14	12.60	4850	4.9t	Medium
Sikorsky S76	16.00	16	13.40	5307	5.3t	Medium
Agusta/ Bell 139	16.66	17	13.80	6400	6.4t	Medium
Bell 212	17.46	17	14.63	5080	5.1t	Not required
Super Puma AS332L	18.70	19	15.00	8599	8.6t	Medium
Bell 214ST	18.95	19	15.85	7936	8.0t	Medium
Super Puma AS332L2	19.50	20	16.20	9300	9.3t	Medium
EC 225	19.50	20	16.20	11000	11.0t	Medium
Sikorsky S92 †	20.88	21	17.17	11861	11.9t	Large
Sikorsky S61N	22.20	22	18.90	9298	9.3t	Large
EH101	22.80	23	18.60	14600	14.6t	Large
Boeing BV234LR* Chinook	30.18	30	18.29	21315	21.3t	Large

* The BV234 is a tandem rotor helicopter and in accordance with ICAO Annex 14 Volume II, the helideck size required is 0.9 of the helicopter D, i.e. 27.16 m. The HCA should be consulted if it is intended to use tandem rotor helicopters on offshore helidecks. See Chapter 10 – 'Tandem Rotor Helicopter Helidecks'.

† Manufacturer derived data has indicated that the maximum take-off mass of the military, and perhaps civil variant, of the S92 may grow to 12,834 kg. It is understood that structural design considerations for new build S92 helidecks will normally be based on the higher take-off mass (12,834 kg). Where structural design is verified by an ICP to be in accordance with the 'growth' take-off mass, duty holders are permitted to display the higher 't' value marking on the helideck i.e. '12.8t'.

NOTE: Where skid fitted helicopters are used routinely, landing nets are not recommended.

2 Helideck Design Considerations – Environmental Effects

2.1 Introduction

2.1.1 The safety of helicopter flight operations can be seriously degraded by environmental effects that may be present around installations, vessels and their helidecks. The term "environmental effects" is used here to represent the effects of the installation or vessel and/or its systems and/or processes on the surrounding environment, which result in a degraded local environment in which the helicopter is expected to operate. These environmental effects are typified by structure-induced turbulence, turbulence and thermal effects caused by gas turbine exhausts, thermal effects of flares and diesel exhaust emissions, and unburnt hydrocarbon gas emissions from cold flaring or, more particularly, emergency blowdown systems. It is almost inevitable that helidecks installed on the cramped topsides of offshore installations will suffer to some degree from one or more of these environmental effects, and controls in the form of operational restrictions may be necessary in some cases. Such restrictions can be minimised by careful attention to the design and layout of the installation topsides and, in particular, the location of the helideck.

2.1.2 Guidance on the design and placement of offshore helidecks has existed for many years in CAP 437, which contains certain environmental criteria (see paragraph 2.2.1 below). These criteria have been set to define safe operating boundaries for helicopters in the presence of known environmental hazards. Where these criteria cannot be met, a limitation is placed in the Helideck Limitation List (HLL). These entries are usually specific to particular combinations of wind speed and direction, and either restrict helicopter weight (payload), or prevent flying altogether in certain conditions.

2.1.3 The HLL system is operated for the benefit of the offshore helicopter operators and should ensure that landings on offshore helidecks are properly controlled when adverse environmental effects are present. On poorly designed helidecks, severe operational restrictions may result leading to significant commercial penalties for an installation operator or vessel owner. Well designed and 'helicopter friendly' platform topsides and helidecks should result in efficient operations and cost savings for the installation operator. Information from helideck flow assessment studies (see paragraphs 2.3.2 and 2.3.3 below) should be made available to the Helideck Certification Agency (HCA) prior to flight operations in order that any necessary operational limitations can be imposed prior to service so that safety is not compromised.

2.2 Guidance

2.2.1 A review of offshore helideck environmental issues (see CAA Paper 99004) concluded that many of the decisions leading to poor helideck operability had been made in the very early stages of design, and recommended that it would be easier for designers to avoid these pitfalls if comprehensive helideck design guidance was made available to run in parallel with CAP 437. As part of the subsequent research programme, material covering environmental effects on offshore helideck operations was commissioned by the Health and Safety Executive (HSE) and the Civil Aviation Authority (CAA). This material is presented in CAA Paper 2004/02: "Helideck Design Considerations – Environmental Effects" and is available on the Publications section of the CAA website at www.caa.co.uk. It is strongly recommended that platform designers and offshore duty holders consult CAA Paper 2004/02 at the earliest possible stage of the design process.

2.2.2 The objective of CAA Paper 2004/02 is to help platform designers to create offshore installation topside designs, and helideck locations, that are safe and 'friendly' to helicopter operations by minimising exposure to environmental effects. It is hoped that, if used from 'day one' of the offshore installation design process when facilities are first being laid out, this manual will prevent or minimise many helideck environmental problems at little or no extra cost to the design or construction of the installation.

NOTE: CAA Paper 2004/02 is reproduced in toto in Section 10 of the Offshore Helideck Design Guidelines sponsored by the Oil Industry Advisory Committee – Helicopter Liaison Group and published by the UK Health and Safety Executive.

2.3 Design Criteria

2.3.1 The design criteria given in the following paragraphs represent the current best information available and should be applied to new installations, significant modifications to existing installations, and to combined operations (where a mobile platform or vessel is operating in close proximity to another installation). In the case of multiple platform configurations, the design criteria should be applied to the arrangement as a whole.

NOTE: When considering the volume of airspace to which the following criteria apply, installation designers should consider the airspace up to a height above helideck level which takes into consideration the requirement to accommodate helicopter landing and take-off decision points or committal point. This is deemed to be up to a height above the helideck corresponding to 30 ft plus wheels-to-rotor height plus one rotor diameter.

2.3.2 All new build offshore helidecks, modifications to existing topside arrangements which could potentially have an effect on the environmental conditions around an existing helideck, or helidecks where operational experience has highlighted potential airflow problems should be subject to appropriate wind tunnel testing or CFD studies to establish the wind environment in which helicopters will be expected to operate. As a general rule, the vertical mean wind speed above the helideck should not exceed ± 0.9m/s (1.75 kts) for a windspeed of up to 25 m/s (48.6 kts). This equates to a wind vector slope of 2°. The helicopter operator should be informed at the earliest opportunity of any wind conditions for which this criterion is not met. Operational restrictions may be necessary.

2.3.3 Unless there are no significant heat sources on the installation or vessel, offshore duty holders should commission a survey of ambient temperature rise based on a Gaussian dispersion model and supported by wind tunnel tests or CFD studies for new build helidecks, modifications to existing topside arrangements, or for helidecks where operational experience has highlighted potential thermal problems. When the results of such modelling and/or testing indicate that there may be a rise of air temperature of more than 2°C (averaged over a 3 second time interval), the helicopter operator should be consulted at the earliest opportunity so that appropriate operational restrictions may be applied if necessary.

2.3.4 Previous editions of CAP 437 have suggested that 'some form of exhaust plume indication should be provided for use during helicopter operations, for example, by the production of coloured smoke'. Research has been conducted into the visualisation of gas turbine exhaust plumes and guidance on how this can be achieved in practice has been established. This work will be reported in a CAA paper in the near future and it is likely that a recommendation will be made for installations which have a known history of gas plume 'encounters' to give serious consideration to implementing systems to ensure effective visualisation of otherwise unseen exhaust plumes. In the interim period, it is recommended that offshore duty holders contact the CAA for guidance and advice.

2.3.5 A survey of offshore helicopter pilot opinion based on responses to a questionnaire on workload and safety hazards (CAA Paper 97009) rated 'turbulence around platforms' as the largest source of workload and presenting the largest safety risk of all aspects of offshore helicopter flight operations. A turbulence criterion has therefore been developed (see CAA Paper 2004/03) which stipulates a limit on the standard deviation of the vertical airflow velocity of 2.4m/s. This criterion should be considered as provisional and is presented here for information only pending satisfactory conclusion of the ongoing validation exercise.

2.3.6 The maximum permissible concentration of hydrocarbon gas within the helicopter operating area is 10% Lower Flammable Limit (LFL). Concentrations above 10% LFL have the potential to cause helicopter engines to surge or flame out with the consequent risk to the helicopter and its passengers. It should also be appreciated that, in forming a potential source of ignition for flammable gas, the helicopter can pose a risk to the installation itself. It is considered unlikely that routine 'cold flaring' will present any significant risk, but the operation of emergency blowdown systems should be assumed to result in excessive gas concentrations. Installation operators should have in place a management system which ensures that all helicopters in the vicinity of any such releases are immediately advised to stay clear.

NOTE: The installation of 'Status Lights' systems (see Chapter 4, paragraph 3.10) is not considered to be a solution to all potential flight safety issues arising from hydrocarbon gas emissions; these lights are only a warning that the helideck is in an unsafe condition for helicopter operations.

2.3.7 For 'permanent' multiple platform configurations, usually consisting of two or more bridge-linked fixed platforms in close proximity, where there is a physical separation of the helideck from the production and process operation, the environmental effects of hazards emanating from the 'remote' production platform should be considered on helideck operations. This is particularly appropriate for the case of hot or cold gas exhausts where there will always be a wind direction that carries the gas cloud from a neighbouring platform (bridge-linked module) in the direction of the helideck.

2.3.8 For 'temporary' combined operations, where one mobile installation or vessel (e.g. a flotel) is operated in close proximity to a fixed installation, the environmental effects of hazards emanating from one installation (or vessel) on the other installation (or vessel) should be fully considered. This 'assessment' should consider the effect of the turbulent wake from one platform impinging on the helideck of the other, and of any hot or cold gas exhausts from one installation or vessel influencing the approach to the other helideck. On occasions there may be more than two installations and/ or vessels in a 'temporary combined' arrangement. Where this is the case, the effect of turbulent wake and hot gas exhausts from each installation or vessel on all helideck operations within the combined arrangement should be considered.

NOTE: Section 2 is primarily concerned with the issue of environmental effects on the helideck design. In respect of permanent multi-platform configurations and 'temporary' combined operations there are a number of other considerations that may need to be addressed. These include, but may not be limited to, the effect of temporary combined operations on helideck obstacle protection criteria.

Additional considerations are described in more detail in the OIAC HLG sponsored 'Offshore Helideck Design Guidelines' and UKOOA 'Guidelines for the Management of Offshore Helideck Operations'.

3 Structural Design

3.1 The take-off and landing area should be designed for the heaviest and largest helicopter anticipated to use the facility (see Table 1). Helideck structures should be designed in accordance with the ICAO (International Civil Aviation Organisation) requirements (the Heliport Manual), ISO (International Standards Organisation) codes for offshore structures and, for a floating installation, the relevant IMO (International Maritime Organisation) code. The maximum size and mass of helicopter for which the helideck has been designed should be stated in the Installation/Vessel Operations Manual and Verification and/or Classification document.

3.2 Optimal operational flexibility will be gained from considering the potential life and usage of the facility along with likely future developments in helicopter design and technology.

3.3 Consideration should also be given in the design to other types of loading such as personnel, traffic, snow, freight, fuelling equipment etc. as stated in the ICAO Heliport Manual and other requirements. It may be assumed that single main rotor helicopters will land on the wheel or wheels of two main undercarriages (or skids if fitted) and that the tandem main rotor helicopter will land on the wheel or wheels of all main undercarriages. The resulting loads should be divided equally between two main undercarriages. For tandem main rotor helicopters the total loads imposed on the structure should be considered as concentrated loads acting at the centres of the undercarriages of the specified helicopter and distributed between the main undercarriages in the same proportions as the maximum static loads. These concentrated undercarriage loads should normally be treated as point loads. Where advantageous a tyre contact area may be assumed in accordance with the manufacturer's specification. Plastic design considerations may be applied to the deck (i.e. plating and stiffeners) but elastic design should be used for the main supporting members (girders, trusses, pillars, columns, etc.) so as to limit deflections and reduce the likelihood of the helideck structure being so damaged as to prevent other helicopters from landing.

NOTES: 1 Requirements for the structural design of helidecks will be set out in ISO 19901-3 Petroleum and Natural Gas Industries – Specific Requirements for Offshore structures, Part 3: Topsides Structure to be published in 2005). Useful guidance is also given in OIAC publication 'Offshore Helideck Design Guidelines' published by the Health and Safety Executive.

2 Consideration should be given to the possibility of accommodating an unserviceable helicopter in the parking or run off area to the side of the helideck to allow a relief helicopter to land. If this contingency is designed into the construction/operating philosophy of the installation, the helicopter operator should be advised of any weight restrictions imposed on the relief helicopter by the structural integrity considerations.

3 Alternative loading criteria equivalent to those recommended here and in Sections 4 and 5 may be used where aircraft specific loads have been derived by the aircraft manufacturer from a suitable engineering assessment taking account of the full range of potential landing conditions, including failure of a single engine at a critical point, and the behaviour of the aircraft undercarriage and the response of the helideck structure. The aircraft manufacturer should provide information to interested parties, including the owner or operator of the installation and the helicopter operator to justify any such alternative criteria. The aircraft

manufacturer may wish to seek the opinion of the CAA on the basis of the criteria to be used. In consideration of alternative criteria, the CAA is content to assume that a single engine failure is the case among likely survivable emergencies which would generate the highest vertical rate of descent on to the helideck.

4 Loads – Helicopters Landing

The helideck should be designed to withstand all the forces likely to act when a helicopter lands including:

a) **Dynamic load due to impact landing**. This should cover both a heavy normal landing and an emergency landing. For the former, an impact load of 1.5 x maximum take-off mass (MTOM) of the helicopter should be used, distributed as described in Section 3 above. This should be treated as an imposed load, applied together with the combined effect of b) to f) below in any position on the safe landing area so as to produce the most severe landing condition for each element concerned. For an emergency landing, an impact load of 2.5 x MTOM should be applied in any position on the landing area together with the combined effects of b) to f) inclusive. Normally the emergency landing case will govern the design of the structure.

b) **Sympathetic response of landing platform**. The dynamic load (see a) above) should be increased by a structural response factor depending upon the natural frequency of the helideck structure, after considering the design of its supporting beams and columns and the characteristics of the designated helicopter. It is recommended that a structure response factor of 1.3 should be used unless further information is available to allow a lower factor to be calculated. Information required to do this will include the natural periods of vibration of the helideck and dynamic characteristics of the designated helicopter and its landing gear.

c) **Overall superimposed load on the landing platform**. To allow for snow, personnel etc. in addition to wheel loads, an allowance of 0.5 kN/m2 should be added over the whole area of the helideck.

d) **Lateral load on landing platform supports**. The landing platform and its supports should be designed to resist concentrated horizontal imposed loads equivalent to 0.5 x maximum take-off mass of the helicopter, distributed between the undercarriages in proportion to the applied vertical loading in the direction which will produce the most severe loading on the element being considered.

e) **Dead load of structural members**.

f) **Wind loading**. Wind loading should be allowed for in the design of the platform. This should be applied in the direction which, together with the imposed lateral loading, will produce the most severe loading condition on each element.

g) **Punching shear**. A check should be made for the punching shear from an undercarriage wheel with a contact area of 65 x 10^3 mm^2 acting in any probable location. Particular attention to detailing should be taken at the junction of the supports and the platform deck.

5 Loads – Helicopters at Rest

The helideck should be designed to withstand all the applied forces that could result from a helicopter at rest; the following should be taken into account:

a) **Imposed load from helicopter at rest**. The entire helideck, including any separate parking or run off area, should be designed to resist an imposed load equal to the maximum take-off mass of the helicopter. This load should be distributed between all the undercarriages of the helicopter. It should be applied in any position on the helicopter platform so as to produce the most severe loading condition for each element considered.

b) **Overall superimposed load, dead load and wind load**. The values for these loads are the same as given in Section 4 above and should be considered to act in combination with a) above. Consideration should also be given to the additional wind loading from any parked or secured helicopter.

c) **The effect of acceleration forces and other dynamic** amplification forces arising from the predicted motions of mobile installations and vessels, in the appropriate environmental conditions corresponding to a 10-year return period, should be considered.

6 Size and Obstacle Protected Surfaces

NOTE: The location of a specific helideck is often a compromise given the competing requirements for space. Helidecks should be at or above the highest point of the main structure. This is a desirable feature but it should be appreciated that if this entails a landing area much in excess of 60m above sea level, the regularity of helicopter operations may be adversely affected in low cloud base conditions.

6.1 For any particular type of single main rotor helicopter, the helideck should be sufficiently large to contain a circle of diameter D equal to the largest dimension of the helicopter when the rotors are turning. This D circle should be totally unobstructed (see Table 1 for D values). Due to the actual shape of most offshore helidecks the D circle will be ‘imaginary’ but the helideck shape should be capable of accommodating such a circle within its physical boundaries.

6.2 From any point on the periphery of the above mentioned D circle an obstacle-free approach and take-off sector should be provided which totally encompasses the safe landing area (and D circle) and which extends over a sector of at least 210°. Within this sector, and out to a distance of 1000 metres from the periphery of the landing area, only the following items may exceed the height of the landing area, but should not do so by more than 0.25 metres:

- the guttering associated with the requirements in paragraph 7.2;
- the lighting required by Chapter 4;
- the outboard edge of the safety net required in paragraph 9.1;
- the foam monitors;
- those handrails and other items associated with the landing area which are incapable of complete retraction or lowering for helicopter operations.

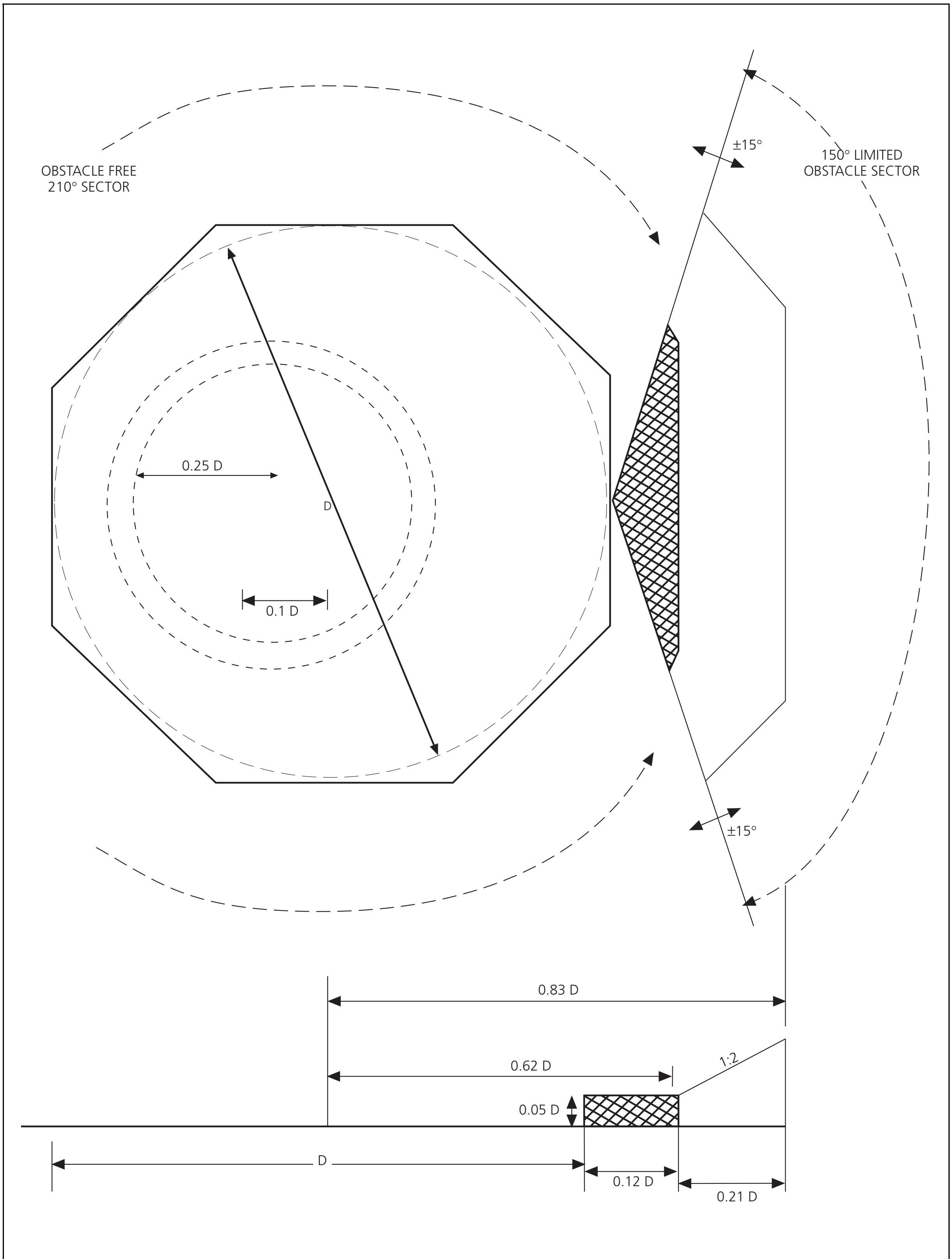


Figure 1 Obstacle Limitation (Single Main Rotor and Side by Side Main Rotor Helicopters) showing position of Aiming Circle

6.3 The bisector of the 210° obstacle-free sector should normally pass through the centre of the D circle. The sector may be 'swung' by up to 15° as illustrated in Figure 1 but not for bi-directional landing rectangles (See Chapter 10). Acceptance of the 'swung' criteria will normally only be applicable to existing Installations.

NOTE: If, for an existing installation, the 210° obstacle-free sector is swung, then it would be normal practice to swing the 180° falling 5:1 gradient by a corresponding amount to indicate, and align with, the swung OFS.

6.4 The Diagram at Figure 1 shows the extent of the two segments of the 150° Limited Obstacle Sector (LOS) and how these are measured from the centre of the (imaginary) 'D' Circle and from the perimeter of the safe landing area (SLA). This diagram assumes, since most helidecks are designed to the minimum requirement of accommodating a 1 'D' Circle, that the 'D' Circle perimeter and SLA perimeter are coincidental. No objects above 0.05D are permitted in the first (hatched area in Figure 1) segment of the LOS. The first segment extends out to 0.62D from the centre of the 'D' Circle, or 0.12D from the SLA perimeter marking. The second segment of the LOS, in which no obstacles are permitted within a rising 1:2 slope from the upper surface of the first segment, extends out to 0.83D from the centre of the 'D' Circle, or a further 0.21D from the edge of the first segment of the LOS.

The exact point of origin of the LOS is assumed to be at the periphery of the 'D' Circle.

Some helidecks are able to accommodate a SLA which covers a larger area than the declared 'D' value; a simple example being a rectangular deck with the minor dimension able to contain the 'D' Circle. In such cases it is important to ensure that the origin of the LOS (and OFS) is at the SLA perimeter as marked by the perimeter line. Any SLA perimeter should guarantee the obstacle protection afforded by both segments of the LOS. The respective measurements of 0.12D from the SLA perimeter line, plus a further 0.21D are to be applied. On these larger decks there is thus some flexibility in deciding the position of the perimeter line and SLA in order to meet the LOS requirements and when considering the position and height of fixed obstacles. Separating the origin of the LOS from the perimeter of the 'D' Circle in Figure 1 and moving it to the right of the page will demonstrate how this might apply on a rectangular SLA.

The extent of the LOS segments will, in all cases, be lines parallel to the SLA perimeter line and follow the boundaries of the SLA perimeter (see Figure 1). Only in cases where the SLA perimeter is circular will the extent be in the form of arcs to the 'D' circle. However, taking the example of an octagonal SLA as drawn at Figure 1, it would be possible to replace the angled corners of the two LOS segments with arcs of 0.12D and 0.33D centred on the two adjacent corners of the SLA; thus cutting off the angled corners of the LOS segments. If these arcs are applied they should not extend beyond the two corners of each LOS segment so that minimum clearances of 0.12D and 0.33D from the corners of the SLA are maintained. Similar geometric construction may be made to a square or rectangular SLA but care should be taken to ensure that the LOS protected surfaces minima can be satisfied from all points on the SLA perimeter.

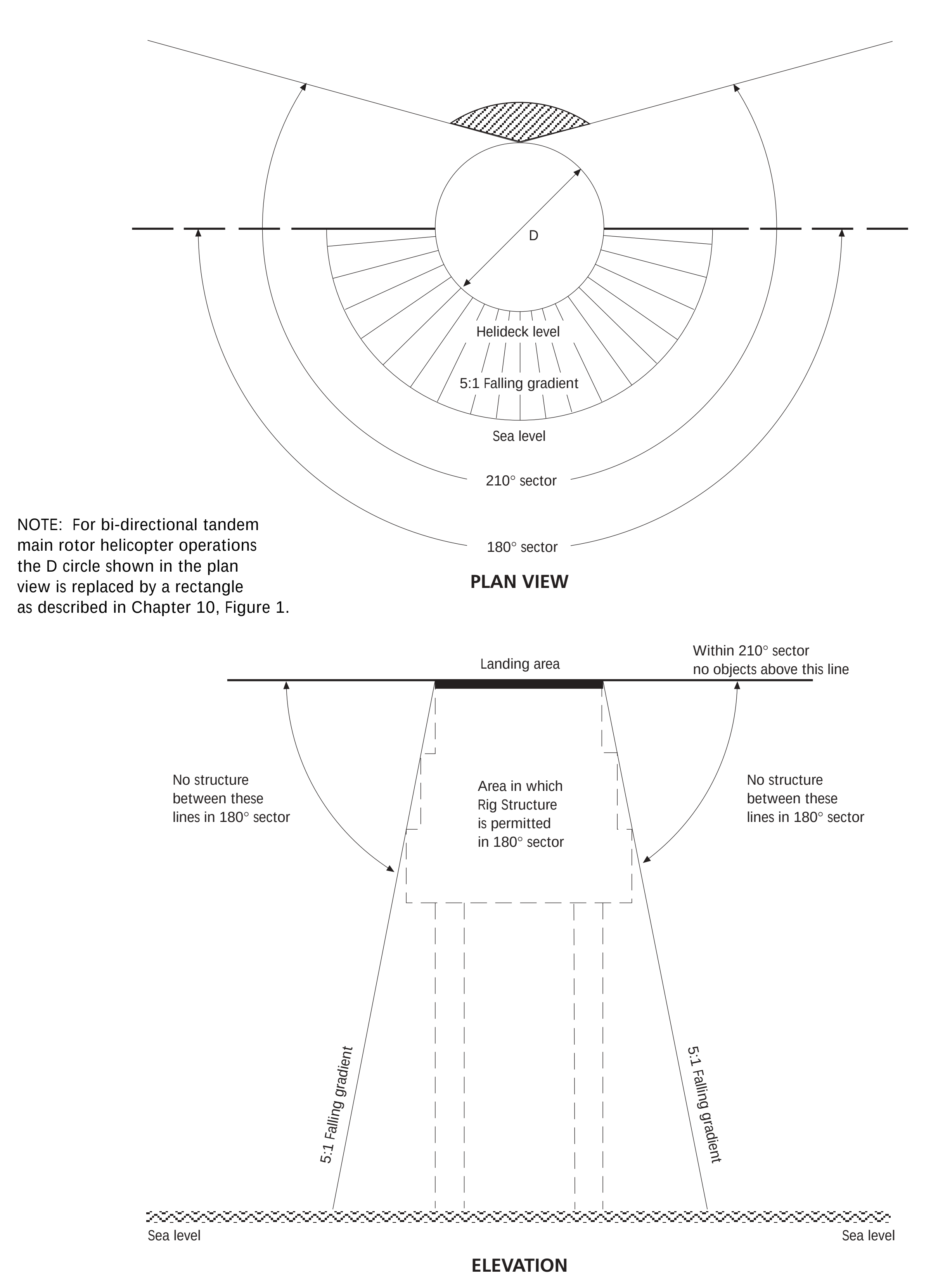


Figure 2 Obstacle-Free Areas – Below Landing Area Level (for all types of helicopters)

6.5 Whilst application of the criteria in paragraph 6.2 above will ensure that no unacceptable obstructions exist above the helicopter landing area level over the whole 210° sector, it is necessary to consider the possibility of helicopter loss of height due to power unit failure during the latter stages of the approach or early stages of take-off. Accordingly, a clear zone should be provided below landing area level on all fixed and mobile installations between the helideck and the sea. This falling 5:1 protected surface should be provided over **at least** 180° and ideally it should cover the whole of the 210° OFS, with an origin at the centre of the 'D' Circle, and extending outwards for 1000 metres (see Figure 2). All objects that are underneath anticipated final approach paths should be assessed.

NOTE: For practical purposes the falling obstacle limitation surface can be assumed to be defined from points on the outboard edge of the helideck perimeter safety netting supports (1.5 metres from deck edge). Minor infringements of the surface by foam monitor platforms or access/escape routes may be accepted only if they are essential to the safe operation of the helideck but may also attract helicopter operational limitations.

NOTE: Research completed in 1999 demonstrated that, following a single engine failure in a twin engine helicopter after take-off decision point, and assuming avoidance of the deck edge, the resulting trajectory will carry the helicopter clear of any obstruction in the range 2:1 to 3:1. It is therefore only necessary for operators to account for performance in relation to specified 5:1 falling gradient when infringements occur to a falling 3:1 rather than a 5:1 slope.

6.6 It is recognised that when support installations, such as 'flotels' and crane-barges are operating close to other installations, it will not always be possible to meet the horizontal and vertical obstacle protected surface requirements. In these circumstances, installation operators should attempt to meet the above criteria as closely as possible when planning the siting of a combination of installations or an installation and a vessel, and should forward drawings of the proposed configuration to the HCA as early as possible in the process for assessment and consultation on the operational aspects. Consultation with the helicopter operators in the early planning stages will help to optimise helicopter operations for support installation location.

NOTE: As a general rule, on helidecks where obstacle protected surfaces are infringed by other installations or vessels which are positioned within 1000 metres of the point of origin of the sector, it may be necessary to impose helicopter operating restrictions on one or all helidecks affected.

6.7 It is accepted that, at times, short term infringement to obstacle protected surfaces cannot be avoided when, for example, supply/support vessels work close to an installation. It may be impractical to assess such situations within the time available. However, the helicopter operator may need to apply operational limitations in such circumstances. It is therefore important for helicopter crews to be kept informed of all temporary infringements.

7 Surface

7.1 The landing area should have an overall coating of non-slip material and all markings on the surface of the landing area should be made with the same non-slip materials. Whilst extruded section or grid construction aluminium (or other) decks may incorporate adequate non-slip profiles in their design, it is preferable that they are also coated with a non-slip material unless adequate friction properties have been designed into the construction. It is important that the friction properties exist in all directions. Over-painting friction surfaces on such designs may compromise the friction properties. Recognised surface friction material is available commercially.

7.2 Every landing area should be equipped with adequate surface drainage arrangements and a free-flowing collection system that will quickly and safely direct any rainwater and fuel spillage and/or fire fighting media away from the helideck surface to a safe place. Helidecks on fixed installations should be cambered to approximately 1:100. Any distortion of the helideck surface on an installation due to, for example, loads from a helicopter at rest should not modify the landing area drainage system to the extent of allowing spilled fuel to remain on the deck. A system of guttering on a new build or a slightly raised kerb (permitted only for an existing installation or vessel) should be provided around the perimeter to prevent spilled fuel from falling on to other parts of the installation and to conduct the spillage to an appropriate drainage system. The capacity of the drainage system should be sufficient to contain the maximum likely spillage of fuel on the deck. The calculation of the amount of spillage to be contained should be based on an analysis of helicopter type, fuel capacity, typical fuel loads and uplifts. The design of the drainage system should preclude blockage by debris. The helideck area should be properly sealed so that spillage will only route into the drainage system.

7.3 Tautly-stretched rope netting should be provided to aid the landing of helicopters with wheeled undercarriages in adverse weather conditions. The intersections should be knotted or otherwise secured to prevent distortion of the mesh. It is preferable that the rope be 20 mm diameter sisal, with a maximum mesh size of 200 mm. The rope should be secured every 1.5 metres round the landing area perimeter and tensioned to at least 2225 N. Netting made of material other than sisal will be considered but netting should not be constructed of polypropylene type material which is known to rapidly deteriorate and flake when exposed to weather. Tensioning to a specific value may be impractical offshore. As a rule of thumb, it should not be possible to raise any part of the net by more than approximately 250 mm above the helideck surface when applying a vigorous vertical pull by hand. The location of the net should ensure coverage of the area of the Aiming Circle but should not cover the helideck Identification marking or ‘t’ value markings. Some nets may require modification to outboard corners so as to keep the Identification Marking uncovered. In such circumstances the dimensions given in Table 2 may be modified.

7.4 There are three sizes of netting as listed below in Table 2. The minimum size depends upon the type of helicopter for which the landing area is to be used as indicated in Table 1.

Table 2 Helicopter Deck Netting

Small	9 metres by 9 metres
Medium	12 metres by 12 metres
Large	15 metres by 15 metres

7.5 For fixed Normally Attended Installations (NAIs), where no significant movement due to environmental conditions occurs, provided the helideck can be shown to achieve an average surface friction value of not less than 0.65 determined by a test method acceptable to the CAA, the helideck landing net may be removed. The installation operator should ensure thereafter that the helideck is kept free from oil, grease, ice, snow, excessive surface water or any other contaminant, particularly guano, that could degrade surface friction. Assurance should be provided to the helicopter operator that procedures are in place for elimination and removal of contaminants prior to a helicopter movement. Following removal of the netting, the helideck should be re-tested at regular intervals. The criteria for initial removal and the frequency of subsequent testing should be approved by an ICP, subject to the guidance contained in CAA Paper 98002. Friction testing periodicity can be determined using a simple trend analysis as described in this paper. Table 3 indicates typical frequencies of inspection for given ranges of friction values.

Consideration to remove landing nets on NUIs may only be given if procedures are in place which guarantee that the helideck will remain clear of contaminants such that there is no risk of helideck markings and visual cues being compromised or friction properties reduced.

Landing nets on Mobile Installations have generally, in the absence of any research, been regarded as essential. However, it may be possible to present a Safety Case to the HCA for specific installations. The Safety Case should consider pitch, roll and heave limitations and will require flight testing and a certain amount of research work.

Table 3 Friction Requirements for Landing Area Net Removal

Average surface friction value	Maximum period between tests
0.85 and above (Recognised Friction Surface)[1]	36 months
0.7 to 0.84	12 months
0.65 to 0.69	6 months
Less than 0.65	Net to be retained

1. Refer to CAA Paper 98/002

Recent experience has shown that the removal of landing nets on some installations has provided undesirable side-effects. Although the landing net was designed specifically to enhance the friction properties of helideck surfaces, it would appear that its textural properties can also provide pilots with a rich set of visual cues in terms of rate of closure and lateral movement which are essential for pilots in what can otherwise be a poor cueing environment. Serious consideration should be given to this aspect before a landing net is removed. The helicopter operator should be consulted before existing landing nets are removed and Installation operators should be prepared to replace landing nets if so advised by the helicopter operator in the case that visual cueing difficulties exist. For these reasons it is also recommended that the design of new Installations should incorporate the provision of landing net fittings regardless of the type of friction surface to be provided.

8 Helicopter Tie-Down Points

8.1 Sufficient flush fitting (when not in use) or removable semi-recessed tie-down points should be provided for securing the maximum sized helicopter for which the helideck is designed. They should be so located and be of such strength and construction to secure the helicopter when subjected to weather conditions pertinent to the installation design considerations. They should also take into account, where significant, the inertial forces resulting from the movement of floating units.

8.2 Tie-down rings should be compatible with the dimensions of tie-down strop attachments. Tie-down rings and strops should be of such strength and construction so as to secure the helicopter when subjected to weather conditions pertinent to the installation design considerations. The maximum bar diameter of the tie-down ring should be 22 mm in order to match the strop hook dimension of the tie-down strops carried in UK offshore helicopters. Advice on recommended safe working load requirements for strop/ring arrangements for specific helicopter types can be obtained from the helicopter operator.

An example of a suitable tie-down configuration is shown at Figure 3. The HCA will provide guidance on the configuration of the tie-down points for specific helicopter types.

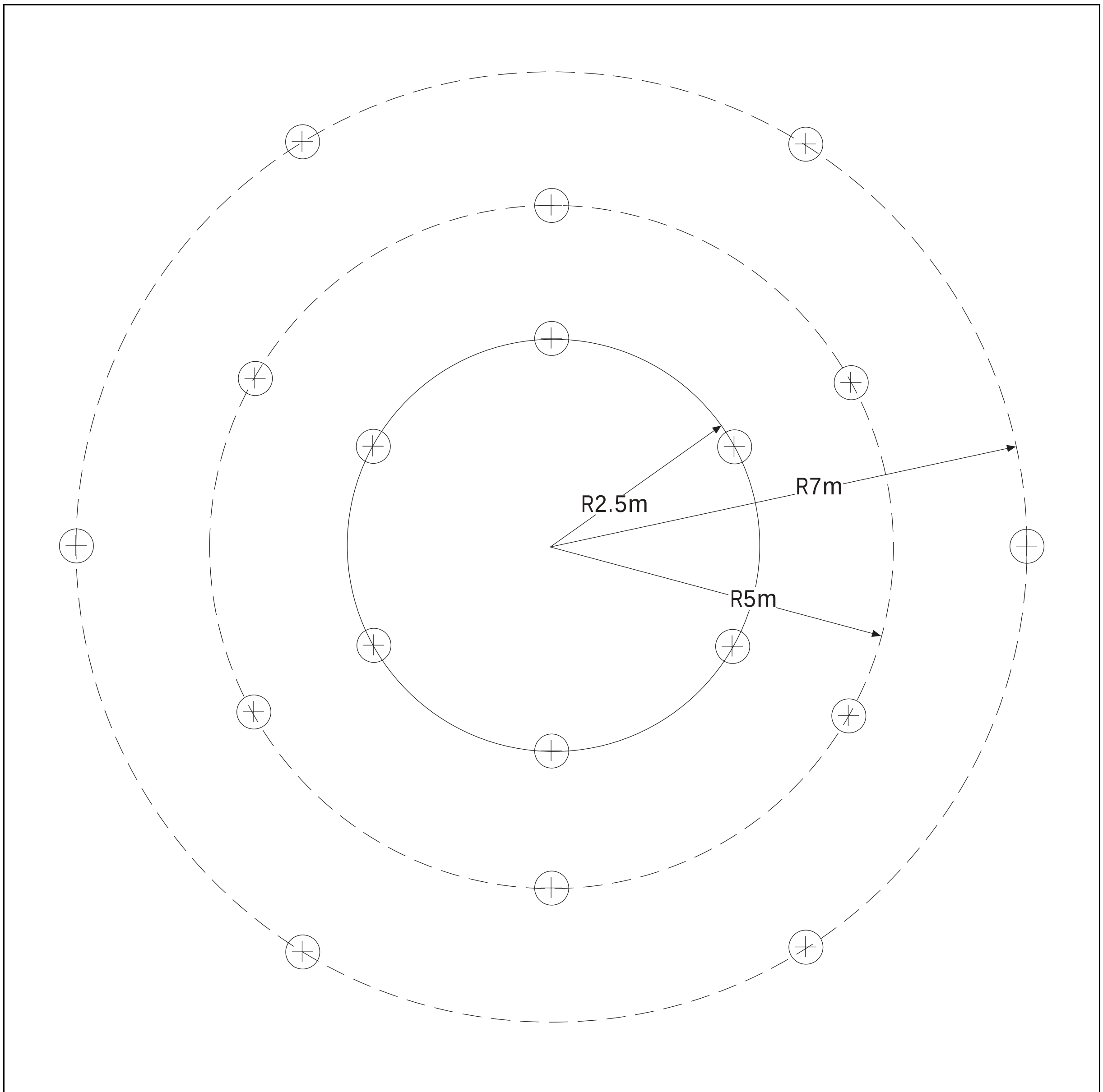


Figure 3 Example of Suitable Tie-down Configuration

NOTES:
1. The tie-down configuration should be based on the centre of the Aiming Circle marking.
2. Additional tie-downs will be required in a parking area.
3. The outer circle is not required for 'D' values of less than 22.2 m.

9 Safety Net

9.1 Safety nets for personnel protection should be installed around the landing area except where adequate structural protection against falls exists. The netting used should be of a flexible nature and be manufactured from non-flammable material, with the inboard edge fastened level with, or just below, the edge of the helicopter landing deck. The net itself should extend 1.5 metres in the horizontal plane and be arranged so that the outboard edge is slightly above the level of the landing area, but by not more than 0.25 metres, so that it has an upward and outward slope of at least 10°. The net should be strong enough to withstand and contain, without damage, a 100 kg weight being dropped from a height of 1 metre.

9.2 A safety net designed to meet these criteria should not act as a trampoline giving a 'bounce' effect. Where lateral or longitudinal centre bars are provided to strengthen the net structure they should be arranged and constructed to avoid causing serious injury to persons falling on to them. The ideal design should produce a 'hammock' effect which should securely contain a body falling, rolling or jumping into it, without serious injury. When considering the securing of the net to the structure and the materials used, care should be taken that each segment will meet adequacy of purpose considerations. Polypropylene deteriorates over time; various wire meshes have been shown to be suitable if properly installed.

10 Access Points

10.1 Many helicopters have passenger access on one side only and helicopter landing orientation in relation to landing area access points becomes important because it is necessary to ensure that embarking and disembarking passengers are not required to pass around the helicopter tail rotor, or under the main rotor of those helicopters with a low profile rotor, when a 'rotors-running turn-round' is conducted (in accordance with normal offshore operating procedures).

10.2 There should be a minimum of two access/egress routes to the helideck. The arrangements should be optimised to ensure that, in the event of an accident or incident on the helideck, personnel will be able to escape upwind of the landing area. Adequacy of the emergency escape arrangements from the helideck should be included in any evacuation, escape and rescue analysis for the installation, and may require a third escape route to be provided.

10.3 The need to preserve, in so far as possible, an unobstructed falling 5:1 gradient (see paragraphs 6.5 and 6.6 above) and the provision of up to three helideck access/ escape routes, with associated platforms, may present a conflict of requirements. A compromise may therefore be required between the size of the platform commensurate with its effectiveness and the need to retain the protection of an unobstructed falling 5:1 gradient. In practice, the 5:1 gradient is taken from the outboard edge of the helideck perimeter safety net supports. Emergency access points which extend outboard from the perimeter safety net constitute a compromise in relation to an unobstructed falling 5:1 gradient which may lead, in some instances, to the imposition of helicopter operating limitations. It is therefore important to construct access point platforms in such a manner as to infringe the falling 5:1 gradient by the smallest possible amount but preferably not at all. Suitable positioning of two major access points clear of the requirements of the protection of the falling 5:1 gradient should always be possible. However, the third access referred to at paragraph 10.2 will probably lie within the falling 5:1 sector and where this is the case it should be constructed within the dimensions of the helideck perimeter safety net supports (i.e. contained within 1.5 metres of the edge of the landing area).

10.4 Where foam monitors are co-located with access points care should be taken to ensure that no monitor is so close to an access point as to cause injury to escaping personnel by operation of the monitor in an emergency situation.

10.5 Where handrails associated with helideck access/escape points exceed the height limitations given at paragraph 6.2 they should be retractable, collapsible or removable. When retracted, collapsed or removed the rails should not impede access/egress.

Handrails which are retractable, collapsible and removable should be painted in a contrasting colour scheme. Procedures should be in place to retract, collapse, or remove them prior to helicopter arrival. Once the helicopter has landed, and the crew have indicated that passenger movement may commence (see Note below), the handrails may be raised and locked in position. The handrails should be retracted, collapsed, or removed again prior to the helicopter taking-off.

NOTE: The helicopter crew will switch off the anti-collision lights to indicate that the movement of passengers and/or freight may take place (under the control of the HLO). Installation/Vessel safety notices placed on approach to the helideck access should advise personnel not to approach the helicopter when the anti-collision lights are on.

11 Winching Operations

It should be noted that for any installation or vessel, attended or unattended, fixed or mobile for which helicopters are a normal mode of transport for personnel, a helicopter landing area should be provided. Winching should not be adopted as a normal method of transfer. However, if winching operations are required, they should be conducted in accordance with procedures agreed between the helicopter operator and the CAA and contained within the Helicopter Operator's Operations Manual. Requirements for winching operations should be discussed with the specific helicopter operator well in advance. Winching areas are described in more detail in Chapter 9.

12 Normally Unattended Installations (NUIs)

12.1 The CAA provides guidance for helicopter operators on the routeing of helicopters intending to land on NUIs. The CAA will also provide such guidance and advice to helicopter operators and installation operators in consideration of specific Installation Safety Cases and risk analyses which address routeing philosophy.

12.2 Guano and associated bird debris is a major problem for NUIs. Associated problems concern the health hazard on board; degradation of visual aids (markings and lighting) and friction surfaces; and the potential for FOD. Helicopter operators should monitor the condition of NUI helidecks and advise the owner/operator **before** markings and lighting degradation becomes a safety concern. Experience has shown that, unless adequate cleaning operations are undertaken or effective preventative measures are in place, essential visual aids will quickly become obliterated. NUIs should be monitored continuously for signs of degradation of visual cues and flights should not be undertaken to helidecks where essential visual cues for landing are insufficient.

12.3 Guano is an extremely effective destroyer of friction surfaces whenever it is allowed to remain. Because of the difficulty of ensuring that a friction surface is kept clear of contaminants (see paragraph 7.5 above), permanent removal of the landing net on NUIs is not normally a viable option unless effective preventative measures are in place.

Chapter 4 Visual Aids

1 General

1.1 The name of the installation should be clearly displayed in such positions on the installation so that it can be readily identified from the air and sea from all normal angles and directions of approach. For identification from the air the helideck name and the side identification panels are used. It is not necessary, neither is it a legal requirement, to complicate recognition processes by inclusion of ‘Block Numbers’, Company logos, or other designators. In fact, complication of identifiers can be confusing and will unnecessarily, and undesirably, extend the mental process of recognition at the critical time when the pilots’ concentration is being fully exercised by the demands of the landing manoeuvre. The names on both identification markings should be identical, simple and unique and facilitate unambiguous communication via radio. The approved radio callsign of the installation should be the same name as the helideck and side panel identifier. Where the inclusion of ‘block numbers’ on side identification panels is deemed to be **essential (i.e. for purposes other than recognition)**, the **name** of the installation should also be included; e.g. ‘NAME. BLOCK NO.’ The installation identification panels should be highly visible in all light conditions and located high up on the installation (e.g. derrick). They should be suitably illuminated at night and in conditions of poor visibility. In order to minimise the possibility of ‘wrong rig landings’ the use of new technology is encouraged so that identification can be confirmed in the early stages of the approach by day and night. Modern technology is capable of meeting this requirement in most ambient lighting conditions. Use of high-intensity LED cluster or fibre-optic systems in other applications have been shown to be effective even in severely reduced visibility. Additionally, it is recognised that alternative technologies have been developed consisting of highly visible reflective side signage that has been successfully installed on some installations with the co-operation of the helicopter operator. (HSE Operations Notice 39, dated January 2002, provides ‘Guidance on identification of offshore installations’).

1.2 Helideck markings (specifically the installation identification marking) and side identification panels are used by pilots to obtain a final pre-landing confirmation that the correct helideck is being approached. It is therefore **VITAL** that the helideck markings and side identification panels are maintained in the best possible condition, regularly re-painted and kept free of all visibility-reducing contaminants. Helideck owners/operators should ensure that specific inspection and re-painting maintenance procedures and schedules for helideck markings and side identification panels take account of the importance of their purpose. Side identification panels should be kept free of any obscuring paraphernalia (draped hoses etc.) and be as high as possible on the structure.

1.3 The installation identification (see paragraphs 1.1 and 1.2) should be marked on the helideck surface between the origin of the obstacle-free sector and the aiming circle in symbols not less than 1.2 metres high and in a colour (normally white) which contrasts with the helideck surface. The name should not be obscured by the deck net. Where there is insufficient space to place the helideck marking in this position, the marking position should be agreed with the HCA (see also Chapter 3, paragraph 7.3).

1.4 Helideck perimeter line marking and lighting serves to identify the limits of the Safe Landing Area (SLA – see Glossary) for day and night operations.

1.5 A wind direction indicator (windsock) should be provided and located so as to indicate the (clear) **area** wind conditions at the installation/vessel location. It is often inappropriate to locate the windsock as close to the helideck as possible where it may compromise obstacle protected surfaces, create its own dominant obstacle or be subjected to the effects of turbulence from structures resulting in an unclear wind indication. The windsock should be illuminated for night operations. Some installations may benefit from a second windsock to indicate a specific difference from the area wind.

1.6 For character marking dimensions, where character bar width is not specified, use 15% of character height with 10% of character height between characters (extreme right-hand edge of one character to extreme left-hand edge of next character) and approximately 50% of character height between words.

2 Helideck Markings
(See Figure 1)

2.1 The colour of the helideck should be dark green or dark grey. The perimeter of the SLA should be clearly marked with a white painted line 0.3 metres wide. (See Chapter 3, paragraph 7.1.)

Aluminium helidecks are in use throughout the offshore industry. Some of these are a natural light grey colour and may present painting difficulties. The natural light grey

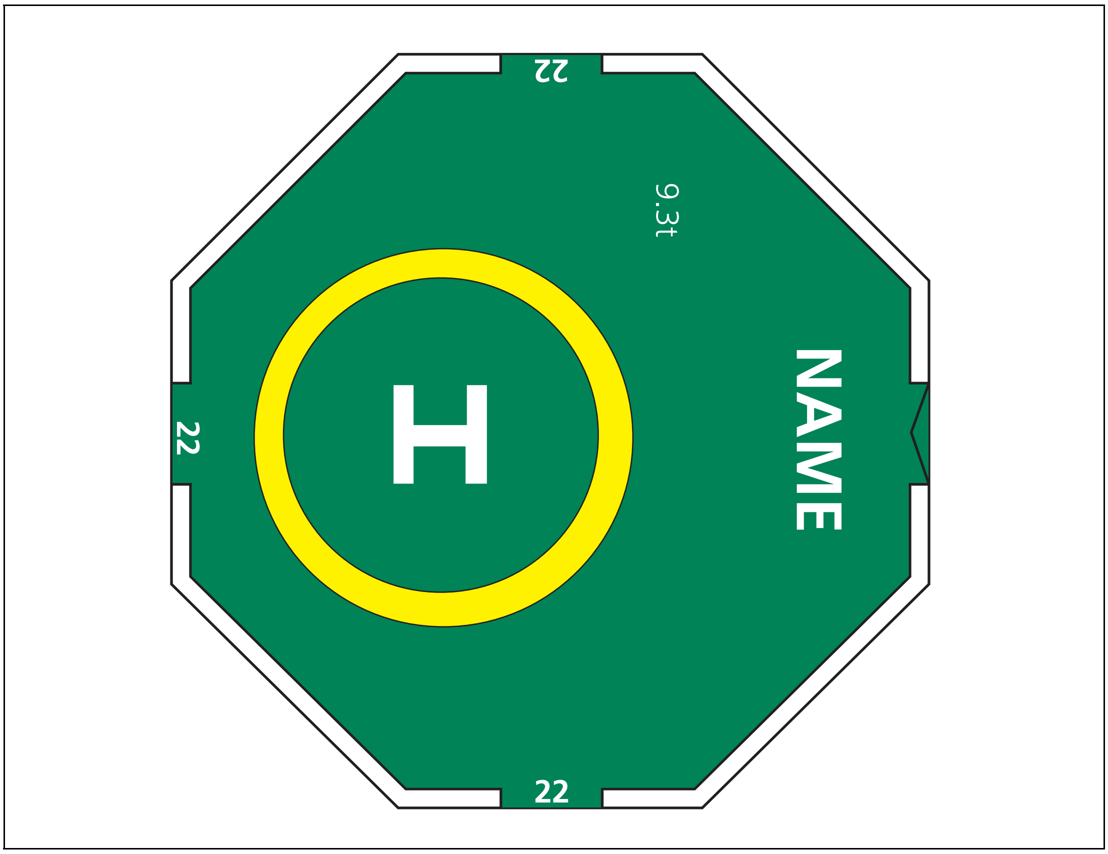


Figure 1 Markings (Single Main Rotor Helicopters)

colour of aluminium may be acceptable in specific helideck applications where these are agreed with the HCA. This should be discussed in the early design phase. In such cases the conspicuity of the helideck markings may need to be enhanced by, for example, outlining the deck marking lines and characters with a thin black line (typically 10 cm). Alternatively, conspicuity may be enhanced by overlaying white markings on a painted black background.

2.2 The origin of the 210° obstacle-free sector (OFS) for approach and take-off as specified in Chapter 3 should be marked on the helideck by a black chevron, each leg being 0.79 metres long and 0.1 metres wide forming the angle in the manner shown in Figure 2. On minimum sized helidecks where there is no room to place the chevron where indicated, the chevron marking, but **not** the point of origin, may be displaced towards the D circle centre. The HCA should be consulted in situations where this is necessary. Where the obstacle-free sector is swung in accordance with the provision of Chapter 3 paragraph 6.3 this should be reflected in the alignment of the chevron. The purpose of the chevron is to delineate the separation of the 210° OFS and 150° limited obstacle sector (LOS). Prior to the helicopter being given clearance to land, the HLO should ensure that there are no obstacles in the 210° OFS other than those identified in the HLAC and/ or HLL. The black chevron may be painted on top of the (continuous) white perimeter line to achieve maximum clarity for the helideck crew.

The actual D-value of the helideck (see Chapter 3, paragraph 6.1) should be painted on the helideck inboard of the chevron in alphanumeric symbols of 0.1 metres high. Where, for an existing installation, a helideck has been accepted which does not meet the normal obstacle-free sector requirements of 210°, the black chevron should represent the angle which has been accepted and this value should be marked inboard of the chevron in a similar manner to the certificated D-value. It is expected that new builds will comply in full with the requirement to provide a minimum 210° obstacle-free sector.

The helideck D-value should also be marked around the perimeter of the helideck in the manner shown in Figure 1 in a colour contrasting (preferably white: avoid black or grey for night use) with the helideck surface. The D-value should be to the nearest whole number with 0.5 rounded down e.g. 18.5 marked as 18 (see Chapter 3, Table 1).

NOTE: Helidecks designed specifically for AS332L2 and EC 225 helicopters, each having a D-value of 19.5 m, should be rounded up to 20 in order to differentiate between helidecks designed specifically for L1 models.

2.3 A maximum allowable mass marking should be marked on the helideck in a position which is readable from the preferred final approach direction i.e. towards the obstacle-free sector origin. The marking should consist of a two- or three-digit number expressed to one decimal place rounded to the nearest 100 kg and followed by the letter ‘t’ to indicate the allowable helicopter weight in tonnes (1000 kg). The height of the figures should be 0.9 metres with a line width of approximately 0.12 metres and be in a colour which contrasts with the helideck surface (preferably white: avoid black or grey). Where possible the mass marking should be well separated from the installation identification marking (see paragraph 1.3) in order to avoid possible confusion on recognition. Refer also to Figure 1 and Chapter 3 paragraph 6.3 and Table 1.

2.4 An aiming circle should be provided as follows: (see Figures 1 and 3).

The marking should be a yellow circle with an inner diameter of 0.5 of the certificated D-value of the helideck and a line width of 1 metre. Its centre should be displaced 0.1 D from the centre of the D-circle towards the outboard edge of the helideck along the bisector of the obstacle-free sector in order to achieve an increased safety margin for tail rotor clearance. On smaller helidecks with a D-value up to and including 16.00 m and for bow-mounted helidecks on vessels, there is a case for making the aiming circle concentric with the helideck centre to ensure maximisation of space all round for safe personnel movement and optimisation of the visual cueing environment. (See Figure 3).

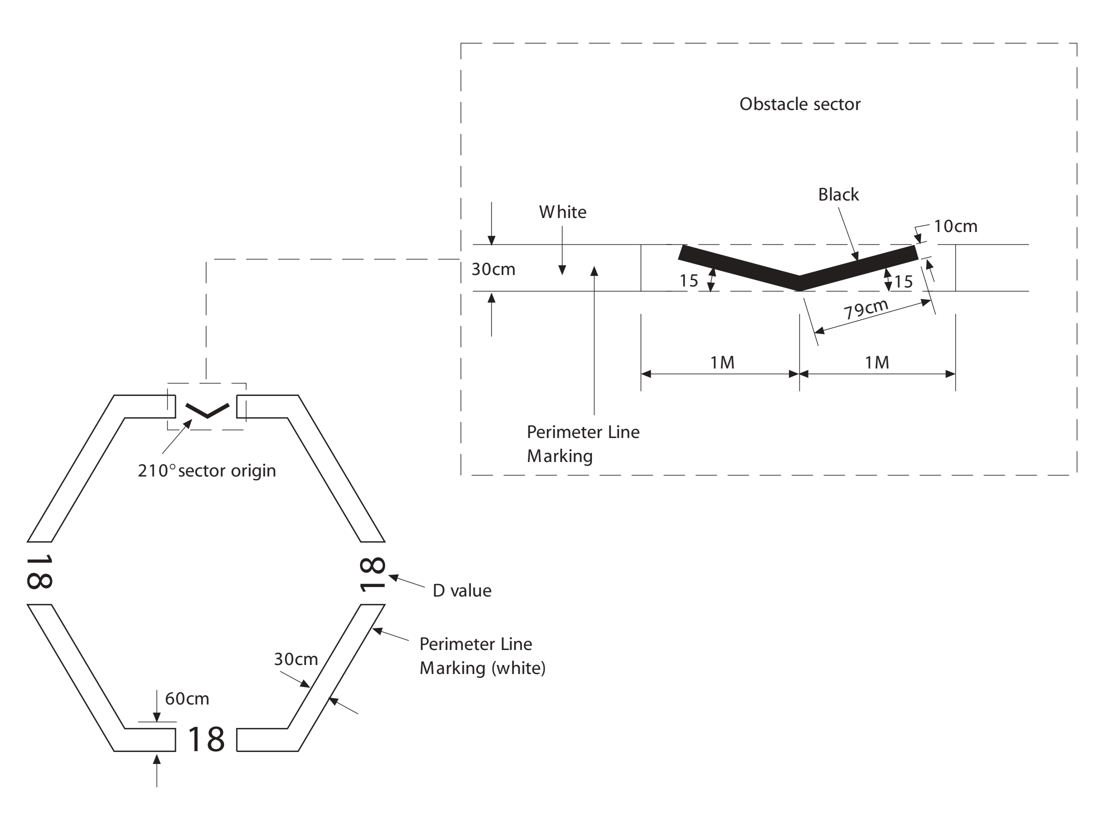


Figure 2 Helideck D-Value and Obstacle-free Marking (not to scale)

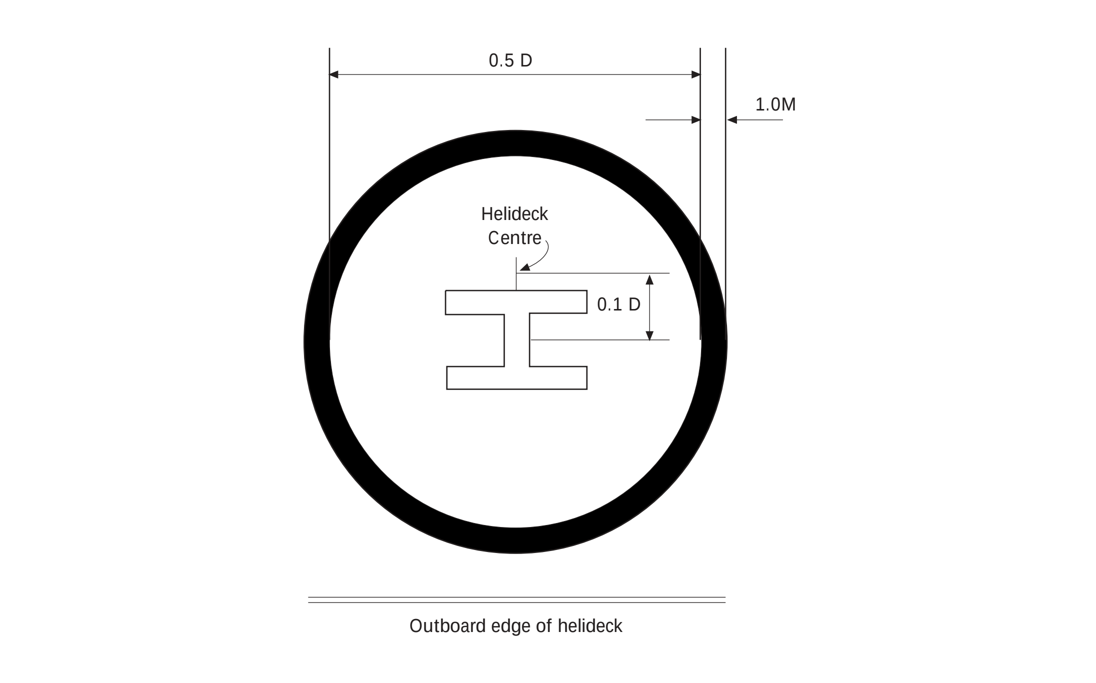


Figure 3 Aiming Circle Marking (Aiming Circle to be painted yellow)

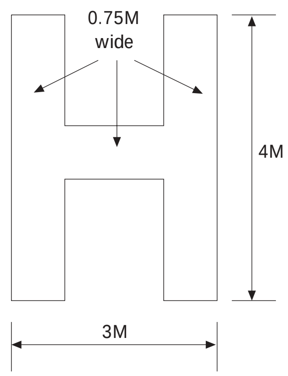


Figure 4 Dimensions of 'H' ('H' to be painted white)

NOTE: On those decks where the aiming circle is concentric with the centre of the D-circle or SLA, the need for some mitigation against concerns over tail rotor clearances should be considered either by achieving more obstacle clearance in the 150° LOS or by adopting appropriate operational procedures (e.g. vessel to provide relative wind from beam or stern).

A white 'H' should be marked co-located with the aiming circle with the crossbar of the 'H' lying along the bisector of the obstacle-free sector. Its dimensions are as shown in Figure 4.

Where the obstacle-free sector has been swung in accordance with Chapter 3 paragraph 6.3 the positioning of the aiming circle and 'H' should comply with the normal unswung criteria. The 'H' should however be orientated so that the bar is parallel to the bisector of the swung sector.

2.5 Prohibited landing heading sectors should be marked where it is necessary to protect the helicopter from landing or manoeuvring in close proximity to limiting obstructions which, for example, infringe the 150° limited obstacle sector protected surface. In addition, for existing installations where the number of deck access points is limited (see Chapter 3, Section 10), prohibited landing heading sectors may be desirable to avoid placing the tail rotor in close proximity to access stairs. Where required, prohibited sector(s) are to be shown by red hatching of the aiming circle, with white and red hatching extending from the red hatching out to the edge of the safe landing area as shown in Figures 5 and 6.

When positioning over the touchdown area helicopters should be manoeuvred so as to keep the aircraft **nose** clear of the hatched prohibited sector(s) at all times.

2.6 For certain operational or technical reasons an installation may have to prohibit helicopter operations. In such circumstances, where the helideck cannot be used, the 'closed' state of the helideck should be indicated by use of the signal shown in Figure 7. This signal is the standard 'landing prohibited' signal given in the Rules of the Air and Air Traffic Control Regulations, except that it has been altered in size to just cover the letter 'H' inside the aiming circle.

2.7 **Exceptionally**, helideck markings which do not comply with the above may be agreed with the HCA.

2.8 Colours should conform with the following BS 381C (1996) standard or the equivalent BS 4800 colour.

a) RED

BS 381C: 537 (Signal Red)
BS 4800: 04.E.53 (Poppy)

b) YELLOW

BS 381C: 309 (Canary Yellow)
BS 4800: 10.E.53 (Sunflower Yellow)

c) DARK GREEN

BS 381C: 267 (Deep Chrome Green)
BS 4800: 14.C.39 (Holly Green)

d) DARK GREY

BS 381C: 632 (Dark Admiralty Grey)
BS 4800: 18.B.25 (Dark Admiralty Grey)

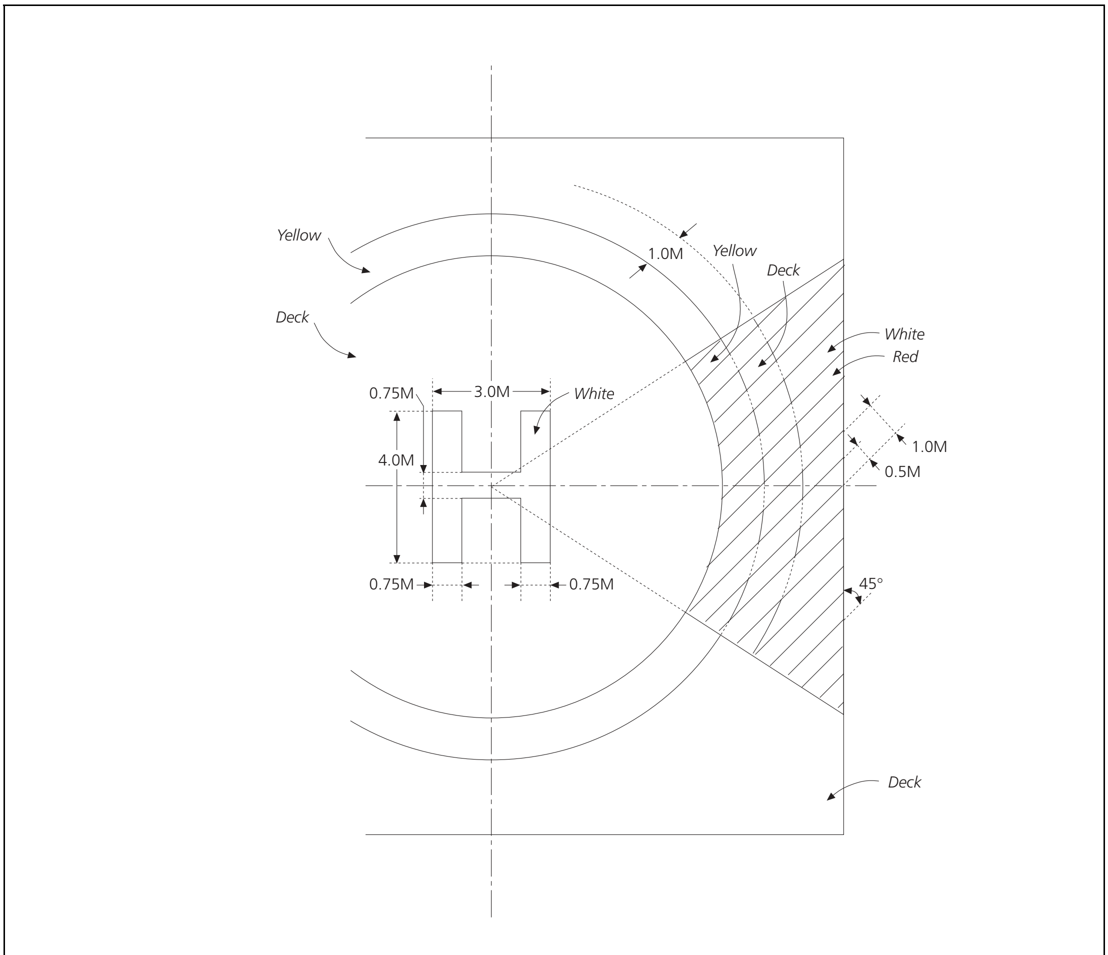


Figure 5 Specification for the Layout of Prohibited Landing Heading Segments on Helidecks

Figure 6 Example of Prohibited Landing Heading Marking

NOTE: The position of the 'H' and the orientation of the prohibited landing heading segment will depend on the obstacle.

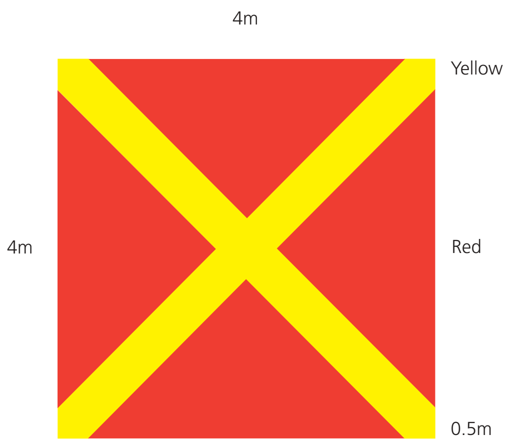


Figure 7 Landing on Installation/Vessel Prohibited

NOTE: Signal covers 'H' inside aiming circle.

3 Lighting

3.1 The safe landing area (SLA) should be delineated by green perimeter lights visible omnidirectionally from on or above the landing area. These lights should be above the level of the deck but should not exceed the height limitations in Chapter 3 paragraph 6.2. The lights should be equally spaced at intervals of not more than 3 metres around the perimeter of the SLA, coincident with the white line delineating the perimeter (see paragraph 2.1). In the case of square or rectangular decks there should be a minimum of four lights along each side including a light at each corner of the safe landing area. The 'main beam' of the green perimeter lights should be of at least 30 candelas intensity (the full vertical beam spread specification is shown below in Table 1). Flush fitting lights may be used at the inboard (150° LOS origin) edge of the SLA.

NOTE: At the time of this revision it is accepted that the majority of **existing** installation and vessel helidecks will probably be fitted with yellow perimeter lights with a lower 25 candelas 'main beam' intensity and different 'off beam' characteristics. These lights should be replaced or modified with green perimeter lighting in accordance with Section 3.2 or 3.3 of CAA's interim guidance letter of 20th July 2004. For ease of reference this letter is reproduced in Appendix C.

3.2 Where the declared D-value of the helideck is less than the physical helideck area, the perimeter lights should delineate the limit of the safe landing area (SLA) so that the helicopter may land safely by reference to the perimeter lights on the limited obstacle sector (LOS -150°) 'inboard' side of the helideck without risk of main rotor collision with obstructions in this sector. By applying the LOS clearances (given in Chapter 3 paragraph 6.4) from the perimeter marking, adequate main rotor to obstruction separation should be achieved. On those decks where insufficient clearance exists in the LOS, a suitable **temporary** arrangement to modify the lighting delineation of the SLA, where this is found to be marked too generously, should be agreed with the HCA by replacing existing green lights with red lights of 30 candelas intensity around the 'unsafe' portion of the SLA (the vertical beam spread characteristics for red lights should also comply with Table 1 below). The perimeter line, however, should be repainted in the correct position immediately and the area of deck between the old and new perimeter lines should be painted in a colour that contrasts with the main helideck. Use of flush fitting lights in the 150° sector perimeter will provide adequate illumination while causing minimum obstruction to personnel and equipment movement.

Table 1 Iso-candela diagram for helideck perimeter lights

Elevation	Intensity
0° - 90°	60 cd max
>20° - 90°	3 cd min
>10° - 20°	15 cd min
0° -10°	30 cd min

-180° Azimuth +180°

3.3 The whole of the safe landing area (SLA) should be adequately illuminated if intended for night use. In the past installation and vessel owners and operators have sought to achieve compliance by providing deck level floodlights around the perimeter of the SLA and/or by mounting floodlights at an elevated location 'inboard' from the SLA, e.g. floodlights angled down from the top of a bridge or hangar. Experience has shown that floodlighting systems, even when properly aligned, can adversely effect the visual cueing environment by reducing the conspicuity of helideck perimeter lights during the approach, and by causing glare and loss of pilots' night vision during the hover and landing. Furthermore floodlighting systems often fail to provide adequate illumination of the centre of the landing area leading to the so called 'black-hole effect'. It is essential therefore, that any interim floodlighting arrangements take full account of these problems. Further guidance on suitable arrangements is described in subsequent paragraphs 3.5 to 3.7 and in the interim guidance letter of 20th July 2004, reproduced at Appendix C.

3.4 Through research programmes undertaken since the mid 1990's, the CAA has been seeking to identify more effective methods of achieving the requirements to provide an effective visual cueing environment for night operations, particularly in respect of illuminating the centre of the landing area. It has been demonstrated that arrays of segmented point source lighting (ASPSL) in the form of encapsulated strips of light emitting diodes (LEDs) can be used to illuminate the aiming circle and heliport identification marking ('H'). This scheme has been found to provide the visual cues required by the pilot earlier on in the approach and more effectively than by using floodlighting, and without the disadvantages associated with floodlighting such as glare. Following offshore trials of prototype systems during winter 2006/7 it is anticipated that the next update of CAP 437 will define a minimum acceptable specification for this lighting.

3.5 Pending availability of suitable products to implement the aiming circle and 'H' lighting, it is strongly recommended that existing helideck floodlighting systems be reviewed. The following paragraphs, 3.6 and 3.7, describe how to make use of current halogen and xenon floodlighting to achieve the objective of illuminating the SLA. Although the modified floodlighting schemes described should provide useful illumination of the landing area without significantly effecting the conspicuity of the perimeter lighting and will minimise glare, trials have demonstrated that neither they nor any other floodlighting system is capable of providing the quality of visual cueing available by illuminating the landing circle and 'H'. These modified floodlighting solutions should therefore be regarded as temporary arrangements only.

3.6 Where installation and vessel owners and operators intend to improve an existing floodlighting arrangement, it is strongly recommended that only systems which comply with the good practice detailed in the CAA's interim guidance letter dated 20th July 2004 (ref: 10A/253/16/3) are considered. This letter, reproduced at Appendix C, provides general guidance and accepts that there may be a range of possible interim solutions, depending on the size, obstacle environment and visual cueing aspects associated with individual decks. It is recommended that operators of existing installations or vessels refer to this letter before committing to any particular interim floodlighting solution. It is essential that floodlighting solutions are considered in collaboration with the helicopter operator who is required to fly a non-revenue approach to a helideck at night before accepting the final configuration.

3.7 The floodlighting should be arranged so as not to dazzle the pilot and, if elevated and located off the landing area clear of the LOS, the system should not present a hazard to helicopters landing and taking off from the helideck. All floodlights should be capable of being switched on and off at the pilot's request. Setting up of lights should be undertaken with care to ensure that the issues of adequate illumination and glare are properly addressed and regularly checked. For some decks it may be beneficial to improve depth perception by floodlighting the main structure or 'legs' of the platform. Adequate shielding of 'polluting' light sources can most easily be achieved early on in the design stage, but can also be implemented on existing installations using simple measures.Temporary working lights which pollute the helideck lighting environment should be switched off during helicopter operations.

3.8 It is important to confine the helideck lighting to the landing area, since any light overspill may cause reflections from the sea. The floodlighting controls should be accessible to, and controlled by, the HLO or Radio Operator.

3.9 The quoted intensity values for lights apply to the intensity of the light emitted from the unit when fitted with all necessary filters and shades (see also paragraph 4 below).

3.10 If a condition can exist on an installation which may be hazardous for the helicopter or its occupants a visual warning system should be installed. The system (Status Lights) should be a flashing red light (or lights), visible to the pilot from any direction of approach and on any landing heading. The aeronautical meaning of a flashing red light is either; "do not land, aerodrome not available for landing" or; "move clear of landing area". The system should be automatically initiated at the appropriate hazard level (process upset, e.g. a gas leak) as well as being capable of manual activation by the HLO. It should be visible at a range in excess of the distance at which the helicopter may be endangered or may be commencing a visual approach. CAA Paper 2003/06 provides a specification for a status light system which is summarised below:

- Where required, the helideck status signalling system should be installed either on or adjacent to the helideck. Additional lights may be installed in other locations on the platform where this is necessary to meet the requirement that the signal be visible from all approach directions, i.e. 360° in azimuth.
- The effective intensity should be a minimum of 700 cd between 2° and 10° above the horizontal and at least 176 cd at all other angles of elevation.
- The system should be provided with a facility to enable the output of the lights (if and when activated) to be dimmed to an intensity not exceeding 60 cd while the helicopter is landed on the helideck.
- The signal should be visible from all possible approach directions and while the helicopter is landed on the helideck, regardless of heading, with a vertical beam spread as shown in the second bullet point.
- The colour of the status light(s) should be red as defined in ICAO Annex 14 Vol.1 Appendix 1, colours for aeronautical ground lights.
- The light system as seen by the pilot at any point during the approach should flash at a rate of 120 flashes per minute. Where two or more lights are needed to meet this requirement, they should be synchronised to ensure an equal time gap (to within 10%) between flashes. While landed on the helideck, a flash rate of 60 flashes per minute is acceptable.
- The light system should be integrated with platform safety systems such that it is activated automatically in the event of a process upset.
- Facilities should be provided for the HLO to manually switch on the system and/or override automatic activation of the system.
- The light system should have a response time to full intensity not exceeding 3 seconds at all times.
- Facilities should be provided for resetting the system which, in the case of NUI's, do not require a helicopter to land on the helideck.

- The system should be designed so that no single failure will prevent the system operating effectively. In the event that more than one light unit is used to meet the flash rate requirement, a reduced flash frequency of at least 60 flashes per minute is considered acceptable in the failed condition for a limited period.
- The system and its constituent component lights should comply with all regulations relevant to the installation.
- Where supplementary 'repeater' lights are employed for the purposes of achieving the 'on deck' 360° coverage in azimuth, these should have a minimum intensity of 16 cd and a maximum intensity of 60 cd.

NOTE: Although not explicitly stated in CAA Paper 2003/06, the duration of the flash should be less than or equal to the duration of the 'off' period, i.e. for a flash rate of 120 flashes per minute, the flash duration should be no greater than 0.25 seconds.

3.11 Manufacturers are reminded that the minimum intensity specification stated above is considered acceptable to meet the **current** operational requirements, which specify a minimum decision range currently on an airborne radar approach of 1400 m (0.75NM). Development of offshore approach aids which permit lower minima (e.g Differential GPS) will require satisfaction of the appropriate intensity. Revised intensities are specified for the lowest anticipated meteorological visibility of 0.5NM (900m) in CAA Paper 2003/06, Appendix A.

3.12 Installation/vessel emergency power supply design should include the landing area lighting. Any failures or outages should be reported immediately to the helicopter operator. The lighting should be fed from an Uninterrupted Power Supply (UPS) system.

4 Obstacles – Marking and Lighting

4.1 Fixed obstacles which present a hazard to helicopters should be readily visible from the air. If a paint scheme is necessary to enhance identification by day, alternate black and white, black and yellow, or red and white bands are recommended, not less than 0.5 metres nor more than 6 metres wide. The colour should be chosen to contrast with the background to the maximum extent. Paint colours should conform with the references at paragraph 2.8 above.

4.2 Obstacles to be marked in these contrasting colours include any lattice tower structures and crane booms which are close to the helideck or the LOS boundary. Similarly, parts of the leg or legs of jack-up units adjacent to the landing area which extend, or can extend, above it should also be marked in the same manner.

4.3 Omnidirectional red lights of at least 10 candelas intensity should be fitted at suitable locations to provide the helicopter pilot with visual information on the proximity and height of objects which are higher than the landing area and which are close to it or to the LOS boundary. This should apply, in particular, to all crane booms on the installation. Objects which are more than 15 metres higher than the landing area should be fitted with intermediate red lights of the same intensity spaced at 10 metre intervals down to the level of the landing area (except where such lights would be obscured by other objects). It is often preferable for some structures such as flare booms and towers to be illuminated by floodlights as an alternative to fitting the intermediate red lights, provided that the lights are arranged such that they will illuminate the whole of the structure and not dazzle the helicopter pilot. Such arrangements should be discussed with the HCA. Offshore duty holders may, where appropriate, consider alternative equivalent technologies to highlight dominant obstacles in the vicinity of the helideck.

4.4 An omnidirectional red light of intensity 25 to 200 candelas should be fitted to the highest point of the installation. Where this is not practicable (e.g. on top of flare towers) the light should be fitted as near to the extremity as possible.

4.5 In the particular case of jack-up units, it is recommended that when the tops of the legs are the highest points on the installation, they should be fitted with omnidirectional red lights of intensity 25 to 200 candelas. In addition the leg or legs adjacent to the helideck should be fitted with intermediate red lights of at least 10 candelas at 10 metre intervals down to the level of the landing area. Sufficient lights should be fitted to provide omnidirectional visibility. As an alternative the legs may be floodlit providing the helicopter pilot is not dazzled.

4.6 Any ancillary structure within 1 kilometre of the landing area, and which is significantly higher than it, should be similarly fitted with red lights.

4.7 Red lights should be arranged so that the location of the objects which they delineate are visible from all directions above the landing area.

4.8 Installation/Vessel emergency power supply design should include all forms of obstruction lighting. Any failures or outages should be reported immediately to the helicopter operator. The lighting should be fed from an Uninterrupted Power Supply (UPS) system.

Chapter 5 Helideck Rescue and Fire Fighting Facilities

1 Introduction

This Chapter gives guidance regarding provision of equipment; extinguishing media; personnel; training; and emergency procedures for offshore helidecks on installations and vessels. For further specific guidance related to NUI's refer to UKOOA's Guidelines for the Management of Offshore Helideck Operations.

2 Key Design Characteristics – Principal Agent

A key aspect in the successful design for providing an efficient, integrated helideck rescue and fire fighting facility is a complete understanding of the circumstances in which it may be expected to operate. A helicopter accident, which results in a fuel spillage with wreckage and/or fire and smoke, has the capability to render some of the equipment inventory unusable or preclude the use of some passenger escape routes.

2.1 Delivery of fire fighting media to the helideck area at the appropriate application rate should be achieved in the quickest possible time. The CAA strongly recommends that a delay of less than thirty seconds, measured from the time of incident to actual production at the required application rate, should be the objective.

2.2 Foam-making equipment should be located so as to ensure the uniform application of foam to any part of the safe landing area (SLA) irrespective of the wind strength/direction or accident location. In this respect particular consideration should be given to the loss of a foam monitor i.e. remaining monitor(s) should be capable of delivering finished foam to the SLA at or above the minimum application rate.

2.3 Consideration should be given to the effects of the weather on static equipment. All equipment forming part of the facility should be designed to withstand protracted exposure to the elements or be protected from them. Where protection is the chosen option, it should not prevent the equipment being brought into use quickly and effectively (see paragraph 2.1 above). The effects of condensation on stored equipment should be considered.

2.4 The minimum capacity of the foam production system will depend on the D-value of the deck, the foam application rate, the discharge rates of installed equipment and the expected duration of application. It is important to ensure that the capacity of the main helideck fire pump is sufficient to guarantee that finished foam can be applied at the appropriate induction ratio and application rate, and for the minimum duration to the whole of the safe landing area (SLA) when all helideck monitors are being discharged simultaneously.

2.5 The application rate is dependant on the types of foam concentrate in use and the types of foam application equipment selected. For fires involving aviation kerosene, the International Civil Aviation Organisation (ICAO) has produced a performance test which assesses and categorises the foam concentrate. Most foam concentrate manufacturers will be able to advise on the performance of their concentrate against this test. The CAA recommends that foam concentrates compatible with seawater and meeting performance level 'B' are used. These foams should be applied at a minimum application rate of 6.0 litres per square metre per minute.

Calculation of Application Rate: Example for a D-value 22.2 metre helideck. Application rate = 6.0 x π x r^2 (6.0 x 3.142 x 11.1 x 11.1) = 2322 litres per minute.

2.6 Given the remote location of helidecks the overall capacity of the foam system should exceed that necessary for initial extinction of any fire. Five minutes discharge capability is generally considered by the CAA to be reasonable.

Calculation of minimum operational stocks: Using the 22.2 metre example as shown in paragraph 2.5 above. A 1% foam solution discharged over 5 minutes at the minimum application rate will require 2322 x 1% x 5 = 116 litres of foam concentrate. A 3% foam solution discharged over 5 minutes at the minimum application rate will require 2322 x 3% x 5 = 348 litres of foam concentrate.

NOTE: Sufficient reserve foam stocks to allow for replenishment as a result of operation of the system during an incident, or following training or testing will also need to be held.

2.7 Low expansion foam concentrates can generally be applied in either aspirated or unaspirated form. It should be recognised that whilst unaspirated foam may provide a quick knockdown of any fuel fire, aspiration, i.e. induction of air into the foam solution by monitor or by hand controlled foam branch (see paragraph 2.8 below), gives enhanced protection after extinguishment. Wherever non-aspirated foam equipment is selected during design, additional equipment capable of producing aspirated foam for post fire security/control should be provided.

2.8 Not all fires are capable of being accessed by monitors and on some occasions the use of monitors may endanger passengers. Therefore, in addition to fixed foam systems, there should be the ability to deploy at-least two deliveries with hand controlled foam branchpipes for the application of aspirated foam at a minimum rate of 250 litres/min through each hose line. A single hose line, capable of delivering aspirated foam at a minimum application rate of 250 litres/min, may be acceptable where it is demonstrated that the hose line is of sufficient length, and the hydrant system of sufficient operating pressure, to ensure the uniform application of foam to any part of the safe landing area irrespective of wind strength or direction. The hose line(s) provided should be capable of being fitted with a branchpipe capable of applying water in the form of a jet or spray pattern for cooling, or for specific firefighting tactics.

2.9 As an alternative to a Fixed Monitor System (FMS), offshore duty holders may consider the provision of a Deck Integrated Fire Fighting System (DIFFS). These systems typically consist of a series of 'pop-up' nozzles designed to provide an effective spray distribution of foam to the whole of the safe landing area (SLA) for the range of weather conditions prevalent on the UKCS. DIFFS systems should be capable of supplying performance level B foam solution within the time constraints stated in paragraph 2.1 and at an application rate, and for a duration, which at least meets the minimum requirements stated in paragraphs 2.5 and 2.6 above.

2.10 If life saving opportunities are to be maximised it is essential that all equipment should be ready for immediate use on, or in the immediate vicinity of the helideck whenever helicopter operations are being conducted. All equipment should be located at points having immediate access to the helicopter landing area. The location of the storage facilities should be clearly indicated.

3 Use and Maintenance of Foam Equipment

3.1 Mixing of different concentrates in the same tank i.e. different either in make or strength is generally unacceptable. Many different strengths of concentrate are on the market. Any decision regarding selection should take account of the design characteristics of the foam system. It is important to ensure that foam containers and tanks are correctly labelled.

3.2 Induction equipment ensures that water and foam concentrate are mixed in the correct proportions. Settings of adjustable inductors, if installed, should correspond with strength of concentrate in use.

3.3 All parts of the foam production system, including the finished foam, should be tested by a competent person on commissioning and annually thereafter. The tests should assess the performance of the system against original design expectations. Further information for testing of helideck foam production systems is stated in HSE Safety Notice 2/2004.

4 Complementary Media

While foam is considered the principal media for dealing with fires involving fuel spillages, the wide variety of fire incidents likely to be encountered during helicopter operations – i.e. engine, avionic bays, transmission areas, hydraulics – may require the provision of more than one type of complementary agent. Dry powder and the gaseous agents carbon dioxide or halon (e.g. BCF 1211 or halogenated hydrocarbon [halocarbon] agents), are generally considered acceptable for this task although halon is now subject to various restrictions under the Montreal Protocol.

4.1 The CAA recommends the use of dry powder as the primary complementary agent. The minimum total capacity should be 45 kg delivered from one or two extinguishers. The dry powder system should have the capacity to deliver the agent anywhere on the SLA at the recommended discharge rate of 1.35-2 kg/sec. Containers of sufficient capacity to allow continuous and sufficient application of the agent should be provided.

4.2 The CAA recommends the use of a gaseous agent in addition to the use of dry powder as the primary complementary agent. Therefore, in addition to dry powder specified in paragraph 4.1, there should be a quantity of halogenated hydrocarbon or CO2 provided with a suitable applicator for use on engine fires. The appropriate minimum quantity of halogenated hydrocarbon, delivered from one extinguisher, is 9 kg. The appropriate minimum quantity of CO2, delivered from one extinguisher, is 18 kg. Containers selected should be capable of delivering gaseous agents at the minimum discharge rate stated in paragraph 4.1. Due regard should be paid to the requirement to deliver gaseous agents to the seat of the fire at the recommended discharge rate. Because of the weather conditions prevalent on the UKCS, all complementary agents could be adversely affected during application and training evolutions should take this into account.

4.3 All offshore helicopters have integral engine fire protection systems (predominantly halon) and it is therefore considered that provision of foam as the principal agent plus suitable water/foam branch lines plus sufficient levels of dry powder with a quantity of secondary gaseous agent will form the core of the fire extinguishing system. It should be borne in mind that none of the complementary agents listed will offer any post fire security / control.

4.4 All applicators are to be fitted with a mechanism which allows them to be hand controlled.

4.5 Dry chemical powder should be of the 'foam compatible' type.

4.6 The complementary agents should be sited so that they are readily available at all times.

4.7 Reserve stocks of complementary media to allow for replenishment as a result of activation of the system during an incident, or following training or testing should be held.

5 Normally Unattended Installations

5.1 In the case of NUI's reference can be made to the 'UKOOA Guidelines for the Management of Offshore Helideck Operations' and the 'Offshore Helideck Design Guidelines' sponsored by OIAC HLG and published by HSE. However, serious consideration should be given to the selection and provision of foam as the principal agent. For an NUI effective delivery of foam to the whole of the safe landing area is probably best achieved by means of a Deck Integrated Fire Fighting System (DIFFS). See paragraph 2.9.

5.2 For Normally Unattended Installations the CAA may also consider other 'combination solutions' where these can be demonstrated to be effective in dealing with a running fuel fire.This may permit, for example, the selection of a seawater-only DIFFS system used in tandem with a passive fire-retarding system capable of removing significant quantities of unburned fuel from the surface of the helideck in the event of fuel spill from a ruptured aircraft tank. Where a sea-water only DIFFS system is selected to deal with the remaining fuel burn, it is strongly recommended that dutyholders also consider some provision for aspirated foam, whether this is provided directly through the 'pop-up' nozzles or alternatively provided from a portable foam unit. See also UKOOA Guidelines for the Management of Offshore Helideck Operations.

5.3 DIFFS systems on NUIs should be integrated with platform safety systems such that they are activated automatically in the event of a heavy or emergency landing on an installation. DIFFS systems should be capable of manual over-ride by the HLO and from the mother installation or the beach. It is recommended that response time from activation to foam or sea-water application should not be greater than 10 seconds.

NOTE: For NUIs without adequate power supply, a passive fire-retarding system represents the best available fire suppression mechanism, in conjunction with adequate complimentary media described in Sections 4 and 5.

6 The Management of Extinguishing Media Stocks

Consignments of extinguishing media should be used in delivery order to prevent deterioration in quality by prolonged storage.

6.1 The mixing of different types of foam concentrate may cause serious sludging and possible malfunctioning of foam production systems. Unless evidence to the contrary is available it should be assumed that different types are incompatible. In these circumstances it is essential that the tank(s), pipework and pump (if fitted) are thoroughly cleaned and flushed prior to the new concentrate being introduced.

6.2 Consideration should be given to the provision of reserve stocks for use in training, testing and recovery from emergency use.

7 Rescue Equipment

In some circumstances, lives may be lost if simple ancillary rescue equipment is not readily available.

7.1 The CAA strongly recommends the provision of at least the following equipment.

Table 1 Rescue Equipment

Helicopter RFF Category		
	H1/H2	**H3**
Adjustable wrench	1	1
Rescue axe, large (non wedge or aircraft type)	1	1
Cutters, bolt	1	1
Crowbar, large	1	1
Hook, grab or salving	1	1
Hacksaw heavy duty c/w 6 spare blades	1	1
Blanket, fire resistant	1	1
Ladder (two-piece)[a]	1	1
Life line, 5cm, 15m in length plus rescue harness	1	1
Pliers, side cutting (tin snips)	1	1
Set of assorted screwdrivers	1	1
Harness knife c/w sheath[b]	b	b
Gloves, fire resistant[b]	b	b
Self-contained breathing apparatus (complete)[c]	2	2
Power cutting tool	–	1

a. For access to casualties in an aircraft on its side
b. This equipment is required for each helideck crew member
c. Refer to Home Office Technical Bulletin 1/1997

Sizes of equipment are not detailed but should be appropriate for the types of helicopter expected to use the facility.

7.2 A responsible person should be appointed to ensure that the rescue equipment is checked and maintained regularly. Rescue equipment should be stored in a clearly marked and secure watertight cabinet or chest. An inventory checklist of equipment should be held inside the equipment cabinet / chest.

8 Personnel Levels

The facility should have sufficient trained firefighting personnel immediately available whenever aircraft movements are taking place. They should be deployed in such a way as to allow the appropriate firefighting and rescue systems to be operated efficiently and to maximum advantage so that any helideck incident can be managed effectively. The HLO should be readily identifiable to the helicopter crew as the person in charge of helideck operations. The preferred method of identification is a brightly coloured 'HLO' tabard. For guidance on helideck crew composition refer to the UKOOA Guidelines for the Management of Offshore Helideck Operations.

9 Personal Protective Equipment

All personnel assigned to rescue and firefighting duties should be provided with suitable personal protective equipment to allow them to carry out their duties. The level of PPE should be commensurate with the nature of the hazard and the risk (consideration should be given to the provision of face masks where, helicopters are partially or substantially constructed of composite material). The protective equipment should meet appropriate safety standards and should not in any way restrict the wearer from carrying out his duties.

9.1 Sufficient personnel to operate the RFF equipment effectively should be dressed in protective clothing prior to helicopter movements taking place.

9.2 The CAA recommends that at least two, positive pressure, self-contained breathing apparatus sets (SCBA) complete with ancillary equipment plus two reserve cylinders should be provided. These should be appropriately stored, readily available close to the helideck for fast deployment by the helideck crew.

9.3 Respiratory protective equipment enables the wearer to enter and work in an atmosphere which would not otherwise support life. It is therefore essential that it be stored, tested and serviced in such a way that it will ensure that it can be used confidently by personnel. SCBA sets should be utilised in a safe and appropriate manner based on current legislation and operating procedures.

9.4 A responsible person(s) should be appointed to ensure that all personal protective equipment is installed, stored, used, checked and maintained in accordance with the manufacturer's instructions.

10 Training

If they are to effectively utilise the equipment provided, all personnel assigned to rescue and fire fighting duties on the helideck should be fully trained to carry out their duties to ensure competence in role and task. The CAA recommends that personnel attend an established helicopter fire fighting course.

In addition, regular training in the use of all RFF equipment, helicopter familiarisation and rescue tactics and techniques should be carried out. Correct selection and use of principal and complementary media for specific types of incident should form an integral part of personnel training.

11 Emergency Procedures

The installation or vessel emergency procedures manual should specify the actions to be taken in the event of an emergency involving a helicopter on or near the installation or vessel. Exercises designed specifically to test these procedures and the effectiveness of the fire fighting teams should take place at regular intervals.

12 Further Advice

Advice is available from the CAA's Aerodrome Standards Department regarding the choice and specification of fire extinguishing agents.

Chapter 6 Helicopter Landing Areas – Miscellaneous Operational Standards

1 Landing Area Height above Water Level

Because of the effects upon aircraft performance in the event of an engine failure (see Chapter 2) the height of the landing area above water level will be taken into account by the Helideck Certification Agency (HCA) in deciding on any operational limitations to be applied to specific helidecks. Landing area height above water level is to be included in the information supplied to the HCA for the purpose of authorising the use of the helideck.

2 Wind Direction (Vessels)

Because the ability of a vessel to manoeuvre may be helpful in providing an acceptable wind direction in relation to the helideck location, information provided to HCA is to include whether the vessel is normally fixed at anchor, single point moored, semi- or fully-manoeuvrable. The HCA may specify windspeed and direction requirements and limitations when authorising the use of the helideck.

3 Helideck Movement

3.1 Floating installations and vessels experience dynamic motions due to wave action which represent a potential hazard to helicopter operations. Operational limitations are therefore set for the helicopter operators which are promulgated in the Helideck Limitations List (HLL) and incorporated in their Operations Manuals. Helideck downtime due to excessive deck motion can be minimised by careful consideration of the location of the helideck on the installation or vessel at the design stage. Guidance on helideck location and how to assess the impact of the resulting helideck motion on operability is presented in CAA Paper 2004/02 "Helideck Design Considerations – Environmental Effects" which is available on the Publications section of the CAA website at www.caa.co.uk. It is strongly recommended that mobile installation and vessel designers consult CAA Paper 2004/02 at the earliest possible stage of the design process.

3.2 The helideck approval will be related to the helicopter operator's Operations Manual limitations regarding the movement of the helideck in pitch, roll, heave and heading. It is necessary for details of these motions to be recorded on the vessel prior to, and during, all helicopter movements.

3.3 Pitch and roll reports to helicopters should include values, in degrees, about both axes of the true vertical datum (i.e. relative to the true horizon) and be expressed in relation to the vessel's head. Roll should be expressed in terms of 'port' and 'starboard'; pitch should be expressed in terms of 'up' and 'down'; heave should be reported in a single figure, being the total heave motion of the helideck rounded up to the nearest metre. Heave is to be taken as the vertical difference between the highest and lowest points of any single cycle of the helideck movement. The parameters reported should be the maximum peak levels recorded during the ten minute period prior to commencement of helicopter deck operations.

The helicopter pilot is concerned, in order to make vital safety decisions, with the amount of 'slope' on, and the rate of movement of, the helideck surface. It is therefore important that the roll values are only related to the true vertical and do not relate to any 'false' datum (i.e. a 'list') created, for example, by anchor patterns or displacement. There are circumstances in which a pilot can be aided by amplification of the heave measurement by reference to the time period (seconds) in terms of 'peak to peak'.

3.4 **Reporting Format:**

A standard radio message should be passed to the helicopter which contains the information on helideck movement in an unambiguous format. This will, in most cases, be sufficient to enable the helicopter crew to make safety decisions. Should the helicopter crew require other motion information or amplification of the standard message, the crew will request it (for example, yaw and heading information). For further guidance refer to the UKOOA Guidelines for the Management of Offshore Helideck Operations.

Standard report example:

Situation: The maximum vessel movement (over the preceding ten minute period) about the roll axis is 1° to port and 3° to starboard (i.e. this vessel may have a permanent list of 1° to starboard and is rolling a further 2° either side of this 'false' datum). The maximum vessel movement (over the preceding ten minute period) about the pitch axis is 2° up and 2° down. The maximum recorded heave amplitude over a single cycle (over the preceding ten minute period) is 1.5 metres.

Report: 'Roll 1° left and 3° right; Pitch 2° up and 2° down; heave two metres'.

3.5 Current research has indicated that the likelihood of a helicopter tipping or sliding on a moving helideck is directly related to helideck accelerations and to the prevailing wind conditions. It is therefore probable that future requirements will introduce additional measuring and reporting criteria. The CAA is currently completing research into the definition of these parameters, and how operating limits in terms of these parameters should be set. A CAA paper describing the new scheme will be published in due course. Pending publication, it is considered useful to highlight some of the findings to date:

- It is important to ensure that the deck motions reported to the helicopter pilot relate to the motion at the helideck. Very often pitch, roll and heave measurements are taken from a source far removed from the helideck location. If this source should happen to be midships and the helideck is located, for example, high up on the bow, the actual heave (and, in future accelerations,) at the helideck are likely to be far in excess of the source measurement. Software packages are available to provide helideck location corrected movement data from a source at a different location.
- Future guidance will advocate that deck motion measuring equipment be located at (attached to the underside of) the helideck or compensated by software to give helideck location readings.
- The research project has identified commercially available motion sensing systems that produce deck motion reports to the present standard (pitch, roll and heave), and are capable of being modified to incorporate the software necessary to generate the new acceleration-based deck motion parameter; the Motion Severity Index (MSI). These systems also have industry standard anemometer interfaces and can be modified to produce the new wind severity parameter that will be

required; the Wind Severity Index (WSI). The MSI and WSI values generated by the system will be reported to the helicopter for comparison with the operating limits that will be contained in the helicopter operations manual. If within limits the deck will be safe for ground operations over the following 10 minutes.

- A deck status scheme consisting of a colour code only (i.e. no signalling lights), to control ground handling procedures is also being considered. Green status will equate to normal deck handling procedures and will be in force when the least stable aircraft is calculated to remain within limits regardless of post landing vessel or wind heading changes. By definition, any helicopter type will be able to land on any deck at green status. Amber status will apply when the deck is within limits for the most stable helicopter, but when a high risk of exceeding helicopter limits would exist in the event of a vessel or wind heading change after landing. Revised deck handling procedures will be employed for amber status to reduce the risk of a tip or slide, and to maximise the opportunity for the helicopter to lift off in the event of problems developing. It is possible that a deck at amber status may be out of limits for less stable helicopters having lower operating limits. Red status applies when the deck is out of limits for all helicopter types and the helideck is consequently closed.

It has been noted that a small number of helideck motion reports to pilots are still based on visual estimations. This is not considered to be an acceptable way of obtaining vital safety information. It is therefore strongly recommended that all moving helidecks are equipped with electronic motion sensing systems which will not only facilitate implementation of the new parameters, but also produce accurate pitch, roll and heave information for current reporting requirements.

4 Aircraft Operational Data – Reporting and Recording

4.1 In addition to the data covered by Section 3 above, it is essential that all installations are provided with means of ascertaining and reporting at any time:

a) the wind speed and direction;

b) the air temperature;

c) the barometric pressure;

d) the visibility, cloud base and cover; and

e) the sea state.

4.2 Air temperature and barometric pressure can be measured by conventional instruments. An indication of wind speed and direction will be provided visually to the pilot by the provision of a windsock coloured so as to give maximum contrast with the background. However, for recording purposes, an anemometer positioned in an unrestricted airflow is required. A second anemometer, located at a suitable height and position can give useful information on wind velocity at hover height over the helideck in the event of turbulent or deflected airflows over the deck. Visibility and cloud conditions will normally be assessed by visual observations as will the sea state, although, on some of the larger installations wave crest to trough measuring instruments are available as are cloud base and visibility measuring instruments.

4.3 Measuring instruments used to provide the data listed in paragraph 4.1 above should be periodically calibrated in accordance with the manufacturer's recommendations in order to provide continuing adequacy of purpose.

5 Location in Respect to Other Landing Areas in the Vicinity

5.1 Mobile installations and support vessels with helidecks may be positioned adjacent to other installations so that mutual interference/overlap of obstacle protected surfaces occur. Also on some installations there may be more than one helideck which may result in a confliction of obstacle-free sectors.

5.2 Where there is confliction as mentioned above, within the obstacle-free sector out to 1000 metres, simultaneous operation of two helicopter landing areas is not to take place without prior consultation with the HCA. It is possible, depending upon the distance between landing areas and the operational conditions which may pertain, that simultaneous operation can be permitted but suitable arrangements for notification of helicopter crews and other safety precautions will need to be arranged. In this context, 'Flotels' will be regarded in the same way as any other mobile installation which may cause mutual interference with the parent installation approach and take-off sector. For a detailed treatment of this subject readers are recommended to refer to "Offshore Helideck Design Guidelines" sponsored by OIAC HLG and published by HSE and "UKOOA Guidelines for the Management of Offshore Helideck Operations" (see also Chapter 3).

6 Control of Crane Movement in the Vicinity of Landing Areas

6.1 Cranes can adversely distract pilots' attention during helicopter approach and take-off from the helideck as well as infringe fixed obstacle protected surfaces. Therefore it is essential that when helicopter movements take place (±5 mins) crane work ceases and jibs, 'A' frames, etc. are positioned clear of the obstacle protected surfaces and flight paths.

6.2 The Helicopter Landing Officer should be responsible for the control of cranes in preparation for and during helicopter operations.

7 General Precautions

7.1 Whenever a helicopter is stationary on board an offshore installation with its rotors turning, no person should, except in case of emergency, enter upon or move about the helicopter landing area otherwise than within view of a crew member or the HLO and at a safe distance from its engine exhausts and tail rotor. It may be dangerous to pass close to the front of those helicopters which have a low main rotor profile.

7.2 The practical implementation of paragraph 7.1 above is best served through consultation with the helicopter operator for a clear understanding of the approach paths approved for personnel and danger areas associated with a rotors-running helicopter. These areas are type-specific but, in general, the approved routes to and from the helicopter are at the 2–4 o'clock and 8–10 o'clock positions. Avoidance of the 12 o'clock (low rotor profile helicopters) and 6 o'clock (tail rotor danger areas) positions should be maintained.

7.3 Personnel should not approach the helicopter while the helicopter anti-collision (rotating/flashing) beacons are operating. In the offshore environment, the helideck should be kept clear of all personnel while anti-collision lights are on.

8 Installation/Vessel Helideck Operations Manual and General Requirements

The maximum helicopter mass and 'D' value for which the deck has been designed and the maximum size and mass of helicopter for which the installation is certified should be included in the Operations Manual. The extent of the obstacle-free area should also be stated and reference made to any helideck operating limitation imposed by helicopter operators as a result of non-compliance. Non-compliances should also be listed.

9 Helicopter Operations Support Equipment

9.1 Provision should be made for equipment needed for use in connection with helicopter operations including:

a) chocks and tie-down strops/ropes (strops are preferable);

b) heavy-duty, calibrated, accurate scales for passenger baggage and freight weighing;

c) a suitable power source for starting helicopters if helicopter shut-down is seen as an operational requirement; and

d) equipment for clearing the helicopter landing area of snow and ice and other contaminants.

9.2 Chocks should be compatible with helicopter undercarriage/wheel configurations. Helicopter operating experience offshore has shown that the most effective chock for use on helidecks is the 'NATO sandbag' type. Alternatively, 'rubber triangular' or 'single piece fore and aft' type chocks may be used as long as they are suited to all helicopters likely to operate to the helideck. The 'rubber triangular' chock is generally only effective on decks without nets.

9.3 For securing helicopters to the helideck it is recommended that adjustable tie-down strops are used in preference to ropes. Specifications for tie-downs should be agreed with the HCA.

9.4 Detailed guidance on the provision and operation of aeronautical communications and navigation facilities associated with Offshore Helicopter Landing Areas is given in the UKOOA Publications 'Guidelines for the Management of Offshore Helideck Operations' and 'Guidelines for Safety Related Telecommunications Systems On Fixed Offshore Installations'.

The CAA requirements, recommendations and guidance for aeronautical communications and navigation facilities can be found in CAA Publication CAP 670 Air Traffic Services Safety Requirements.

Radio operators of offshore aeronautical radio stations are required to hold a Certificate of Competence. Further information can be found in CAA Publication CAP 452 'Aeronautical Radio Station Operator's Guide'.

CAA Approval under the Air Navigation Order and Wireless Telegraphy (WT) Act 1949 Licences is required for the installation and operation of offshore aeronautical communications and navigation facilities. The Office of Communications (Ofcom) has contracted the CAA Directorate of Airspace Policy (DAP) to administer WT Act radio licences for aircraft, aeronautical ground stations and navigation aids.

Chapter 7 Helicopter Fuelling Facilities

1 General

The contents of this Chapter and Chapter 8 are intended as general advice on the requirements necessary for the fuelling of helicopters on offshore installations and vessels. The information has been compiled by UKOOA in consultation with the Offshore Industry. More detailed information, if required, can be obtained from aviation fuel suppliers. Civil Aviation Publications CAP 74 (Aircraft Fuelling: Fire Prevention and Safety Measures) and CAP 434 (Aviation Fuel at Aerodromes) have been superseded by CAP 748 (Aircraft Fuelling and Fuel Installation Management); CAP 748 provides the additional general information and guidance which was previously held in CAP 74 and CAP 434. It is inevitable that in a document such as this, the reader will be referred to British Standards or alternative guidance and example. The reader should always check that standards and numbers so referenced are current and reflect current best practice.

1.1 It should be noted that offshore fuelling systems may vary according to the particular application for which it was designed. Nevertheless the elements of all systems will basically be the same to include:

a) transit tanks;

b) storage facilities (see Note); and

c) a delivery system.

NOTE: In some systems where built in tanks are not provided transit tanks are acceptable for storage purposes.

1.2 Chapter 7 describes the features of a typical offshore fuelling system with additional information on maintenance requirements and procedures. Chapter 8 provides a detailed guide on fuelling procedures. It should be noted that additional guidance on safety measures concerning fuelling of helicopters can be obtained from CAP 748 ‘Aircraft Fuelling and Fuel Installation Management.

1.3 Particularly in the UK, many responsible bodies within the oil and helicopter industries have developed their own maintenance and inspection regimes and cycles. There may, therefore, appear to be anomalies between different source guidance on: filter element replacement periodicity; hose inspection and replacement periodicity; static storage tank inspection periodicity and; bonding lead continuity checks. Alternative, responsible source guidance may be used where the user can satisfy himself that the alternative is adequate for the purpose considering particularly the hostile conditions to which the systems may be subjected and the vital importance of a supply of clean fuel.

1.4 Product Identification

It is essential to ensure at all times that the quality of aviation fuel delivered to helicopters offshore is of the highest level. A major contributor toward ensuring that fuel quality is maintained and contamination is prevented is to provide clear and unambiguous product identification on all system components and pipelines denoting the fuel type (e.g. Jet A-1) and following the standard aviation convention for markings and colour code.

Correct identification markings should initially be applied during system manufacture and subsequently checked during maintenance cycles.

2 Fuelling System Description

2.1 Transit Tanks

2.1.1 Transit tanks should be constructed to satisfy the requirements of the Intergovernmental Marine Consultative Organisation (IMCO), meeting the Dangerous Goods Code Type 1 or Type 2 tank. They should also conform with EN 12079 (1999) – Inspection and Repair of Offshore Containers.

2.1.2 Tanks may be of stainless steel or mild steel; if the latter, then tanks should be lined with suitable fuel resistant epoxy lining. The tanks should be encased in a robust steel cage with tie-down points and four main lifting eyes. Where possible, stainless steel fasteners, in conjunction with stainless steel fittings, are recommended. The tank frame should incorporate cross-members to provide an integral 'ladder' access to the tank top. When mounted in the transit frame there should be a centreline slope towards a small sump. This slope should be at least 1 in 30, although 1 in 25 is preferred. Tanks should be clearly marked with the tank capacity. The tank's serial number should also be permanently marked on the identification plate. The tank should normally be fitted with the following:

a) **Manhole**. An 18″ manhole to allow physical access to the interior of the tank.

b) **Inspection Hatch**. A 6″ hatch to enable inspection of the low end of the tank contents.

c) **Dipstick Connection**. A suitable captive dipstick to determine the tank contents, preferably of fibreglass material.

d) **Emergency Pressure Relief**. A stainless steel 2½″ pressure/vacuum relief valve fitted with weatherproof anti-flash cowl. The valve settings will depend on the type of tank in use, manufacturers' recommendations should be followed.

e) **Sample Connection**. A stainless steel sample point, fitted at the lowest point of the tank. A foot-valve should be fitted in the sample line, complete with an extension pipe and terminating with a ball valve with captive dust cap. Sample lines should be a minimum of ¾″ diameter and preferably 1″ diameter. In order to allow correct sample jars to be used, the sample point should be designed with sufficient access, space and height to accommodate the standard 4 litre sample jar.

f) **Outlet/Fill Connection**. The outlet/fill connection should be a flanged fitting with a 3″ internal valve terminating to a 2½″ self-sealing coupler complete with dust cap. The tank outlet should be at least 6″ higher than the lowest point of the tank.

g) **Document Container**. A suitable container should be positioned close to the fill/discharge point to hold the tank and fuel certification documents.

h) **Tank Barrel and Frame**. The tank barrel and frame should be suitably primed and then finished in safety-yellow (BS 4800, Type 08E51). Where the barrel is fabricated from stainless steel it may remain unpainted. Safety-yellow is not mandatory but has been generally accepted for helifuel tanks. All component parts e.g. tank, frame etc. should be properly bonded before being painted. Whether the tank barrel is painted yellow or otherwise Jet A-1 Transit Tanks should be correctly identified by placing clear product identification markings on all sides, particularly above the tank filling and dispensing attachment.

More detailed specification for transit tanks can be obtained on request from UKOOA.

2.2 **Static Storage Tanks**

Where static tanks are provided they should be constructed to suitable standards. Acceptable standards include ASME VIII and BS 5500 Categories I, II and III. The tank should be cylindrical and mounted with an obstacle-free centreline slope (e.g. no baffles fitted) to a small sump. This slope should be at least 1 in 30, although 1 in 25 is preferred. The sump should be fitted with a sample line which has both a gate valve and ball valve and should preferably have a captive camlock dustcap on the end to prevent the ingress of dirt or moisture. Sample lines should be a minimum of ¾″ diameter and preferably 1″ diameter. The sample point accessibility should be as described in paragraph 2.1.2 e) above. Tanks should be clearly marked with the tank capacity. Static tanks should be fitted with the following:

a) **Manhole**. A 24″ minimum diameter manhole which should normally be hinged to assist easy opening.

b) **Inspection Hatch**. A 6″ sample hatch to allow for a visual inspection of the low end of the tank, or for the taking of samples.

c) **Dipstick**. A suitable captive dipstick to determine the tank contents, designed so that it cannot bottom on the tank interior and cause scratching, particularly in lined tanks. The dipstick should preferably be of fibreglass material.

d) **Vent**. A free vent, or an emergency pressure relief valve. When a pressure relief valve is fitted, the type and pressure settings should be in accordance with the manufacturer's recommendations.

e) **Outlet/Fill Connection**. Separate outlet and fill connections with the fill point arranged so that there is no free-fall of product at any stage of the tank filling. The outlet should either be by floating suction or from a stack pipe which extends at least 6″ above the lowest point of the tank. If a floating suction is embodied then a bonded floating suction check wire pull assembly should be fitted directly to the top of the tank. A floating suction offers several advantages over a stack pipe outlet and is therefore strongly recommended.

f) **Contents Gauge**. A sight glass or preferably a contents gauge.

g) **Automatic Closure Valves**. Automatic quick closure valves to the delivery and suction inlet and outlets. These valves should be capable of operation from both the helideck and from another point which is at a safe distance from the tank.

2.2.1 The static storage tank shell should be properly bonded and the entire tank external surface should preferably be finished in safety-yellow paint (BS 4800, Type 08E51) and the correct product identification markings applied. Safety-yellow is not mandatory but has been generally accepted for helifuel tanks.

Tanks should be marked with the date of the initial/last inspection and the date of the next due inspection.

2.3 **Sample Reclaim Tank**

If the refuelling system includes a bulk storage tank, samples can be disposed of into a dedicated reclaim tank (if fitted) that is equipped with a conical base and a sample point at the sump and returned to the storage tank via a filter water separator. Before transfer of the reclaim tank takes place the reclaim tank should be sampled to ensure fuel is in good condition. Any contaminated samples should be disposed of in a suitable container. The transfer water separator should also be sampled under pump pressure, and before the storage tank inlet valve is opened, to ensure no contamination is present in the filter vessel.

A reclaim tank cannot be used if refuelling is direct from transit tanks.

3 Delivery System

3.1 The delivery system to transfer fuel from the storage tank to the aircraft should include the following components:

a) **Pump**. The pump should be an electrically or air driven, centrifugal or positive displacement type with a head and flow rate suited to the particular installation. The pump should be able to deliver up to 50 IGPM (225 litres per minute) under normal flow conditions and to produce 50 psi no flow pressure, i.e. with the delivery nozzle closed. A remote start/stop button should be provided on or immediately close to the helideck and close to the hose storage location. There should also be a flashing amber-coloured pump running warning light that is visible from the helideck.

b) **Filtration Units**. Filter units including microfilters, filter water separators and fuel monitors should be fitted with automatic air eliminators and sized to suit the discharge rate and pressure of the delivery system. Units should be API 1581 approved. Such filters should provide protection down to 1 micron particle size. Filter units should be fitted with a sample line to enable water to be drained from the unit. The sample line should terminate with a ball valve and have a captive dust cap. Sample lines on filter units should be a minimum ½" diameter but, in general, the larger the diameter of the sample line the better. In any event the drain line should match the vessel outlet.

c) **Flowmeter**. The flowmeter should be of the positive displacement type and sized to suit the flow rate. The meter should be regularly calibrated in accordance with the manufacturer's recommendation, normally annually. It is also recommended that the flowmeter includes both a strainer and an air eliminator. The flowmeter should read in litres.

d) **Fuel Monitor**. A fuel monitor should be provided between the flowmeter and delivery hose. This unit should be API 1583 approved and be designed to absorb any water still present in the fuel and to cut off the flow of fuel once a certain amount of water has been exceeded. The monitor is described as an Aviation Fuel Filter Monitor with absorbent type elements. Filter units should be fitted with a sample line to enable water to be drained from the unit. The sample line should terminate with a ball valve and have a captive dust cap. Sample lines on filter units should be a minimum ½" diameter but, in general, the larger the diameter of the sample line the better. In any event the drain line should match the vessel outlet.

e) **Delivery Hose**. The delivery hose should be an approved semi-conducting type to EN 1361 type C, Grade 2, 1½" internal bore fitted with reusable safety clamp adaptors; hoses of larger diameter may be required if a higher flow rate is specified. The hose should be stored on a reel suitable for the length and diameter of the hose being used (the minimum bend radius of the hose should be considered).

f) **Bonding Cable**. A suitable high-visibility bonding cable should be provided and should always be used to earth the helicopter airframe before any refuelling commences. The cable should be bonded to the system pipework at one end, and be fitted with a correct earthing adaptor to attach to the aircraft and a means of quick disconnection at the aircraft end. The electrical resistance between the end connection and the system pipework should not be more than 0.5 ohms.

g) **Fuelling Nozzle**. The fuel delivery to the aircraft may be either by gravity (overwing) or pressure (underwing) refuelling. It is beneficial to have the ability to refuel by either means to suit the aircraft type being refuelled:

i) **Gravity**. The nozzle should be 1½" spout diameter fitted with 100 mesh strainer. Suitable types include the EMCO G180-GRTB refuelling nozzle.

ii) **Pressure**. For pressure refuelling the coupling should be 2½" with 100 mesh strainer and quick disconnect. A Carter or Avery Hardoll pressure nozzle with regulator/surge control (maximum 35 psi) should be used.

iii) **Pressure Gravity**. To meet both requirements, a pressure nozzle can be fitted to the hose end. A separate short length of hose fitted with an adaptor (to fit the pressure nozzle) and with the gravity nozzle attached can be used as required. This arrangement gives the flexibility to provide direct pressure refuelling or, with the extension hose attached, a means of providing gravity refuelling. Alternatively a GTP coupler may be used.

3.2 The delivery system, including hoses and nozzles should have adequate weather protection to prevent deterioration of hoses and ingress of dust and water into the nozzles.

4 Recommended Maintenance Schedules

Different elements of the helifuel refuelling systems require maintenance at different times, ranging from daily checks on the delivery system to annual/biennial checks on static storage tanks. The various components of the system given in Sections 2 and 3 are listed with their servicing requirements.

4.1 Transit Tanks

All transit tanks should be subject to a 'trip examination' each time the tank is filled and, additionally, they should be checked weekly for condition. The following six-monthly and twelve-monthly inspections should be carried out on all lined carbon steel tanks. However, for stainless steel tanks, the inspections can be combined at twelve-monthly intervals.

a) **Trip Inspection**. Each time the tank is offered for refilling the following items should be checked:

i) Tank Shell – for condition; has shell suffered any damage since its previous filling?

ii) Visual check of filling/discharge point and sample point for condition and leakage, and caps in place.

iii) Visual check of lifting lugs and four-point sling for signs of damage.

iv) Tank top fittings to be checked for condition, caps in place, dirt free and watertight.

v) Check that tank identification, serial number and contents are properly displayed.

vi) Ensure tank certificate is valid and located in the document container.

b) **Weekly Inspection**. Each tank whether it is full or empty, onshore or offshore, should be given a weekly check similar to the trip inspection at a) above to ensure that the tank remains serviceable for the purpose. The weekly check should primarily be for damage and leakage. The completion of this check should be signed for on the serviceability report.

c) **Six-Monthly Inspection**. The six-monthly inspection should be carried out onshore by a specialist organisation. Such a check should include:

i)	Tank identification plate	Check details.
ii)	Tank shell	Visual check for damage.
iii)	Paint condition (external)	Check for deterioration.
iv)	Paint condition (internal)	Check for deterioration, particularly if applicable around seams.
v)	Lining materials (if applicable)	Check for deterioration, lifting, etc. MEK and/or acetone test should be carried out on linings or on any lining repairs.
vi)	Tank fittings (internal)	Check condition.
vii)	Tank fittings (external)	Check condition.
viii)	Access manhole	Check security.
ix)	Pressure relief valve	Check condition, in particular check for leaks.
x)	Dipstick assembly	Check constraint, markings and cover/ cap for security.
xi)	Bursting disc	Check for integrity and cover/cap for security.
xii)	Inspection hatch assembly	Check seal condition and security.
xiii)	Bonding	Measure electrical bonding resistance between transit tank and its shell.
xiv)	General	Examination and test procedures as set out in EN 12079.

d) **Rectification**. It is a legal requirement that transit tanks are re-certified by an authorised Fuel Inspector functioning under the verification scheme at least every five years with an intermediate check every 2½ years which includes recertification of pressure/vacuum relief valve. The date of certification should be stamped on the tank inspection plate.

4.2 **Storage Tanks**

Static storage tanks are subject to an annual or biennial inspection depending on the type of tank. If the storage tank is mild steel with a lining then it should be inspected at least once per year, if the tank is stainless steel then a two-year interval between inspections is acceptable. When due for inspection the tank should be drained and vented with the manhole access cover removed. The inspection should include the following:

i)	Cleanliness	Clean tank bottom as required.
ii)	Tank internal fittings	Check condition.
iii)	Lining material (if applicable)	Acetone test (note this check need only be carried out on new or repaired linings).

iv)	Paint condition	Check for deterioration particularly around seams.
v)	Access to tank top fittings	Check condition of access ladder/ platform.
vi)	Inspection hatch	Check condition of seal.
vii)	Access manhole cover	Check seal for condition and refit cover securely. Refill tank.
viii)	Floating suction	Check operation and condition.
ix)	Valves	Check condition, operation and material.
x)	Sump/drain line	Check condition, operation and material.
xi)	Grade identification	Ensure regulation Jet A-1 markings applied and clearly visible.
xii)	Contents gauge	Check condition and operation.
xiii)	Bonding	Measure electrical bonding resistance between tank and system pipework.

4.3 **Delivery Systems**

The offshore delivery system should nominally be inspected by the helicopter operator every three months. However the inspection may be carried out by a specialist contractor on behalf of the helicopter operator. No system should exceed four months between successive inspections. In addition the system should be subject to daily and weekly checks by offshore fuelling personnel to ensure satisfactory fuel quality.

a) **Daily Checks**. The following checks should be carried out each day:

i) Microfilter and/or filter/water separator and filter monitor. Drain the fuel from the sump until clear. The sample should be of the correct colour, clear, bright and free from solid matter. The sample should be checked for dissolved water by using a syringe and water detection capsule. Filter vessel and hose end samples should be taken under pump pressure (see Chapter 8, paragraph 2 b).

NOTE: This check includes the transfer filter located in the transfer line between the transit tanks and static storage tank.

ii) Storage tank. A fuel sample should also be drawn from each compartment of the storage tank (as applicable) and checked for quality as in paragraph i) above.

iii) A sample should also be drawn from the hose end and checked for quality as in paragraph i) above.

iv) These daily checks should be recorded on the 'daily storage checks'.

NOTE: Fuel samples taken in accordance with ii) and iii) above should be retained for at least 7 days to enable them to be analysed in the event of an aircraft accident.

b) **Weekly Checks**. The following checks should be carried out each week (in addition to the daily checks specified above).

i) Differential pressure gauge. During refuelling the differential pressure gauge reading should be noted and recorded on the filter record sheets.

ii) Entire system. (Including transit tank checks detailed in paragraph 4.1 b) The system should be checked for leaks and general appearance.

iii) Tank top fittings. Should be checked to see all are in place, clean and watertight.

iv) Inlet and outlet couplings. Check caps are in place.

v) Hose end strainers. Strainers fitted to fuelling nozzles and fuelling couplings should be inspected and cleaned. If significant quantities of dirt are found, the reason should be established and remedial action taken. During these checks the condition of any seal should be checked for condition and to ensure they are correctly located.

vi) Floating suction. This should be checked for buoyancy and free movement.

vii) Aviation delivery hose. The hose should be checked visually whilst subjected to system pump pressure. This particular check should be recorded on the hose inspection record.

viii) Delivery nozzle/coupling. The bonding wire and clip should also be checked for general condition, security and electrical continuity (maximum 0.5 ohms).

ix) Bonding reel. Check for general condition, security and electrical continuity (maximum 0.5 ohms).

x) The completion of these checks should be recorded on the serviceability report.

c) **Three-Monthly Checks**. A three-monthly check is the major inspection of the system and should be carried out by an authorised Fuel Inspector. The following check of items to be included will depend on the particular installation and is included as a general guide, additional items may be included as appropriate:

i) All filtration units, i.e. decant line, dispenser and monitor filter. Obtain a fuel sample and check for appearance and water presence (see Chapter 8, paragraph 2 b) procedure). Note results of sample check on system records. If bad samples are obtained on this three-monthly check it could indicate the presence of bacteriological growth in the separator. If samples are not good proceed as follows: open the filter vessel and inspect for surfactants, bacteriological presence, mechanical damage and condition of lining (if applicable). Clean out any sediment and carry out a water test on the water stripper.

ii) Check earth bonding between transit tank and main storage.

iii) Suction fuel hose and coupling

aa) Ensure outer protective cover is present.

bb) Check hose for damage and leakage.

cc) Check end connections for damage and leakage.

dd) Check correct operation of hose coupling.

ee) Check end cap present.

iv) Pump unit

aa) Remove, clean and inspect strainers.

bb) If air driven, then remove air line lubricator, regulator and water separator units, service as required.

v) Hose reel

Ensure reel mechanism operates correctly, grease rewind gears.

vi) Differential pressure gauge

aa) Check correct operation. (Renew filter element if the differential pressure limit is exceeded.)

bb) Prime the unit and check the operation of the automatic air eliminator. (If manual type is fitted it is recommended that it is replaced with an automatic type.)

vii) Delivery hose

Carry out a visual check of the hose whilst under system pressure. Look for external damage, soft areas, blistering, leakage and any other signs of weakness. Particular attention should be paid to those sections of the hose within about 45 cm (18 ins) of couplings since these sections are especially prone to deterioration.

viii) Delivery coupling/nozzle

aa) Check operation to ensure correct lock off and no leakages.

bb) Remove, clean and visually check cone strainers, replace as necessary.

cc) Check earth bonding wire assemblies and bonding clips and pins. Renew if required.

dd) Ensure all dust caps are present and are secured.

NOTE: No lubrication is to be applied to any of the coupling or nozzle parts.

ix) Main earth bonding

aa) On auto rewind, check for correct operation or rewind mechanism, adjust and lubricate as necessary.

bb) Carry out a visual check on earth bonding cable and terminal connections, replace if required.

cc) Check condition of earth clamp quick disconnect assembly.

dd) Carry out continuity check (maximum 0.5 ohms).

d) **Six-Monthly Checks**. Six-monthly checks, as for the three-monthly checks, should be carried out only by an authorised Fuel Inspector. The contents of the six-monthly check should include all the elements of the three-monthly checks detailed in paragraph 4.3 c) above and, in addition, should include the following items:

i) All filtration units, i.e. decant line, dispenser and monitor filter

aa) Ensure the unit has the correct fuel grade identification.

bb) Ensure the connecting pipework has the correct fuel grade identification.

ii) Electrical pump unit (if applicable)

aa) All electrical circuits to be checked by a qualified electrician.

bb) Check gearbox oil level is appropriate.

cc) Lubricate pump bearings.

dd) Check coupling between motor and pump for wear and signs of misalignment.

ee) Refer to pump manufacturer's recommended maintenance schedule for additional items.

iii) Air-driven pump system (if applicable)

aa) Lubricate air motor bearings.

bb) Lubricate pump bearings.

cc) Check coupling between motor and pump for wear and signs of misalignment.

dd) Refer to pump manufacturer's recommended maintenance schedule for additional items.

iv) Metering unit

aa) Check operation of automatic air eliminator.

bb) Lubricate the meter register head, drive and calibration gears with vaseline only.

cc) Lubricate bearings.

dd) Clean and inspect strainer element.

v) Hose reel

aa) Check tension on chain drive and adjust if necessary.

bb) Lubricate the bearings.

vi) Delivery hose

aa) Ensure the correct couplings are attached to the hose.

e) **Annual Checks**. Annual checks should be carried out by an authorised Fuel Inspector. The contents of the annual check includes all the items in both the three-monthly and six-monthly and, in addition, consists of the following items:

i) All filtration units, i.e. transfer, water separator and monitor filters

aa) Remove and discard existing elements and shrouds (see Note below). Clean out vessel. Visually check all areas of lining for signs of deterioration.

bb) Carry out water test on separator element if applicable.

NOTE: For onshore installations, filter elements need only be replaced on condition or every 3 years. For offshore installations filter elements should be replaced either annually or, if appropriate, less frequently (e.g. 3 years) in accordance with the original equipment manufacturers (OEM) instructions.

cc) Carry out MEK test if applicable.

NOTE: This need only be carried out to check for correct curing when lining is new or has been repaired.

dd) Carry out DfT thickness test on vessel interior linings if applicable (again this is only necessary on new or repaired linings).

ee) Apply pin hole detection test if applicable.

ff) Fit new elements and shrouds.

gg) Fit new gasket and seals.

hh) Mark the filter body with the dates of the last filter element change date and the next due date.

ii) Delivery hose

Ascertain when the hose was fitted from system records. It should be recertified every two years or earlier if any defects are found which cannot be repaired. The hose will have a ten-year life from date of manufacture.

NOTE: Hoses unused for a period of more than two years are unsuitable for aircraft refuelling.

iii) Fuel delivery meter

The fuel delivery meter may require calibration; refer to manufacturer's recommendations.

Authorised Fuel Inspectors will normally issue a report following an offshore inspection, whether it be a three-monthly, six-monthly or annual check. These reports should be copied to all offshore helicopter operators for their information.

Chapter 8 Refuelling Procedures

1 General

This section includes recommended procedures for the filling of transit tanks, the transfer of fuel from transit tanks to static storage and the refuelling of aircraft from static storage. Civil Aviation Publication CAP 748 'Aircraft Fuelling and Fuel Installation Management' also gives general advice on fuel storage, handling and quality control.

NOTE: Certain companies arrange 2-day training courses at onshore locations. The courses are intended for offshore staff who are involved with maintaining and operating helicopter fuel systems offshore. Details of the above mentioned courses may be obtained from Cogent OPITO on 01224 787800.

2 Filling of Transit Tanks

The trip examination should be carried out as specified in Chapter 7, paragraph 4.1. The tank should then be dipped to ascertain the quantity of fuel in the tank in order to calculate the volume of fuel required to fill the tank. The following items should then be completed:

a) Draw fuel from transit tank sample line and discard until the samples appear water free.

b) Carry out check for fuel quality in the following manner:

   i) Samples should be drawn at full flush into scrupulously clean, clear glass sample jars (4 litres capacity).

   ii) The fuel should be of the correct colour, visually clear, bright and free from solid matter and dissolved water. (Jet A-1 may vary from colourless to straw colour.)

   iii) Free water will appear as droplets on the sides, or bulk water on the bottom of the sample jar.

   iv) Suspended water will appear as a cloud or haze

   v) Solid matter is usually made up of small amounts of dust, rust, scale etc. suspended in the fuel or settled out on the jar bottom. When testing for dirt, swirl the sample to form a vortex, any dirt present will concentrate at the centre of the vortex making it more readily visible.

   vi) Testing for dissolved water should be done with a syringe and capsule detector test. Fit a capsule to the syringe and immediately withdraw a 5 ml fuel sample into the syringe. Examine the capsule for any colour change. If there is a distinct colour change the fuel should be rejected. (Capsules should be used within 9 months from the date of manufacture. Tubes or capsules are marked with the relevant expiry date. Note: Capsules should not be re-used.)

NOTE: The use of water-finding paper is no longer recommended.

c) Once satisfied that the fuel is free from water, draw off sufficient fuel to measure its specific gravity with a clean hydrometer. The fuel temperature should also be noted in order to correct the measured specific gravity to a relative density (this is done using a correction graph). The Relative Density (RD) of the fuel sample taken from the transit tank should be compared with that of the previous recorded RD after the last tank filling. The relative density of the previous batch of fuel should be taken from the previous release note or from the label from the retained sample. If the difference in relative densities exceeds 0.003 the contents of the transit tank may have been contaminated with some other product and the refilling should not take place.

d) First connect the bonding wire to the transit tank then connect the delivery hose coupling to the transit tank filling point and start the transfer pump to fill the tank. The inspection hatch should be opened prior to filling otherwise the bursting disc could be ruptured. When the meter register head indicates that the required quantity of fuel has been transferred, stop the transfer pump, remove the coupling from the tank and then remove the bonding connection. The dust cap should then be replaced on the filling point. The tank should be dipped to check the tank contents. Leave the tank to settle for 10 minutes then a further sample should be drawn from the tank once it has been filled. This sample should be labelled with the tank number, the fuel batch number and date of filling and should then be retained safely until the tank is offered again for refilling. The sample should be subjected to a Relative Density (RD) check following the same process given in paragraph c) above. The record of this should be within 0.003 of the RD of the bulk supply. This RD reading should be recorded to allow the fuel remaining in the tank to be checked for possible contamination when the tank next returns from offshore for the next tank filling. This sample will be required as a proof of fuel quality in the event of an aircraft incident where fuel may be considered to be a causal factor.

e) The tank should then be sealed and a release note completed with all the required particulars; special attention should be paid that the correct grade of fuel is included on this release note, e.g. with AL48 as appropriate. A copy of this release note should be secured in the tank document container and a further copy retained for reference.

3 Decanting from Transit Tanks to Static Storage

Before commencing any transfer of fuel it is necessary to dip the storage tank to ensure that the contents of the transit tank can be accommodated within the intended storage facility. The transit tank should have had sufficient time to settle once positioned correctly for the transfer operation. Bulk storage tanks equipped with a floating suction device need at least 1 hour for settling time and tanks without floating suction should be left for a period in hours approximately equal to the depth of fuel in feet (i.e 6 feet depth of fuel should be left to settle for a period of at least 6 hours).

The following procedure should then be followed:

a) Check transit tank seals are still intact.

b) Check transit tank grade marked.

c) Check tank shell for damage particularly around welded seams.

d) Check release note for the following.

   i) Correct grade.

   ii) Quantity.

   iii) Batch number.

   iv) Date.

v) Certified free from dirt and water.

vi) Signed by authorised product inspector.

e) Take fuel samples from the transit tank and discard until the samples appear water free.

f) Carry out checks for fuel quality as described above in paragraph 2 b).

g) If the transit tank sample test is not satisfactory, then draining a quantity of fuel off at full flush and then retesting may produce a satisfactory result.

h) Once a satisfactory test has been obtained the transit tank should next be properly bonded to the system interconnecting pipework and then the transfer hose should be connected to the transit tank discharge point (via a suitable filter, i.e. 5 micron or less) and open valve.

i) With the transfer pump running obtain a sample from the transfer filter separator until a satisfactory result is obtained.

NOTE: Fuel should be pumped through filtration vessels for the elements to be effective.

j) Start the transfer pump and open the static tank inlet valve to start the fuel flow. Once fuel transfer has commenced check the coupling connections for any signs of leakage and continue to monitor the fuel flow whilst transfer is taking place.

k) When sufficient fuel has been transferred shut off the valves and stop the transfer pump.

l) Disconnect the electrical bonding lead and replace any dust caps that were removed at the commencement of the operation.

m) Record fuel quality checks and the transfer of the transit tank contents into the storage tanks and retain the release note on board the installation/vessel.

n) After transfer of fuel into the bulk storage tank ensure that the fuel is allowed to settle in accordance with paragraph 3 above, before it is released for use.

4 Aircraft Refuelling

4.1 Always ensure before starting any refuelling that the fuel in the storage tank is properly settled, refer to paragraph 3 above for correct settling times.

4.2 Before the commencement of any helicopter refuelling, the HLO should be notified. All passengers should normally be disembarked from the helicopter and should be clear of the helideck before refuelling commences (but see j) below). The fire team should be in attendance at all times during any refuelling operation. The following procedure will then apply:

a) When the aircraft captain is ready and it has been ascertained how much fuel is required and that the grade of fuel is correct for the particular aircraft, run out the delivery hose on the helideck to the aircraft refuelling point.

b) Take a fuel sample from the nozzle end or from the filter monitor drain point (if a pressure refuelling coupling is in use) and carry out a water detection check. For two-pilot operations this should be witnessed by the non-handling pilot, who should be satisfied that the fuel water test is acceptable. During single-pilot operations the water detection capsule should be shown to the pilot after the water detection check.

c) Next attach the main bonding lead to the aircraft earthing point.

d) If pressure refuelling, first connect the secondary bonding lead to bond the refuelling nozzle to the aircraft then connect the pressure coupling to the aircraft and remain adjacent to the fuelling point. If gravity refuelling, first connect the secondary bonding lead to bond the refuelling nozzle to the aircraft, open the tank filler and insert the nozzle and prepare to operate the fuel lever when cleared to do so.

e) The nominated person in charge of the refuelling should operate the system pump switches and open any necessary valves to start the flow of fuel only when given clearance by the pilot.

f) If any abnormalities are observed during the refuelling, the off switch should immediately be operated. When refuelling is complete, the pump should be shut down and the nozzle handle released.

g) Remove the refuelling nozzle or disconnect the pressure coupling as appropriate and replace the aircraft filler cap. Finally disconnect the secondary bond lead. A further fuel sample should now be taken, witnessed by the pilot, as in b) above and a fuel water check should again be carried out. See also Daily Checks in Chapter 7 paragraph 4.3 for retained samples.

h) Remove the delivery hose from the helideck and carry out a final check that the aircraft filler cap is secure then disconnect the main bonding lead from the aircraft and check that all equipment is clear from the proximity of the aircraft. The hose should be rewound onto its reel.

i) Enter the fuel quantity onto the daily refuelling sheet and obtain the pilot's signature for the fuel received.

j) If for safety reasons the aircraft captain has decided that the refuelling should be carried out with passengers embarked, the following additional precautions should be undertaken:

   i) Constant communications should be maintained between the aircraft captain and the refuelling crew.

   ii) The passengers should be briefed.

   iii) The emergency exits opposite the refuelling point should be unobstructed and ready for use.

   iv) Passengers seatbelts should be undone.

   v) A competent person should be positioned ready to supervise disembarkation in the event of an emergency.

4.3 Civil Aviation Publication CAP 748, 'Aircraft Fuelling and Fuel Installation Management', offers further general guidance.

5 Sample Documentation

Recording of aviation refuelling system / component manufacture, routine maintenance and rectification, testing, fuel transfer history and aircraft refuelling, etc. should be recorded on official company documentation. This documentation is normally provided by the helicopter operators and / or specialist fuel suppliers and system maintainers. As a minimum, the documentation used should comprise:

- Tank Certificate;
- Fuel Release Certificate;

- Record of Transit Tank Receipt;
- Daily and Weekly Serviceability Report;
- Daily Storage Checks;
- Differential Pressure Record;
- Hose Inspection and Nozzle Filters Test Record;
- Storage Tank Checks Before and After Replenishment;
- Fuel System Maintenance Record;
- Tank Inspection and Cleaning Record;
- Fuelling Daily Log Sheet.

Chapter 9 Helicopter Landing Areas on Vessels

1 Vessels Supporting Offshore Mineral Workings and Specific Standards for Landing Areas on Merchant Vessels

1.1 Helidecks on vessels used in support of the offshore oil and gas industry should be designed to comply with the requirements of the preceding chapters of this publication.

The International Chamber of Shipping (ICS) has published a 'Guide to Helicopter/Ship Operations' which comprehensively describes physical criteria and procedures on ships. It is not intended to reproduce detail from the ICS document which should be referenced in addition to this chapter.

1.2 Helicopter landing areas on vessels which comply with the criteria and which have been satisfactorily assessed by the Helideck Certification Agency (HCA) will be included in the Helideck Limitations List (HLL) published by the HCA. This list will specify the D-value of a helideck; include pitch, roll and heave category, list areas of non-compliance against CAP 437 and detail specific limitations applied to the helideck. Vessels having ships'-side or midships helidecks or landing areas may be subject to specific limitations due to the lack of obstacle protected surfaces and public transport requirements in terms of performance considerations.

1.3 Helicopter landing areas should have an approved D-value equal to or greater than the 'D' dimension of the helicopter intending to land on it.

1.4 Helicopter landing areas which cannot be positioned so as to provide a full obstacle-free surface for landing and take-off for specific helicopter types will be assessed by the HCA and appropriate limitations will be imposed.

1.5 It should be noted that helicopter operations to ships with landing areas at the bow or stern may be further limited depending on the ships movement in pitch, roll and heave.

2 Amidships Helicopter Landing Areas – Purpose Built or Non-Purpose Built Ships Centreline
(See Figure 1)

2.1 General

The following special requirements apply to vessels which can only accommodate a helicopter landing area in an obstructed environment amidships. The centre of the landing area will usually be co-located on the centreline of the vessel, but may be offset from the ships centreline either to the port or starboard side to the extent that the edge of the landing area is coincidental with the ship's side.

2.2 Size and Obstacle Environment

2.2.1 The reference value 'D' (overall dimension of helicopter) given at Table 1 (Chapter 3) also applies to ships' landing areas referred to in this Chapter. It should also be noted that amidships landing areas are only considered suitable for single main rotor helicopters.

2.2.2 Forward and aft of the centreline landing area should be two symmetrically located 150° limited obstacle sectors with apexes on the circumference of the 'D' reference circle. Within the area enclosing these two sectors, and to provide a ‘funnel of protection’ over the whole of the ‘D’ circle there should be no obstructions above the level of the landing area except those referred to at Chapter 3, paragraph 6.2 which are permitted up to a maximum height of 0.25 metres above the landing area level.

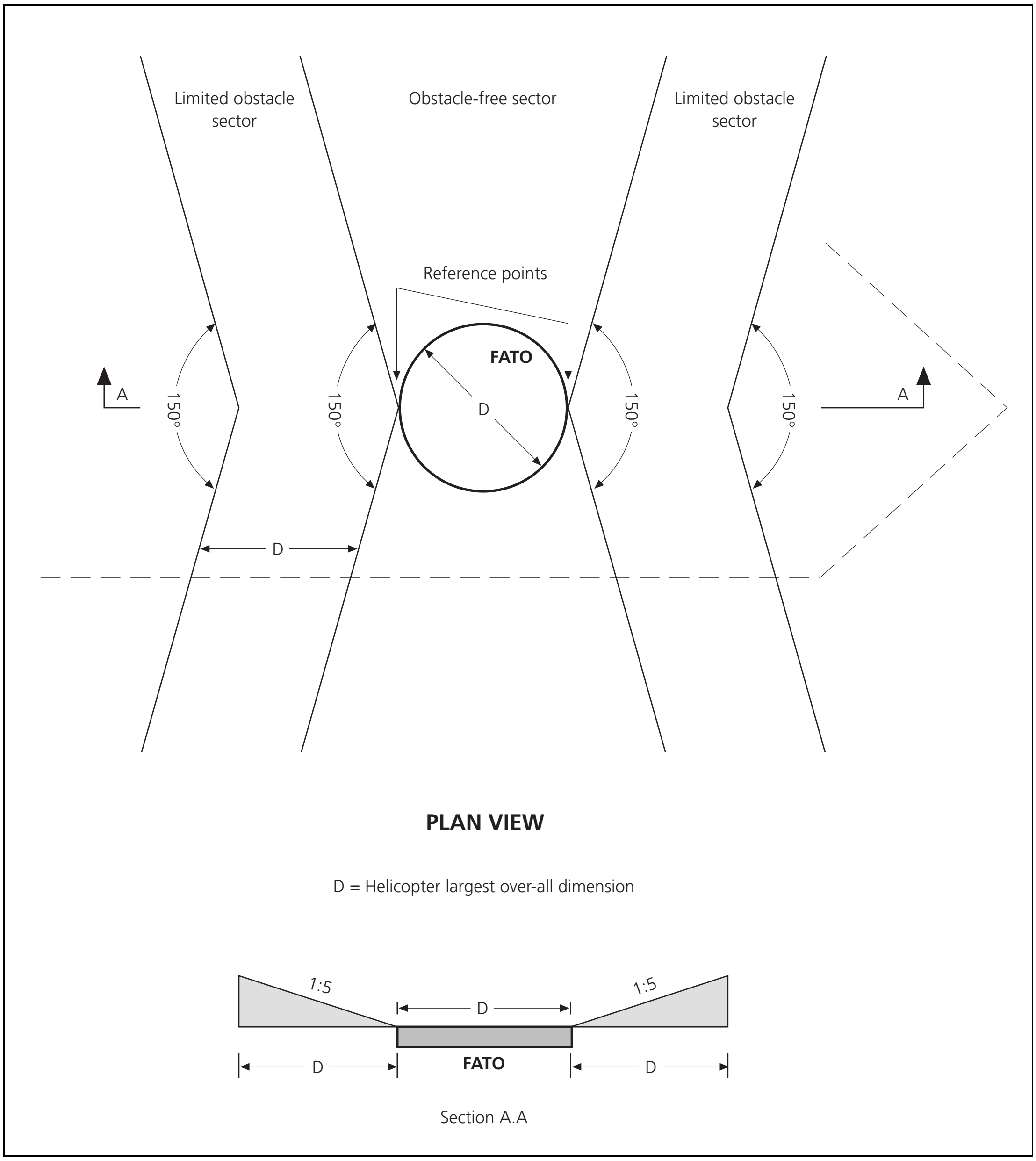


Figure 1 Midship Centreline

2.2.3 To provide protection from obstructions adjacent to the landing area, an obstacle protection surface extends both fore and aft of the final approach and take-off area (FATO). This surface extends at a gradient of 1:5 out to a distance of ‘D’ as shown in Figure 1.

2.2.4 Where the requirements for the limited obstacle surface cannot be fully met but the landing area size (FATO) is acceptable, it may be possible to apply specific operational limitations or restrictions which will enable helicopters up to a maximum ‘D’ value of the FATO to operate to the deck.

2.2.5 The structural requirements referred to in Chapter 3 should be applied whether providing a purpose-built amidships helideck above a ship’s deck or providing a non-purpose built landing area on a ship's deck. The provision of a landing area net is a requirement except where skid fitted helicopters are routinely used.

3 Helicopter Landing Area Marking and Lighting

The basic marking and lighting requirements referred to at Chapter 4 will also apply to all helicopter landing areas on ships except that at amidships helicopter landing areas the aiming circle should be positioned on the centre of the safe landing area and both the forward and aft 'origins' denoting the limited obstacle sector should be marked with a black chevron (see Chapter 4, Figure 2). In addition, where there is an operational requirement, vessel owners may consider providing the helideck name marking and maximum allowable mass 't' marking both forward and aft of the painted helideck identification 'H' marking and aiming circle.

4 Ship's Side Non Purpose Built Landing Area

4.1 Refer to Figure 2 for layout and dimensions.

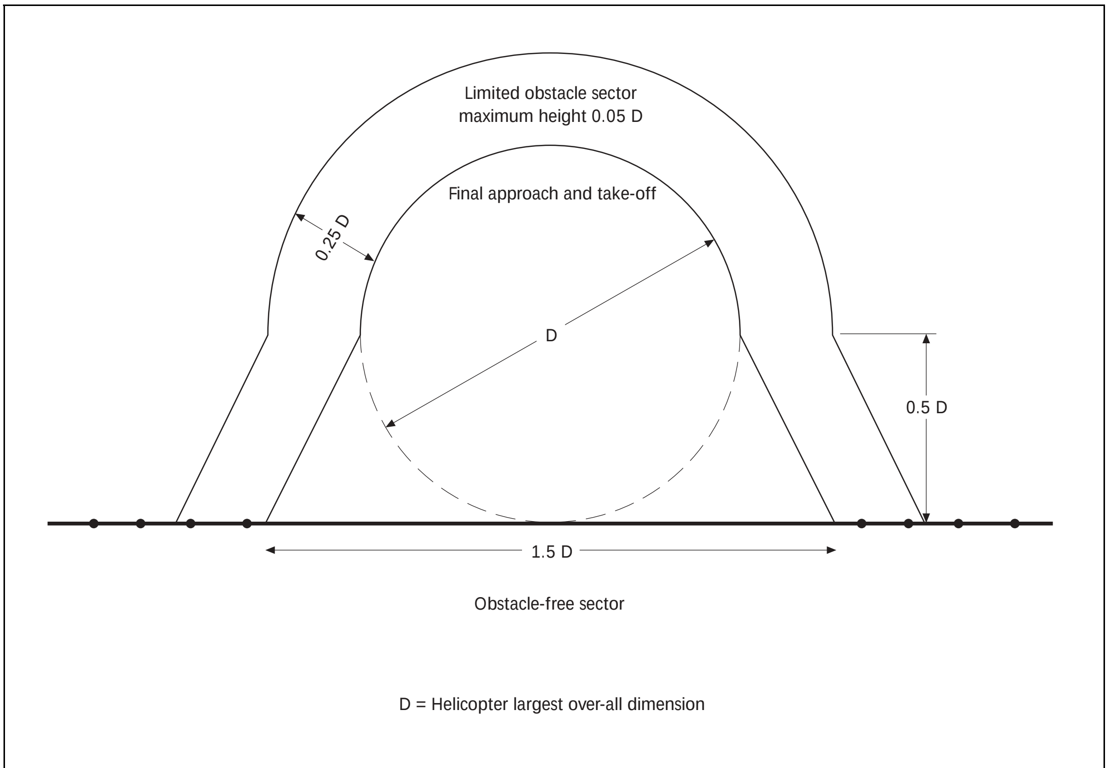


Figure 2 Ship's Side: Non-Purpose Built Landing Area

4.2 The above areas which consist of an inner 'clear zone' (D-value) and an outer 'manoeuvring zone' should, where possible, be established on the vessel's main deck. The 'manoeuvring zone' which extends beyond the final approach and take-off area (FATO) by 0.25 D for a landing area is intended to provide the helicopter with an additional area of protection to account for rotor overhang beyond the 'clear zone'.

5 Winching Areas

A winching area should provide a 'manoeuvring zone' with a minimum diameter of 2D (twice the overall dimension of the largest helicopter permitted to use the area).

Within the 'manoeuvring zone' a 'clear area' should be centred. This clear area should be at least 5 metres in diameter and should be a solid surface. It is accepted that part of the manoeuvring zone, outwith the clear area, may be located beyond the ship's side but it should comply with obstruction requirements shown in Figure 3.

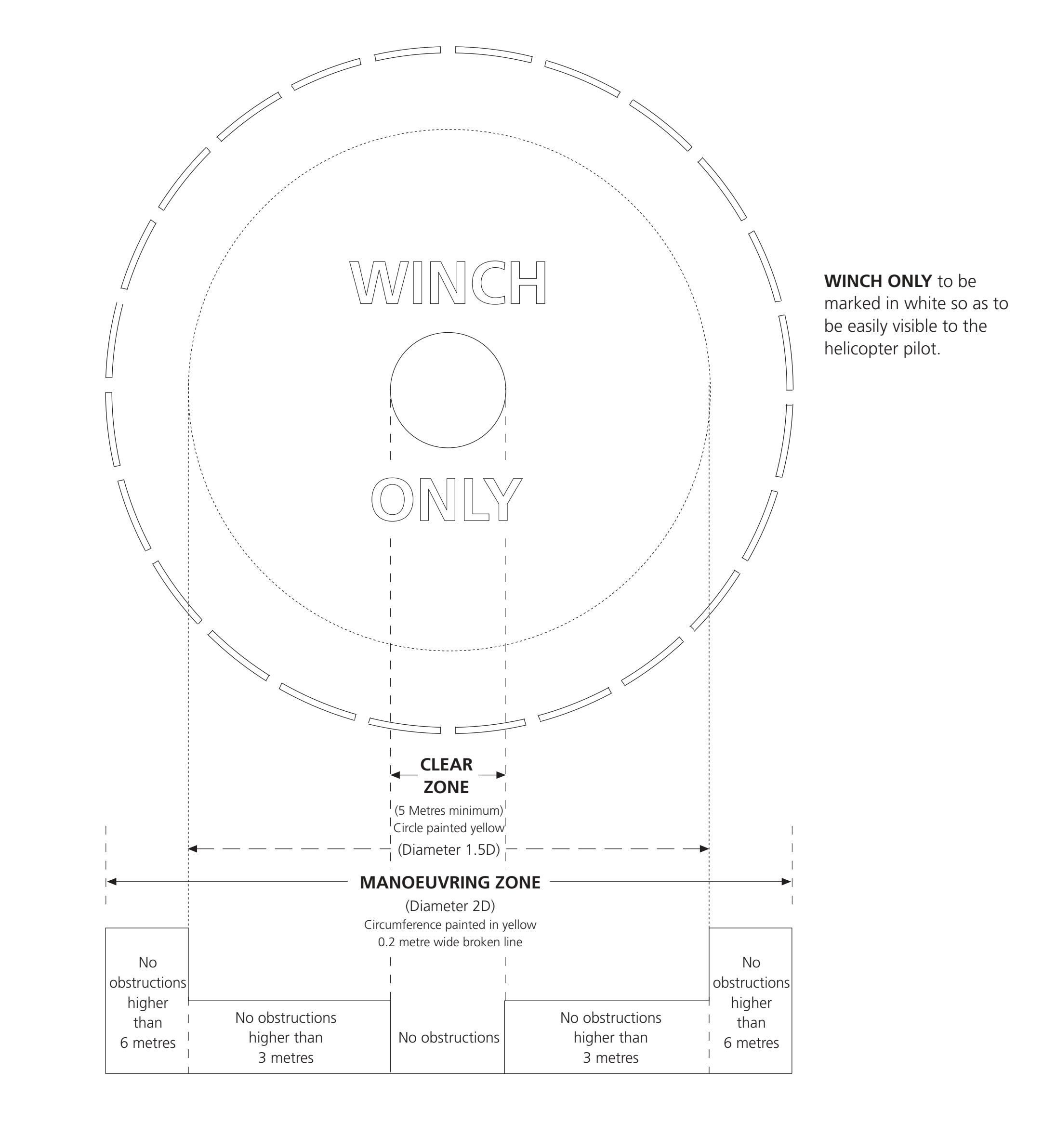


Figure 3 Winching Area

6 Obstructions

6.1 To make a landing operation safe it is essential that any part of the ship's side rail within the manoeuvring zone is removed or stowed horizontally.

6.2 All aerials, awnings, stanchions and derricks or cranes within the vicinity of the manoeuvring zone should be either lowered or securely stowed.

6.3 All dominant obstacles within, or adjacent to the manoeuvring zone should be conspicuously marked.

7 Poop Deck Operations

Due to the design and nature of a vessel, where it is impossible to provide a main deck landing or winching area it may be acceptable to accommodate a suitable area on the poop deck of the ship. However, if this is the case, the following additional safety factors will have to be considered:

a) air turbulence caused by the superstructure may adversely affect helicopter performance;

b) flue gases may adversely affect the pilot and the performance of the helicopter engines;

c) vessel movement in both pitch and yaw are exaggerated at the stern.

These safety factors are considered more fully in Chapter 3 and in CAA Paper 2004/02 "Helideck Design Considerations – Environmental Effects". It is strongly recommended that vessel designers review CAA Paper 2004/02 before accommodating a landing area on the poop deck of the ship.

NOTE: To reduce adverse factors mentioned above it is beneficial to position the vessel so that the relative wind is 30° off the port bow.

8 Winching Above Accommodation Spaces

Some vessels may only be able to provide winching areas which are situated above accommodation spaces. Due to the constraints of operating above such an area only twin-engined helicopters should be used for such operations and the following procedures adhered to:

a) personnel should be cleared from all spaces immediately below the helicopter operating area and from those spaces where the only means of escape is through the area immediately below the operating area;

b) safe means of access to and escape from the operating area should be provided by at least two independent routes;

c) all doors, ports, skylights etc. in the vicinity of the aircraft operating area should be closed. This also applies to deck levels below the operating area;

d) Fire and rescue personnel should be deployed in a ready state but sheltered from the helicopter operating area.

9 Night Operations

Figure 4 shows an example of the overall lighting required for night helicopter operations. Details of the landing area lighting are given at Chapter 4, Section 3. Additionally the Ship's Master should ensure that:

a) Floodlights are not directed at an angle which will dazzle the helicopter pilot.

b) Photographic flash equipment is not to be used during the landing and take-off or winching operation.

10 Operating Guidance

10.1 Landing or Winching

Where practicable, the helicopter should land, rather than winch, because safety is enhanced if the time spent hovering is reduced. Whether the helicopter lands or hovers, the master should be fully aware of, and in agreement with, the pilot's intentions.

10.2 Twin and Single-Engined Helicopters

Some states permit offshore operations in single-engined helicopters in accordance with specified rules and criteria. The guidance given in this paragraph (10.2) is not relevant for UK G registered operations.

Single-engined helicopters should only be used for transfer to ships on which either a 'full' or 'restricted' landing area is available.

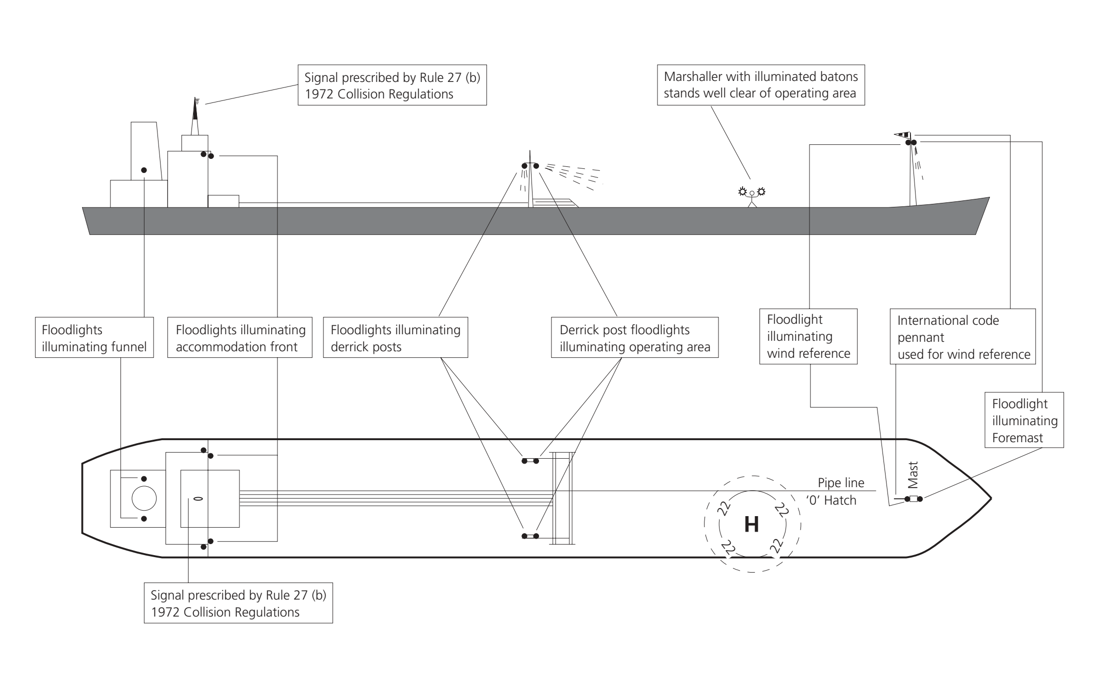


Figure 4 Night Operations: Lighting Requirements

At night, single-engined helicopters should only be used to transfer stores. They should not be used to transfer personnel.

Personnel should normally be winched only from multi-engined helicopters with a one-engine-inoperative hover capability.

When helicopter operations are being carried out above winching areas in the vicinity of accommodation spaces, compliance with the requirements of paragraph 8 is especially important.

The following Table 1 shows the operations which may be conducted with twin-engined and single-engined helicopters respectively, subject to local regulations.

Table 1 Twin- and single-engined helicopter operations

	Personnel				**Stores**			
	Landing		**Winching**		**Landing**		**Winching**	
	Day	**Night**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
Twin Engined	YES	YES	YES[1]	YES[1]	YES	YES	YES	YES
Single Engined	YES	NO	NO	NO	YES	YES	NO	NO

1. Winching area may be used only if a ‘full’ or ‘restricted’ landing area is not available or cannot be used.

11 Weather Conditions

Limiting weather conditions will be in accordance with the requirements of the helicopter operator’s ‘Operations Manual’. Some vessels may apply lower limits for personnel movement on the helideck.

Chapter 10 Tandem Rotor Helicopter Helidecks

NOTE: For structural load considerations refer to Chapter 3, Sections 4 and 5. There are currently no tandem rotor helicopters operating on the UK continental shelf. This chapter is written to provide guidance and an explanation on helidecks marked for tandem rotor helicopters which may appear in UK waters. Ideally such helidecks should be re-marked for single rotor helicopters in accordance with Chapters 3 and 4 above. The criteria listed below is taken from the third edition of CAP 437 and is intended for use only where appropriate.

1 Introduction

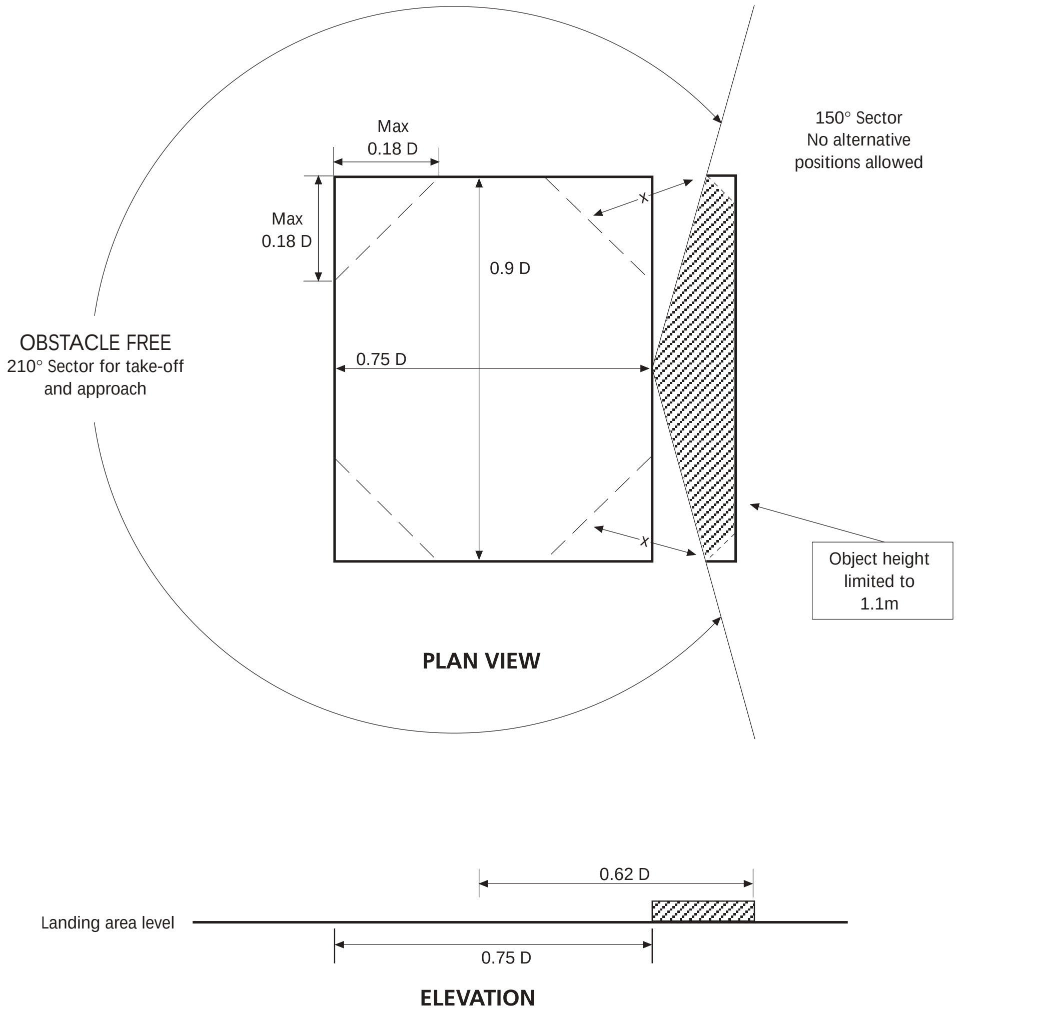
1.1 To allow for omnidirectional landings for any helicopter having tandem main rotors, the area should be sufficiently large to contain a D circle of diameter 0.9 D, where D is the measurement across the rotors in a fore and aft line. If this cannot be met, a landing area rectangle should be provided with a major axis of at least 0.9 D and a minor axis of at least 0.75 D. To allow for omnidirectional landings for any helicopter having tandem main rotors, the area should be sufficiently large to contain a landing area circle of diameter 0.9 D, where D is the measurement across the rotors in a fore and aft line. If this cannot be met, a landing area rectangle should be provided with a major axis of at least 0.9 D and a minor axis of at least 0.75 D, which dimension will allow for bi-directional landings only.

1.2 Within this landing rectangle, bi-directional landings will be permitted in the direction of the major axis only. (If necessary for design purposes, any of the corners of this rectangle may be omitted provided that neither of the two sides forming the right angle of any such triangle exceeds 0.18 D in length). (This is illustrated in Figure 1.)

1.3 From any point on the periphery of the above-mentioned landing area circles, or from the inboard end of the minor axis of the landing area rectangle, an obstacle-free approach and take-off sector should be provided which totally encloses the landing area circle or rectangle and which extends over an arc of at least 210°. Within this sector, and out to a distance of 1000 metres from the periphery of the landing area, only the following items may exceed the height of the landing area, but should not do so by more than 0.25 metres:

- the guttering or slightly raised kerb (associated with the requirements in Chapter 3);
- the lighting required by Chapter 4;
- the outboard edge of the safety net required in Chapter 3;
- the foam monitors;
- those handrails and other items associated with the landing area which are incapable of complete retraction or lowering for helicopter operations.

NOTE: As a general rule, at helidecks where obstacle-free sectors are infringed by installations or vessels which are positioned within 1000 metres of the point of origin of the sector, it may be necessary to impose helicopter operating restrictions. (See Chapter 6 for further details.)



NOTES: 1 The D-value relates to the D-value of the largest tandem main rotor helicopter for which the deck is designed.

2 For omnidirectional operations by single main rotor (or side by side rotor) helicopters the minimum deck dimension (0.75 D axis) should be equal to or greater than the D-value of the single main rotor (or side by side rotor) helicopter.

3 Distance x = 0.62D–0.375D. The extent of the protected surface in the limited obstacle sector as shown hatched above, is measured from and follows the perimeter of the safe landing area.

Figure 1 Obstacle-Free Areas (Tandem Main Rotor Helicopters – Bi-Directional Landings)

1.4 The bisector of the 210° obstacle-free sector should normally pass through the centre of the landing circle or rectangle. The sector may be ‘swung’ by up to 15° in the case of omnidirectional landing circles, but not for bi-directional landing rectangles.

For bi-directional landing areas for tandem main rotor helicopters, within the limited obstacle sector, no object should exceed 1.1 m above helideck level out to a distance of 0.62 D from the centre of the landing rectangle (see Figure 1).

1.5 For omnidirectional landing areas for tandem main rotor helicopters no objects should be permitted in the limited obstacle sector within a radius of 0.62 D from the centre of the D circle. Beyond that arc out to an overall distance of 0.83 D objects should not exceed a height of 0.05 D above helideck level (see Figure 2).

1.6 The bisector of the 210° obstacle-free sector should normally pass through the centre of the safe landing area. The sector may not be ‘swung’ (as illustrated in Figure 2) in the case of bi-directional landing rectangles.

2 Omnidirectional Landing Area

The criteria contained in Chapters 3 and 4 should be followed except that the touchdown marking and H should be located in the centre of the D circle. The inner diameter of the touchdown marking should be 0.5 D of the actual helideck D-value but should not exceed 12 metres.

3 Bi-directional Rectangular Landing Area

The criteria contained in Chapters 3 and 4 should be followed except that the touchdown marking and H should be located in the centre of the landing area. Where the minor axis of the landing rectangle is greater than 0.75 D, the marking should be located half the nominal 0.75 D distance from the outboard edge of the helideck. The inner diameter of the touchdown marking should be half the 0.9 D value of the helideck but should not exceed 12 metres. Additionally, yellow guidelines, 1 metre wide, from the periphery of the touchdown marking to the edge of the helideck parallel to the long side of the rectangle should be marked. (See Figure 3.)

4 Loads – Structural Response Factor

Reference should be made to Chapter 3.

Where test data for both front and rear undercarriage has been reviewed, the structural response factor may be modified as follows:

Natural frequency of deck structure	Structural response factor
Between 17 and 25 Hz	1.30
Between 25 and 50 Hz	1.15
Between 50 and 100 Hz	1.10

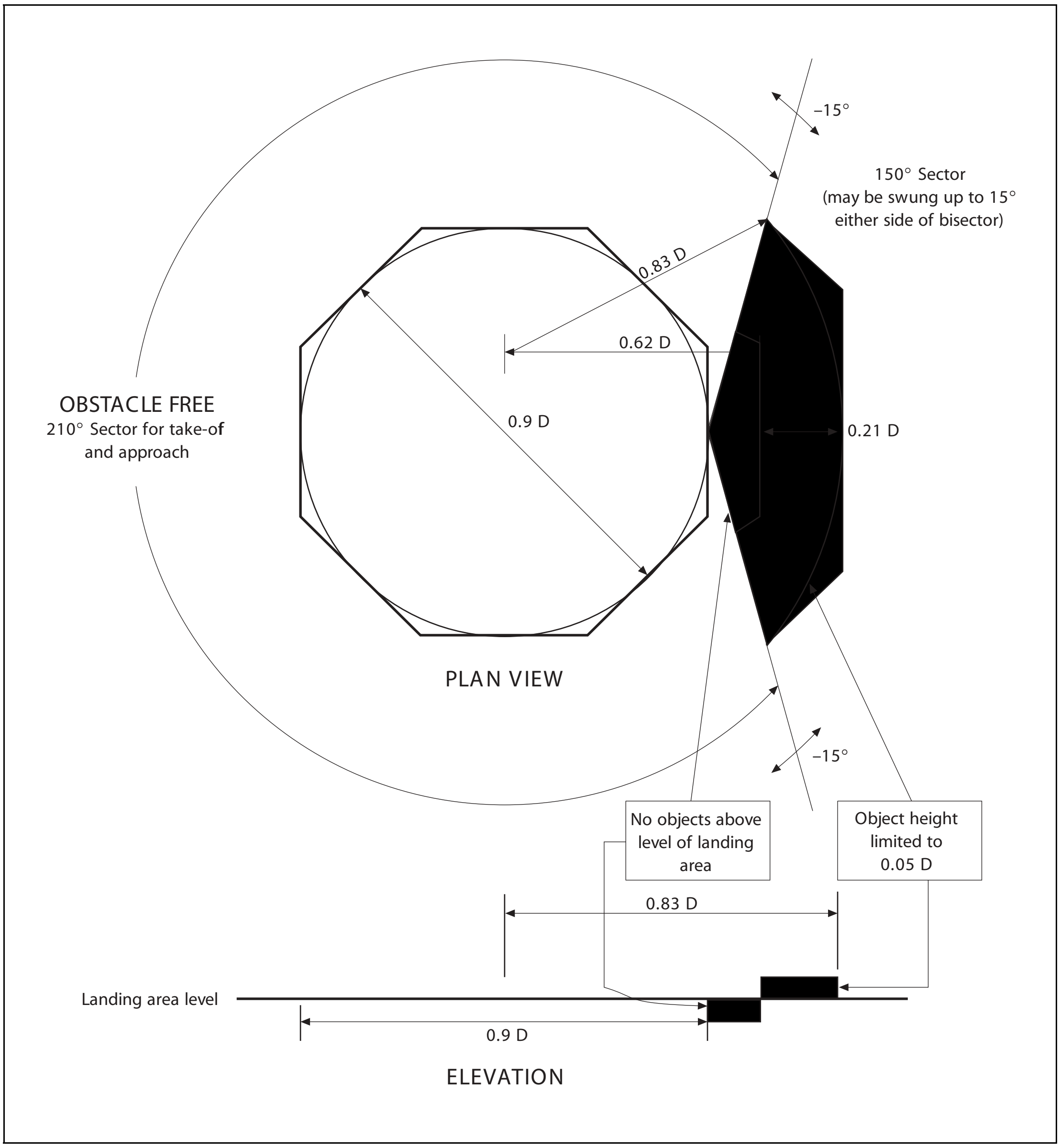


Figure 2 Obstacle-Free Areas (Tandem Main Rotor Helicopters – Omnidirectional Landing)

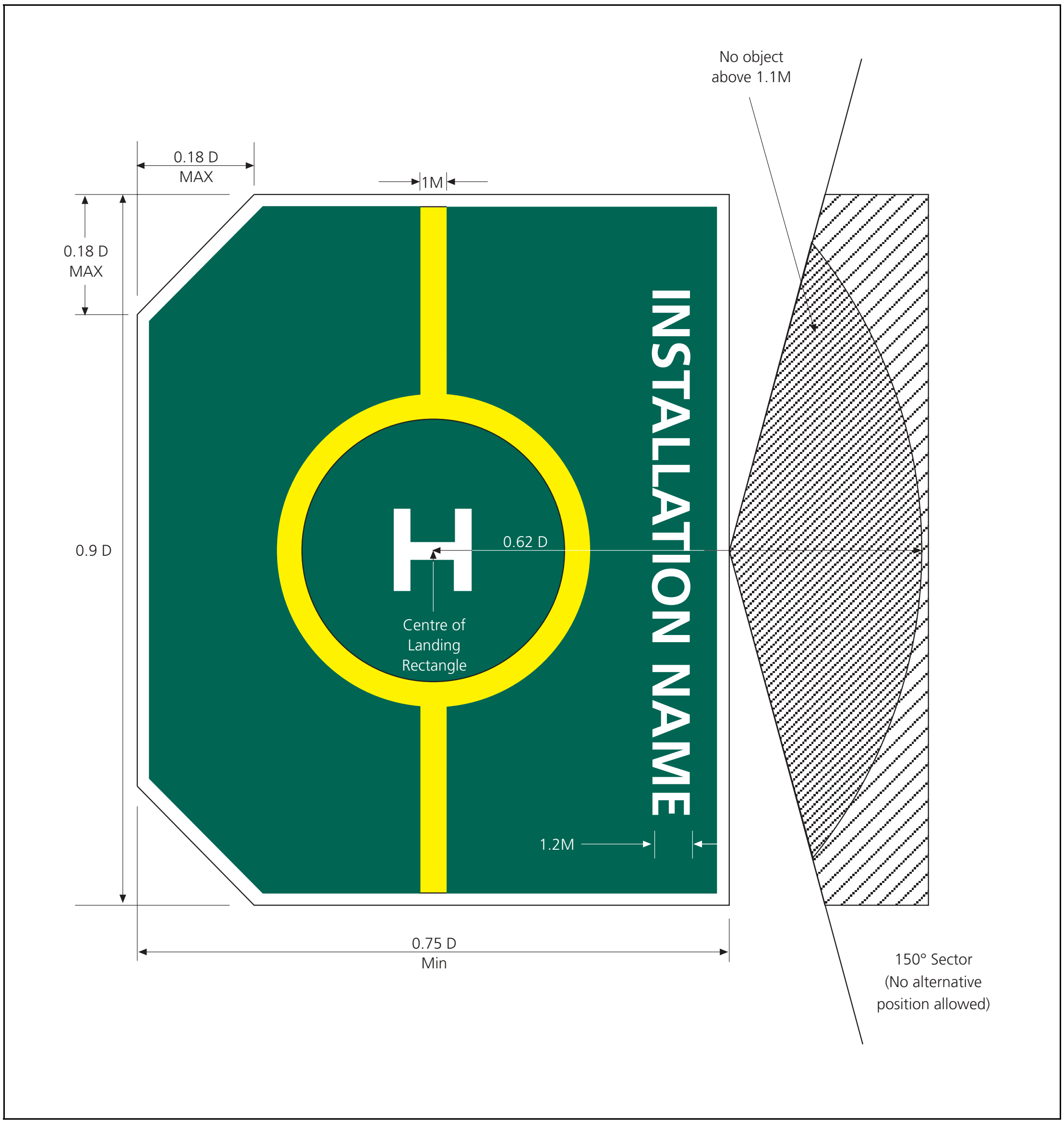


Figure 3 Bi-Directional Markings for Tandem Main Rotor Helicopter Operations

NOTES:

1. The D-value relates to the D-value of the largest tandem main rotor helicopter for which the helideck is designed.
2. For omnidirectional operations by single main rotor (or side by side rotor) helicopters the minimum deck dimension (0.75 D axis) should be equal to or greater than the D-value of the largest single rotor (or side by side rotor) helicopter approved to use the deck.
3. Where the minor axis is greater than the minimum 0.75 D, the 'H' should be located at ½ of the nominal 0.75 D from the outboard edge of the deck.

Appendix A Checklist

The following checklist indicates in general terms the minimum number of helideck physical characteristics which the CAA considers should be examined during periodic surveys to confirm that there has been no alteration or deterioration in condition. For a detailed Helideck and System Inspection Checklist, readers are recommended to refer to UKOOA Guidelines for the Management of Offshore Helideck Operations.

a) **Helideck Dimensions:**

  i) D-value as measured;

  ii) Declared D-value;

  iii) Deck shape;

  iv) Scale drawings of deck arrangement.

b) **Deck Landing Area Conditions:**

  i) Type of surface, condition, friction, contaminant free;

  ii) Fuel retention;

  iii) Deck landing area net;

  iv) Perimeter safety netting;

  v) Tie-down points.

c) **Environment:**

  i) Turbine and other exhausts;

  ii) Hot and cold gas emissions;

  iii) Turbulence generators;

  iv) Flares;

  v) Emergency gas release systems;

  vi) Adjacent fixed/mobile/vessel exhausts, gas emissions, flares, and turbulence generators.

d) **Obstacle Protected Surfaces (Minima):**

  i) Obstacle-free sector (210°);

  ii) Limited obstacle sector (150°);

  iii) Falling 5:1 gradient;

  iv) Note if i) or iii) above are swung from normal axis.

e) **Visual Aids:**

  i) Deck surface;

  ii) General condition of painted markings;

  iii) Location of H;

  iv) Aiming circle;

  v) Safe Landing Area perimeter line – relationship to Chevron;

vi) D-value marked within perimeter line;

vii) Chevron marking (if reduced the sector is to be marked in degrees);

viii) Certification marking (exact D-value);

ix) Maximum allowable mass marking;

x) Conspicuity of installation name;

xi) Wind indicator;

xii) Perimeter lighting;

xiii) Floodlighting;

xiv) Obstruction lighting;

xv) Marking of dominant obstacles;

xvi) Shield of installation working lights (helideck light pollution);

xvii) Status Lights (where required).

f) **Fuel System:**

i) Jet A-1 installation;

ii) Hose;

iii) Earthing equipment.

g) **Rescue and Firefighting Equipment**

i) Principal agent;

ii) Complementary media;

iii) Rescue equipment;

iv) Personal protective equipment.

Appendix B Bibliography

1 References

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Offshore Installations: Guidance on Design, Construction and Certification, Health and Safety Executive, HMSO ISBN 0114106126.

Health and Safety Executive: Operations and Safety Notices

Operations Notice No. 39: Guidance on Identification of Offshore Installations

Operations Notice No. 67: Offshore Helideck Design Guidelines

Safety Notice 1 / 1994: Mobile Installations and Vessels: Movement of Helidecks

Safety Notice 2 / 2004: Testing of Helideck Foam Production Systems

International Civil Aviation Organization

ICAO Doc 9261 AN/903	Heliport Manual
ICAO Doc 9284 AN/905	Technical Instruction for the Safe Transport of Dangerous Goods by Air
ICAO Annex 14 Volume II	Heliports

UK Offshore Operators Association (UKOOA) and Offshore Industry Advisory Committee – Helicopter Liaison Group (OIAC-HLG)

UKOOA	Guidelines for the Management of Offshore Helideck Operations (Issue 5) February 2005
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UKOOA Guidelines for Safety Related Telecommunications Systems On Fixed Offshore Installations

* Published by UK Health and Safety Executive with the endorsement of OIAC – HLG (can be downloaded from HSE's website www.hse.gov.uk).

Offshore Petroleum Industry Training Organisation (OPITO)

Helicopter Landing Officers Handbook (OPITO)

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Civil Aviation Authority – CAPs and Research Papers

CAA Paper 97009	A Questionnaire Survey of Workload and Safety Hazards associated with North Sea and Irish Sea Helicopter Operations
CAA Paper 98002	Friction Characteristics of Helidecks on Offshore Fixed-Manned Installations
CAA Paper 99004	Research on Offshore Helideck Environmental Issues
CAA Paper 2003/06	Specification for an Offshore Helideck Status Light_ System
CAA Paper 2004/01	Enhancing Offshore Helideck Lighting – NAM K14 Trials
CAA Paper 2004/02	Helideck Design Considerations - Environmental Effects
CAA Paper 2004/03	Helicopter Turbulence Criteria for Operations to Offshore Platforms
CAA Paper 2005/01	Enhancing Offshore Helideck Lighting – Onshore trials at Longside Airfield
CAP 452	Aeronautical Radio Station Operator's Guide
CAP 670	Air Traffic Services Safety Requirements
CAP 748	Aircraft Fuelling and Fuel Installation Management

2 Sources

Civil Aviation Publications (CAPs) and Civil Aviation Authority Papers (CAA Papers) are published on the CAA web site at www.caa.co.uk where you may register for e-mail notification of amendments. Please see inside cover of this CAP for details of availability of paper copy.

ICAO publications are available from Airplan Flight Equipment, 1a Ringway Trading Estate, Shadowmoss Road, Manchester M22 5LH. Telephone 0161 499 0023. The ICAO website address is www.icao.int.

British Standards (BS) may be obtained from Her Majesty’s Stationery Office, PO Box 276, Nine Elms Lane, London SW8 5DT. Telephone 020 7211 5656 or from any HMSO. Advice on relevant codes (BS EN & PREN) is available from the CAA at SRG Gatwick.

HSE Publications from HSE Books, PO Box 1999, Sudbury, Suffolk, CO10 6FS. Telephone (01787) 881165.

OPITO Publications from OPITO, Inchbraoch house, South Quay, Ferryden, Montrose, Scotland, DD10 9SL. Telephone (01674) 662500.

UKOOA Publications from UKOOA, 3 Hans Crescent, London, SW1X 0LN. Telephone 020 7589 5255; or, from UKOOA, 9 Albyn Terrace, Aberdeen, AB10 1YP. UKOOA publications can also be viewed on the Internet at:- http\\www.ukooa.co.uk.

Appendix C Interim Guidance issued by CAA in July 2004

Safety Regulation Group

Flight Operations Inspectorate (Helicopters)

20 July 2004

Ref 10A/253/16/3

Dear Sirs

Helideck Lighting – Further Interim Guidance on Standards

1 Introduction

Further to my letter ref 10A/253/16/3 of 17 November 2003, ICAO has now endorsed the changes proposed to the helideck lighting standards contained in Annex 14 Vol.2. UK CAA, recommends that the improvements to helideck lighting systems be introduced in two stages and, in conjunction with other North Sea States, intends to update CAP 437 in the near future adding a recommendation that duty holders implement the first stage, Stage 1, as soon as practical.

The purpose of this letter is to update the interim guidance on offshore helideck lighting standards in respect of Stage 1 pending update of CAP 437, and supersedes the 17 November 2003 letter which should now be discarded. Section 2 describes the background to the initiative, and Sections 3 and 4 cover the associated changes to perimeter lighting and floodlighting respectively.

2 Background

Three main problems exist with current helideck lighting systems:

- the location of the helideck on the platform is often difficult to establish due to the lack of conspicuity of the perimeter lights;
- helideck floodlighting systems frequently present a source of glare and loss of pilots' night vision on deck, and further reduce the conspicuity of helideck perimeter lights during the approach;
- the performance of most helideck floodlighting systems do not meet the current specification for light intensity and distribution and thus illumination of the central landing area is inadequate, leading to the so-called 'black hole' effect.

CAA has consequently been researching improved lighting systems for offshore helidecks for a number of years. Work started in earnest with a series of three dedicated trials on the K14 platform in the southern North Sea. A conference paper describing the trials was presented at the Royal Aeronautical Society in London in March 2001. The full report on the trials has been published as CAA Paper 2004/01, and is available from the publications section of the CAA website at www.caa.co.uk. Since then, CAA has completed two dedicated trials at an onshore site just north of Aberdeen (Longside airfield) and a further four dedicated trials at Norwich airport to refine the system, test new ideas, and evaluate the effect of a landing net on the lighting. These trials are currently being written up and will be published in two separate CAA papers later in 2004.

As a result of this work, a proposal to change the standards and recommended practices in ICAO Annex 14 Vol.2 was made. This has been accepted and became effective for all member states on 12 July 2004 with a compliance date of 01 January 2009. Pending the mandate of the Annex 14 Vol.2 changes, CAA will update CAP 437 by including the associated material as additional information and encouraging the Industry to implement the new standards as soon as practical. CAA has agreed with UK Industry that these changes may be progressed in two stages. The changes proposed for CAP 437 will be implemented in these two stages as follows:

- Stage 1 comprises changing the colour of the perimeter lights from yellow to green with a revision of the associated isocandela diagram, and the deletion of the existing deck level floodlighting, ideally replacing it with the improved system described in Section 4.2. (NB: Changes to the floodlighting should be conducted in consultation with the helicopter operators.)
- Stage 2 comprises (as an alternative to fully compliant floodlighting) the provision of a circle of yellow arrays of segmented point source lighting within the yellow painted aiming circle and a lit (green) heliport identification 'H' marking in the centre of the helideck aiming circle. Trials to date indicate that LED lighting is effective for both elements, but ICAO compliant alternatives providing an equivalent level of visual cueing will be acceptable.

For Stage 1, the changes are now finalised and equipment to meet the revised specification is commercially available. It is therefore CAA's intention, in conjunction with other European States with offshore interests, to incorporate the Stage 1 changes as additional guidance material at the next update of CAP 437, scheduled for Autumn 2004.

As regards Stage 2, further trials are being completed to finalise the detail of the lighting and support the development of equipment suitable for installation on an offshore helideck. The associated changes will be considered for a further update of CAP 437 when this work has been completed.

In the longer term, the introduction of Stage 2 to offshore platforms is an issue that is likely to be raised as a topic for the 'new' UKOOA/CAA/Helicopter Operator forum. In particular, identifying a commercially available product and the priority of installing it onto platforms.

3 Perimeter Lights

3.1 General

CAA recommends implementing the new perimeter light specification at the earliest practical opportunity. This can most conveniently be accomplished on new decks or on existing decks during refurbishment where new lights are to be installed. Otherwise, some types of existing light can be modified (see Section 3.3) at reasonable cost to provide a satisfactory interim solution (until 31 December 2008) that represents a significant improvement over the current standard.

3.2 New Lights

Where new lights are to be purchased, it is recommended that these fully meet the new specification in terms of both colour and intensity. It is CAA's understanding that a number of suppliers have suitable products available.

The colour of the light shall be green as defined in ICAO Annex 14 Vol.1 Appendix 1, paragraph 2.1.1(c), i.e. the chromaticity shall be within the following boundaries:

Yellow boundary x = 0.36 - 0.08y

White boundary x = 0.65y

Blue boundary y = 0.39 - 0.171x

As regards intensity, the following change to Annex 14 Vol.2 has been adopted:

Elevation	**Intensity**
20º-90º	3cd
13º-20º	8cd
10º-13º	15cd
5º-10º	30cd
*2º-5º	15cd

-180º Azimuth +180º

*Additional values may be required in the case of installations requiring identification by means of the lights at an elevation of less than 2º.

NB: The note below the table was inserted at ICAO with offshore helidecks specifically in mind; operational data from 270 night approaches to 50 different installations in the North Sea has confirmed the need for the beam to extend down to the horizontal.

CAA recognises that the form of presentation chosen by ICAO is designed to cover TLOF lighting systems for both offshore and onshore environments where specific operational requirements may differ. While fully accepting the ICAO standard in general, with the benefit of extensive research in relation to offshore operations the CAA recommends the enhanced specification for offshore helideck perimeter lights defined in the table below:

Elevation	**Intensity**
0º - 90º	60cd max*
>20º - 90º	3cd min
>10º - 20º	15cd min
0º -10º	30cd min

-180º Azimuth +180º

*NB: A study of helideck lighting performed for the Dutch CAA by TNO Human Factors (report ref. TM-02-C003) has indicated that lighting intensities greater than 60cd can represent a source of glare. The value of 60cd has therefore been adopted as a maximum value.

CAA recommends that any new perimeter lights designed for use offshore meet this enhanced intensity specification which, in any case, is compatible with the ICAO specification.

3.3 Existing Lights

Green filters are available for some existing perimeter lights at modest cost, and could be installed with relatively little effort. While CAA wishes to encourage platform operators to implement the colour change as soon as possible, the following issues need to be considered:

- The colour of the filter must meet the chromaticity defined in ICAO Annex 14 Vol.1 Appendix 1, paragraph 2.1.1(c) - see Section 2.2 above.
- Replacing the existing yellow filter with a green filter will significantly reduce the intensity of the light. **Green filters should not be fitted unless a minimum of 10cd is emitted between 0º and 10º elevation for all angles of azimuth.** Note that not all types of existing perimeter light will be able to meet this requirement. While this figure is less than the 30cd that will be required under the new specification, it is nevertheless considered to represent a significant improvement on the current standard given the increase in conspicuity conferred by the change of colour and acceptable on an interim basis.
- As a consequence of the lower efficiency of green filters compared to yellow, the temperature inside and on external surface of the light will increase. This may have an adverse effect on lamp life and may invalidate the approval of the light for use in hazardous areas.
- It should be noted that new EU hazardous area certification standards (ATEX 95) for new equipment came into effect for new equipment on 01 July 2003. It is CAA's understanding that these standards are not being applied retrospectively and may not be applicable for all classes of installation and vessel, however changes to existing lights may invalidate their current hazardous area certification necessitating re-approval to the new standards.

3.4 Floodlights

4 General

4.1 While the continued use of deck level floodlights is allowed under the new ICAO Annex 14 Vol.2 Phase 2 material, the current standard is difficult to meet and there is presently no practical means available of ensuring initial or continued compliance. It is considered that, by reducing the conspicuity of the pattern formed by the perimeter lights and in potentially presenting a significant source of glare, deck level floodlighting is often counter productive.

Under the newly adopted ICAO Annex 14 Vol.2 material, a lit touchdown marking and/or heliport identification marking may in future be used in lieu of floodlighting (Stage 2). Currently, CAA does not believe that any products are readily available that are suitable for use in the offshore environment. As an interim measure and where practical therefore, CAA recommends replacing the existing deck level floodlighting with a combination of high-mounted floodlights located within the Limited Obstacle Sector (LOS) and deck level floodlights on the opposite edge of the deck to the LOS. If the existing deck level floodlights are suitable for re-use as high-mounted (or LOS) floodlights, the cost of this modification is expected to be modest.

4.2 Improved Floodlighting System

The main constraining factor in floodlighting helidecks is the 25cm height limit within the 210º Obstacle Free Sector (OFS). With reference to Chapter 3, Figure 1 in CAP 437, however, obstacles up to a height of 0.05D are permitted at the edge of the helideck within the 150º Limited Obstacle Sector (LOS). Trials conducted by CAA have demonstrated that useful light can be provided by using a minimum of two ORGA SHLF218 halogen units mounted at a height of 0.05D within the LOS, angled downwards by approximately 5º and fitted with louvres to prevent glare, together with two Tranberg TEF 9964 xenon floodlights mounted at deck level opposite the LOS.

NB: The lighting products employed for CAA's trials are stated above in order to provide an indication of suitable beam characteristics. Alternative products with similar beam characteristics are equally acceptable. No product endorsement is either made or intended.

While not fully compliant with the ICAO Annex 14 Vol.2 standard, this system offers the following advantages:

- with properly designed and fitted louvres on the high-mounted halogen floodlights virtually all helideck floodlight glare is eliminated;
- the conspicuity of the pattern formed by the perimeter lights is unaffected by the floodlights, the only exception being a slight degradation in the unusual event of an approach from behind the LOS, i.e. facing the deck level xenon floodlights;
- the LOS floodlights identify the location of the origin of the 210º OFS, and provide the pilot with a heading reference.

This arrangement also provides general lighting for deck handling operations.

As stated above, correct louvre design for the high-mounted floodlights is essential to avoid glare and to minimise the attenuation of the main beam of the floodlights. CAA has included guidance material for the design of louvres for this application as an appendix to the Longside trials report (shortly to be published as a CAA paper). In the meantime, key louvre design parameters to note are:

- maximum intensity at and above minimum pilot eye height is 60cd (see Section 3.2 above);
- minimum pilot eye height (Sikorsky S76 on-deck) is 1.6m for which the design reference point is to be taken as the centre of the helideck aiming circle.

Lighting equipment manufacturers may contact CAA directly for further information on louvre design pending publication of the Longside trials report.

In summary, pending availability of suitable hardware to implement Stage 2 of the helideck lighting improvement programme (lit yellow aiming circle and lit green ‘H’), CAA recommends replacing existing deck level floodlighting systems with a combination of a minimum of two high mounted halogen floodlights supplemented with two xenon floodlights mounted around the helideck perimeter at deck level opposite the LOS high mounted units.

NB1: High intensity xenon floodlights are not recommended for high-mounting within the LOS. The 5º angle of depression will result in reflections from the deck surface (when wet) into the approach path and unacceptable glare in certain approach directions.

NB2: Halogen floodlight units are not recommended for deck level use. Their intensity is unlikely to provide sufficient illumination of the deck surface and the relative lack of close vertical beam control could result in glare in the event of misalignment unless fitted with suitable louvers (which would further reduce the output of the light).

4.3 Caveats

For helidecks located on platforms with a sufficiently high level of illumination from cultural lighting, the need for an improved floodlighting system may be reviewed with the helicopter operator(s), i.e. in such circumstances it may be sufficient to just delete or disable the existing deck level floodlighting. This concession assumes that the level of illumination from cultural lighting is also sufficiently high to facilitate deck operations such as movement of passengers and refuelling (where applicable). It is a condition that prior to the removal of floodlights, extended trials of the ‘no-floodlight’ configuration be conducted and their subsequent removal will be subject to satisfactory reports from crews to indicate the acceptability of operating to the helideck with the re-configured lighting.

For helidecks that are currently obstacle free and/or for minimum sized helidecks (e.g. NUIs), it may not be desirable or practical to fit high-mounted floodlights within the LOS, i.e. to create an obstacle where there is presently none. In the absence of sufficient cultural lighting, CAA recommends that installation owners consider a deck level floodlighting system consisting of not less than 4 deck level xenon floodlights equally spaced around the perimeter of the helideck. In considering this solution, installation owners must ensure that the deck level xenon units do not adversely effect the pilots' judgment by ensuring that they do not present a source of glare or loss of pilots' night vision on the helideck, and do not affect the ability of the pilots to determine the actual location of the helideck on the installation. It is therefore essential that all lights are maintained in correct alignment. It is also desirable to position the lights such that no light is pointing directly away from the prevailing wind. Floodlights located on the upwind (for the prevailing wind direction) side of the deck should ideally be mounted so that the centreline of the floodlight beam is at an angle of 45° to the reciprocal of the prevailing wind direction. This will minimise any glare or disruption to the pattern formed by the green perimeter lights for the majority of approaches. An example of an acceptable floodlighting arrangement is shown at Figure 1.

For NUIs previously fitted with deck mounted halogen systems but now fitted either with the improved floodlighting system recommended in Section 4.2 or the 4 deck level xenon units as described above, it would be desirable to redeploy surplus halogen units to improve illumination of the platform structure below deck level. This will assist to alleviate the 'floating in space' effect often encountered with operations to NUIs which have no other significant sources of cultural lighting.

For helidecks on mobile installations where deletion of the deck level floodlighting is appropriate, it may be desirable to disable the existing floodlighting rather than remove it. Adoption of this solution would facilitate the re-instatement of the deck level floodlighting should the installation move out of the UKCS into a region where strict adherence to the letter of the ICAO requirements for floodlighting is necessary.

Yours faithfully

Kevin P Payne

Flight Operations Inspectorate (Helicopters)

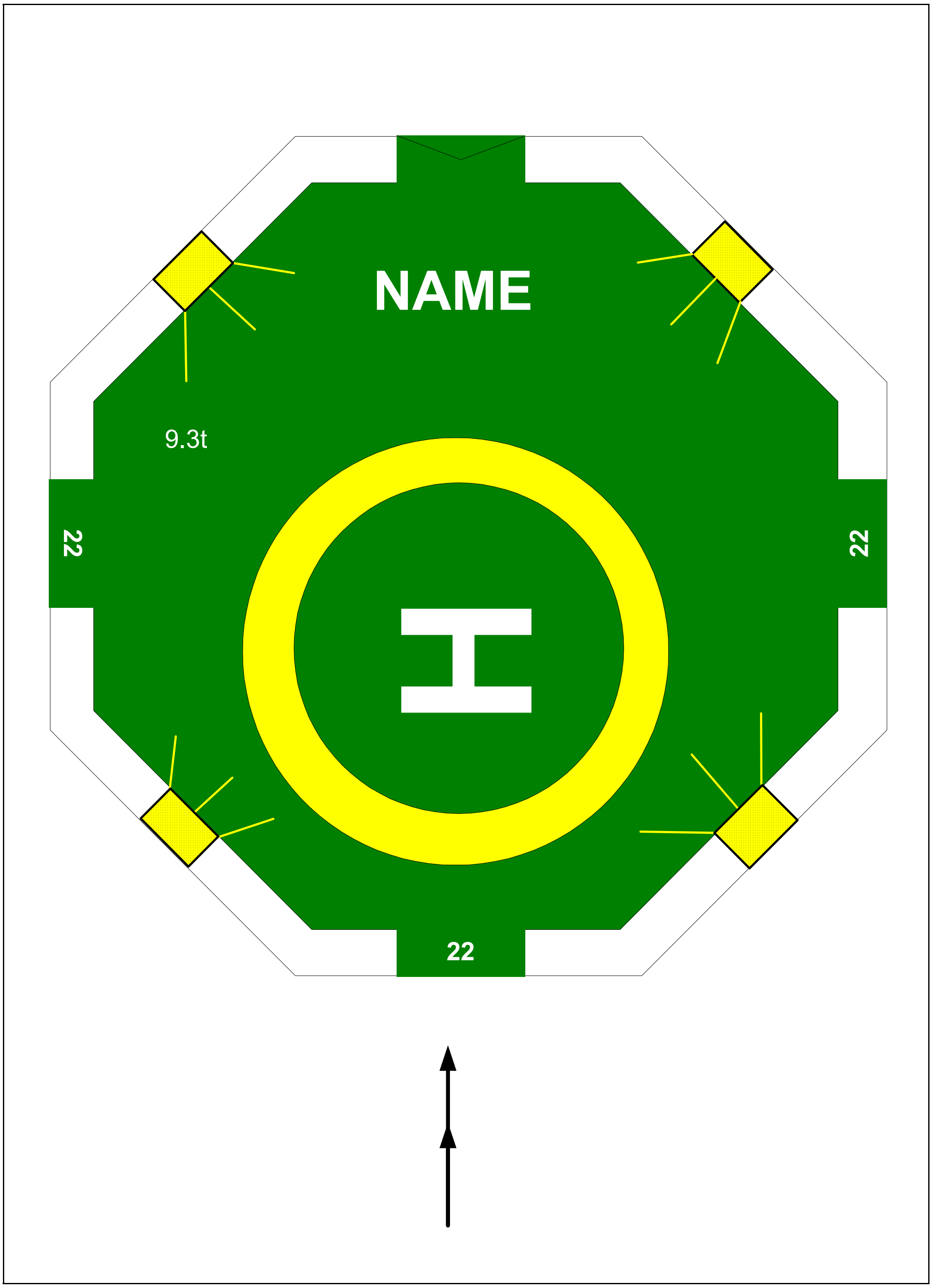

Figure 1

Appendix D Procedure For Authorising Offshore Helidecks (July 2003)

Safety Regulation Group
Flight Operations Inspectorate (Helicopters)

Ref 10A/253/5

16 July 2003

Dear Sirs

PROCEDURE FOR AUTHORISING OFFSHORE HELIDECKS

This letter restates the legal requirements and related Industry procedure for the authorisation of helidecks on installations and vessels for worldwide use by public transport helicopters registered in the United Kingdom.

Article 34 of the Air Navigation Order (ANO) 2000 requires a public transport operator to reasonably satisfy himself that any place he intends to take-off or land is suitable for purpose.

A United Kingdom registered helicopter, therefore, shall not operate to an offshore helideck unless the operator has satisfied itself that the helideck is suitable for purpose and it is properly described in the helicopter operator's Operations Manual

CAP 437 gives guidance on the arrangements that the CAA will expect an operator to have to discharge this responsibility under article 34. The BHAB procedure for the authorisation of helidecks is designed to enable helicopter operators to ensure that offshore helidecks to which their helicopters fly are suitable for purpose, thus permitting them to discharge that responsibility.

Article 6 of the Air Navigation Order 2000 provides that to hold an air operator's certificate an operator must satisfy the CAA that amongst other things its equipment, organisation and other arrangements are such that it is able to secure the safe operation of aircraft.

When looking at a particular operator, the CAA will therefore have regard to its 'other arrangements'. These arrangements include the manner in which the operator discharges its duty under article 34.

The CAA, in discharging its duty for the grant of an Air Operators Certificate (AOC), will audit the helicopter operators' application of the process on which the operator relies. As part of such an audit, the CAA will review BHAB Helidecks procedures and processes and may accompany an operator when the operator undertakes an audit of BHAB Helidecks procedures or inspects a helideck.

The legal responsibility for acceptance of the safety of landing sites rest with the helicopter operator.

Yours faithfully

Captain B G Hodge
Head of Flight Operations Inspectorate (Helicopters)