CIVIL AVIATION REGULATIONS

Heliports (Onshore/Offshore)
Vertiports (Onshore)

(CAR-HVD)

Issue 01

March 2023

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FOREWORD

1. The General Civil Aviation Authority has developed CAR HVD based on latest ICAO Annex 14 Volume II standards and recommended practices including ICAO Document 9261 heliport Manual. This document is divided into seven parts:

    - Part I – Onshore Heliports
    - Part II – Offshore Helidecks
    - Part III – Onshore Vertiports
    - Part IV – (reserved)
    - Part V – (reserved)
    - Part VI – (reserved)
    - Part VII - Hybrid Heliport/Vertiport Operations – (Reserved)

2. This CAR HVD will cancels and supersedes AMC 70 and AMC 71.

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AMENDMENT RECORDS

Issue Number	Key Changes	Issue Date	Applicable Date
01	1. Incorporating AMC 70 and AMC 71 issue 05 2. incorporation of ICAO Annex 14 Volume II edition 5 3. Addition of New Part III – Vertiports	31st March 2023	01st September 2023

PART I - ONSHORE HELIPORTS

Chapter I-1 – Introduction

1.1 Applicability

1.1.1 The requirements contained in CAR-HVD Part I are applicable to all operators of onshore heliports.

1.1.2 An operator of an on-shore heliport shall hold either a Heliport Certificate or a Landing Area Acceptance as described in Appendix A.

1.1.3 An operator of a heliport which is required to hold a Landing Area Acceptance may apply for a Heliport Certificate under this CAR-HVD Part I.

Note - A landing area that is not identifiable as a heliport and is only used on a temporary or infrequent basis is not required to hold a Heliport Certificate or a Landing Area Acceptance. Helicopter operations to these locations shall comply with the requirements of CAR AIR OPS.

1.2 General

1.2.1 The purpose of this CAR-HVD – Part I is to establish the regulatory requirements to operators of all onshore heliports within the UAE. This regulation represents the minimum requirements to achieve an acceptable level of safety.

1.2.2 By following the regulation described in this publication and on successful completion of the process listed in Chapter I-2 as applicable, heliport operators will be provided with a ***Heliport Certificate*** or a ***Landing Area Acceptance***.

1.2.3 For a Heliport Certificate and a Landing Area Acceptance, applications are provided through ANA e-Services. Each Applicant will be required to hold a GCAA ANA e-Service account and complete an initial on-line form.

1.2.4 This regulation should be used in conjunction with CAR Part IV (CAR AIR OPS), CAR Part IX Aerodromes, X, XI and other relevant GCAA publications.

1.3 Purpose

1.3.1 The information within this publication will ensure compliance with the UAE Civil Aviation Law and Civil Aviation Regulations and conformance with the international standards of ICAO Annex 14, Volume II.

1.3.2 Civil Aviation Regulation, Part III (General Regulations), Chapter 5 states that "An aircraft shall not land at, or take-off from, any place unless; the place is authorized by the GCAA and the place is suitable for use as an aerodrome (heliport) for the purposes of the landing and taking-off of aircraft in safety, having regard to all circumstances, including the prevailing weather conditions".

1.3.3 The requirements set out in this CAR-HVD Part I indicates the minimum requirements to determine the suitability of a heliport and its continued use.

1.4 References

a) CAR DEF
b) CAR AIR OPS
c) CAR Part IX Aerodromes (Aerodromes)
d) CAR Part X (Safety Management Requirements)
e) CAR Part XI (Aerodrome Emergency Services, Facilities & Equipment)
f) ICAO Annex 14 Volume II (Aerodromes – Heliports)
g) ICAO Heliport Manual Doc 9261-AN/903
h) ICAO Doc 9137 Airport Service Manual Part 1 Rescue and Fire-Fighting
i) ICAO Annex 2 (Rules of the Air)
j) National Fire Protection Association (NFPA) 418 Standards for Heliports
k) AMC 22 (Safety Incident Reporting)
l) AMC 35 (Inspecting and Testing of Rescue and Fire-Fighting Equipment)
m) AMC 36 (Runway and Movement Area Inspections)
n) AMC 43 (Foreign Object Debris – FOD)
o) AMC 45 (Breathing Apparatus Operational Guidance)
p) AMC 57 (Voluntary Occurrence Reporting System)
q) ICAO Annex 15 (Aeronautical Information Services)

1.5 Policy

1.5.1 The GCAA will approve the certification of heliports or provide a Landing Area Acceptance (whichever is deemed appropriate), once the criteria have been met; however, the responsibility for the maintenance and condition of the heliport, the facilities, and for obstacle control, remains with the Certificate/Acceptance Holder.

1.5.2 This CAR-HVD PART I (ONSHORE HELIPORT) includes references to UAE legislative requirements and ICAO Standards and Recommended Practices; compliance is required wherever the word “shall” is used in this document.

1.5.3 Applications will be assessed and processed by Air Navigation and Aerodrome Department through assessing visual aids (markings, lights, signs and markers); Heliport Manual and AES (RFFS and Emergency Response) in relation to CAR Part IX Aerodromes, CAR Part X and CAR Part XI, any Air Navigation Services in relation to the relevant requirements in CAR-ANS (which includes Air Traffic Services (ATS), Communication Navigation & Surveillance Services (CNS), Aeronautical Information Services (AIS), Aeronautical Meteorological Services (MET)) and Airspace, this will include the direction of flight; the assessment of the obstacle environment on the basis of the intended use of a FATO.

1.5.4 Aviation Security Affairs Sector: Applicants may be, prior to the issue of a Certificate or Landing Area Acceptance, required to obtain a security clearance through the GCAA website e-Services under security. Further guidance shall be sought directly to Aviation Security Affairs Sector (**ITA@gcaa.ae**).

1.5.5 Aircraft Operators shall comply with the Performance requirements published in the Air Operations Regulations (CAR AIR OPS).

1.6 Definitions

1.6.1 The term ‘’shall’’ is used in the GCAA regulation to impose an obligation or a requirement or a prohibition.

1.6.2 The use of the word “should” does not mean that compliance is optional but rather that, where insurmountable difficulties exist, the Authority may accept an Alternative Means of Compliance, provided that an acceptable safety assurance from the Aerodrome Operator shows that the safety requirements will not be reduced below that intended by the requirement.

1.6.3 The terms described below shall have the following meaning whenever they appear in these regulations. To the extent of any inconsistency between the definitions in CAR Part I and these regulations, the definitions in this regulation shall prevail:

Accepted Landing Area.	An aerodrome or heliport whose operator has been granted a Landing Area Acceptance.
Accuracy.	A degree of conformance between the estimated or measured value and the true value. Note: For measured positional data, the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.
Approved by the Authority.	Documented by the Authority as suitable for the purpose intended.
Authority Publication.	Any applicable document published by the Authority including, but not limited to Civil Aviation Regulations (CARs), Safety Alerts, Standalone GM, Standalone AMC, Standards, Informational Bulletins, Notice to Aerodrome Certificate Holders (NOTAC); Operational Directives (DIR) or any other applicable document published as an e-Publication as part of the GCAA website.
Assessor	A designated examiner for assessment of the theoretical and practical competencies of a trainee for the issuance of a certificate of competency after successful completion of a given structured learning program in accordance with the training standards defined in this regulation
Certified Heliport	A heliport whose operator has been granted a Heliport Certificate by the GCAA under applicable regulations for the operation of a heliport.
Elevated heliport	A heliport located on a raised structure on land.
Elongated.	When used with TLOF or FATO, elongated means an area which has a length more than twice its width.
Emergency Evacuation Helipad	An emergency landing area on top of a building, solely for the purpose of emergency evacuation of the building.

GCAA Inspector	An Inspector from any discipline within the GCAA, dependent upon the discipline being inspected or audited.
GCAA Service Fees	Those fees on the General Civil Aviation Authority website, as varied from time to time and in respect to a service delivered by the GCAA, which are required to be paid to the General Civil Aviation Authority pursuant to federal government decisions
Helicopter clearway	A defined area on the ground or water, selected and/or prepared as a suitable area over which a helicopter operated in performance class 1 may accelerate and achieve a specific height.
Helicopter taxiway	A defined path on a heliport intended for the ground movement of helicopters and that may be combined with an air taxi-route to permit both ground and air taxiing.
Helicopter stand	A defined area intended to accommodate a helicopter for purposes of: loading or unloading passengers, mail or cargo; fuelling, parking or maintenance; and, where air taxiing operations are contemplated, the TLOF.
Helicopter taxi-route.	A defined path established for the movement of helicopters from one part of a heliport to another. a) An air taxi-route. A marked taxi-route intended for air taxiing. b) b) A ground taxi-route. A taxi-route centred on a taxiway.
Helipad	Any portion of land, building or structure or part thereof which has been demarcated and approved by the competent Authority for the purposes of landing or taking off of helicopters.
Heliport Certificate	A Certificate issued by the GCAA under CAR-HVD for the operation of a heliport.
Heliport facilities and equipment	Facilities and equipment, inside or outside the boundaries of the heliport, that are constructed or installed, operated and maintained for the arrival, departure and surface movement of aircraft.

Heliport Operations Manual	The Manual that forms part of the application for a certification process of a Heliport, including any amendments thereto accepted by the GCAA.
Heliport Operator	In relation to a certified Heliport, the Heliport Certificate holder or in relation to an accepted landing area, the Helicopter Landing Area Acceptance holder.
Hospital Heliport	A heliport located at a hospital or medical facility intended to serve helicopters engaged in HEMS or other hospital related functions.
Instructor	a training specialist who possesses the relevant qualifications, competencies and has the responsibility to deliver a given structured learning program to trainees in accordance with the training standards defined in this regulation
Landing Area Acceptance	A heliport whose operator has been granted a Heliport Landing Area Acceptance by the GCAA under applicable regulations for the operation of a heliport limited to private use.
Limited-sized heliport	a heliport where the firefighting capacity is concentrated at the FATO/TLOF and there is no requirement to move foam and/or water dispensing equipment.
Surface-level heliport	A heliport located on the ground or on the water.
Technical Inspection	An inspection of a heliport conducted by the GCAA to confirm compliance with the physical characteristics' requirements of these requirements
Touchdown positioning circle (TDPC).	A touchdown positioning marking (TDPM) in the form of a circle used for omnidirectional positioning in a TLOF.
Touchdown positioning marking (TDPM).	A marking or set of markings providing visual cues for the positioning of helicopters.
Verification Audit	An inspection of the heliport facilities, equipment and services and audit of the relevant safety manuals and Compliance Statements conducted prior to the issue of a Heliport Certificate or Landing Area Acceptance.

Water heliport	A heliport on water intended for use by helicopters specifically equipped and approved in relevant Flight Manuals for routine water operations or rejected take-offs on to water.
Deck integrated firefighting system (DIFFS)	a fixed firefighting system consisting practical a series of flush-mounted nozzles positioned over the surface of the practical critical area which, upon activation, are capable of delivering primary extinguishing agent to the entire loadbearing area of the heliport.
Dispersed pattern application	Foam or water delivered over a wider area from nozzles mounted in the deck surface, e.g. DIFFS.
Fire control time	a fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent.
Fixed application system (FAS)	a variation of an FFAS that is capable of applying water-only in a dispersed pattern. An FAS is only permitted when it is used in tandem with a passive fire-retarding surface
Fixed foam application systems (FFAS)	a fixed firefighting system capable of delivering a primary foam extinguishing agent at the required application rate and over the assumed practical critical area. An FFAS may include, but not necessarily be limited to FMS, a DIFFS or a RMS.
Fixed monitor system (FMS)	a fixed foam application system consisting of 2, 3 or 4 monitors installed at the periphery of a heliport capable of delivering finished foam as a solid straight stream application to the landing area at or above the minimum application rate.
Foam certificate of conformity	a documentary evidence issued by an authorized party (sometimes by the foam manufacturer or an independent laboratory), which states that the foam product meets the required standards and specifications established by ICAO.
Foam meeting performance level B	a type of foam concentrate, which complies with the minimum ICAO foam performance specifications based on an application rate of 5.5 $L/min/m^2$

Foam meeting performance level C	a type of foam concentrate, which complies with the minimum ICAO foam performance specifications based on an application rate of 3.75 L/min/m^2.
Heliport response area	all areas used for the manoeuvring, landing, take-off, rejected take-off, ground taxiing, air-taxiing and parking of helicopters that are in the direct control of the heliport operator
Limited-sized heliport	a heliport where the firefighting capacity is concentrated at the FATO/TLOF and there is no requirement to move foam and/or water dispensing equipment.
Passive fire-retarding surface	a heliport surface incorporating numerous drain holes to allow fuel (and other liquids) to drain through the surface.
Portable foam application systems (PFAS)	any equipment capable of being transported to the accident location which, having been moved to the fire location is then capable of distributing primary extinguishing agent at the required application rate over the assumed practical critical area.
Practical critical area	a critical area concept for rescue of the occupants of a helicopter, which is representative of actual helicopter accident conditions. The objective is to attempt to control and extinguish the entire fire, it seeks to control only that area of fire adjacent to the fuselage. The objective is to safeguard the integrity of the fuselage and maintain tolerable conditions for its occupants.
Ring main system (RMS)	another form of foam dispensing equipment, capable of delivering primary extinguishing agent in a dispersed pattern that consists of equally spaced nozzles are located around the perimeter of the practical critical area, just above the surface, capable of directing extinguishing agent from the perimeter towards the centre of the landing area
Solid plate surface deck	a heliport surface that is impervious to liquids.
Solid stream application	foam delivered to a concentrated area in the form of a jet, e.g. foam monitors.

Task resource analysis	a risk-based approach to establish the minimum number of competent personnel required to deliver an effective RFF service to deal with a worst-case credible helicopter accident at the heliport

1.7 Abbreviations

cm	Centimetre
AIP	Aeronautical Information Publication
ASPSL	Arrays of Segmented Point Source Lighting
DCP	Dry Chemical Powder
DIFFS	Deck Integrated Fire Fighting System
FATO	Final approach and take-off area
FAS	Fixed application system
FFAS	Fixed foam application system
FMS	Fixed monitor system
FOD	Foreign Object Debris
GCAA	General Civil Aviation Authority
GNSS	Global navigation satellite system
HAPI	Helicopter Approach Path Indicator
HEMS	Helicopter Emergency Medical Services
HFM	Helicopter Flight Manual
HLO	Heliport Landing Officer
HPA	Heliport Assistant
ICAO	International Civil Aviation Organisation
LED	Light Emitting Diodes
LP	Luminescent Panel
Lpm	Litre per minute
MAPt	Missed approach point

MTOM	Maximum take-off mass
NVIS	Night vision imaging system (NVIS)
OFS	Obstacle-free sector
OLS	Obstacle limitation surface
PAPI	Precision approach path indicator
PFAS	Portable foam application system
PinS	Point-in-space
RFFS	Rescue and firefighting service
RTOD	Rejected take-off distance
RTODAH	Rejected take-off distance available
SMS	Safety Management System
TLOF	Touchdown and Lift-Off Area
UCW	Width of undercarriage

Chapter I-2 – Heliport Certificate and Landing Area Acceptance

2.1 General

Note 1. - For new heliports the operator should apply for a Design Acceptance prior to commencing construction of the heliport. For details refer to Appendix G.

Note 2. - The applicant should initiate a meeting with the GCAA to discuss the application and the contents of the submission including the anticipated scope of operations for the heliport.

2.1.1 All applicants must have secure access to the ANA e-Services to apply for a Heliport Certificate or Landing Area Acceptance, available on the GCAA website: *www.gcaa.gov.ae*.

2.1.2 Organisation applicants must supply a copy of their Trade License or equivalent.

2.1.3 Individual applicants must supply a copy of their Emirates ID or their passport.

2.1.4 After receiving access to ANA e-Services, the applicant shall complete the details required in the on-line form for the issue of a Heliport Certificate or a Landing Area Acceptance.

2.2 Application

2.2.1 The initial information required for the completion of the on-line application form includes the following:

a) a point of contact for the application;
b) particulars of the heliport including name, location, intended scope of operations etc.;
c) for a Heliport Certificate the nomination of Responsible Persons (Post Holders); (refer to 2.4.2)
d) for a Landing Area Acceptance, the nomination of a Person Responsible for Operations;
e) if applicable, evidence that all security, emergency planning and any requirements relating to the provision of Air Navigation and Airspace have been satisfied; and
f) evidence of payment of any applicable GCAA Service Fees. (refer to 2.3.2)

2.3 Service Fees

2.3.1 Applicants undertake to pay GCAA Service Fees in respect of an initial issue of Heliport Certificate or a Landing Area Acceptance.

2.3.2 Payment of the GCAA Service Fee does not guarantee the grant or continuation of a Heliport Certificate or a Landing Area Acceptance.

2.4 Heliport Certification Requirements

2.4.1 Certification Requirements

2.4.1.1 The Certification requirements shall include the following:

a) Written policy, procedures and other information as required by Chapter I-10.
b) Any other documents or evidence as requested by the competent authority.

2.4.1.2 The GCAA will conduct a Verification Audit of the facilities and equipment, including sampling of policies and procedures and other related safety activities.

2.4.1.3 The aim of the Verification Audit is to verify compliance with the applicable requirements through a technical inspection, the examination of documentation, and demonstration of compliance. It should be noted that the GCAA audit, inspection, testing or sampling processes do not absolve the applicant from the responsibility to provide accurate information and documentary evidence.

2.4.1.4 The GCAA will produce an audit report identifying any shortfalls in compliance.

2.4.1.5 If shortfalls in compliance are identified during the Verification Audit, the applicant will be required to provide confirmation of the audit report together with an action plan with timescales to rectify or mitigate all findings to a level acceptable to the GCAA.

2.4.1.6 The GCAA will only issue a Heliport Certificate when completely satisfied that all regulatory and critical safety elements have been adequately mitigated. This may require a further audit/inspection follow-up visit and/or special additional operating approvals or restrictions.

2.4.2 Personnel Requirements

2.4.2.1 Each heliport operator prior to the grant of a Heliport Certificate and thereafter on an on-going basis shall engage, employ or contract:

a) Sufficient, qualified and trained personnel for the planned tasks and activities to be performed related to the operation, maintenance, emergency response and management of the aerodrome in accordance with the applicable requirements and the heliport operator's training programme; and
b) sufficient number of managerial, supervisory and operational personnel with defined duties and responsibilities, taking into account the structure of the organisation and the number of personnel employed.

2.4.2.2 The heliport operator shall nominate responsible persons (Post Holders) for the management and supervision of the following areas:

a) Heliport Accountable Manager - a person who has full control of the resources, final authority over operations under the certificate/approval of the organisation and ultimate responsibility and accountability for the resolution of all safety issues; and
b) Heliport Operations Post Holder – a person who is responsible for ensuring that the heliport and its operations comply with the requirements of this CAR-HVD PART I.

2.4.2.3 The heliport operator shall consider the size and complexity of the organization, recognizing that the roles of the Heliport Accountable Manager and Heliport Operations Post Holder may be combined.

2.4.2.4 The nomination of a single person should depend upon the individual's competence and capacity to meet the responsibilities of holding both positions.

2.4.2.5 The heliport operator shall ensure that any changes to the responsible person(s) are notified to the GCAA.

2.4.2.6 Heliport Operations Post Holder should be responsible for all aspects of the heliport operations and maintenance, where necessary and for the issuing and cancelling of Aeronautical Information Publication (AIP) and Notice to Airmen (NOTAMs). The post holder is also responsible for development, implementation of and compliance with the heliport:

a) emergency response;
b) safety plan;
c) manoeuvring area access and control procedures;
d) apron management;
e) disabled aircraft removal plan;
f) other environmental, security and safety programs as required; and
g) oversight to ensure compliance with certification regulatory obligations.

2.4.2.7 A Heliport Landing Officer (HLO) should be responsible for ensuring that the physical and operational aspect of the heliport is safe for helicopter operations including:

a) all necessary steps are taken to deny unauthorised persons' access to the heliport landing area prior to take-off and landing;
b) the heliport is cleared of loose objects, people, vehicles etc.;
c) the heliport is clear of any birds or other wildlife;
d) all necessary personnel are present and at a state of readiness; and
e) passengers are held in a safe zone during the landing or take off of helicopters and are under supervision while on the heliport movement area.

2.4.2.8 The HLO should wear identification clearly showing he is the responsible person during heliport operations. A tabard should be marked on the front and back with the letters HLO in a reflective material, and should be clearly visible from a distance.

2.4.2.9 As the HLO is required to be present on the heliport during helicopter arrivals and departures, the heliport operator should appoint 'Heliport Assistants ' to assist the HLO with the administration of passengers and freight.

2.4.2.10 Unless determined otherwise by means of a task resource analysis, the heliport operator should:

a) provide for 3 Heliport Assistants (HPA's) for a surface level heliport, as a minimum, and
b) provide for 4 Heliport Assistants (HPA's) for an elevated heliport, as a minimum.

2.4.2.11 The provision of a minimum of 3 Heliport Assistants (HPAs) for a surface level heliport and 4 for an elevated heliport, is to provide operational support to helicopter operations and if required provide fire-fighting action and assist in evacuation in the event of any heliport/helicopter fire situation.

2.4.2.12 The responsibilities of HPAs should include but not be limited to:

a) assisting the HLO in the operation of the heliport;
b) directing passengers to and from the helicopter;
c) loading and unloading freight and baggage from the helicopter; and
d) operation of firefighting and equipment under the direction of the HLO and assisting the HLO in checking, operational, firefighting and rescue equipment

2.4.2.13 During helicopter operations both the HLO and HPAs should be standing by in the immediate location of the helicopter landing area. The HPAs should be dressed in fire-fighting protective clothing to enable them to respond to any incident as quickly as possible.

2.5 Landing Area Acceptance Process

Note - For new heliports the operator should apply for a Design Acceptance prior to commencing construction of the heliport. For details refer to Appendix G.

2.5.1 Landing Area Acceptance Requirements

2.5.1.1 The GCAA will conduct an on-site inspection to determine the level of compliance with GCAA Regulations.

2.5.1.2 The Landing Area Acceptance will only be granted by the GCAA when it is satisfied that:

a) remedial action for any safety critical deficiencies is complete; and
b) the facilities, services and equipment, including the emergency response, comply with the regulations or agreed conditions.

2.6 Certification of Heliport on Aerodrome

2.6.1 Aerodrome Certificate Holders planning to operate helicopters from a new heliport infrastructure within the aerodrome boundary; shall apply for both AMC 59 Approval and also a subsequent Aerodrome Operational Approval prior to operations commencing.

2.7 Oversight

2.7.1 Following the issue of a Landing Area Acceptance and/or Certified Heliport, the Acceptance Holder and/or heliport certificate holder will be subject to a continuous oversight process.

2.7.2 The GCAA retains also the right to inspect the heliport at any time.

2.7.3 If conditions or operations are found to be unsafe, the GCAA also retains the right to place restrictions on the use of the heliport or withdraw or suspend the Landing Area Acceptance.

2.8 Movement Data

2.8.1 When requested by the GCAA, the Landing Area Acceptance and/or heliport certificate holder shall provide details on the number of helicopter movements occurring at the heliport.

Note - A movement is either a take-off or a landing

Chapter I-3 – Heliport Data

3.1 Notifying and Reporting Information to the Aeronautical Information Service

3.1.1 A heliport operator holding a Heliport Certificate shall publish the relevant information on its heliport within the Aeronautical Information Publication (AIP) and ensure that its activities are coordinated with other nearby civil and military aviation activity.

Note1. - Commercial helicopter activities include, but not limited to ferrying passengers, transporting cargo, hospitality, tourism, photography, filming, etc.

Note2. - Information on all heliports is published in GCAA Heliport Dashboard. Subscription to the dashboard is available through the GCAA website (www.gcaa.gov.ae).

3.1.2 Certified heliports published in the AIP shall comply with the documents reference in Table 3-1. Reference should also be made to CAR Part IX – Aerodromes, Chapter 4, Section 4.10 Notifying and Reporting Information to the Aeronautical Information Service.

Table 3-1 – Document References

Aeronautical Information Service	Reference documents
ICAO	Annex 4 – Aeronautical Charts Annex 15 – Aeronautical Information Services DOC 8126 - Aeronautical Information Services Manual
GCAA	CAR PART IX – Aerodromes, Chapter 4, Section 4.10 AMC 56: Electronic Data Provision in AIM

3.2 Naming of Heliports

3.2.1 In aviation safety terms, the name of a heliport is directly connected with aeronautical communications and flight safety information. It is therefore important that the heliport name is representative of its location (the nearest city, town or village) and should not have the potential to be confused with another aerodrome or heliport.

3.3 Common Reference System

3.3.1 Please refer to CAR Part IX - Aerodromes, Chapter 1, Section 1.4.

3.4 Aeronautical Data

3.4.1 Heliport Operators shall comply with aeronautical data accuracy and integrity requirements stipulated in CAR Part IX – Aerodromes, Chapter 4, Section 4.10.

3.5 Heliport Reference Point

3.5.1 A heliport reference point shall be established for a heliport not co-located with an aerodrome.

3.5.2 The heliport reference point shall be located near the initial or planned geometric centre of the heliport and shall normally remain where first established.

3.5.3 The position of the heliport reference point shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

Note. - When the heliport is co-located with an aerodrome, the established aerodrome reference point serves both aerodrome and heliport.

3.6 Heliport Elevation

3.6.1 The heliport elevation and geoid undulation at the heliport elevation position shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre.

3.6.2 The elevation of the TLOF and/or the elevation and geoid undulation of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre.

Note. - Geoid undulation must be measured in accordance with the appropriate system of coordinates.

3.7 Heliport Dimensions and Related Information

3.7.1 The following data shall be measured or described, as appropriate, for each facility provided on a heliport:

a) Heliport type — surface-level or elevated;

b) TLOF — dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1000 kg);
c) FATO — type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length and width to the nearest metre, slope, surface type;
d) safety area — length, width and surface type;
e) helicopter taxiway and helicopter taxi route — designation, width, surface type;
f) apron — surface type, helicopter stands;
g) clearway — length, ground profile;
h) visual aids for approach procedures, marking and lighting of FATO, TLOF, helicopter ground taxiways, helicopter air taxiway and helicopter stands.

3.7.2 Geographical coordinates shall meet the accuracy requirements of CAR Part IX - Aerodromes.

3.8 Declared Distances

3.8.1 The following distances to the nearest metre shall be declared, where relevant, for a heliport:

a) take-off distance available;
b) rejected take-off distance available; and
c) landing distance available.

3.9 Heliport Emergency Response

Note. - See Chapter 8 for information on heliport emergency response.

3.9.1 Information concerning the level of protection provided at a heliport for helicopter rescue and firefighting purposes shall be made available.

3.9.2 The level of protection normally available at a heliport shall be expressed in terms of the category of the rescue and firefighting service as described in Chapter 8 and in accordance with the types and amounts of extinguishing agents normally available at the heliport.

3.9.3 Changes in the level of protection normally available at a heliport for rescue and firefighting shall be notified to the appropriate aeronautical information services unit and, where applicable, air traffic units to enable them to provide the necessary information to arriving and departing helicopters. When such a change has been corrected, the above units shall be advised accordingly.

Note. - Changes in the level of protection from that normally available at the heliport could result from, but may not be limited to, a change in the availability of extinguishing agent or equipment used to deliver *agents, or of personnel used to operate the equipment.*

3.9.4 A change shall be expressed in terms of the new category of the rescue and firefighting service available at the heliport.

3.10 Coordination between aeronautical information services and vertiport authorities

Note. - See Chapter 8 for information on vertiport emergency response.

3.10.1 To ensure that aeronautical information services (AIS) providers obtain information that allows them to provide up-to-date pre-flight information and in-flight information, arrangements should be made in due time between AIS providers and the heliport operator, to report to the responsible AIS unit:

(1) information on heliport conditions;

(2) the operational status of associated facilities, services, and navigation aids within their area of responsibility; and

(3) any other information that is considered to be of operational significance.

3.10.2 Before introducing changes to the air navigation system, the services responsible for such changes should take due account of the time needed by the AIS providers to prepare, produce, and distribute the relevant material for promulgation. To ensure timely provision of the information to the AIS providers, close coordination between the services concerned is therefore required.

3.10.3 Of particular importance are changes to aeronautical information affecting charts and/or computer-based navigation systems that qualify to be notified by the aeronautical information regulation and control (AIRAC) system, as specified in ICAO Annex 15, Chapter 6. The responsible heliport services should consider the predetermined, internationally agreed AIRAC effective dates when submitting raw information/data to the AIS providers.

Note: Detailed specifications on the AIRAC system are contained in ICAO Doc 10066, PANS-AIM, Chapter 6.

3.10.4 The vertiport services responsible for the provision of raw aeronautical information/data to the AIS providers should do so taking into account accuracy and integrity requirements that are necessary to meet the needs of the end user of aeronautical information/data.

Note 1: Specifications on the accuracy and integrity classification of heliport related aeronautical data are contained in ICAO Document 10066, 'PANS-AIM', Appendix 1.

Note 2: Specifications for issuing a Notice to Airmen (NOTAM) and NOTAM on snow conditions (SNOWTAM) are contained in ICAO Annex 15, Chapter 6, and ICAO Document 10066, 'PANSAIM', *Appendices 3 and 4 respectively.*

Note 3: The AIRAC information is distributed at least 42 days in advance of the AIRAC effective dates to reach recipients at least 28 days in advance of the effective date.

Note 4: The schedule of the predetermined, internationally agreed, and common AIRAC effective dates at intervals of 28 days, as well as guidance on the AIRAC use, are contained in ICAO Document 8126, 'AIS Manual', Chapter 2, Section 2.6.

3.11 Safeguarding of heliports

3.11.1 Obstacle limitation surfaces (OLSs) (see Chapter III-5) describe the airspace around vertiports that allow safe helicopter aircraft operations and prevent vertiports from becoming unusable due to obstacles growing around them.

3.11.2 Heliport safeguarding is the process by which heliport operators can, in consultation with the appropriate authorities and within their capability, protect the environment surrounding the heliport from developments that may affect the heliport's operation and/or business.

3.11.3 heliport safeguarding assesses the implications of any development being proposed in the vicinity of an established heliport to ensure, as far as practicable, that the heliport and its surrounding airspace are not adversely affected by those proposals, thus ensuring the continued safety of helicopter aircraft operating at the location.

3.11.4 Heliport safeguarding covers several aspects. Its purpose is to protect:

(a) the airspace around a heliport to ensure no buildings or structures cause danger to aircraft either in the air or on the ground, through the provision of OLSs;

(b) all the elements of heliport lighting by ensuring that they are not obscured by any proposed development and that any proposed lighting, either temporary or permanent, is not confused with aeronautical ground lighting;

(c) the heliport from any increased risk of wildlife strike, in particular bird strikes, which pose a serious threat to flight safety (e.g. the proximity of a garbage and waste disposal site);

(d) heliport operations from interference by any construction processes that produce dust and smoke, by temporary lighting or by construction that affects navigational aids; and

(e) helicopter aircraft from the risk of collision with obstacles, through appropriate lighting.

Note: The heliport operator should consider all the above when assessing the heliport development proposals.

3.11.5 For the purposes of safeguarding, the heliport operator should provide a layout plan that shows the following key dimensions:

— heliport elevation,

— TLOF size,

— FATO size,

— SA size,

— clearway,

— distance from the safety area or clearway perimeter to the heliport edges, and

— approach/departure paths showing locations of buildings, trees, fences, power lines, obstructions (including elevations), schools, places of worship, hospitals, residential areas, and other significant features.

3.11.6 For heliports that are elevated, the heliport operator should provide the above-mentioned layout plan, together with OLSs, and virtual clearways, with the altitude of their origins.

Note: Further guidance on safeguarding is provided in ICAO Document 9261, 'Heliport Manual'.

Chapter I-4 – Physical Characteristics: Onshore Heliports

Note1. - The provisions given in this section are based on the design assumption that no more than one helicopter will be in the FATO at the same time.

Note2. - The design provisions given in this section assume when conducting operations to a FATO in proximity to another FATO, these operations will not be simultaneous. If simultaneous helicopter operations are required, appropriate separation distances between FATOs need to be determined, giving due regard to such issues as rotor downwash and airspace, and ensuring the flight paths for each FATO, defined in Chapter 6, do not overlap. Further guidance on this issue is given in the Heliport Manual (Doc 9261)

Note3. - An elevated heliport located on a rooftop or other elevated structure where the TLOF is at least 30 inches (76 cm) above the surrounding surface (a ground level heliport with the TLOF on a mound is not considered as an elevated heliport).

Note4. - The provisions given in this section are common for surface-level heliports and elevated heliports unless otherwise specified.

Note5. - Guidance on the minimum size for elevated FATO/TLOFs in order to permit facilitation of essential operations around the helicopter is given in the Heliport Manual (Doc 9261).

Note6. - Guidance on structural design to account for the presence on elevated heliports of personnel, freight, refuelling and firefighting equipment, etc. is given in the Heliport Manual (Doc 9261).

Note7. - Guidance on siting of a heliport and the location of the various defined areas, with due consideration of the effects of rotor downwash and other aspects of helicopter operations on third parties is given in the Heliport Manual (Doc 9261).

4.1 Final approach and take-off areas (FATO)

Note. - Guidance on siting and orientation of the FATO at a heliport to minimize interference of arrival and departure tracks with areas approved for residential use and other noise-sensitive areas close to the heliport is given in the Heliport Manual (Doc 9261).

4.1.1 A FATO shall

a) provide:

1) an area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of every part of the design helicopter in the final phase of approach and commencement of take-off-in accordance with the intended procedures;

Note. - Essential objects are visual aids (e.g. lighting) or others (e.g. firefighting systems) necessary for *safety purposes. For further requirements regarding penetration of a FATO by essential objects, see 5.1.4.*

2) when solid, a surface which is resistant to the effects of rotor downwash;

i) when co-located with a TLOF, is contiguous and flush with the TLOF; has bearing strength capable of withstanding the intended loads; and ensures effective drainage; or

ii) when not co-located with a TLOF, is free of hazards should a forced landing be required; and

Note. - Resistant implies that effects from the rotor downwash neither cause a degradation of the surface nor result in flying debris.

And;

b) be associated with a safety area.

4.1.2 A heliport shall be provided with at least one FATO, which need not be solid.

Note. - A FATO may be located on or near a runway strip or taxiway strip.

4.1.3 The minimum dimensions of a FATO shall be:

a) where intended to be used by helicopters operated in performance class 1:

1) the length of the Rejected Take-Off Distance (RTOD) for the required Take-Off procedure prescribed in the helicopter flight manual (HFM) of the helicopters for which the FATO is intended, or 1.5 Design D, whichever is greater; and

2) the width for the required procedure prescribed in the HFM of the helicopters for which the FATO is intended, or 1.5 Design D, whichever is greater.

b) where intended to be used by helicopters operated in performance classes 2 or 3, the lesser of:

1) an area within which can be drawn a circle of diameter of 1.5 Design D; or,

2) when there is a limitation on the direction of approach and touchdown, an area of sufficient width to meet the requirement of 4.1.1 a) 1) but not less than 1.5 times the overall width of the design helicopter.

Note1. - The RTOD is intended to ensure containment of the helicopter during a rejected take-off. Although some flight manuals provide the RTOD, in others the dimension provided is the "minimum demonstrated … size" (where "…" could be "heliport", "runway", "helideck" etc.) and this may not include helicopter containment. When this is the case, it is necessary to consider sufficient safety area dimensions as well as the dimensions of 1.5·D for the FATO, should the HFM not deliver data. For further guidance *see Heliport Manual (Doc 9261).*

Note2. - Local conditions, such as elevation, and temperature, and permitted manoeuvring may need to be considered when determining the size of a FATO. Guidance is given in the Heliport Manual (Doc 9261).

4.1.4 Essential objects located in a FATO shall not penetrate a horizontal plane at the FATO elevation by more than 5 cm.

4.1.5 When the FATO is solid the slope shall not:

a) except as provided in b) or c) below; exceed 2 per cent in any direction;

b) when the FATO is elongated and intended to be used by helicopters operated in performance class 1, exceed 3 per cent overall, or have a local slope exceeding 5 per cent; and

c) when the FATO is elongated and intended to be used solely by helicopters operated in performance class 2 or 3, exceed 3 per cent overall, or have a local slope exceeding 7 per cent.

4.1.6 The FATO should be located so as to minimize the influence of the surrounding environment, including turbulence, which could have an adverse impact on helicopter operations.

Note. - Guidance on determining the influence of turbulence is given in the Heliport Manual (Doc 9261). If turbulence mitigating design measures are warranted but not practical, operational limitations may need to be considered under certain wind conditions.

4.1.7 A FATO shall be surrounded by a safety area which need not be solid.

4.2 Safety Areas

4.2.1 A safety area shall provide:

a) An area free of obstacles, except for essential objects which because of their function are located on it, to compensate for manoeuvring errors; and

b) When solid, a surface which: is contiguous and flush with the FATO; is resistant to the effects of rotor downwash; and ensures effective drainage

4.2.2 The safety area surrounding a FATO shall extend outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 Design D, whichever is greater.

4.2.3 No mobile object shall be permitted in a safety area during helicopter operations.

4.2.4 Essential objects located in the safety area shall not penetrate a surface originating at the edge of the FATO at a height of 25 cm above the plane of the FATO sloping upwards and outwards at a gradient of 5 per cent.

4.2.5 When solid, the slope of the safety area shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

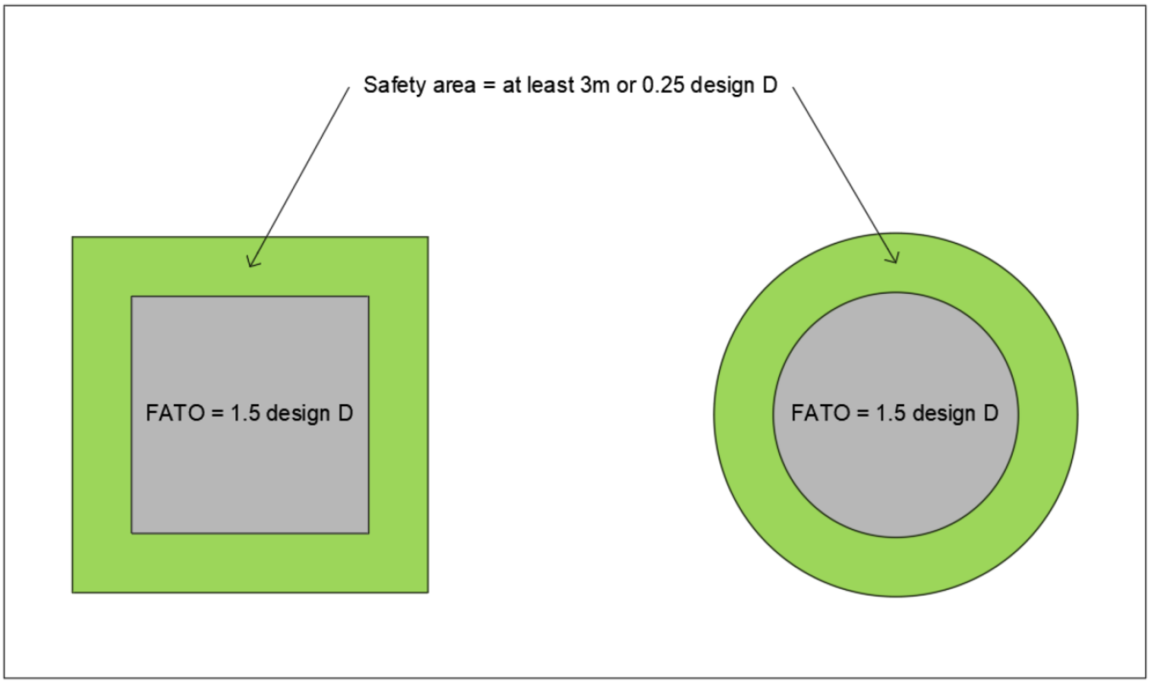


Figure 4-1 – FATO and associated safety area

Protected Side Slope

4.2.6 A heliport shall be-provided with at least one protected side slope, rising at 45 degrees from the edge of the safety area and extending to a distance of 10 m (see Figure 4-2).

4.2.7 A heliport should be provided with at least two protected side slopes, rising at 45 degrees outward from the edge of the safety area and extending to a distance of 10 m.

4.2.8 The surface of a protected side slope shall not be penetrated by obstacles.

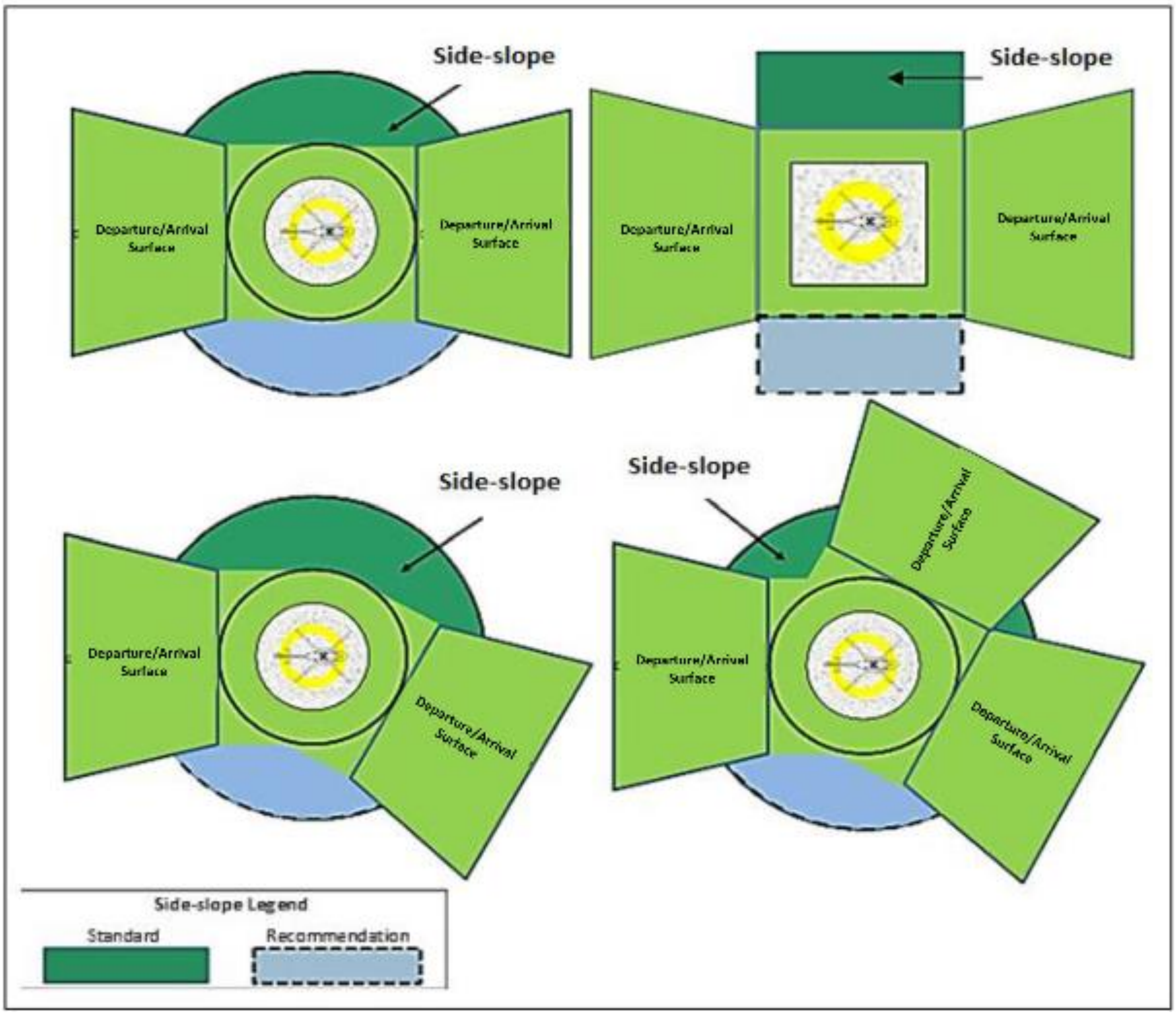


Figure 4-2 – FATO simple/complex safety area and side slope protection

Note. - These diagrams show a number of configurations of FATO/Safety Areas/Side slopes. For a more complex arrival/departure arrangement which consists of two surfaces that are not diametrically opposed; more than two surfaces; or an extensive obstacle free sector (OFS) which abuts directly to the FATO, it can be seen that appropriate provisions are necessary to ensure that there are not obstacles between the FATO and/or safety area and the arrival/departure surfaces

4.3 Helicopter Clearways

Note. - The inclusion of detailed specifications for helicopter clearways in this section is not intended to imply that a clearway has to be provided.

4.3.1 A helicopter clearway shall provide:

a) An area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of the design helicopter when it is accelerating in level flight, and close to the surface, to achieve its safe climbing speed; and

b) When solid, a surface which: is contiguous and flush with the FATO; is resistant to the effects of rotor downwash; and is free of hazards if a forced landing is required.

4.3.2 When a helicopter clearway is provided, it shall be located beyond the end of the FATO.

4.3.3 The width of a helicopter clearway should not be less than that of the FATO and associated safety area. (See Figure 4-1).

4.3.4 When solid, the ground in a helicopter clearway should not project above a plane having an upward slope of 3 per cent, or having a local upward slope exceeding 5 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

4.3.5 An object situated in a helicopter clearway which may endanger helicopters in the air should be regarded as an obstacle and should be removed.

4.4 Touchdown and Lift-Off Areas

4.4.1 A TLOF shall:

a) provide:

1) An area free of obstacles and of sufficient size and shape to ensure containment of the undercarriage of the most demanding helicopter the TLOF is intended to serve in accordance with the intended orientation;

2) a surface which:

a. has sufficient bearing strength to accommodate the dynamic loads associated with the anticipated type of arrival of the helicopter at the designated TLOF;

b. is free of irregularities that would adversely affect the touchdown or lift-off of helicopters;

c. has sufficient friction to avoid skidding of helicopters or slipping of persons;

d. is resistant to the effects of rotor downwash; and

e. ensures effective drainage while having no adverse effect on the control or stability of a helicopter during touchdown and lift-off, or when stationary; and

b) be associated with a FATO or a stand.

4.4.2 A heliport shall be provided with at least one TLOF.

4.4.3 A TLOF shall be provided whenever it is intended that the undercarriage of the helicopter will touch down within a FATO or stand, or lift off from a FATO or stand.

4.4.4 The minimum dimension of a TLOF shall be:

a) when in a FATO intended to be used by helicopters operated in performance class 1, the dimensions for the required procedure prescribed in the helicopter flight manual (HFMs) of the helicopter for which the TLOF is intended; and

b) when in a FATO intended to be used by helicopters operated in performance classes 2 or 3, or in a stand:

1) when there is no limitation on the direction of touchdown, of sufficient size to contain a circle of diameter of at least 0.83 D of:

a. In a FATO, the design helicopter; or

b. In a stand, the largest helicopter the stand is intended to serve;

2) when there is a limitation on the direction of touchdown, of sufficient width to meet the requirement of 4.4.1 a) 1) above but not less than twice the undercarriage width (UCW) of:

a. In a FATO, the design helicopter; or

b. In a stand, the most demanding helicopter the stand is intended to serve.

4.4.5 For an elevated heliport, the minimum dimensions of a TLOF, when in a FATO, shall be of sufficient size to contain a circle of diameter of at least 1 Design-D.

4.4.6 Slopes on a TLOF shall not:

a) except as provided in b) or c) below, exceed 2 per cent in any direction;

b) when the TLOF is elongated and intended to be used by helicopters operated in performance class 1, exceed 3 per cent overall, or have a local slope exceeding 5 per cent; and

c) when the TLOF is elongated and intended to be used solely by helicopters operated in performance class 2 or 3, exceed 3 per cent overall, or have a local slope exceeding 7 per cent.

4.4.7 When a TLOF is within a FATO, it should be:

a) centred on the FATO; or

b) for an elongated FATO, centred on the longitudinal axis of the FATO.

4.4.8 When a TLOF is within a helicopter stand, it shall be centred on the stand.

4.4.9 A TLOF shall be provided with markings which clearly indicate the touchdown position and, by their form, any limitations on manoeuvring.

Note. - When a TLOF in a FATO is larger than the minimum dimensions, the TDPM may be offset while ensuring containment of the undercarriage within the TLOF and the helicopter (including the rotors) within the FATO.

4.4.10 Where an elongated Performance Class 1 FATO/TLOF contains more than one TDPM, measures shall be in place to ensure that only one can be used at a time.

4.4.11 Where alternative TDPMs are provided they shall be placed to ensure containment of the undercarriage within the TLOF and the helicopter within the FATO.

Note. - The efficacy of the rejected take-off or landing distance will be dependent upon the helicopter being correctly positioned for take-off, or landing.

4.4.12 Safety devices such as safety nets or safety shelves shall be located around the edge of an elevated heliport but shall not exceed the height of the TLOF.

4.5 Helicopter Taxiways and Taxi-Routes

Note.1 - The specifications for ground taxi-routes and air taxi-routes are intended for the safety of simultaneous operations during the manoeuvring of helicopters. The effect of wind velocity/turbulence induced by the rotor downwash would need to be considered.

Note2. - The defined areas addressed in this section are taxiways and ground/air taxi-routes:

a) Taxiways associated with air taxi-routes may be used by both wheeled and skidded helicopters for either ground or air taxiing.

b) Ground taxi-routes are meant for use by wheeled helicopters, for ground taxiing only.

c) Air taxi-routes are meant for use by air taxiing only.

Helicopter taxiways

Note.1 - A helicopter taxiway is intended to permit the surface movement of a wheeled helicopter under its own power.

Note2. - A helicopter taxiway can be used by a wheeled helicopter for air taxi if associated with a helicopter air taxi-route.

Note3. - When a taxiway is intended for use by aeroplanes and helicopters, the provisions for aeroplane taxiways; taxiway strips; helicopter taxiways; and taxi-routes will be taken into consideration and the more stringent requirements will be applied.

4.5.1 A helicopter taxiway shall:

a) provide:

1) an area free of obstacles and of sufficient width to ensure containment of the undercarriage of the most demanding wheeled helicopter the taxiway is intended to serve;

2) a surface which:

a. has bearing strength to accommodate the taxiing loads of the helicopters the taxiway is intended to serve;

b. is free of irregularities that would adversely affect the ground taxiing of helicopters;

c. is resistant to the effects of rotor downwash; and

d. ensures effective drainage while having no adverse effect on the control or stability of a wheeled helicopter when being manoeuvred under its own power, or when stationary; and

b) be associated with a taxi-route.

4.5.2 The minimum width of a helicopter taxiway shall be the lesser of:

a) two times the undercarriage width (UCW) of the most demanding helicopter the taxiway is intended to serve; or

b) a width meeting the requirements of 4.5.1 a)1).

4.5.3 The transverse slope of a taxiway shall not exceed 2 per cent and the longitudinal shall not exceed 3 per cent.

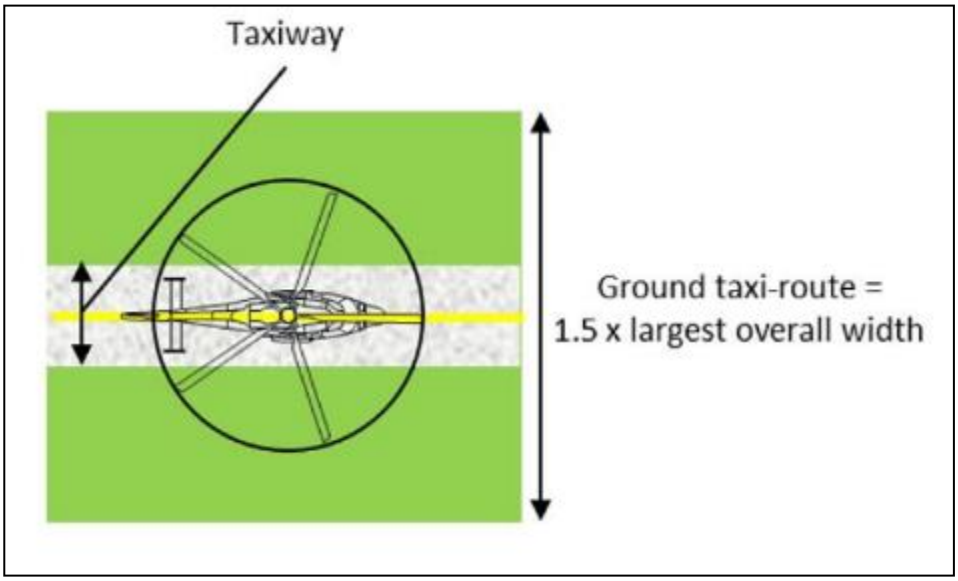


Figure 4-3 – Helicopter taxiway/ground taxi route

Helicopter taxi-routes

4.5.4 A helicopter taxi-route shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it, established for the movement of helicopters; with sufficient width to ensure containment of the largest helicopter the taxi-route is intended to serve;

b) when solid, a surface which is resistant to the effects of rotor downwash; and

c) when co-located with a taxiway:

1) is contiguous and flush with the taxiway;

2) does not present a hazard to operations; and

3) ensures effective drainage; and

d) when not co-located with a taxiway:

1) is free of hazards if a forced landing is required

4.5.5 No mobile object shall be permitted on a taxi-route during helicopter operations.

Note. - See the Heliport Manual (Doc 9261) for further guidance.

4.5.6 When solid and co-located with a taxiway, the taxi-route shall not exceed an upward slope of 4 per cent outwards from the edge of the taxiway.

Helicopter ground taxi-routes

4.5.7 A helicopter ground taxi-route shall have a minimum width of 1.5 times the overall width of the largest helicopter it is intended to serve, and be centred on a taxiway.

4.5.8 Essential objects located in a helicopter ground taxi-route shall not:

a) be located at a distance of less than 50 cm outwards from the edge of the helicopter ground taxiway; and

b) penetrate a plane originating 50 cm outwards of the edge of the helicopter taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

4.6 Helicopter Air Taxi-Routes

Note. — A helicopter air taxi-route is intended to permit the movement of a helicopter above the surface at a height normally associated with ground effect and at ground speed less than 37 km/h (20 kts).

4.6.1 A helicopter air taxi-route shall have a minimum width of twice the overall width of the largest helicopter it is intended to serve.

4.6.2 If co-located with a taxiway for the purpose of permitting both ground and air taxi operations (see Figure 4-4):

a) the helicopter air taxi-route shall be centred on the taxiway; and

b) essential objects located in the helicopter air taxi-route shall not:

1) be located at a distance of less than 50 cm outwards from the edge of the helicopter taxiway; and

2) penetrate a surface originating 50 cm outwards of the edge of the helicopter taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

4.6.3 When not co-located with a taxiway, the slopes of the surface of an air taxi-route should not exceed the slope landing limitations of the helicopters the air taxi-route is intended to serve. In any event the transverse slope should not exceed 10 per cent and the longitudinal slope should not exceed 7 per cent.

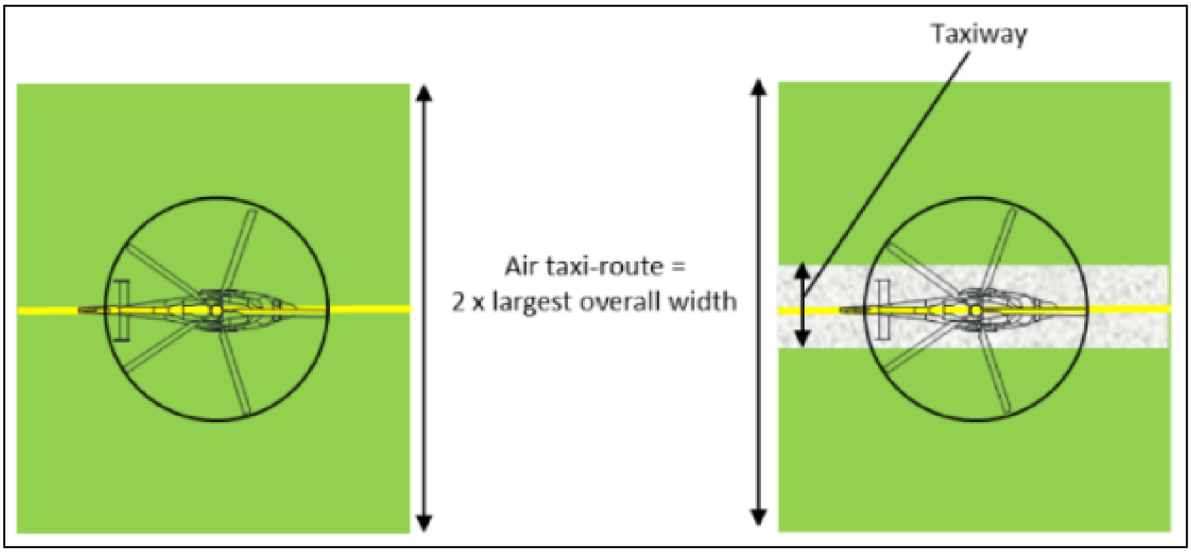


Figure 4-4 – Helicopter air taxi-route and combined air taxi-route/ taxiway

4.7 Helicopter stands

Note. . — The provisions of this section do not specify the location for helicopter stands but allow a high degree of flexibility in the overall design of the heliport. However, it is not considered good practice to locate helicopter stands under a flight path. See Heliport Manual (Doc 9261) for further guidance.

4.7.1 A helicopter stand shall:

a) provide:

1) an area free of obstacles and of sufficient size and shape to ensure containment of every part of the largest helicopter the stand is intended to serve when it is being positioned within the stand;

2) a surface which:

a. is resistant to the effects of rotor downwash;

b. is free of irregularities that would adversely affect the manoeuvring of helicopters;

c. has bearing strength capable of withstanding the intended loads;

d. has sufficient friction to avoid skidding of helicopters or slipping of persons; and

b) ensures effective drainage while having no adverse effect on the control or stability of a wheeled helicopter when being manoeuvred under its own power, or when stationary; and

c) be associated with a protection area.

4.7.2 The minimum dimensions of a helicopter stand shall be:

a) a circle of diameter of 1.2 D of the largest helicopter the stand is intended to serve;

or

b) when there is a limitation on manoeuvring and positioning, of sufficient width to meet the requirement of 4.7.1 a) 1) above but not less 1.2 times overall width of largest helicopter the stand is intended to serve.

Note1. — For a helicopter stand intended to be used for taxi-through only, a width less than 1.2D but which provides containment and still permits all required functions of a stand to be performed, might be used (in accordance with 4.7.1 a) 1)).

Note 2. — For a helicopter stand intended to be used for turning on the ground, the minimum dimensions may be influenced by the turning circle data provided by the manufacturer and are likely to exceed 1.2 D. See the Heliport Manual (Doc 9261) for further guidance.

4.7.3 The mean slope of a helicopter stand in any direction shall not exceed 2 per cent.

4.7.4 Each helicopter stand shall be provided with positioning markings to clearly indicate where the helicopter is to be positioned and, by their form, any limitation on manoeuvring.

4.7.5 A stand shall be surrounded by a protection area which need not be solid.

Protection Areas

4.7.6 A protection area shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it; and

b) when solid, a surface which is contiguous and flush with the stand; is resistant to the effects of rotor downwash; and ensures effective drainage.

4.7.7 When associated with a stand designed for turning, the protection area shall extend outwards from the periphery of the stand for a distance of 0.4D. (See Figure 4-5).

4.7.8 When associated with a stand designed for taxi-through, the minimum width of the stand and protection area shall not be less than the width of the associated taxi-route (see Figures 4-6 and 4-7).

4.7.9 When associated with a stand designed for non-simultaneous use (see Figures 4-8 and 4-9):

a) the protection area of adjacent stands may overlap but shall not be less than the required protection area for the larger of the adjacent stands; and

b) the adjacent non-active stand may contain a static object but it shall be wholly within the boundary of the stand.

Note. — To ensure that only one of the adjacent stands is active at a time, instruction to pilots in the AIP make clear that a limitation on the use of the stands is in force.

4.7.10 No mobile object shall be permitted in a protection area during helicopter operations.

4.7.11 Essential objects located in the protection area shall not:

a) if located at a distance of less than 0.75 D from the centre of the helicopter stand, penetrate a plane at a height of 5 cm above the plane of the central zone; and

b) if located at distance of 0.75 D or more from the centre of the helicopter stand, penetrate a plane at a height of 25 cm above the plane of the central zone and sloping upwards and outwards at a gradient of 5 per cent.

4.7.12 When solid, the slope of a protection area shall not exceed an upward slope of 4 per cent outwards from the edge of the stand.

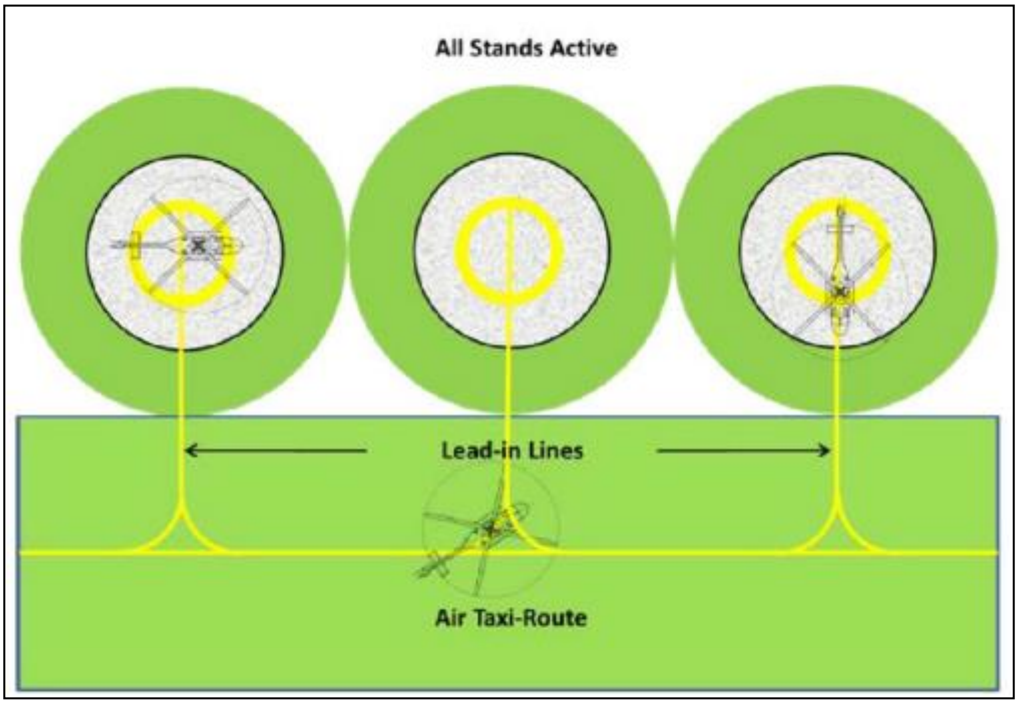


Figure 4-5 – Turning stands (with air taxi-routes)/ simultaneous use

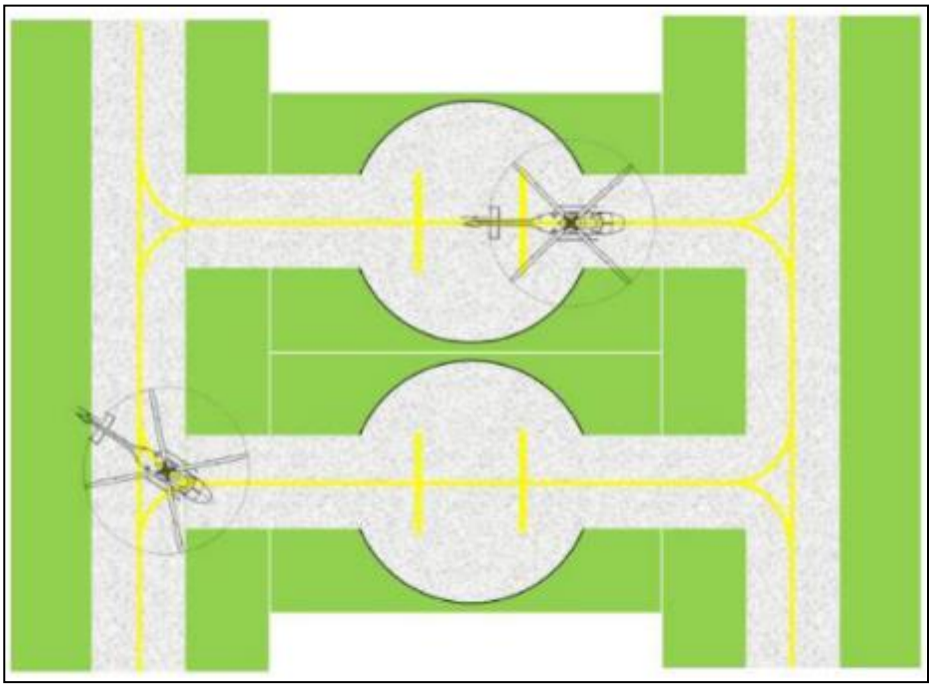


Figure 4-6 – Ground taxi-through stands (with taxiway/ground taxi-route) simultaneous use

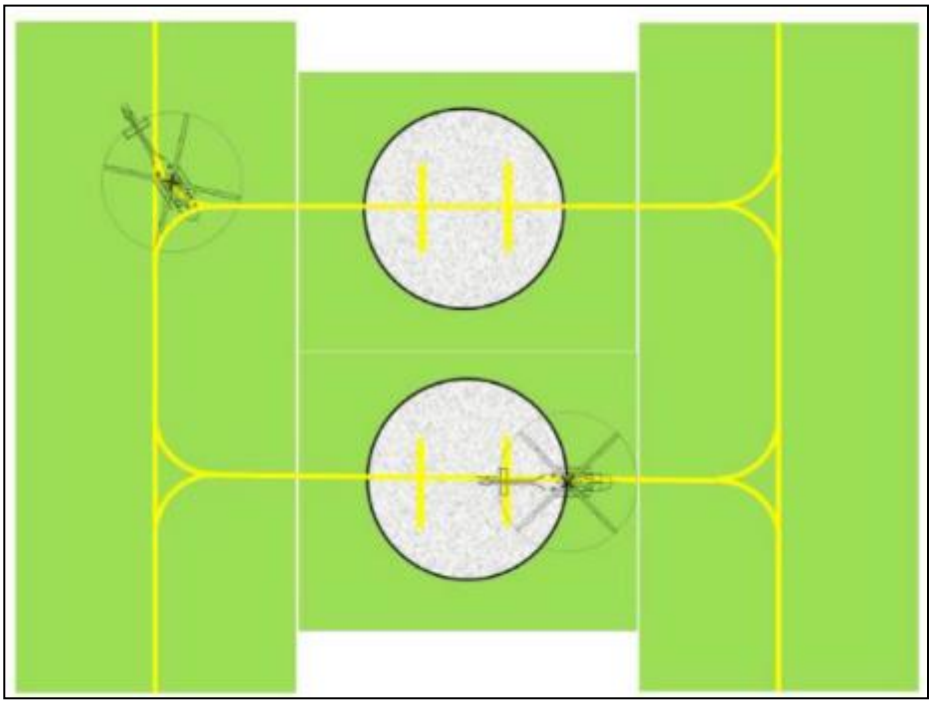


Figure 4-7 – Air taxi-through stands (with air taxi route) simultaneous use

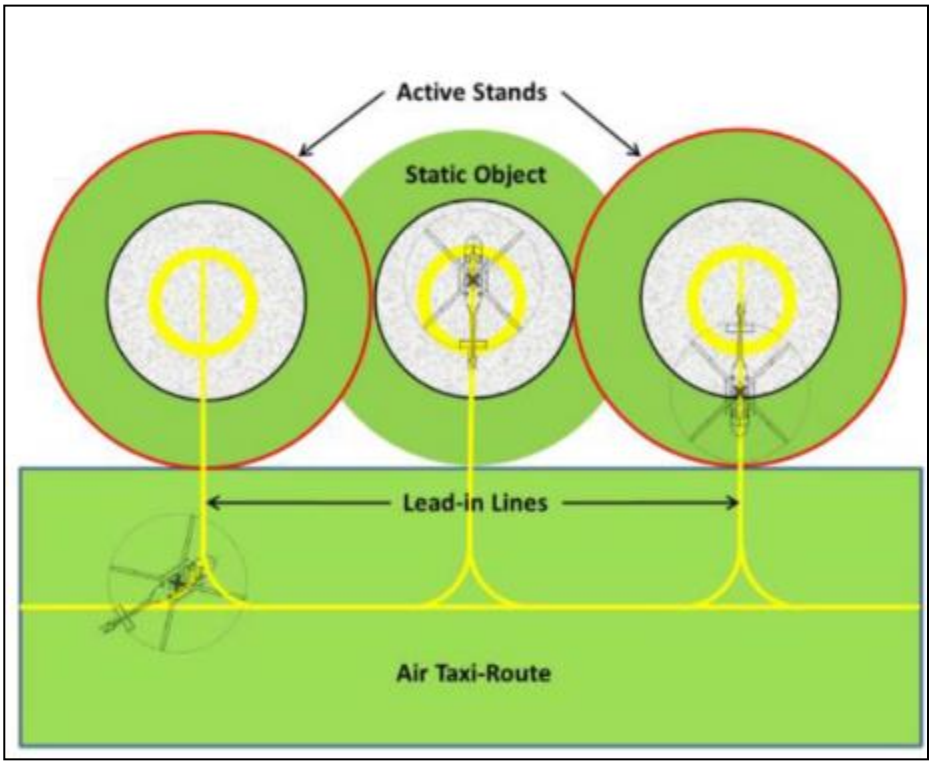


Figure 4-8 – Turning stands (with air taxi-routes) non-simultaneous use – outer stands active

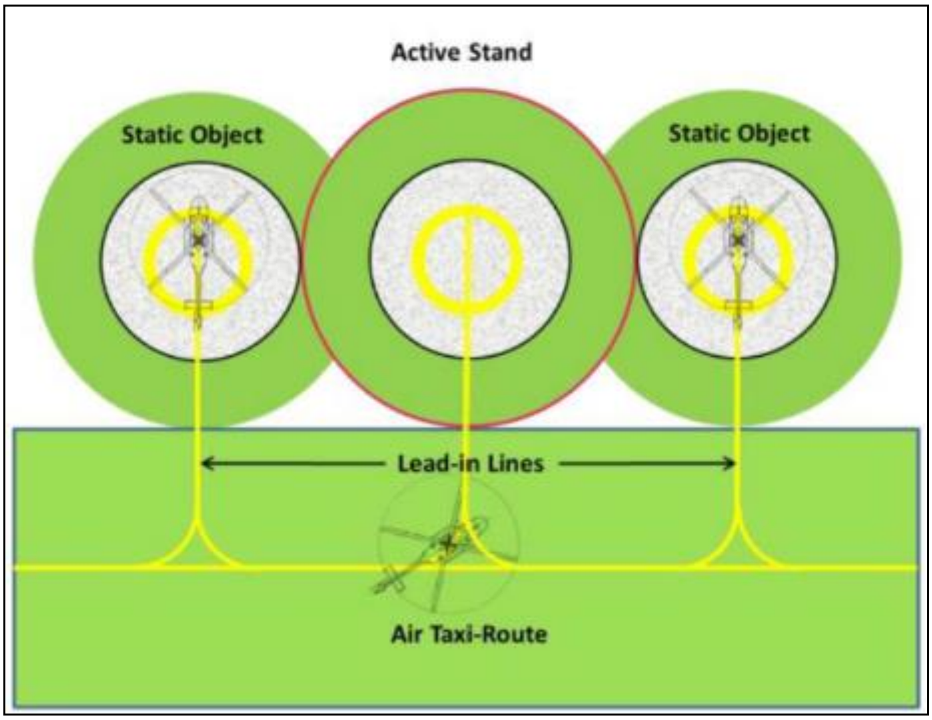


Figure 4-9 – Turning stands (with air taxi-route) non-simultaneous use – inner stand active

4.8 Location of a FATO in Relation to a Runway or Taxiway

4.8.1 Where a FATO is located near a runway or taxiway, and where simultaneous operations are planned, the separation distance between the edge of a runway or taxiway and the edge of a FATO shall not be less than the appropriate dimension in Table 4-1.

4.8.2 A FATO shall not be located:

a) near taxiway intersections or holding points where jet engine efflux is likely to cause high turbulence; or

b) near areas where aeroplane vortex wake generation is likely to exist.

Table 4-1 – FATO Minimum Separation Distances for simultaneous operations

If aeroplane mass and/or helicopter mass are:	Distance between FATO edge and runway edge or taxiway edge (m)

up to but not including 3 175 kg	60
3 175 kg up to but not including 5 760 kg	120
5 760 kg up to but not including 100 000 kg	180
100 000 kg and over	250

4.9 Safety Devices Around an Elevated Heliport

4.9.1 Personnel protection safety devices such as perimeter safety nets or safety shelves should be installed around the edge of the elevated heliport, or a surface level heliport where there is a risk of persons falling, except where structural protection already exists. They should not exceed the height of the outboard edge of the TLOF/FATO to avoid presenting a hazard to helicopter operations. The load bearing capability of the safety device should be assessed fit for purpose by reference to the shape and size of the personnel that it is intended to protect (see 4.9.5).

4.9.2 Where the safety device consists of perimeter netting, this should be of a flexible nature and be manufactured from a non-flammable material, with the inboard edge fastened just below the edge of the TLOF/FATO. The net itself should:

a) extend in the horizontal plane beyond the edge of the TLOF/FATO to the distance shall comply with UAE regulation on fall protection system and safety net and in any case to at least 1.5 m;

b) be arranged with an upward slope of approximately 10°; and

c) not act as a trampoline but exhibit properties that provide a hammock effect to securely contain a person falling or rolling into it, without serious injury.

Note: To achieve such a slope, the net should be connected to the TLOF/FATO below the plane of the surface to ensure it does not protrude above.

4.9.3 When considering the securing of the net to the structure and the materials used, each element should meet adequacy of purpose requirements, particularly that the netting should not deteriorate over time due to prolonged exposure to the elements, including ultraviolet light.

4.9.4 Perimeter nets may incorporate a hinge arrangement to facilitate the removal of sacrificial panels to allow for periodic testing.

4.9.5 A safety net support assembly and its fixings to the heliport primary structure should be designed to withstand the static load of the whole support structure, the netting system and any attached appendages plus at least 125 kg load imposed on any section of the netting system (equivalent to a body falling onto the net from heliport level).

4.9.6 Where the safety device consists of safety shelving rather than netting, the construction and layout of the shelving should not promote any adverse wind flow issues over the FATO, while providing equivalent personnel safety benefits, and should be installed to the same minimum dimensions as the netting system, beyond the edge of the TLOF/FATO. It may also be further covered with netting to improve grab capabilities. Where there is a sheer drop from the edges of the heliport and the free movement of passengers and heliport personnel cannot be made without some risk, a safety net should be installed.

4.9.7 Safety devices around elevated heliport should be tested annually.

4.10 Elevated Heliports - Structural Design

4.10.1 Elevated heliports may be designed for a specific helicopter type though greater operational flexibility will be obtained from a classification system of design. The FAT0 should be designed for the largest or heaviest type of helicopter that it is anticipated will use the heliport, and account taken of other types of loading such as personnel, freight, refuelling equipment, etc.

Note. — Guidance on the structural design for helicopters on landing and helicopters at rest are summarised in Appendix C.

4.11 Elevated Heliports - Means of Escape

4.11.1. Access and escape routes shall be of a suitable design to enable quick and efficient movement of the maximum number of personnel who may require to use them, and to facilitate easy manoeuvring of rescue and firefighting equipment and at hospital, the use of stretchers.

4.11.2. Access and escape routes should have a minimum width of 1.2 metres for main route and 0.7 m for secondary route. Dimensions should be increased accordingly to facilitate rapid transportation of rescue and firefighting equipment and at hospital, areas for manoeuvring a stretcher.

4.11.3. Means of escape should be hatch-painted red and white & Marked 'EMERGENCY EXIT').

Note1. - Preferred option is for routes to be positioned opposite each other.

4.11.4. Escape routes should not be positioned within direct range of a fixed foam application system and consider the likely effect of water blast impeding any passenger evacuation.

4.11.5. Escape routes should be designed and positioned so as not to impede rescue operations and to direct passengers immediately away from the helicopter, in particular the tail rotor area.

4.11.6. Escape routes should be sufficiently illuminated to aid rapid evacuation of passengers away from the heliport to a safe area.

Chapter I-5 – Obstacle Environment

Note. — The objectives of the specifications in this chapter are to describe the airspace around heliports so as to permit intended helicopter operations to be conducted safely and to prevent, heliports from becoming unusable by the growth of obstacles around them. This is achieved by establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace.

5.1 Obstacle Limitation Surfaces and Sectors

Approach Surface

5.1.1 Description. An inclined plane or a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note. — See Figure 5-1, 5-2, 5-3 and 5-4 for depiction of surfaces. See Table 5-1 for dimensions and slopes of surfaces.

Characteristics

5.1.2 The limits of an approach surface shall comprise:

a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the approach surface and located at the outer edge of the safety area;

b) two side edges originating at the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and:

c) an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height of 152 m (500 feet) above the elevation of the FATO.

5.1.3 The elevation of the inner edge shall be the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the approach surface. For heliports intended to be used by helicopters operated in performance class 1 and when accepted by the GCAA, the origin of the inclined plane may be raised directly above the FATO.

5.1.4 The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the surface.

5.1.5 In the case of an approach surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope of the centre line shall be the same as that for a straight approach surface.

Note. — See Figure 5-5

5.1.6 In the case of an approach surface involving a turn, the surface shall not contain more than one curved portion.

5.1.7 Where a curved portion of an approach surface is provided the sum of the radius of arc defining the centre line of the approach surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

5.1.8 Any variation in the direction of the centre line of an approach surface shall be designed so as not to necessitate a turn radius less than 270 m.

Note. — For heliports intended to be used by performance class 2 and 3 helicopters, it is intended good practice for the approach paths to be selected so as to permit safe forced landing or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimized. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.

Transitional surface

Note. – For a FATO at a heliport without a PinS approach incorporating a visual segment surface (VSS) there is no requirement to provide transitional surfaces.

5.1.9 Description. A complex surface along the side of the safety area and part of the side of the approach/take-off climb surface, that slopes upwards and outwards to a predetermined height of 45 m (150 feet).

Note. – See Figure 5-3 Transitional Surfaces. See Table 6-1 for dimensions and slopes of surfaces.

5.1.10 Characteristics. The limits of a transitional surface shall comprise:

a) a lower edge beginning at a point on the side of the approach/take-off climb surface at a specified height above the lower edge extending down the side of the approach/take-off climb surface to the inner edge of the approach/take-off climb surface and from there along the length of the side of the safety area parallel to the centre line of the FATO; and

b) an upper edge located at a specified height above the lower edge as set out in Table 5-1.

5.1.11 The elevation of a point on the lower edge shall be:

a) along the side of the approach/take-off climb surface — equal to the elevation of the approach/take-off climb surface at that point; and

b) along the safety area — equal to the elevation of the inner edge of the approach/take-off climb surface.

Note 1. — If the origin of the inclined plane of the approach/take-off climb surface is raised and supported by an aeronautical study or approved by appropriate authority, the elevation of the origin of the transitional surface will be raised accordingly.

Note 2. — As a result of b) the transitional surface along the safety area will be curved if the profile of the FATO is curved, or a plane if the profile is a straight line.

5.1.12 The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the FATO.

Take-Off Climb Surface

5.1.13 Description. An inclined plane, a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note. - See Figure 5-1, 5-2, 5-3 and 5-4 for depiction of surfaces. See Table 5-1 for dimensions and slopes of surfaces.

5.1.14 Characteristics. The limits of a take-off climb surface shall comprise:

a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the take-off climb surface and located at the outer edge of the safety area;

b) two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and

c) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface and at a specified height of 152 m (500 feet) above the elevation of the FATO.

5.1.15 The elevation of the inner edge shall be the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the take-off climb surface. For heliports intended to be used by helicopters operated in performance class 1 and when accepted by the GCAA, the origin of the inclined plane may be raised directly above the FATO.

5.1.16 Where a clearway is provided the elevation of the inner edge of the take-off climb surface shall be located at the outer edge of the clearway at the highest point on the ground based on the centre line of the clearway.

5.1.17 In the case of a straight take-off climb surface, the slope shall be measured in the vertical plane containing the centre line of the surface.

5.1.18 In the case of a take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line, and the slope of the centre line shall be the same as that for a straight take-off climb surface. See Figure 6-5.

5.1.19 In the case of a take-off climb surface involving a turn, the surface shall not contain more than one curved portion.

5.1.20 Where a curved portion of a take-off climb surface is provided the sum of the radius of arc defining the centre line of the take-off climb surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

5.1.21 Any variation in the direction of the centre line of a take-off climb surface shall be designed so as not to necessitate a turn of radius less than 270 m.

Note 1. – Helicopter take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve allows for acceleration.

Note 2. — For heliports intended to be used by performance class 2 and 3 it is good practice for the departure paths to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimized. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.

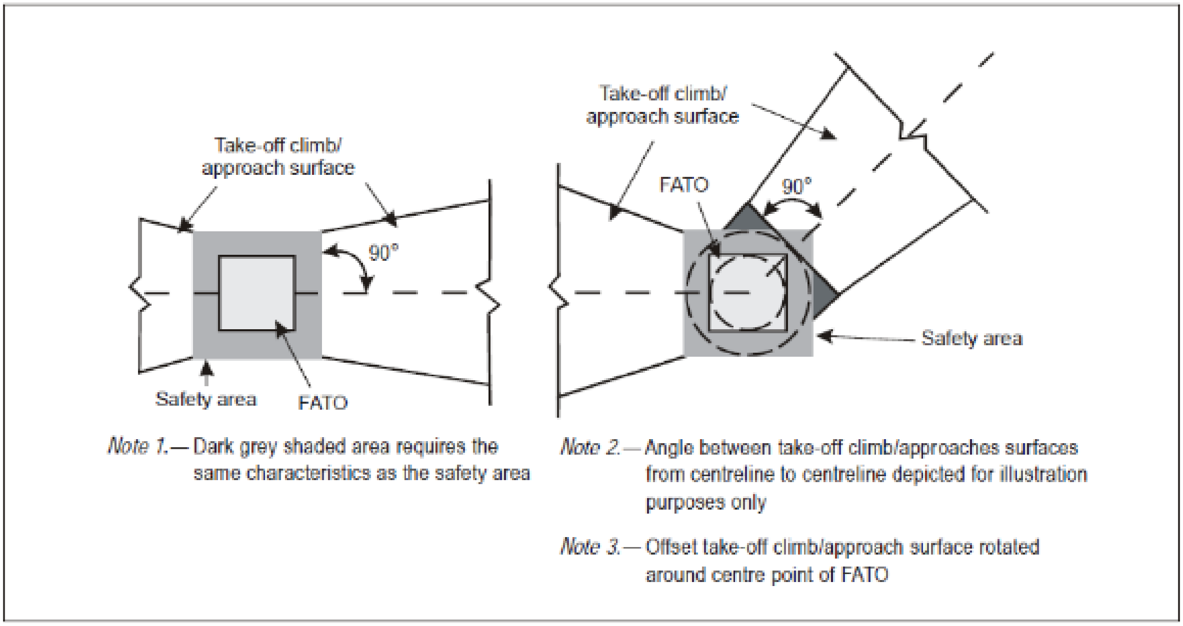


Figure 5-1 – Obstacle Limitation Surface – Take-Off Climb and Approach Surface

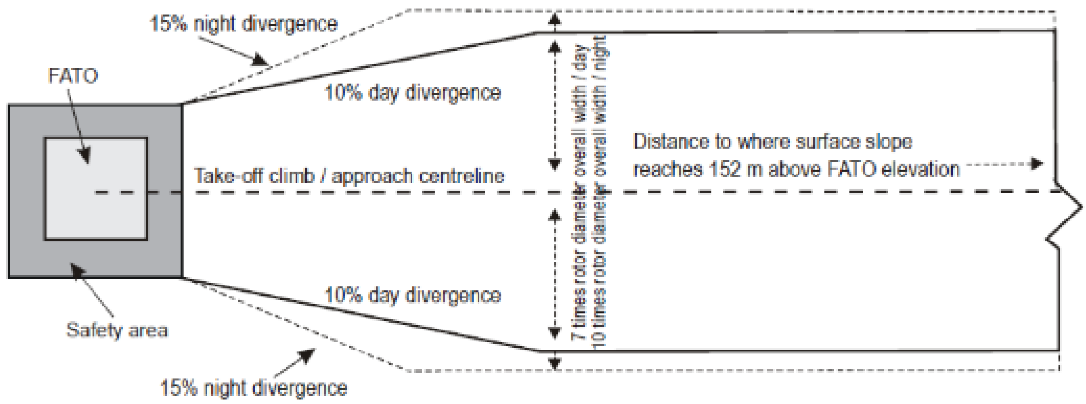
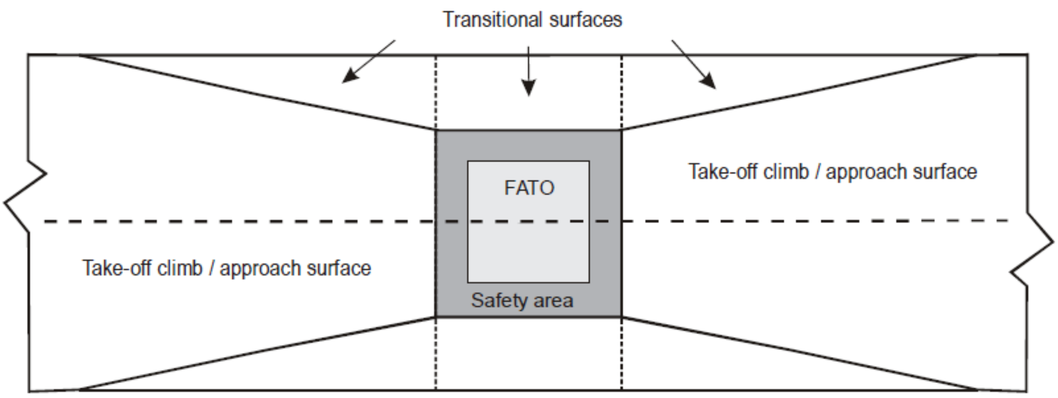


Figure 5-2 – Take-Off Climb / Approach Surface Width



Note 1.— For single take-off climb / approach surface. Transition surface extends perpendicular to far side of Safety Area.
Note 2.— PANS-OPS, Doc 8168, Volume II, Part IV Helicopters, details procedure design criteria.
Note 3.— This figure shows a square FATO for illustration purposes only. For a circular FATO the transitional surface lower and upper edges would also be circular.

Figure 5-3 – Transitional surface for a FATO with a PinS approach procedure with a VSS

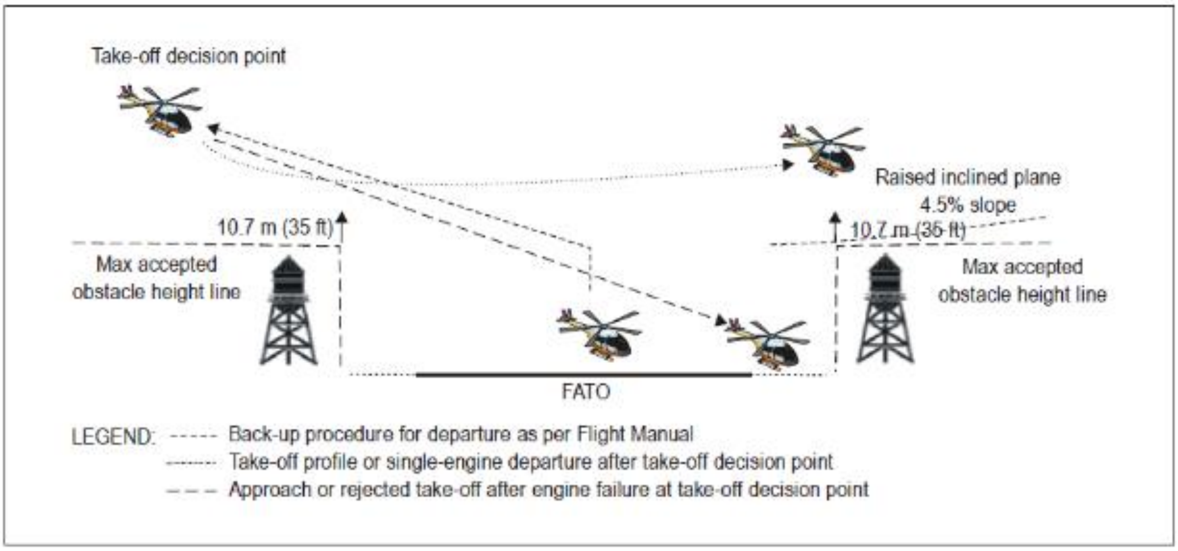


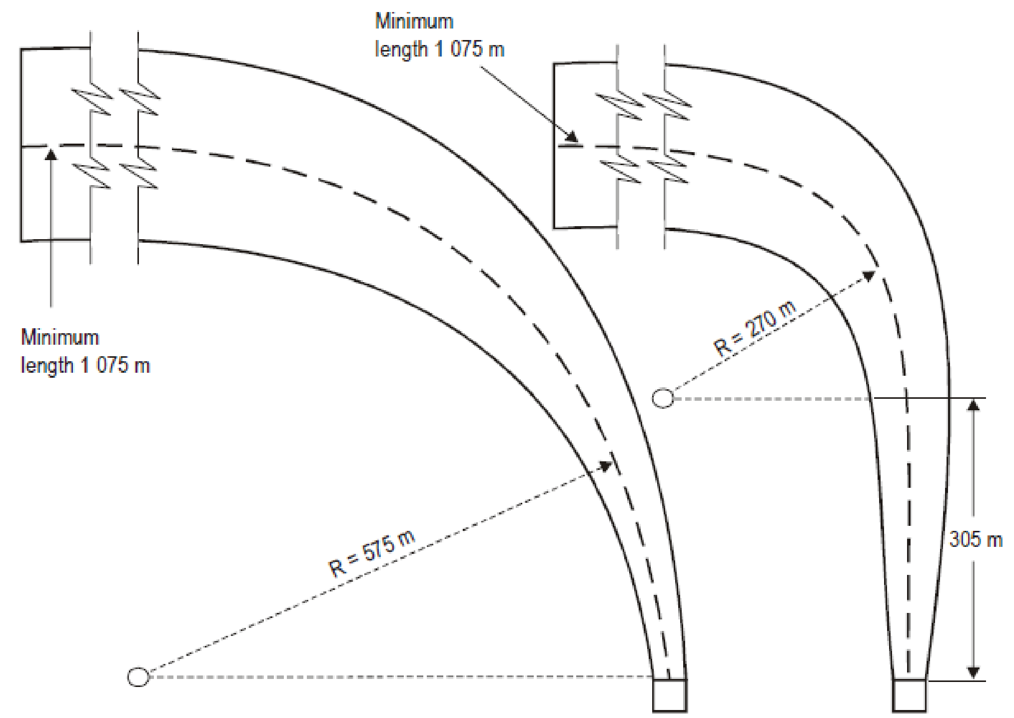
Figure 5-4 – Example of raised inclined plane during operations in Performance Class 1

Note 1. — This example diagram does not represent any specific profile, technique or helicopter type and is intended to show a generic example. An approach profile and a back-up procedure for departure profile are depicted. Specific manufacturers operations in performance class 1 may be represented differently in the specific Helicopter Flight Manual.

Note 2. — Annex 6, Part 3, Attachment A provides back-up procedures that may be useful for operations in performance class 1.

Note 3. — The approach/landing profile may not be the reverse of the take-off profile.

Note 4. — Additional obstacle assessment might be required in the area that a back-up procedure is intended. Helicopter performance and the Helicopter Flight Manual limitations will determine the extent of the assessment required.



Note 1.— Any combination of curve and straight portion may be established using the following formula: S+R ≥ 575 m and R ≥ 270 m where S = 305 m, where S is the length of the straight portion and R is the radius of turn. Note any combination ≥ 575 m will work.

Note 2.— The minimum length of the centre line of the curve and straight portion is 1 075 m but may be longer depending upon the slope used. See Table 4-1 for longer lengths.

Note 3.— Helicopter take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve should be considered to allow for acceleration.

Figure 5-5 – Curved approach and take-off climb surface for all FATOs

Table 5-1 – Dimensions and slopes of obstacle limitation surfaces for all visual FATOs

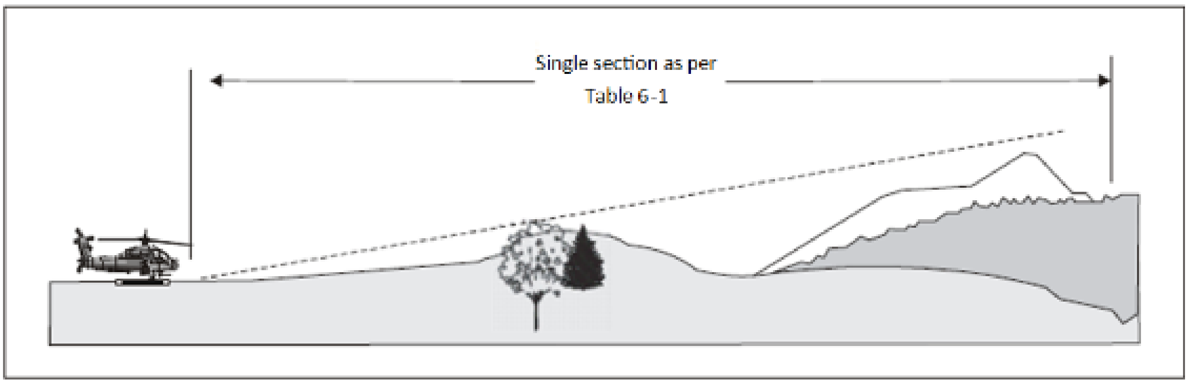
Surface and Dimensions	***Slope Design Categories***		
	A	**B**	**C**
Approach and Take-off Climb Surface			
Length of inner edge	Width of Safety Area	Width of Safety Area	Width of Safety Area
Location of Inner Edge	Safety Area Boundary (Clearway boundary if provided)	Safety Area Boundary	Safety Area Boundary
Divergence: (1st and 2nd section			
Day use only	10%	10%	10%
Night use	15%	15%	15%
First Section			
Length	3386 m	245 m	1220 m
Slope	4.5% (1:22.2)	8% (1:12.5)	12.5% (1:8)
Outer Width	(b)	N/A	(b)
Second Section			
Length	N/A	830 m	N/A
Slope	N/A	16% (1:6.25)	N/A
Outer Width	N/A	(b)	N/A
Total length from inner edge (a)	3386 m	1075 m	1220 m
Transitional Surface (FATO's with PinS approach procedure with a VSS)			
Slope	50% (1:2)	50% (1:2)	50% (1:2)
Height	45 m	45 m	45 m

a) The approach and take-off climb surface lengths of 3 386 m, 1 075 m and 1 220 m associated with the respective slopes, brings the helicopter to 152 m (500 ft) above FATO elevation.

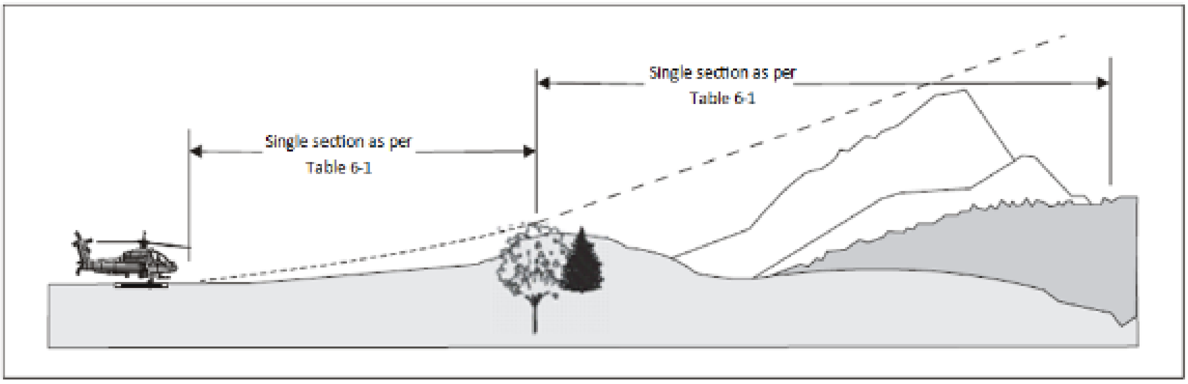
b) Seven rotor diameters overall width for day operations or 10 rotor diameters overall width for night operations.

Note — The slope design categories in Table 5-1 may not be restricted to a specific performance class of operation and may be applicable to more than one performance class of operation. The slope design categories depicted in Table 5-1 represent minimum design slope angles and not operational slopes. Slope category "A" generally corresponds with helicopters operated in performance class 1; slope category "B" generally corresponds with helicopters operated in performance class 3; and slope category "C" generally corresponds with helicopters operated in performance class 2.

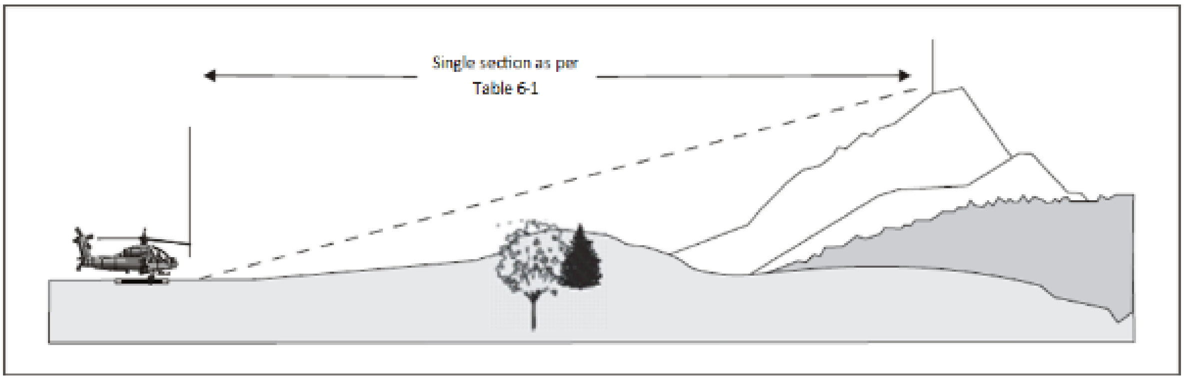
5.1.22. Consultation with helicopter operators will help to determine the appropriate slope category to apply according to the heliport environment and the most critical helicopter type for which the heliport is intended.



a) Approach and take-off climb surfaces - "A" slope profile - 4.5% design



b) Approach and take-off climb surfaces - "B" slope profile - 8% and 16% design



c) Approach and take-off climb surfaces - "C" slope profile - 12.5% design

Figure 5-6 – Approach and take-off climb surfaces with different slope design categories

5.2 Obstacle Limitation Requirements

Note1. — The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a FATO, i.e. approach manoeuvre to hover or landing, or take-off manoeuvre and type of approach, and are intended to be applied when such use is made of the FATO. In cases where operations are conducted to or from both directions of a FATO, then the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.

Note2. – Guidance on obstacle protection surfaces, for when a visual approach slope indicator (VASI) is installed, is given in the onshore section of the Heliport Manual (Doc 9261)

5.2.1. Surface-Level Heliports

5.2.1.1 The following obstacle limitation surfaces shall be established for a precision approach FATO:

a) take-off climb surface;

b) approach surface; and

c) transitional surfaces.

Note1. - See Figure 5-3 – Transitional Surfaces.

Note2. - Doc 8168, Volume II, Part IV – Helicopters, details procedure design criteria.

5.2.1.2 The following obstacle limitation surfaces shall be established for a FATO at heliports, other than specified in 5.2.1.1, including heliports with a PinS approach procedure where a visual segment surface is not provided:

a) take-off climb surface; and

b) approach surface.

5.2.1.3 The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than those specified in Table 6-1 and shall be located as shown in Figures 5-1, 5-2 and 5-6.

5.2.1.4 For heliports that have an approach/take-off climb surface with a 4.5% slope design, objects shall be permitted to penetrate the obstacle limitation surface, if the results of an aeronautical study approved by an appropriate authority have reviewed the associated risks and mitigation measures.

Note1. - The identified objects may limit the heliport operation.

Note2. - Annex 6, Part 3 provides procedures that may be useful in determining the extent of obstacle penetration.

5.2.1.5 New objects or extensions of existing objects shall not be permitted above any of the surfaces in paragraphs 5.2.1.1 to 5.2.1.2 except when shielded by an existing immovable object or after an aeronautical study approved by an appropriate authority, determines that the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.

Note — Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual, Part 6 (Doc 9137).

5.2.1.6 Existing objects above any of the surfaces in 5.2.1.1 to 5.2.1.2 should, as far as practicable, be removed except when the object is shielded by an existing immovable object, or after an aeronautical study approved by the Authority determines that the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.

Note — The application of curved approach or take-off climb surfaces as specified in 5.1.5 and 5.1.18 may alleviate the problems created by objects infringing these surfaces.

5.2.1.7 A surface-level heliport shall have at least one approach and take-off climb surface. An aeronautical study shall be undertaken when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;

b) the obstacle environment surrounding the heliport and the availability of at least one protected side slope;

c) the performance and operating limitations of helicopters intending to use the heliport; and

d) the local meteorological conditions including the prevailing winds.

5.2.1.8 A surface level heliport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.

Note - See ICAO Heliport Manual (Doc 9261) for further guidance.

5.2.2. Elevated Heliports

5.2.2.1 The obstacle limitation surfaces for elevated heliports shall conform to the requirements for surface-level heliports specified in paragraphs 5.2.1.1. to 5.2.1.6.

5.2.2.2 An elevated heliport shall have at least one approach and take-off climb surface. An aeronautical study shall be undertaken when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;

b) the obstacle environment surrounding the heliport and the availability of at least one protected side slope;

c) the performance and operating limitations of helicopters intending to use the heliport; and

d) the local meteorological conditions including the prevailing winds.

5.2.2.3 An elevated heliport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.

Note - See Heliport Manual (Doc 9261) for guidance.

Chapter I-6 – Visual Aids

Note 1 — The procedures used by some helicopters require that they utilise a FATO having characteristics similar in shape to a runway for fixed wing aircraft. For the purpose of this chapter a FATO having characteristics similar in shape to a runway is considered as satisfying the concept for a "runway-type FATO". For such arrangements it is sometimes necessary to provide specific markings to enable a pilot to distinguish a runway-type FATO during an approach. Appropriate markings are contained within sub-sections entitled "Runway-type FATOs". The requirements applicable to all other types of FATOs are given within sub-sections entitled "All FATOs except runway-type FATOs.

Note 2 — It has been found that, on surfaces of light colour, the conspicuousity of white and yellow markings can be improved by outlining them in black.

Note 3.— Guidance is given in the Heliport Manual (Doc 9261) on marking the maximum allowable mass (6.2.3) and the D-value (6.2.4) on the heliport surface to avoid confusion between markings where metric units are used and markings where imperial units are used.

6.1 Wind Direction Indicator

Application

6.1.1 A heliport shall be equipped with at least one wind direction indicator.

Location

6.1.2 A wind direction indicator shall be located so as to indicate the wind conditions over the FATO and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a helicopter in flight, in a hover or on the movement area.

6.1.3 Where a TLOF may be subject to a disturbed airflow, then additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

Note — Guidance on the location of wind direction indicators is given in the Heliport Manual (Doc 9261).

Characteristics

6.1.4 A wind direction indicator shall be constructed so that it gives a clear indication of the direction of the wind and a general indication of the wind speed. See Figure 6-1.

6.1.5 An indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:

	Surface-level Heliports (m)	Elevated heliports and helidecks (m)
Length	2.4	1.2
Diameter (large end)	0.6	0.3
Diameter (small end)	0.3	0.15

6.1.6 The colour of the wind direction indicator should be so selected as to make it clearly visible and understandable from a height of at least 200 m (650 ft) above the heliport, having regard to background. Where practicable, a single colour, preferably white or orange, should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands the first and last band being the darker colour.

6.1.7 A wind direction indicator at a heliport intended for use at night shall be illuminated. See Figure 6-1A.

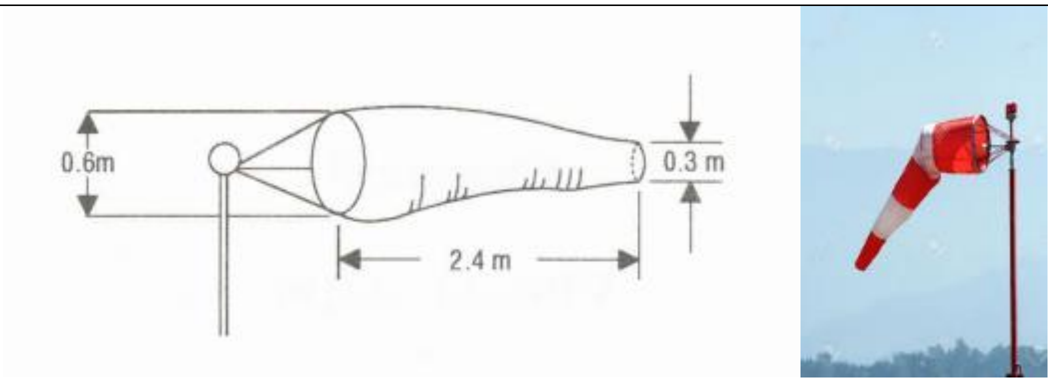


Figure 6-1 – Wind Direction Indicator – Surface Level

Figure 6-1A – Wind Direction Indicator – Illuminated

6.2 Heliport Identification Marking

Application

6.2.1 A heliport identification marking shall be provided at a heliport.

Location - All FATOs except runway-type FATOs

6.2.2 A heliport identification marking shall be located at or near the centre of the FATO

Note 1 - The objective of a heliport identification marking is to provide to the pilot an indication of the presence of a heliport and, by its form, likely usage; the preferred direction(s) of approach; or the FATO orientation within the heliport obstacle environment.

Note 2 - For other than helidecks, the preferred direction(s) of approach corresponds to the median of the departure/arrival surface(s).

Note 3 - If the touchdown/positioning marking is offset, the heliport identification marking is established in the centre of the touchdown/positioning marking.

Note 4 - On a FATO, which does not contain a TLOF and which is marked with an aiming point marking, except for a heliport at a hospital, the heliport identification marking is established in the centre of the aiming point marking as shown in Figures 6-2 and 6-3.

6.2.3 On a FATO which contains a TLOF, a heliport identification marking shall be located in the FATO so the position of it coincides with the centre of the TLOF.

Location - Runway-type FATOs

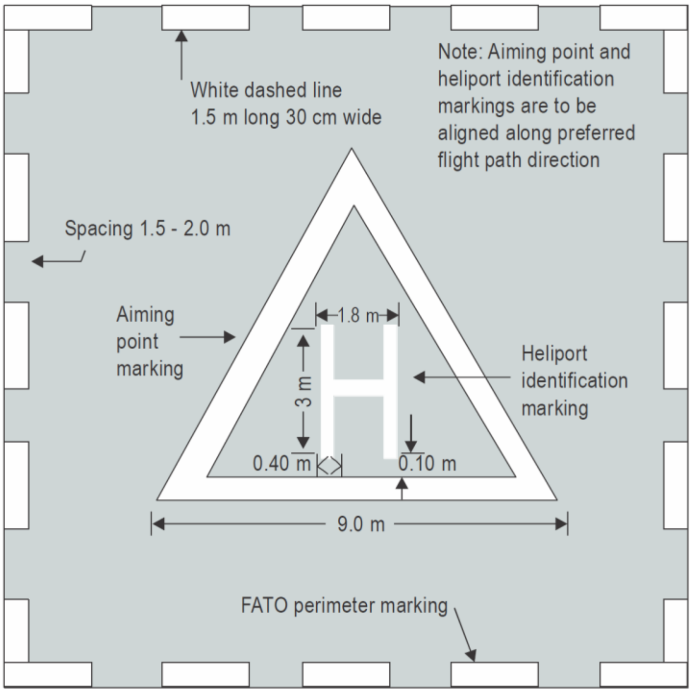
6.2.4 A heliport identification marking shall be located in the FATO and when used in conjunction with FATO designation markings, shall be displayed at each end of the FATO as shown in Figure 6-5.

Characteristics

6.2.5 A heliport identification marking, except for a heliport at a hospital, shall consist of a letter H, white in colour. For a hospital heliport the heliport identification marking shall be red in colour on a white cross.

6.2.6 The dimensions of the H marking and the white cross (where applicable) shall be no less than those shown in Figure 6-2 and where the marking is used for a runway-type FATO, its dimensions shall be increased by a factor of 3 as shown in Figure 6-5.

6.2.7 A heliport identification marking shall be oriented with the cross arm of the H at right angles to the preferred final approach direction.



Note.— The aiming point, heliport identification and FATO perimeter markings are white and may be edged with a 10 cm black border to improve contrast.

Figure 6-2 – Combined heliport identification, aiming point and FATO perimeter marking

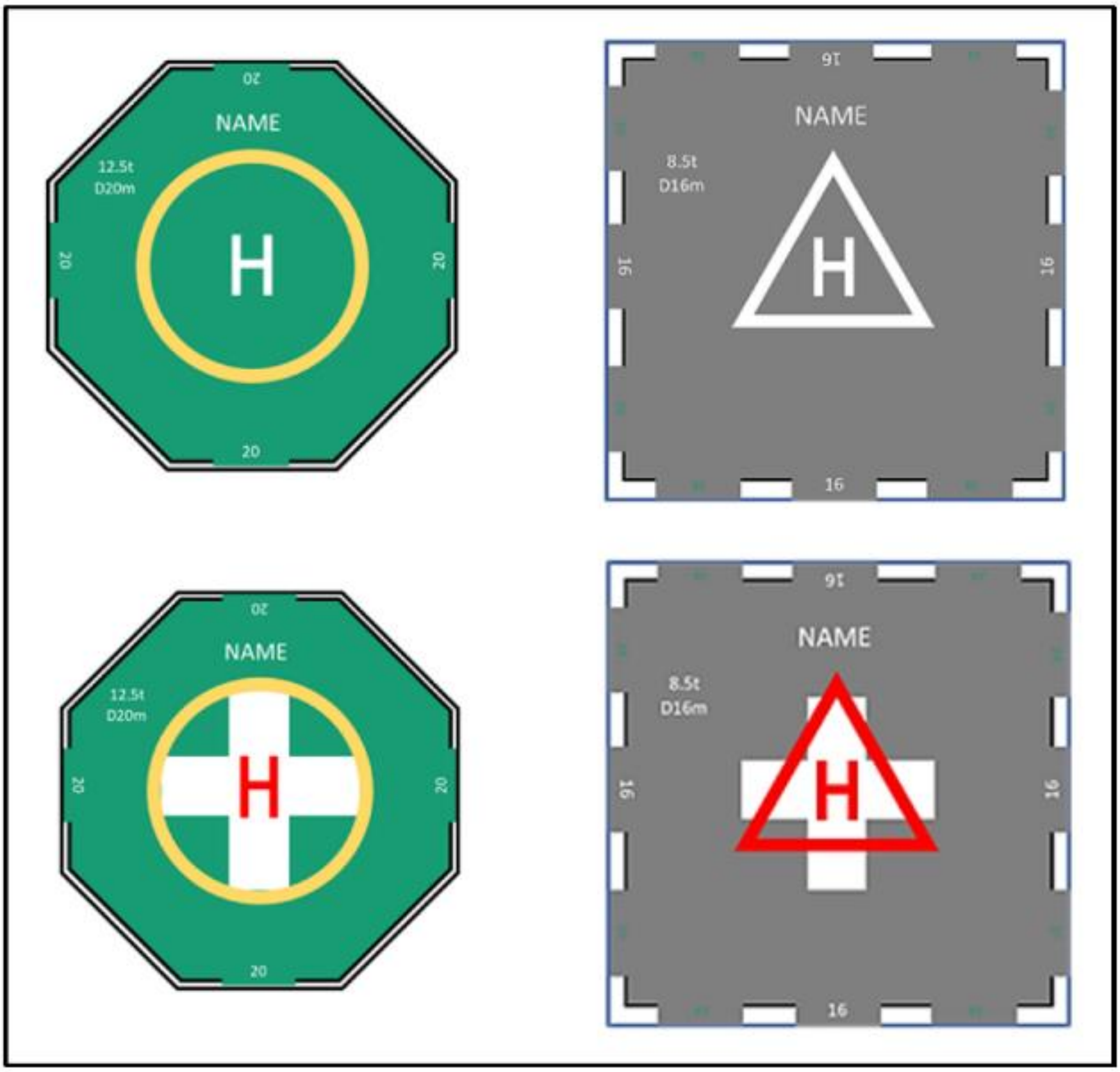


Figure 6-3 – Heliport identification markings with TLOF and aiming markings for heliport and hospital heliport

6.3 FATO identification marking

Note. - The objective of the FATO identification markings is to provide the pilot with an identification of different FATOs at vertiport equipped with two or more FATOs.

Note. - FATO identification markings are not intended to be used in runway-type FATOs where the differentiation can be provided by the designation markings.

Application

6.3.1 Where appropriate for differentiation, FATO identification markings shall be provided.

Location

6.3.2 A FATO identification marking should be located within the FATO and so arranged as to be readable from the preferred final approach direction.

Characteristics

6.3.3 Each FATO identification marking should consist of an ordinal number, beginning with 1 and ending in the last of the numbered FATOs (see Figure 6-4). The demonstration of ordinal number could be replaced by QR code.

6.3.4 The numbers code will have the size and proportions shown in Figure 6-6.

6.3.5 The FATO identification number will be inside a yellow square with diameter 175 cm as shown in Figure 6-4.

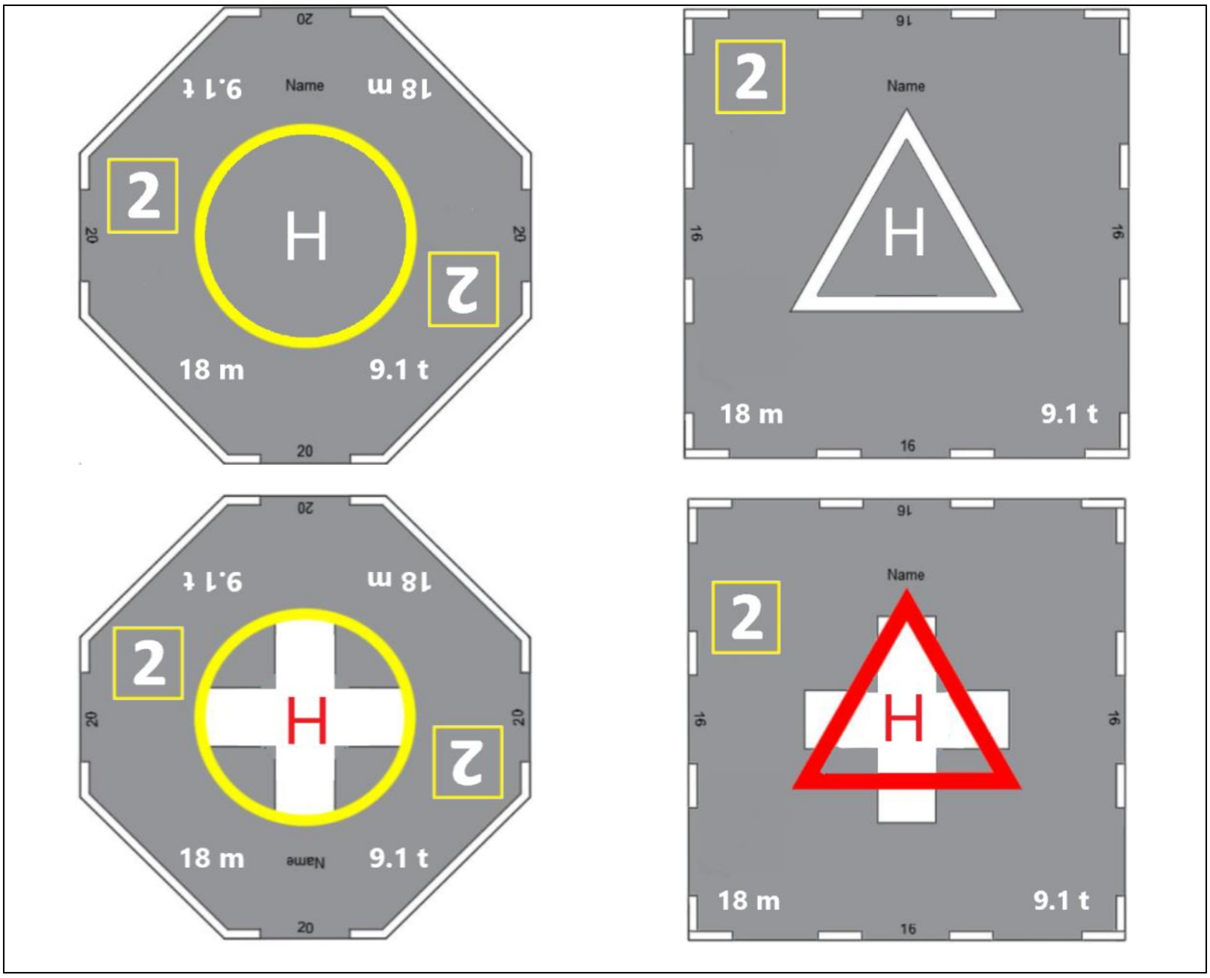


Figure 6-4. Heliport identification, FATO identification, maximum allowable mass and D-value markings

6.4 Maximum Allowable Mass Marking

Note. - The objective of the maximum allowable mass marking is to provide the mass limitation of the heliport such that it is visible to the pilot from the preferred final approach direction.

Application

6.4.1 A maximum allowable mass marking shall be displayed at an elevated heliport.

6.4.2 A maximum allowable mass marking should be displayed at a surface-level heliport.

Characteristics

6.4.3 A maximum allowable mass marking shall consist of a one-, two- or three-digit number.

6.4.4 The marking shall be expressed in tonnes (1 000 kg) rounded to the nearest 1000 kg followed by a letter “t”.

6.4.5 The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter “t”.

6.4.6 When the maximum allowable mass is expressed to 100 kg, the decimal place should be preceded with a decimal point marked with a 30 cm square.

All FATOs except runway-type FATOs

6.4.7 The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 6-7, for a D-value of more than 30 m. For a D-value with a dimension of between 15 m to 30 m the height of the numbers and the letter of the marking should be a minimum of 90 cm, and for a D-value of less than 15 m the height of the numbers and the letter of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

Runway-type FATOs

6.4.9 The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure6-7.

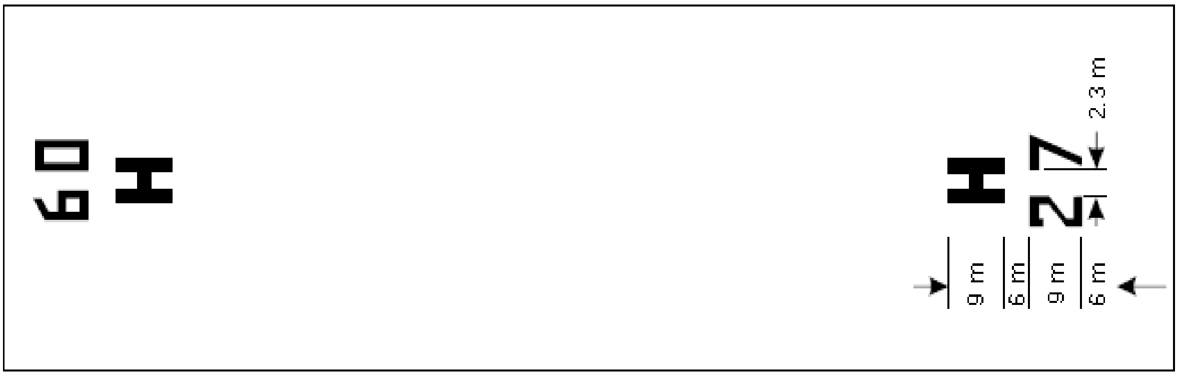


Figure 6-5 – Designation marking and heliport identification marking for a runway-type FATO

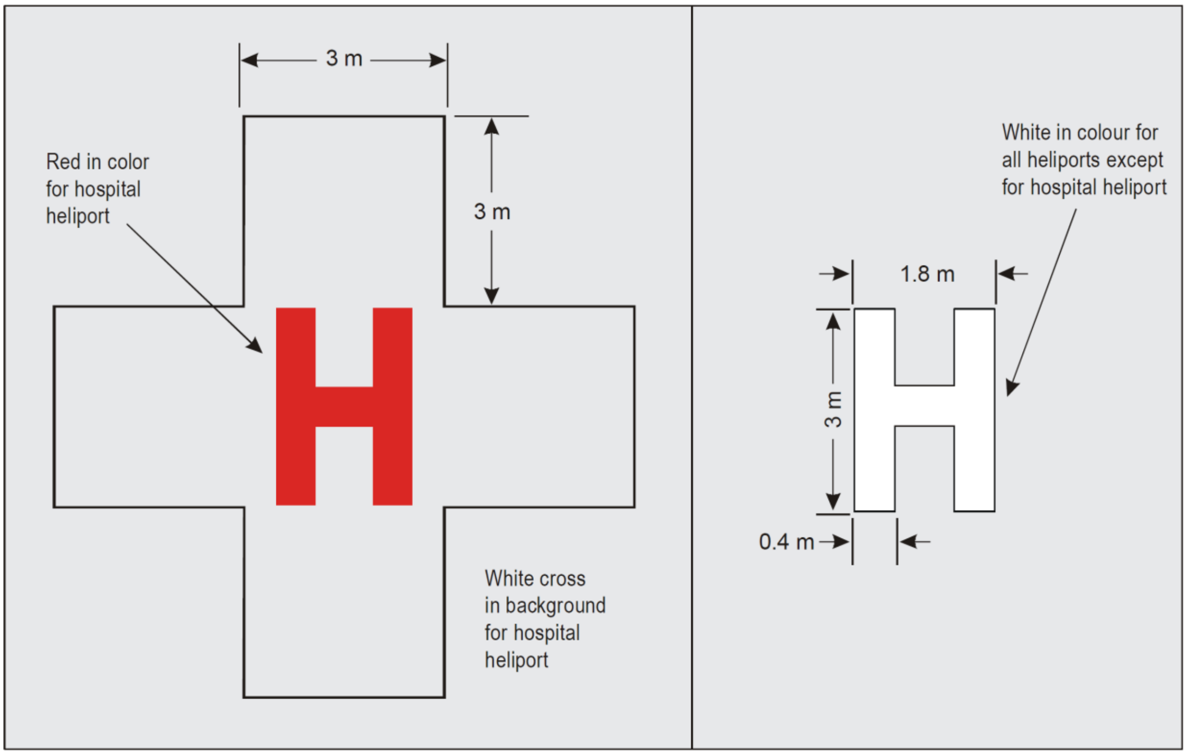


Figure 6-6 – Hospital heliport identification and heliport identification marking

6.5 D-Value Marking

Note. - The objective of the D-value marking is to provide to the pilot the "D" of the largest helicopter that can be accommodated on the heliport. This value may differ in size from the FATO and the TLOF provided in compliance with Chapter I-4.

6.5.1 The D-value marking shall be displayed at surface-level and elevated heliports.

Note —The D-value is not required to be marked on a heliport with a runway-type FATO.

Location

6.5.2 A D-value marking shall be located within the TLOF or FATO and so arranged as to be readable from the preferred final approach direction.

6.5.3 Where there is more than one approach direction, additional D-value markings should be provided such that at least one D-value marking is readable from the final approach directions.

Characteristics

6.5.4 The D-value marking shall be white. The D-value marking shall be rounded to the nearest whole metre with 0.5 rounded down.

6.5.5 The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 6-6 for a D-value of more than 30 m. For a D-value with a dimension of between 15 m to 30 m the height of the numbers of the marking should be a minimum of 90 cm, and for a D-value of less than 15 m the height of the numbers of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

6.6 FATO Perimeter Marking or Markers for Surface Level Heliports

Note. - The objective of final approach and take-off area perimeter marking, or markers, is to provide to the pilot, where the perimeter of the FATO is not self-evident, an indication of the area that is free of obstacle and in which intended procedures, or permitted manoeuvring, may take place.

Application

6.6.1 FATO perimeter marking or markers shall be provided at a surface-level heliport where the extent of a FATO with a solid surface is not self-evident.

Location

6.6.2 The FATO perimeter marking or markers shall be located on the edge of the FATO.

Characteristics - Runway-type FATOs

6.6.3 The perimeter of the FATO shall be defined with markings or markers spaced at equal intervals of not more than 50 m with at least three markings or markers on each side including a marking or marker at each corner.

6.6.4 A FATO perimeter marking shall be a rectangular stripe with a length of 9 m or one-fifth of the side of the FATO which it defines and a width of 1 m.

6.6.5 FATO perimeter markings shall be white.

6.6.6 A FATO perimeter marker shall have dimensional characteristics as shown in Figure 6-6.

6.6.7 FATO perimeter markers shall be of colour(s) that contrast effectively against the operating background.

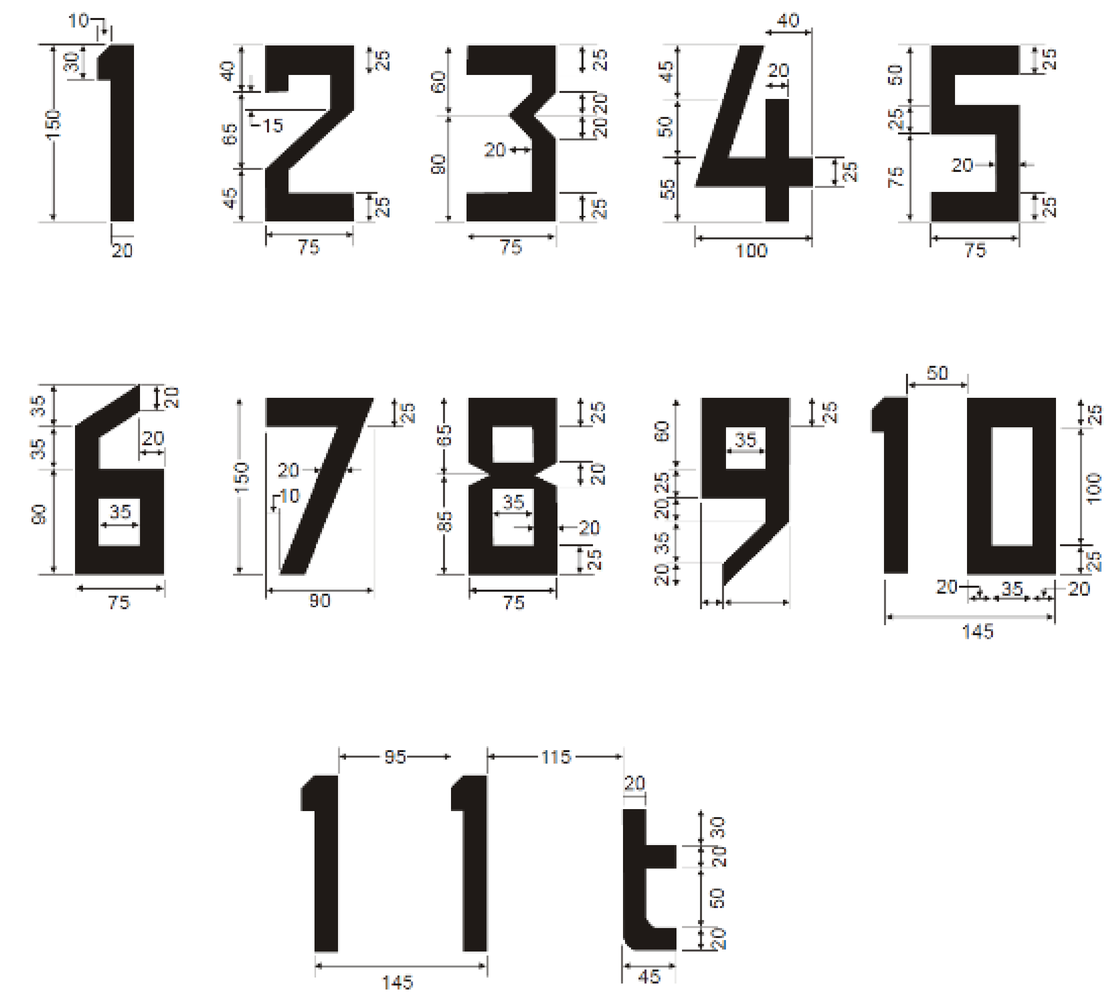
6.6.8 FATO perimeter markers should be a single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white should be used except where such colours would merge with the background.

Characteristics – All FATOs except runway-type FATOs

6.6.9 For an unpaved FATO the perimeter shall be defined with flush in-ground markers. The FATO perimeter markers shall be 30 cm in width, 1.5 m in length, and with end-to-end spacing of not less than 1.5 m and not more than 2 m. The corners of a square or rectangular FATO shall be defined.

6.6.10 For a paved FATO the perimeter shall be defined with a dashed line. The FATO perimeter marking segments shall be 30 cm in width, 1.5 m in length, and with end-to-end spacing of not less than 1.5 m and not more than 2 m. The corners of the square or rectangular FATO shall be defined.

6.6.11 FATO perimeter markings and flush in-ground markers shall be white.



Note.— All units are expressed in centimetres.

Figure 6-7 – Form and Proportions of Numbers and Letters

6.7 FATO designation markings for runway-type FATO's

Note. - The objective of final approach and take-off area designation marking for runway-type FATOs is to provide to the pilot an indication of the magnetic heading of the runway

Application

6.7.1 A FATO designation marking should be provided where it is necessary to designate the FATO to the pilot.

Location

6.7.2 A FATO designation marking shall be located at the beginning of the FATO as shown in Figure 6-5.

Characteristics

6.7.3 A FATO designation marking shall consist of a two-digit number. The two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach. When the above rule would give a single digit number, it shall be preceded by a zero. The marking as shown in Figure 6-5, shall be supplemented by the heliport identification marking.

6.8 Aiming Point Marking

Note. - The objective of the aiming point marking is to provide a visual cue indicating to the pilot the preferred approach/departure direction; the point to which the helicopter approaches to the hover before positioning to a stand where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

Application

6.8.1 An aiming point marking should be provided at a heliport where it is necessary for a pilot to make an approach to a particular point above a FATO before proceeding to a TLOF.

Location- Runway-type FATOs

6.8.2 The aiming point marking shall be located within the FATO.

Location - All FATOs except runway-type FATOs

6.8.3 The aiming point marking shall be located at the centre of the FATO.

Characteristics

6.8.4 The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach direction. The marking shall consist of continuous lines~~,~~ providing a contrast with the background colour, and the dimensions of the marking shall conform to those shown in Figure 6-8.

Note. - The aiming point, heliport identification and FATO perimeter markings are white and may be edged with a 10 cm black border to improve contrast.

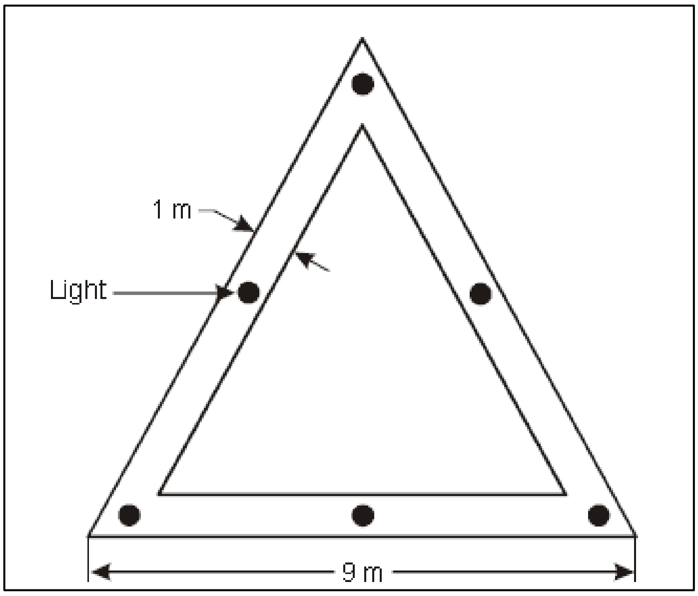


Figure 6-8 – Aiming point marking and lighting

6.9 TLOF Perimeter Marking

Note. - The objective of the touchdown and lift-off area perimeter marking is to provide to the pilot an indication of an area that is free of obstacles; has dynamic load bearing; and in which, when positioned in accordance with the TDPM, undercarriage containment is assured.

Application

6.9.1 A TLOF perimeter marking shall be displayed on a TLOF located in a FATO at a surface-level heliport if the perimeter of the TLOF is not self-evident.

6.9.2 A TLOF perimeter marking shall be displayed on an elevated heliport.

Location

6.9.3 The TLOF perimeter marking shall be located along the edge of the TLOF.

Characteristics

6.9.4 A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

6.10 Touchdown / Positioning Marking

Note. - The objective of a touchdown/positioning marking (TDPM) is to provide visual cues which permit a helicopter to be placed in a specific position such that, when the pilot's seat is above the marking, the undercarriage is within the load-bearing area and all parts of the helicopter will be clear of any obstacles by a safe margin.

Application

6.10.1 A TDPM shall be provided for a helicopter to touch down or be accurately placed in a specific position.

6.10.2 The TDPM marking shall be:

a) when there is no limitation on the direction of touchdown/positioning, a touchdown/positioning circle (TDPC) marking; and

b) when there is a limitation on the direction of touchdown/positioning:

1) for unidirectional applications, a shoulder line with an associated centre line; or

2) for multidirectional applications, a TDPC marking with prohibited landing sector(s) marked.

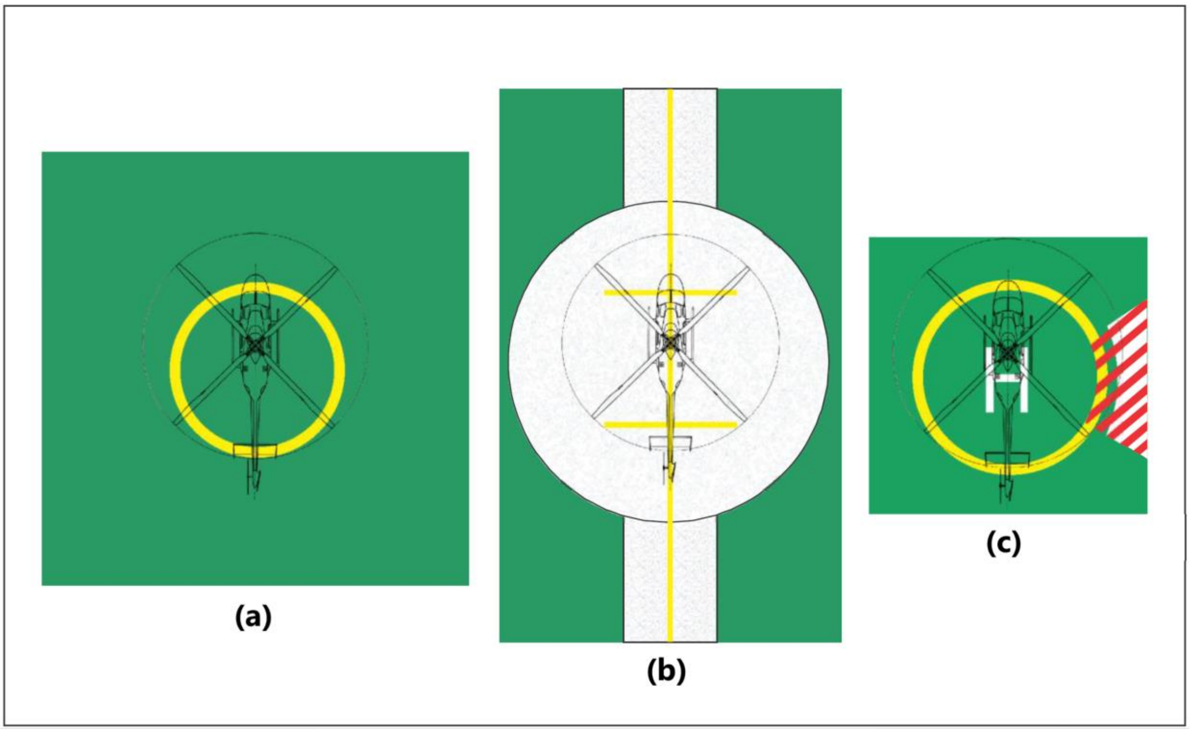


Figure 6-9 - (**a**) multidirectional TDPC with no limitation. (**b**) unidirectional marking shoulder line with associated centerline. (**c**) multidirectional TDPC with prohibited landing sector marking

Note. - The prohibited landing sector (PLS) marking, when provided, is not intended to move the helicopter away from objects around the FATO, but to ensure that the tail is not placed in an orientation that might constitute a hazard. This is achieved by having the helicopter nose clear of the hatched markings during the touchdown.

Location

6.10.3 The inner edge/inner circumference of the touchdown/positioning marking shall be at a distance of 0.25 D from the centre of the area in which the helicopter is to be positioned.

6.10.4 Prohibited landing sector markings, when provided, shall be located on the touchdown/positioning marking, within the relevant headings, and extend to the inner edge of the TLOF perimeter marking.

Characteristics

6.10.5 The inner diameter of the TDPC shall be 0.5 D of the largest helicopter the area is intended to serve.

6.10.6 A touchdown/positioning marking shall have a line width of at least 0.5 m. For a purpose-built shipboard heliport, the line width shall be at least 1 m.

6.10.7 The length of a shoulder line shall be 0.5D of the largest helicopter the area is intended to serve.

6.10.8 The prohibited landing sector markings, when provided, shall be indicated by white and red hatched markings as shown in Figure 6-9.

6.10.9 The TDPM shall take precedent when used in conjunction with other markings on the TLOF except for the prohibited landing sector marking.

6.11 Heliport Name Marking

Note. - The objective of a heliport name marking is to provide to the pilot a means of identifying a heliport which can be seen, and read, from all directions of approach

Application

6.11.1 A heliport name marking should be provided at a heliport where there is insufficient alternative means of visual identification.

Location

6.11.2 The heliport name marking should be displayed on the heliport so as to be visible, as far as practicable, at all angles above the horizontal. Where a limited obstacle sector (LOS) exist on a heliport the marking should be located on that side of the "heliport identification marking ". For a non-purpose built heliport located on a ships side the marking should be located on the inboard side of the heliport identification marking in the area between the TLOF perimeter marking and the boundary of the LOS.

Characteristics

6.11.3 A heliport name marking shall consist of the name or the alphanumeric designator of the heliport as used in the radio (R/T) communications.

6.11.4 A heliport name marking intended for use at night or during conditions of poor visibility should be illuminated, either internally or externally.

Runway-type FATOs

6.11.5 The characters of the marking should be not less than 3 m in height.

All FATOs except runway-type FATOs

6.11.6 The characters of the marking should be not less than 1.5 m in height at surface level heliports and not less than 1.2 m on elevated heliports. The colour of the marking should contrast with the background and preferably be white.

6.12 Helicopter Taxiway Markings and Markers

Note1 - The objective of helicopter taxiway markings and markers is, without being a hazard to the helicopter, to provide to the pilot by day and, if necessary, by night, visual cues to guide movement along the taxiway.

Note2. - The specifications for taxi-holding position markings in CAR Part IX - Aerodromes are equally applicable to taxiways intended for ground taxiing of helicopters.

Note3 - Ground taxi-routes and air taxi routes over a taxiway are not required to be marked.

Note4 - Unless otherwise indicated it may be assumed that a helicopter taxiway is suitable for both ground taxiing and air taxiing of helicopters.

Note5 - Signage may be required on an aerodrome where it is necessary to indicate that a helicopter taxiway is suitable only for the use of helicopters.

Application

6.12.1 The centre line of a helicopter taxiway shall be identified with a marking.

6.12.2 The edges of a helicopter taxiway, if not self-evident, should be identified with markers or markings.

Location

6.12.3 Helicopter taxiway markings shall be along the centre line and, if required, along the edges of a helicopter taxiway.

6.12.4 Helicopter taxiway edge markers shall be located at a distance of 1 m to 3 m beyond the edge of the helicopter taxiway.

6.12.5 Helicopter taxiway edge markers shall be spaced at intervals of not more than 15 m on each side of straight sections and 7.5 m on each side of curved sections with a minimum of four equally spaced markers per section.

Characteristics

6.12.6 On a paved taxiway, a helicopter taxiway centre line marking shall be a continuous yellow line 15 cm in width.

6.12.7 On an unpaved taxiway that will not accommodate painted markings, a helicopter taxiway centre line shall be marked with flush in-ground 15cm wide and approximately 1.5m in length yellow markers, spaced at intervals of not more than 30m on straight sections and not more than 15m on curves, with a minimum of four equally spaced markers per section.

6.12.8 Helicopter taxiway edge markings shall be a continuous double yellow line, each 15 cm in width, and spaced 15 cm apart (nearest edge to nearest edge).

6.12.9 A helicopter taxiway edge marker shall be frangible to the wheeled undercarriage of a helicopter.

6.12.10 A helicopter taxiway edge marker shall not exceed a plane originating at a height of 25 cm above the plane of the helicopter taxiway, at a distance of 0.5 m from the edge of the helicopter-taxiway and sloping upwards and outwards at a gradient of 5 per cent to a distance of 3 m beyond the edge of the helicopter taxiway.

6.12.11 A helicopter taxiway edge marker shall be blue.

Note1 - Guidance on suitable edge markers is given in the Heliport Manual (Doc 9261).

Note2 - If blue markers are used on an aerodrome, signage may be required to indicate that the helicopter taxiway is suitable only for helicopters.

6.12.12 If the helicopter–taxiway is to be used at night, the edge markers shall be internally illuminated or retro-reflective.

6.13 Helicopter Air Taxi-Route Markings and Markers

Note1 - The objective of helicopter air taxi-route markings and markers is to provide to the pilot by day and, if necessary, by night, visual cues to guide movement along the air taxi-route.

Application

6.13.1 The centre line of a helicopter air taxi-route shall be identified with markers or markings.

Location

6.13.2 A helicopter air taxi-route centre line marking or flush in-ground centre line marker shall be located along the centre line of the helicopter air taxiway.

Characteristics

6.13.3 A helicopter air taxi-route centre line, when on a paved surface, shall be marked with a continuous yellow line 15 cm in width.

6.13.4 A helicopter air taxi-route centre line, when on an unpaved surface that will not accommodate painted markings, shall be marked with flush in-ground 15 cm wide and approximately 1.5 m in length yellow markers, spaced at intervals of not more than 30 m on straight sections and not more than 15 m on curves, with a minimum of four equally spaced markers per section.

6.13.5 If the helicopter air taxi-route is to be used at night, markers shall be either internally illuminated or retro-reflective.

6.14 Helicopter Stand Markings

Note1 - For helicopter stands intended to be used only by wheeled helicopters not operating in the hover, standard markings as for fixed wing aircraft should be used taking into account the protection area requirements for ground taxiways in Chapter 4.5.

Note2 - The objective of the helicopter stand marking is to provide to the pilot a visual indication of an area that is free of obstacles and in which permitted manoeuvring, and all necessary ground functions, may take place; identification, mass and D-value limitation, when required; and guidance for manoeuvring and positioning of the helicopter within the stand.

Application

6.14.1 A helicopter stand perimeter marking shall be provided.

6.14.2 A helicopter stand shall be provided with the appropriate TDPM. See Figure 6.10.

6.14.3 A helicopter stand perimeter marking and a TLOF marking shall be provided on a helicopter stand designed for helicopters in the hover and for turning as shown on Figure 6-11, except that a touchdown/positioning marking shall be provided if the helicopter stand perimeter marking is not practicable.

6.14.4 A TLOF marking and a stop line shall be provided on a helicopter stand intended to be used by helicopters in the hover and which does not allow the helicopter to turn.

6.14.5 Alignment lines and lead-in/lead-out lines should be provided on a helicopter stand.

Note1 - See Figures 4-5 to 4-9 of Chapter 4.

Note2 - Helicopter stand identification markings may be provided where there is a need to identify individual stands.

Note3 - Additional markings relating to stand size may be provided. See Heliport Manual (Doc 9261).

Location

6.14.6 The TDPM, alignment lines and lead-in/lead-out lines shall be located such that every part of the helicopter can be contained within the helicopter stand during positioning and permitted manoeuvring.

6.14.7 A stop line shall be located on the helicopter stand at right angles to the centre line.

6.14.8 Alignment lines and lead-in/lead-out lines shall be located as shown in Figure 6-10.

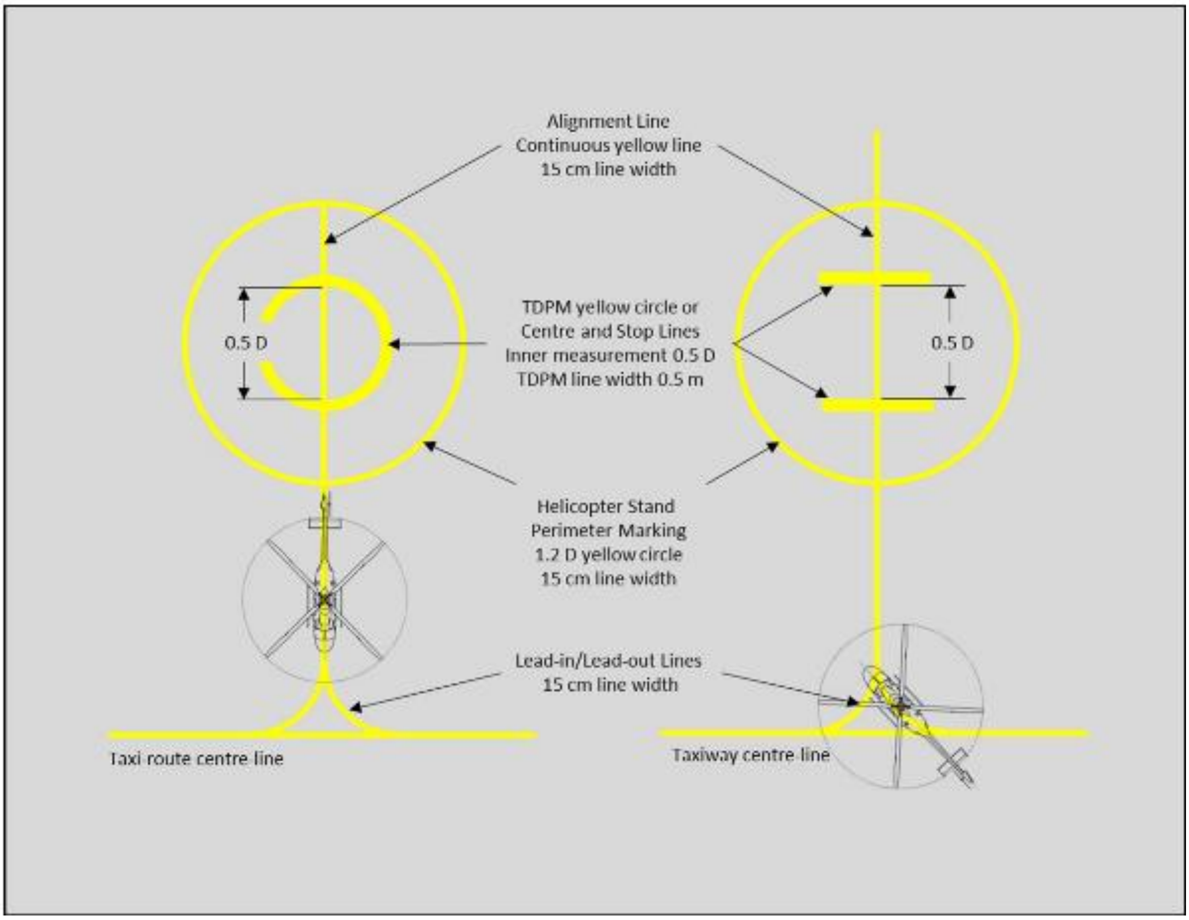


Figure 6-10 – Helicopter Stand Markings

Characteristics

6.14.9 A helicopter stand perimeter marking shall consist of a continuous yellow line and have a line width of 15 cm. The outer diameter of the circle shall be 1.2 D of the largest helicopter the helicopter stand is intended to serve.

6.14.10 A TLOF marking shall be a white circle and have a line width of 30 cm. The outer diameter of the circle shall be 0.83 D of the largest helicopter the helicopter stand is intended to serve.

6.14.11 A touchdown/positioning marking shall have the characteristics describe in Section 6.9 above.

6.14.12 Alignment lines, lead-in/lead-out lines and stop lines shall be continuous yellow lines and have a width of 15 cm.

6.14.13 Curved portions of alignment lines and lead-in/lead-out lines shall have radii appropriate to the most demanding helicopter type the helicopter stand is intended to serve.

6.14.14 Stand identification markings shall be marked in a contrasting colour so as to be easily readable.

Note1. - Where it is intended that helicopters proceed in one direction only, arrows indicating the direction to be followed may be added as part of the alignment lines.

Note2. - The characteristics of markings related to the stand size and alignment and lead-in/lead-out lines are illustrated in Figure 6-10 – examples of stands and their markings can be seen in Figures 4-5 to 4-9 of Chapter I-4.

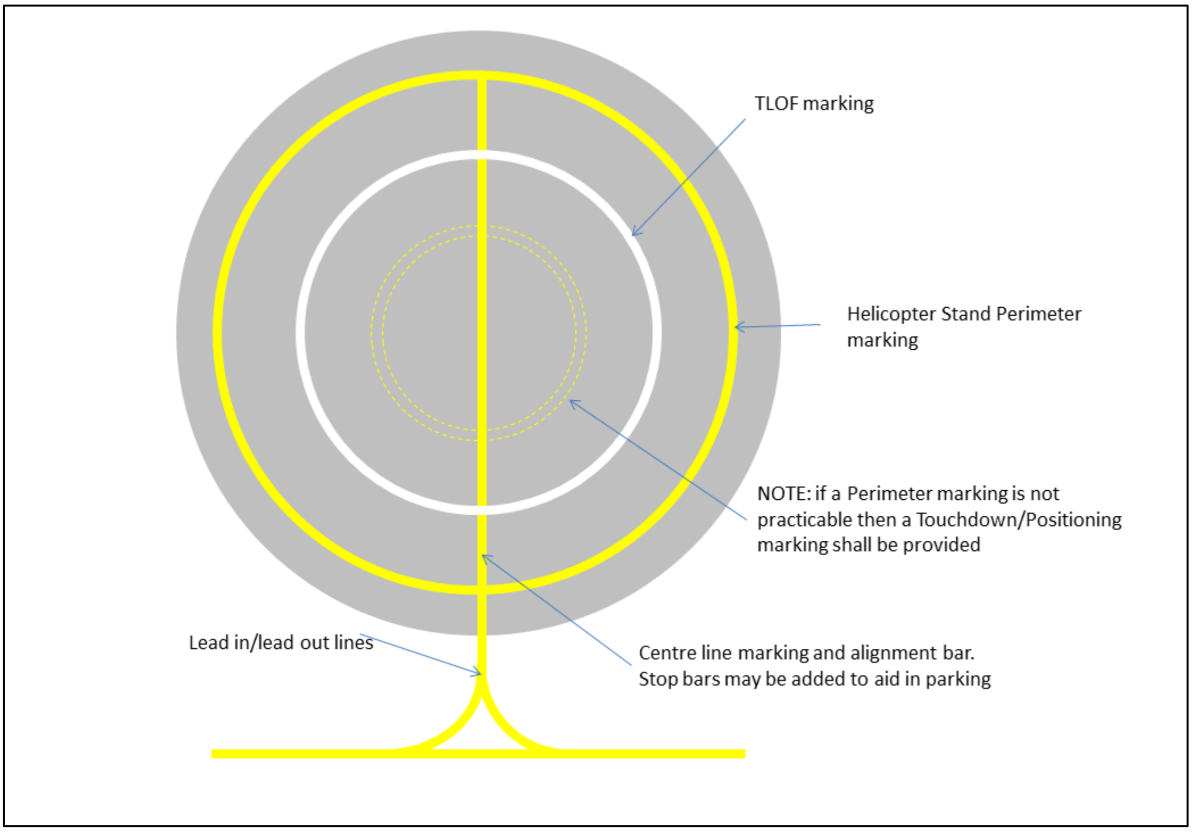


Figure 6-11 – Helicopter stand markings helicopters in the hover and turning

6.15 Flight Path Alignment Guidance Marking

Note. - The objective of a flight path alignment guidance marking is to provide the pilot with a visual indication of the available approach and/or departure path direction(s).

Application

6.15.1 Flight path alignment guidance marking(s) should be provided at a heliport where it is desirable and practicable to indicate available approach and/or departure path direction(s).

Note. — The flight path alignment guidance marking can be combined with a flight path alignment guidance lighting system described in Chapter I-7, section 3.

Location

6.15.2 The flight path alignment guidance marking shall be located in a straight line along the direction of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO or safety area.

Characteristics

6.15.3 A flight path alignment guidance marking shall consist of one or more arrows marked on the TLOF, FATO and/or safety area surface as shown in Figure 6-12. The stroke of the arrow(s) shall be 50 cm in width and at least 3 m in length. When combined with a flight path alignment guidance lighting system it shall take the form shown in Figure 6-12 which includes scheme for marking 'heads of the arrows' which are constant regardless of stroke length.

Note. — In the case of a flight path limited to a single approach direction or single departure direction, the arrow marking may be uni-directional. In the case of a heliport with only a single approach/departure path available, one bi-directional arrow is marked.

6.15.4 The markings should be in a colour which provides good contrast against the background colour of the surface on which they are marked, preferably white.

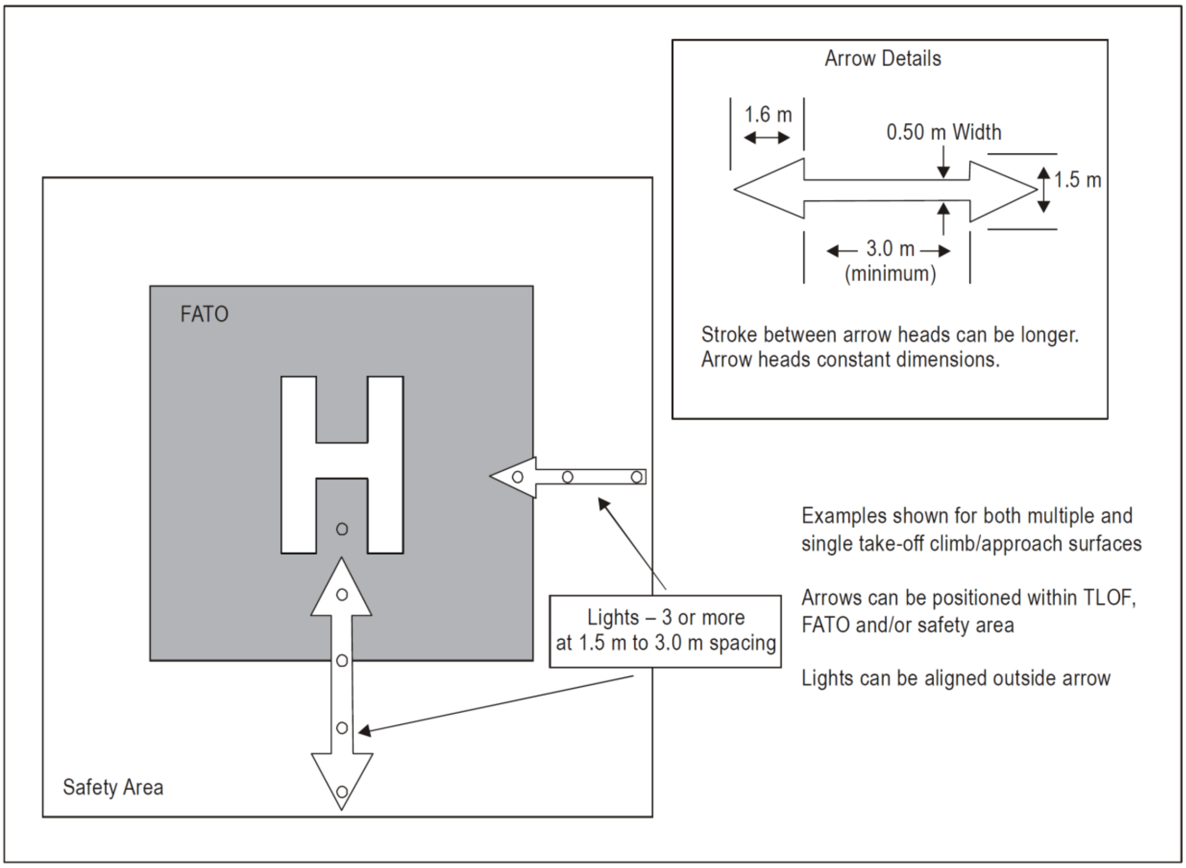


Figure 6-12 – Flight path alignment guidance markings and lights

6.16 Closed Marking

Application

6.16.1 A closed marking should be displayed on a FATO, TLOF, stand, taxiway or portion of taxiway which is permanently closed to the use of all aircraft.

6.16.2 A closed marking should be displayed on a temporarily closed FATO or TLOF except that such marking may be omitted when the closing is of short duration (>6 hrs) and adequate warning to helicopter operators is provided.

6.16.3 Lighting on a closed FATO or TLOF shall not be operated, except as required for maintenance purposes.

Location

6.16.4. On a runway-type FATO, a closed marking should be placed at each end of the FATO.

6.16.5. On a FATO other than a runway-type FATO, a closed marking should be placed at the centre of the FATO.

6.16.6. On a taxiway, a closed marking should be placed at least at each end of the taxiway or portion thereof closed.

6.16.7. On a TLOF, a closed marking should be placed at the centre of the TLOF.

6.16.8. On a stand, a closed marking should be placed at the centre of the stand.

Characteristics

6.16.9 The closed marking should be of the form of a letter 'X'. See Figure 6-13. The width of the strokes should be 1,5 m. When displayed on a FATO, the length of the strokes will extend at a distance of 15 cm of the FATO perimeter marking. When displayed on a taxiway, the length of the strokes will extend at a distance of 15 cm of the edge of the taxiway. The marking shall be white when displayed on a FATO and shall be yellow when displayed on a taxiway.

6.16.10 When a FATO, TLOF, stand, taxiway or portion of taxiway is permanently closed, all normal FATO, TLOF, stand, taxiway markings should be physically removed.

6.16.11 Lighting on a closed FATO, TLOF, stand, taxiway or portion of taxiway should not be operated, except as required for maintenance purposes.

6.16.12 In addition to closed markings, when the taxiway or portion thereof that is closed is intercepted by a usable taxiway which is used at night, unserviceability lights should be placed across the entrance to the closed area with a minimum of three lights at intervals not exceeding 3 m.

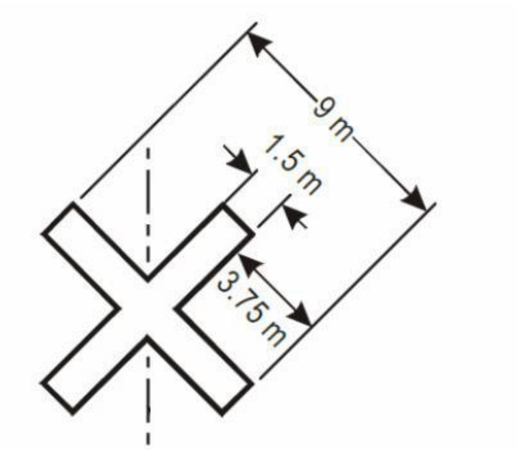


Figure 6-13 – Closed FATO, TLOF, stand or taxiway marking

6.17 Unserviceable Areas

Application

6.17.1 Unserviceability markers should be displayed wherever any portion of a taxiway or apron is unfit for the movement of helicopter/aircraft, but it is still possible for helicopter/aircraft to bypass the area safely. On a movement area used at night, unserviceability lights shall be used.

Location

6.17.2 Unserviceability markers and lights should be placed at intervals sufficiently close so as to delineate the unserviceable area.

Characteristics (markers)

6.17.3 Unserviceability markers should consist of conspicuous upstanding devices such as cones or marker boards.

6.17.4 An unserviceability cone should be of a height that does not interfere with parts of the helicopter/aircraft and red, orange or yellow in combination with white.

6.17.5 An unserviceability marker board should be of a height that does not interfere with parts of the helicopter/aircraft and 0.6 m in length, with alternate red and white or orange and white vertical stripes.

Characteristics (lights)

6.17.6 An unserviceability light should consist of a red fixed light. The light should have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case should the intensity be less than 10 cd of red light.

Chapter I-7 – Aeronautical Lights

Note1. — See CAR Part IX Aerodromes, concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights.

Note2 — In the case of heliports located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.

Note3 — As helicopters will generally come very close to extraneous light sources, it is particularly important to ensure that, unless such lights are navigation lights exhibited in accordance with international regulations, they are screened or located so as to avoid direct and reflected glare.

Note4 — Specifications Systems addressed in sections 7.3, 7.5, 7.6 and 7.7 of this Chapter are designed to provide effective lighting systems cues based on night conditions. Where lights are to be used in conditions other than night (i.e. - day or twilight) it may be necessary to increase the intensity of the lighting to maintain effective visual cues by use of a suitable brilliancy control. Guidance is provided in the Aerodrome Design Manual (Doc 9157), Part 4 Visual Aids, Chapter 5 Light Intensity Settings.

Note5 - The specifications for marking and lighting of obstacles included in Annex 14, Vol.I are equally applicable to heliports and winching areas.

Note6 - In cases where operations into a heliport are to be conducted at night with Night Vision Imaging Systems (NVIS), it is important to establish the compatibility of the NVIS with all heliport lighting through an assessment by the helicopter operator prior to use.

Note7 - The technical specifications for the lights address issues for helicopter aircraft operations at night:

(1) distinguishing one defined area from another;

(2) providing conspicuity for acquiring visual contact with the vertiport;

(3) providing guidance in the approach and departure phases of flight; and

(4) providing visual cues to allow accurate manoeuvring and placement of the helicopter aircraft when within the bounds of the vertiport.

Note8. - Lights and lighting systems installed at vertiports should be dimmable in order to reduce intensity, if needed.

Further guidance on lights is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4 – Visual aids and Document 9261, Heliport Manual.

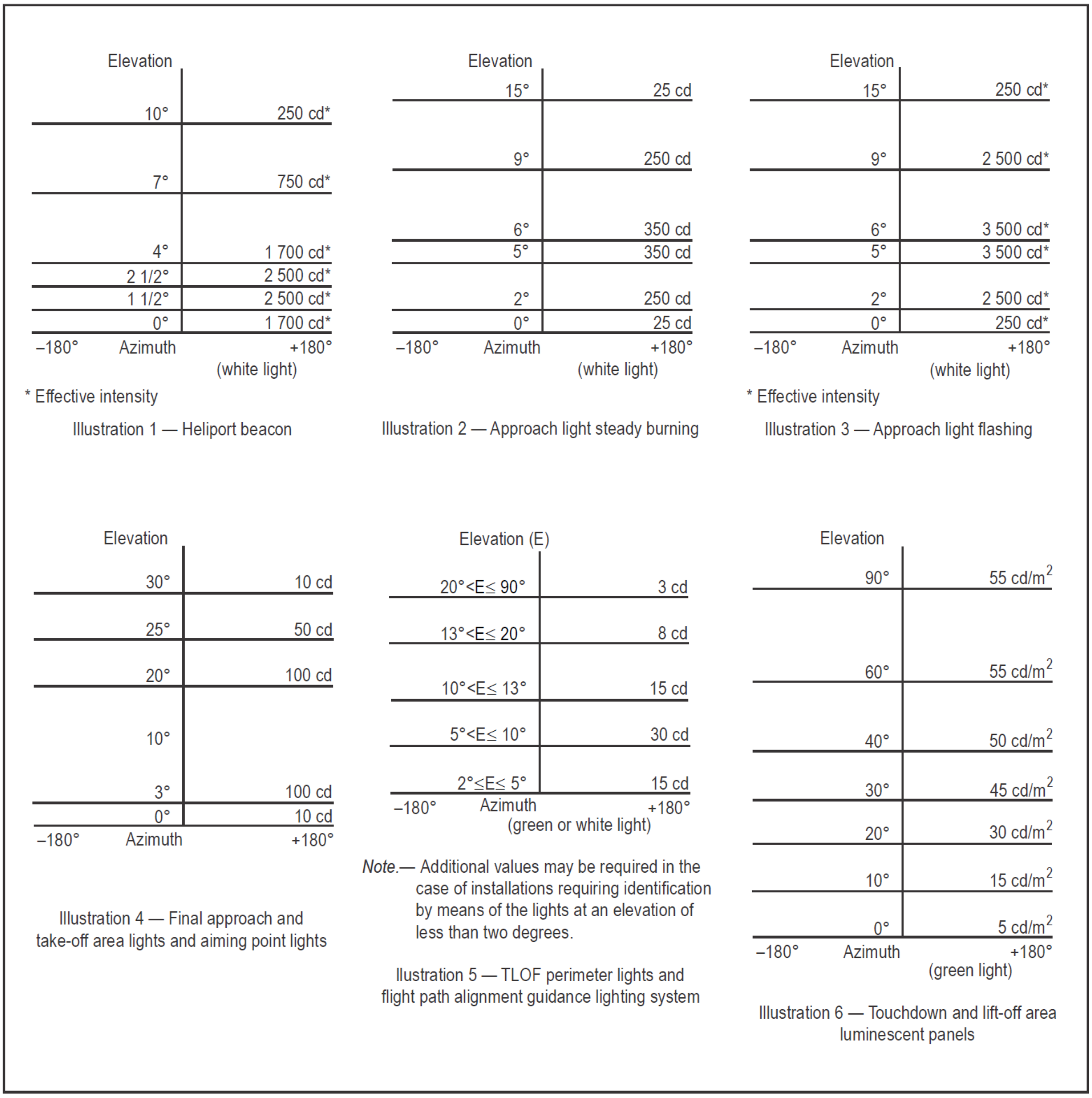


Figure 7-1 – Isocandela diagrams of lights meant for visual heliports

7.1 Heliport Beacon

Note. - The objective of the heliport beacon is to provide, when necessary, a long-range visual guidance and when not provided by other visual means, or when identifying the vertiport is difficult due to surrounding lights.

Application

7.1.1 A heliport beacon should be provided at a heliport where:

a) long-range visual guidance is considered necessary and is not provided by other visual means; or

b) identification of the heliport is difficult due to surrounding lights.

Location

7.1.2 The heliport beacon shall be located on or adjacent to the heliport preferably at an elevated position and so that it does not dazzle a pilot at short range.

Note — Where a heliport beacon is likely to dazzle pilots at short range, it may be switched off during the final stages of the approach and landing.

Characteristics

7.1.3 The heliport beacon shall emit repeated series of equally spaced short duration white flashes in the format in Figure 7-2.

7.1.4 The light from the beacon shall show at all angles of azimuth.

7.1.5 The effective light intensity distribution of each flash should be as shown in Figure 7-1, Illustration 1.

Note — Where brilliancy control is desired, settings of 10 per cent and 3 per cent have been found to be satisfactory. In addition, shielding may be necessary to ensure that pilots are not dazzled during the final stages of the approach and landing.

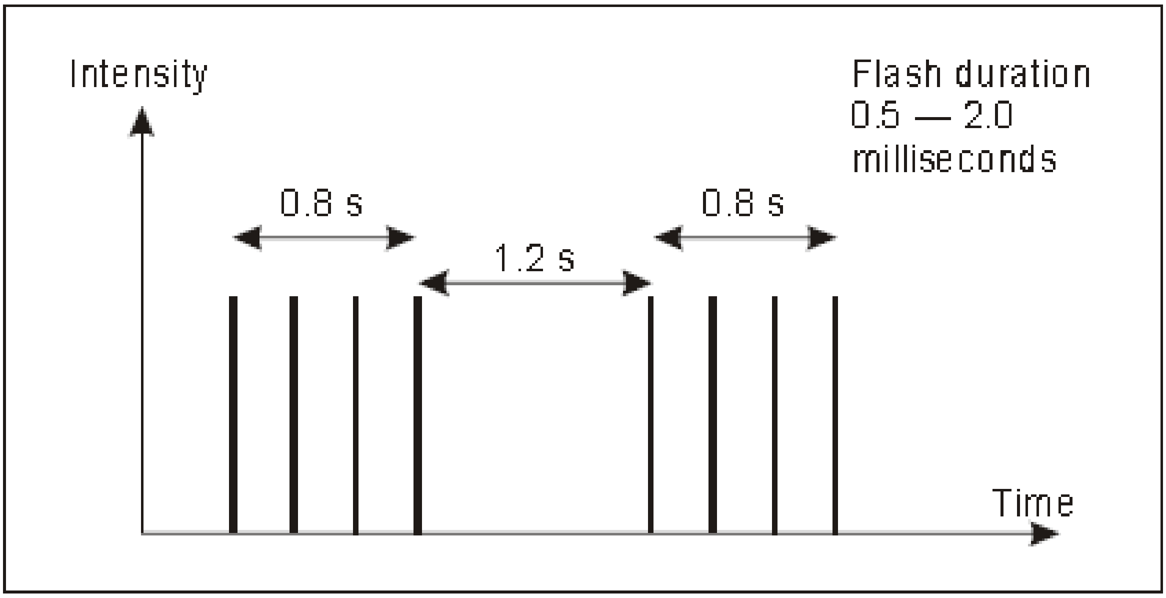


Figure 7-2 – Heliport beacon flash characteristics

7.2 Approach Lighting System

Note. - The objective of an approach lighting system is to provide an indication of the preferred approach direction to enhance the closure rate information to pilots at night.

Application

7.2.1 An approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction.

Location

7.2.2 The approach lighting system shall be located in a straight line along the preferred direction of approach.

Characteristics

7.2.3 An approach lighting system should consist of a row of three lights spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the FATO as shown in Figure 7-3a and 7-3b. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights and spaced at 4.5 m intervals. Where there is the need to make the final approach course more conspicuous additional lights spaced uniformly at

30 m intervals should be added beyond the crossbar. The lights beyond the crossbar may be steady or sequenced flashing, depending upon the environment.

Note. — Sequenced flashing lights may be useful where identification of the approach lighting system is difficult due to surrounding lights.

7.2.4 The steady lights shall be omni-directional white lights.

7.2.5 Sequenced flashing lights shall be omni-directional white lights.

7.2.6 The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure 7-1, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.

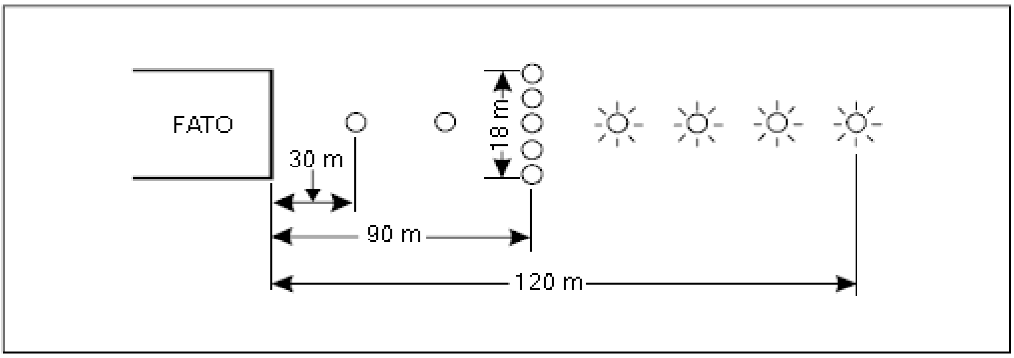


Figure 7-3a – Approach lighting system

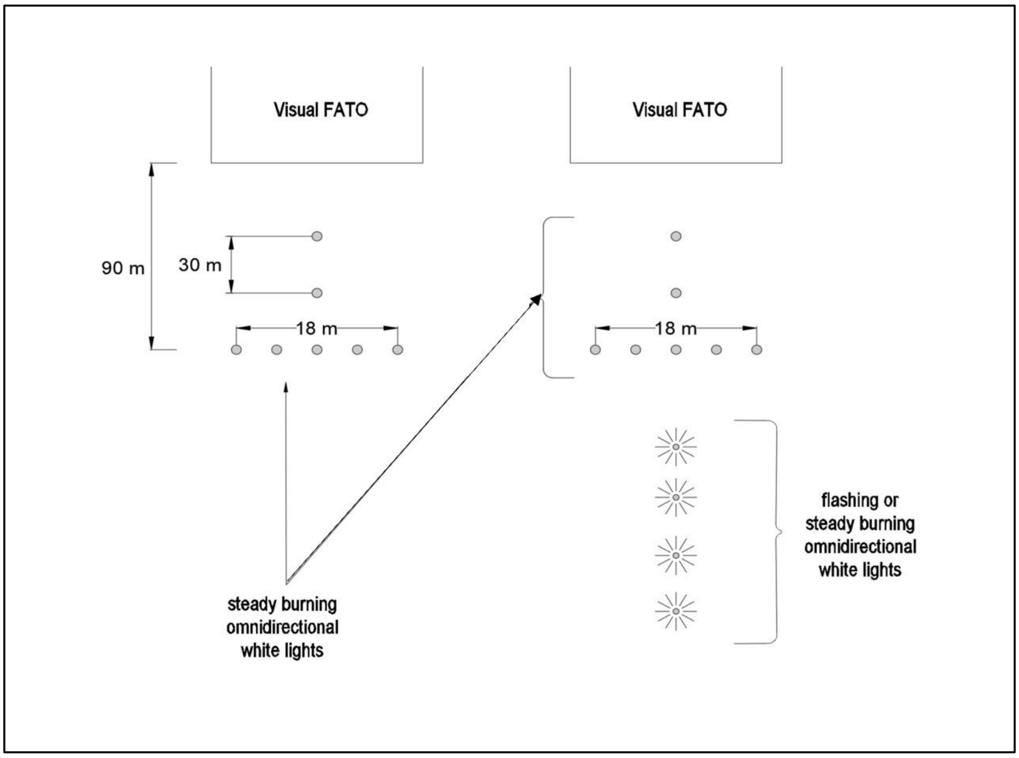


Figure 7-3b. Two different configurations of an approach lighting system

7.2.7 A suitable brilliancy control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions.

Note. — The following intensity settings have been found suitable:

a) steady lights — 100 per cent, 30 per cent and 10 per cent; and

b) flashing lights — 100 per cent, 10 per cent and 3 per cent.

7.3 Flight Path Alignment Guidance Lighting System

Note. - The objective of the flight path alignment guidance lighting system is to provide the pilot with a visual indication, at night, of the available approach and/or departure path directions.

Application

7.3.1 Flight path alignment guidance lighting system(s) should be provided at a heliport where it is desirable and practicable to indicate available approach and/or departure path direction(s).

Note. — The flight path alignment guidance lighting can be combined with a flight path alignment guidance marking(s) described in Chapter 6.

Location

7.3.2 The flight path alignment guidance lighting system shall be in a straight line along the direction(s) of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO, TLOF or safety area.

7.3.3 If combined with a flight path alignment guidance marking, as far as is practicable the lights should be located inside the “arrow” markings.

Characteristics

7.3.4 A flight path alignment guidance lighting system should consist of a row of three or more lights spaced uniformly a total minimum distance of 6 m. Intervals between lights should not be less than 1.5 m and should not exceed 3 m. Where space permits there should be 5 lights. (See Figure 6-12)

Note. — The number of lights and spacing between these lights may be adjusted to reflect the space available. If more than one flight path alignment system is used to indicate available approach and/or departure path direction(s), the characteristics for each system are typically kept the same. (See Figure 7-12)

7.3.5 The lights shall be steady omnidirectional inset white lights.

7.3.6 The distribution of the lights should be as indicated in Figure 7-1, Illustration 6.

7.3.7 A suitable control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions and to balance the flight path alignment guidance lighting system with other heliport lights and general lighting that may be present around the heliport.

7.4 Visual Alignment Guidance System

Note. - The objective of a visual alignment system is to provide conspicuous and discrete cues to assist the pilot to attain, and maintain, a specified approach track to a heliport. Guidance on suitable visual alignment guidance systems is given in the Heliport Manual (Doc 9261).

Application

7.4.1 A visual alignment guidance system should be provided to serve the approach to a heliport where one or more of the following conditions exist especially at night:

a) obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

b) the environment of the heliport provides few visual surface cues; and

c) it is physically impracticable to install an approach lighting system.

7.5 Visual Approach Slope Indicator

Note. - The objective of a visual approach slope indicator is to provide conspicuous and discrete colour cures within a specified elevation and azimuth, to assist the pilot to attain and maintain the approach slope t a desired position within a FATO. Guidance on suitable visual approach slope indicators is given in the Heliport Manual (Doc 9261).

Application

7.5.1 A visual approach slope indicator should be provided to serve the approach to a heliport, whether or not the heliport is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist especially at night:

a) obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;

b) the environment of the heliport provides few visual surface cues; and

c) the characteristics of the helicopter require a stabilized approach.

7.6 FATO Lighting Systems for Onshore Surface-level Heliports

Note. - The objective of a final approach and take-off area lighting system for onshore surface level heliports is to provide to the pilot operating at night an indication of the shape, location and extent of the FATO.

Application

7.6.1 Where a FATO with a solid surface is established at a surface-level heliport intended for use at night, FATO lights shall be provided except that they may be omitted where the FATO and the TLOF are nearly coincidental or the extent of the FATO is self-evident.

Location

7.6.2 FATO lights shall be placed along the edges of the FATO. The lights shall be uniformly spaced as follows:

a) for an area in the form of a square or rectangle, at intervals of not more than 50 m with a minimum of four lights on each side including a light at each corner; and

b) for any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

Characteristics

7.6.3 FATO lights shall be fixed omni-directional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

7.6.4 The light distribution of FATO lights should be as shown in Figure 8-1, Illustration 4.

7.6.5 The lights should not exceed a height of 25 cm and should be inset when a light extending above the surface would endanger helicopter operations. Where a FATO is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground.

7.7 Aiming Point Lights

Note. - The objective of aiming point lights is to provide a visual cue indicating to the pilot by night the preferred approach/departure direction; the point to which the helicopter approaches to hover before positioning to a TLOF, where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

Application

7.7.1 Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights should be provided.

Location

7.7.2 Aiming point lights shall be co-located with the aiming point marking.

Characteristics

7.7.3 Aiming point lights shall form a pattern of at least six omni-directional white lights as shown in Figure 6-7. The lights shall be inset when a light extending above the surface could endanger helicopter operations.

7.7.4 The light distribution of aiming point lights should be as shown in Figure 7-1, Illustration 5.

7.8 Touchdown and Lift-Off Area Lighting System

Note. - The objective of a touchdown and lift-off area lighting system is to provide illumination of the TLOF and required elements within. For a TLOF located in a FATO, the objective is to provide discernibility, to the pilot on a final approach, of the TLOF and required elements within; while for a TLOF located on an elevated heliport and shipboard heliport, the objective is visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.

Application

7.8.1 A TLOF lighting system shall be provided at a heliport intended for use at night.

Note. - Where a TLOF is located in a stand, the objective may be met with the use of ambient lighting or stand floodlighting.

7.8.2 For a surface-level heliport, lighting for the TLOF in a FATO shall consist of one or more of the following:

a) perimeter lights;

b) floodlighting;

c) arrays of segmented point source lighting (ASPSL) or luminescent panel (LP) lighting to identify the TLOF when a) and b) are not practicable and FATO lights are available.

7.8.3 For an elevated heliport and shipboard heliport, lighting of the TLOF in a FATO shall consist of:

a) perimeter lights; and

b) ASPSL and/or LPs to identify the TDPM and/or floodlighting to illuminate the TLOF.

Note. — At elevated heliports and shipboard heliports surface texture cues within the TLOF are essential for helicopter positioning during the final approach and landing. Such cues can be provided using various forms of lighting (ASPSL, LP, floodlights or a combination of these lights, etc.) in addition to perimeter lights. Best results have been demonstrated by the combination of perimeter lights and ASPSL in the form of encapsulated strips of light emitting diodes (LEDs) and inset lights to identify TDPM and heliport identification markings.

7.8.4 TLOF ASPSL and/or LPs to identify the TDPM and/ or floodlighting should be provided at a surface-level heliport intended for use at night when enhanced surface texture cues are required.

Location

7.8.5 TLOF perimeter lights shall be placed along the edge of the area designated for use as the TLOF or within a distance of 1.5 m from the edge. Where the TLOF is a circle the lights shall be:

a) located on straight lines in a pattern which will provide information to pilots on drift displacement; and

b) where a) is not practicable, evenly spaced around the perimeter of the TLOF at the appropriate interval, except that over a sector of 45 degrees the lights shall be spaced at half spacing.

7.8.6 TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated heliports and not more than 5 m for surface-level heliports. There shall be a minimum number of four lights on each side including a light at each corner. For a circular TLOF, where lights are installed in accordance with paragraph 7.8.5 b) there shall be a minimum of fourteen lights.

Note. — Guidance on this issue is contained in the Heliport Manual (Doc 9261).

7.8.7 The TLOF perimeter lights shall be installed at an elevated heliport such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

7.8.8 On surface-level heliports, ASPSL or LPs, if provided to identify the TLOF, shall be placed along the marking designating the edge of the TLOF. Where the TLOF is a circle, they shall be located on straight lines circumscribing the area.

7.8.9 On surface-level heliports the minimum number of LPs on a TLOF shall be nine. The total length of LPs in a pattern shall not be less than 50 per cent of the length of the pattern. There shall be an odd number with a minimum number of three panels on each side of the TLOF including a panel at each corner. LPs shall be uniformly spaced with a distance between adjacent panel ends of not more than 5 m on each side of the TLOF.

7.8.10 When LPs are used on an elevated heliport to enhance surface texture cues, the panels should not be placed adjacent to the perimeter lights. They should be placed around a touchdown marking or coincident with heliport identification marking.

7.8.11 TLOF floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

Note. — ASPSL and LPs used to designate the TDPM and/or heliport identification marking have been shown to provide enhanced surface texture cues when compared to low-level floodlights. Due to the risk of misalignment, if floodlights are used, there will be a need for them to be checked periodically to ensure they remain within the specifications contained within 7.8.

Characteristics

7.8.12 The TLOF perimeter lights shall be fixed omni-directional lights showing green.

7.8.13 At a surface-level heliport, ASPSL or LPs shall emit green light when used to define the perimeter of the TLOF.

7.8.14 The chromaticity and luminance of colours of LPs should conform to CAR Part IX Aerodromes.

7.8.15 An LP shall have a minimum width of 6 cm. The panel housing shall be the same colour as the marking it defines.

7.8.16 For a surface level or elevated heliport, the TLOF perimeter lights located in a FATO should not exceed a height of 5 cm and should be inset when a light extending above the surface could endanger helicopter operations.

7.8.17 When located within the safety area of a surface level or elevated heliport, the TLOF floodlights should not exceed a height of 25 cm.

7.8.18 The LPs shall not extend above the surface by more than 2.5 cm.

7.8.19 The light distribution of the perimeter lights should be as shown in Figure 7-1, Illustration 5.

7.8.20 The light distribution of the LPs should be as shown in Figure 7-1, Illustration 6.

7.8.21 The spectral distribution of TLOF area floodlights shall be such that the surface and obstacle marking can be correctly identified.

7.8.22 The average horizontal illuminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1 measured on the surface of the TLOF.

7.8.23 Lighting used to identify the TDPC should comprise a segmented circle of omni-directional ASPSL strips showing yellow. The segments should consist of ASPSL strips, and the total length of the ASPSL strips should not be less than 50 per cent of the circumference of the circle.

7.8.24 If utilized, the heliport identification marking lighting should be omni-directional showing green.

7.9 Taxiway Lights

Note. — The specifications for taxiway centre line lights and taxiway edge lights in CAR Part IX Aerodromes, are equally applicable to taxiways intended for ground taxiing of helicopters.

7.10 Visual Aids for Denoting Obstacles Outside and Below the Obstacle Limitation Surfaces

Note. - Arrangements for an aeronautical study of objects outside the obstacle limitation surface (OLS) and for other objects are addressed in CAR Part IX Aerodromes ADR.

7.10.1 Where an aeronautical study indicates that obstacles in areas outside and below the boundaries of the OLS, established for the heliport, constitute a hazard to helicopters, they should be marked and lit, except that the marking may be omitted when the obstacle is lighted with high intensity obstacle lights by day.

7.10.2 Where an aeronautical study indicates that overhead wires or cables crossing a river, waterway, valley or highway constitute a hazard to helicopters, they should be marked, and their supporting towers marked and lit.

7.11 Floodlighting of Obstacles

Application

7.11.1 At a heliport intended for use at night, obstacles shall be floodlighted if it is not possible to display obstacle lights on them.

Location

7.11.2 Obstacle floodlights shall be arranged so as to illuminate the entire obstacle and as far as practicable in a manner so as not to dazzle the helicopter pilots.

Characteristics

7.11.3 Obstacle floodlighting should be such as to produce a luminance of at least 10cd/m2.

7.12 Helicopter Stand Floodlighting

Note. - The objective of helicopter stand floodlighting is to provide illumination of the stand surface and associated markings to assist the manoeuvring and positioning of a helicopter and facilitation of essential operations around the helicopter.

Application

7.12.1 Floodlighting should be provided on a helicopter stand intended to be used at night.

Note. - Guidance on stand floodlighting is given in the apron floodlighting section in the Aerodrome Design Manual (Doc 9157), Part 4.

Location

7.12.2 Helicopter stand floodlights should be located so as to provide adequate illumination, with a minimum of glare to the pilot of a helicopter in flight and on the ground, and to personnel on the stand. The arrangement and aiming of floodlights should be such that a helicopter stand receives light from two or more directions to minimize shadows.

Characteristics

7.12.3 The spectral distribution of stand floodlights shall be such that the colours used for surface and obstacle marking can be correctly identified.

7.12.4 Horizontal and vertical illuminance shall be sufficient to ensure that visual cues are discernible for required manoeuvring and positioning, and essential operations around the helicopter can be performed expeditiously without endangering personnel or equipment.

Chapter I-8 – Rescue and Firefighting

8.1. General

8.1.1. Provisions described in this section shall address incidents or accidents within the heliport response area only. No dedicated firefighting provisions are included for helicopter accidents or incidents that may occur outside the response area, such as on an adjacent roof near an elevated heliport.

Note1 - The principal objective of a helicopter rescue and firefighting response is to save lives. For this reason, the provision of a means of dealing with a helicopter accident or incident, occurring within the immediate vicinity (i.e. within the designated response area) of a heliport, assumes primary importance because it is within the response area that there are the greatest opportunities for saving lives by a dedicated heliport rescue and firefighting response. This will have to assume, at all times the possibility of, and need for, extinguishing a fire which may occur either immediately following a helicopter accident or incident, or at any time during a subsequent rescue phase.

Note2 - The most important factors bearing on effective escape in a survivable helicopter accident are the speed of initiating a response and the effectiveness of that response.

Note3 - Where a heliport is located on top of a building that is occupied, it is also paramount, for the protection of inhabitants in the building beneath that any fire situation occurring at the elevated heliport be rapidly brought under control. On a purpose-built heliport constructed of aluminium or steel, any effect the fire may have on the structural integrity of the heliport and/or its supporting structure has to be considered. In the event of a fire at a purpose-built heliport, a full structural analysis must be undertaken post-accident, and before helicopter operations are permitted to resume.

8.2. Applicability

8.2.1. Rescue and firefighting equipment and services shall be provided at onshore heliports.

Note - For areas for the exclusive use of helicopters at aerodromes primarily for the use of aeroplanes, distribution of extinguishing agents, response time, rescue equipment and personnel have not been considered in this section. Refer to CAR Part XI for guidance.

8.3. Level of Protection

8.3.1. For the application of primary media, the discharge rate (in litres/minute) applied over the practical critical area (in m^2) shall be predicated on a requirement to bring any fire which may occur on the heliport under control within one minute, measured from activation of the system at the appropriate discharge rate.

Practical critical area calculation where primary media is applied as a solid stream at heliports

8.3.2. The practical critical area should be calculated by multiplying the helicopter fuselage length (m) by the helicopter fuselage width (m) plus an additional width factor (W1) of 4 m. Categorization from H0 to H3 should be determined on the basis of the fuselage dimensions in Table 8-1 below.

Table 8-1 - Heliport Rescue and Firefighting Category

Heliport RFF Category (1)	Maximum Fuselage Length (2)	Maximum Fuselage Width (3)
H0	up to but not including 8 m	1.5 m
H1	from 8 m up to but not including 12 m	2 m
H2	from 12 m up to but not including 16 m	2.5 m
H3	from 16 m up to 20 m	3 m

Note - The practical critical area may be considered on a helicopter type-specific basis by using the formula in 8.4.2. Guidance on practical critical area in relation to the heliport firefighting category is given in the ICAO Heliport Manual (Doc 9261) where a discretionary 10 per cent tolerance on fuselage dimension "upper limits" is applied.

8.3.3. For helicopters which exceed one or both of the dimensions for a category H3 heliport, level of protection using practical critical area assumptions should be recalculated based on the actual fuselage length and the actual fuselage width of the helicopter plus an additional width factor (W1) of 6 m.

Practical critical area calculation where primary media is applied in a dispersed pattern at heliports

8.3.4. The practical critical area should be based on an area contained within the heliport perimeter, which always includes the TLOF, and to the extent that it is load-bearing, the FATO.

8.3.5. In determining the amount of water required for foam production, it is first necessary to calculate a practical critical area (in m^2) which is multiplied by the application rate (in $L/min/m^2$) of the respective foam performance level B or C to determine the discharge rate for foam solution (in L/min). By multiplying the discharge rate by the discharge duration, the quantity should determine the amount of water needed for foam production. The assumptions used to determine practical critical area should depend on whether principal extinguishing agent is initially applied as a solid stream (jet) or in a dispersed (spray) pattern application.

8.4. Extinguishing Agents

Note-1 - The primary objective of an extinguishing agent is to extinguish or suppress a helicopter fire on which it is applied. Principal agents are provided for permanent control, i.e. for a period of several minutes or longer. Complementary agents may provide rapid-fire suppression but generally only offer a transient control, which is available during application.

Note-2 - The principal extinguishing agent (primary media unless otherwise specified) to be used at heliports is either a foam meeting performance level B or C. The discharge rate of a foam meeting performance level B foam is based on an application rate of 5.5 L/min/m², and for a foam meeting performance level C and for water, is based on an application rate of 3.75 L/min/m². These rates may be reduced if, through practical testing, a heliport operator can demonstrate that the objectives of 8.1.3.1 can be achieved for a specific foam use at a lower discharge rate (l/min). A foam concentrate must be supplied with certificate of conformity and the document kept for inspection.

Note-3 - Information on the physical properties and fire extinguishing performance criteria needed for a foam to achieve an acceptable performance level B or C rating is given in the ICAO Airport Services Manual (Doc 9137), Part 1.

Note-4 - While foam is considered as the principal agent for dealing with fires involving fuel spillages, the wide variety of fire incidents likely to be encountered during helicopter operations — e.g. engine, avionic bays, transmission areas, hydraulics — may require the provision of more than one type of complementary agent. Dry powder and gaseous agents (e.g CO2, etc) are acceptable for this task. The complementary agents selected must comply with the appropriate specifications of the International Organization for Standardization (ISO). Systems should be capable of delivering the agents through equipment to ensure its effective application. When selecting complementary agents for use with foam, care needs to be exercised to ensure compatibility.

Note-5 - Where new and/or alternative heliport firefighting technologies are available, providing they are demonstrated by rigorous practical testing to be at least equal to or more effective than the firefighting solutions described in this chapter, with the approval of the GCAA, may be considered determined by a safety risk assessment. Any alternative firefighting technologies or media must comply with standards and specifications specified by ICAO Airport Services Manual (Doc 9137), Part 1.

8.4.1. Both principal and complementary extinguishing agents shall be provided at surface-level and elevated-level heliports.

8.4.2. Complementary extinguishing agents should be dispensed from one or two extinguishers (although more extinguishers may be permitted where high volumes of an agent are specified, e.g. H3 operations). The discharge rate of complementary agents should be selected for optimum effectiveness of the agent used.

8.4.3. Delivery of firefighting agents to the heliport landing area at the appropriate application rate should be achieved in the quickest possible time. The method for delivery of the primary agent is best achieved through a fixed foam application system (FFAS). A FFAS can either be an automatic or semi-automatic method for the distribution of extinguishing agent to knock down and bring a helicopter fire under control in the shortest possible time, while protecting the means of escape for helicopter occupants to evacuate to a place of safety. An FFAS should include, but is not limited to a fixed monitor system (FMS), a deck integrated firefighting system (DIFFS) and for a heliport with a D-value of 20 m or less, a ring main system (RMS).

8.4.4. A FFAS should be regarded as different methods by which the uniform distribution of foam, at the required application rate based on foam performance level B or C and for the required duration, are efficiently applied to the whole of the landing area (an area that is based on the D-circle of the critical design helicopter).

a) For an FMS, where, due to its location around the periphery of the heliport, a good range of application is essential, foam should be initially applied in a solid stream (jet) application.

b) A dispersed pattern should be applied through a DIFFS or an RMS where the requirement is to deliver media at shorter ranges to combine greater coverage and a more effective surface application of primary media.

c) Where a solid plate deck is provided, i.e. a heliport having a solid plate surface design set to a fall or camber which allows fuel to drain across the solid surface into a suitable drainage collection system, primary media should be foam. However, where the option is taken to install a passive fire-retarding surface constructed in the form of a perforated surface or grating, which contains numerous holes that allow burning fuel to rapidly drain through the surface of the heliport, the use of water in lieu of foam is accepted. In this case, the critical area calculation based on application rate for a foam meeting performance level C should be selected.

At heliports with primary media applied as a solid stream using a portable foam application system (PFAS).

Note1 - Except at a limited-sized surface level heliport, foam dispensing equipment will be transported to the incident or accident location on an appropriate vehicle (a PFAS).

8.4.5. The minimum amount of extinguishing agents to be provided at a surface-level heliport for a certificated or hospital shall be in accordance with Table 8-2(a). The minimum discharge duration is based on two minutes duration. Where a significant delay from Civil Defence or supporting specialist fire services in responding to the heliport accident is anticipated, the discharge duration should be increased from two minutes to three minutes.

Table 8-2(a) - Minimum Amounts of Extinguishing Agents for a Surface-level Heliport (Certificated and Hospital)

Heliport RFF Category	Foam meeting performance level B		Foam meeting performance level C		Complementary agents (both)	
	Water (L)	Discharge rate foam solution / minute (L)	Water (L)	Discharge rate foam solution / minute (L)	Dry chemical powder (kg)	Gaseous Media (kg)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
H 0	500	250	330	165	23	9
H 1	800	400	540	270	23	9
H 2	1 200	600	800	400	45	18
H 3	1 600	800	1100	550	90	36

Note - At a surface-level certificated or hospital heliport, it is permissible to replace all or part of the amount of water for foam production by complementary agents to be determined by a safety risk assessment. Contact GCAA for guidance.

8.4.6. The minimum amount of extinguishing agents to be provided at a surface-level heliport for a landing area acceptance shall be in accordance with Table 8-2(b). The minimum discharge duration is based on two minutes duration.

Table 8-2(b) – Minimum Amounts of Extinguishing Agents for a Surface-level Heliport (Landing Area Acceptance)

Heliport RFF Category	Foam meeting performance level B		Foam meeting performance level C		Complementary agents (both)	
	Water (L)	Discharge rate foam solution / minute (L)	Water (L)	Discharge rate foam solution / minute (L)	Dry chemical powder (kg)	Gaseous Media (kg)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
H 0	250	125	165	83	23	9
H 1	400	200	270	135	23	9

H 2	600	300	400	200	45	18
H 3	800	400	550	275	90	36

Note1 - At a surface-level heliport (landing area acceptance), it is permissible to replace all or part of the amount of water for foam production by complementary agents to be determined by a safety risk assessment. Contact GCAA for guidance.

Note2 - Approval from GCAA is required before issuance of a heliport landing area acceptance.

8.4.7. Where a fire hydrant system is provided at a heliport, the system should be regularly checked and inspected for adequate pressure and flowrate. If hose lines are directly connected to the hydrant system, a safety risk assessment should be undertaken to ensure the RFF personnel is not placed in any danger due to excessive water pressure during firefighting operations.

8.4.8. At some heliports, it is necessary to move primary extinguishing agent-dispensing equipment towards the accident or incident location, for example at a surface level heliport operating a remote FATO (analogous to a fixed wing runway operation at an airport, where the fire vehicle has to be positioned from a location remote to the runway). A PFAS should include, but not necessarily be limited to, hand-controlled portable foam branch pipes capable of being moved across the heliport surface by trained personnel, and monitors or foam cannons that are mounted on an appropriate rescue and firefighting vehicle and then transported to the scene of an accident as part of the rescue and firefighting response for the heliport (see Figure 8-1 for examples).

Figure 8-1 – Examples of Portable Foam Application System (PFAS)

8.4.9. A PFAS equipment should be located at a safe area close to a FATO, helicopter parking or engine start location and clearly identified as a Designated Fire Point. The purpose of a Designated Fire Point is to provide a clearly identified location of firefighting equipment for immediate access in event of a helicopter incident/accident. Figure 8-2 provides some examples.

Figure 8-2 – Examples of a Designated Fire Point

8.4.10. At the start of each helicopter operation, the heliport operator should ensure that PFAS equipment are inspected, in position and available for immediate use. All firefighting equipment should be tested and inspected at a frequency determined by the manufacturer.

Note - For guidance, refer to AMC 35 - Inspection and Testing of Fire Service Equipment.

8.4.11. Where a heliport has more than 1 FATO, parking areas and simultaneous helicopter operations occur, a safety risk assessment shall be conducted to determine the suitable location of the PFAS equipment to ensure response time can be achieved to all FATO areas. Where a PFAS equipment is unable to achieve response time to all FATO areas, the minimum quantities of extinguishing agents shall be increased accordingly as defined in this chapter.

Elevated heliports with primary media applied as a solid stream using a fixed monitor system (FMS)

8.4.12. The minimum amounts of extinguishing agents to be provided at elevated heliports with primary media applied as a solid stream using an FMS, should be in accordance with Table 8-3. The minimum discharge duration is based on five minutes.

Table 8-3 - Minimum amounts of extinguishing agents for elevated heliports with primary media applied through an FMS

Heliport RFF Category	Foam meeting performance level B		Foam meeting performance level C		Complementary agents (both)	
	Water (L)	Discharge rate foam	Water (L)	Discharge rate foam	Dry chemical	Gaseous Media (kg)

(1)	(2)	solution / minute (L) (3)	(4)	solution / minute (L) (5)	powder (kg) (6)	(7)
H 0	1 250	250	825	165	23	9
H 1	2 000	400	1 350	270	45	18
H 2	3 000	600	2 000	400	45	18
H 3	4 000	800	2 750	550	90	36

Note1 - Contact GCAA for guidance.

Note2 - Sufficient reserve foam stocks to allow for replenishment as a result of operation of the system during an incident or following training or testing, need to be considered.

8.4.13. Where an FMS is installed, at least two fire monitors shall be provided, each monitor having the capability of producing foam at the required discharge rate. The actual number provided and their locations around the heliport should be such as to ensure the application of foam to any part of the heliport area under any weather condition and to minimize the possibility of one or more monitors being impaired by a helicopter accident.

8.4.14. Fire monitors should be strategically located so as to ensure the uniform application of foam to any part of the landing area irrespective of wind strength/direction or accident location. In this respect, contingency 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 landing area at or above the minimum application rate.

8.4.15. Where an FMS is operated by trained monitor operators, they should be positioned on at least the upwind location to ensure primary media is directed to the seat of the fire. For a ring-main system (RMS), practical testing has indicated that these solutions are only guaranteed to be fully effective for TLOFs up to 20 m diameter. If the TLOF is greater than 20 m, an RMS should not be considered unless supplemented by other means to distribute primary media (e.g. additional pop-up nozzles installed in the centre of the TLOF).

8.4.16. A solid stream should be considered for firefighting when range of application is essential. In this case the practical critical area is limited to the fuselage dimensions of the helicopter plus an additional width factor. Delivering foam solution for initial attack from a fixed monitor system (FMS) located on the periphery of the heliport (see Figure 8-3), or from a hose-line, in a jet configuration, are examples of typical solid stream applications. Once the fire has been brought under control during the initial attack, there is usually a facility to adjust the nozzle, changing the throughput of equipment from a solid stream application to a dispersed pattern, i.e. the nozzle is adjusted from a jet to a spray (fog) pattern. Where applicable, this should provide a safer environment for RFF personnel to approach the accident/ incident location to rescue any trapped crew and/or occupants.

Figure 8-3 – Solid stream application utilising a fixed monitor system (FMS)

Elevated heliports/ limited-sized surface level heliports with primary media applied in a dispersed pattern through a Deck Integrated Fire Fighting System (DIFFS) on a solid plate heliport.

8.4.17. The amount of water required for foam production should be predicated on the practical critical area (m^2) multiplied by the appropriate application rate ($L/min/m^2$), giving a discharge rate for foam solution (in L/min). The discharge rate should be multiplied by the discharge duration to calculate the amount of water needed for foam production. The discharge duration should be at least three minutes. Complementary media should be in accordance with Table 8-3, for H2 operations.

Note1 - For helicopters with a fuselage length greater than 16 m and/or a fuselage width greater than 2.5 m, complementary media in Table 8-3 for H3 operations may be considered.

8.4.18. A deck integrated firefighting system (DIFFS) should be considered at heliports when it is necessary to deliver foam and/or water at shorter ranges, combining greater coverage with a more effective surface application of the primary extinguishing agent (see Figure 8-4). Here, due to the greater coverage of primary extinguishing agent applied in a dispersed spray pattern, the assumed practical critical area is much larger than in a case where primary extinguishing agent is applied in a solid stream (jet).

Figure 8-4 – Example of a dispersed pattern application on a solid plate heliport utilising DIFF

8.4.19. Purpose-built heliports should either be constructed of aluminium or steel with aluminium or steel support structures. A solid plate surface is set to an appropriate fall or camber (typically 1:100) which allows burning fuel to drain across the solid surface of the heliport into a suitable drainage collection system, whether the fall or camber emanates from the centre of the TLOF or at the perimeter edge. An example of a DIFFS installed on a solid plate surface at an elevated heliport is shown in Figure 8-5. While this description is most commonly met by a purpose-built arrangement, it should also be a non-purpose-built structure, such as the roof of a building, typically made of concrete. The important distinction, from a firefighting perspective, is that in all cases, whether purpose built or non-purpose built, a solid plate surface is by definition non-porous, i.e. impervious to liquids – therefore there is no reasonable expectation that fluids, i.e. aviation fuel discharging from ruptured tanks in a crash and burn, will rapidly drain away, other than through dissipation due to a mild slope on the solid plate surface.

Figure 8-5 – A foam DIFFS on a solid plate surface at an elevated heliport

Purpose-built elevated heliports/limited-sized surface level heliport with primary media applied in a dispersed pattern through a fixed application system (FAS) – a passive fire retarding surface with water-only DIFFS

8.4.20. The amount of water required should be predicated on the practical critical area (m²) multiplied by the appropriate application rate (3.75 L/min/m²) giving a discharge rate for water (in L/min). The discharge rate should be multiplied by the discharge duration to determine the total amount of water needed. The discharge duration should be at least two minutes. Complementary media should be in accordance with Table 8-3, for H2 operations.

Note - For helicopters with a fuselage length greater than 16 m and/or a fuselage width greater than 2.5 m, complementary media for H3 operations may be considered.

8.4.21. As an alternative to the solid-plate deck surface, consideration should be given to install a passive fire retarding surface which, at a purpose-built heliport is constructed in the form of a perforated surface or grating, containing numerous holes that allow burning fuel to rapidly drain through the surface of the heliport, in some cases to an intermediate safety screen and that functions to extinguish the fire (by starving it of oxygen) permitting, now un-ignited, fuel to drain away to a safe collection area. Other systems (like the design pictured in Figure 8-6) have no safety screen inside the deck chambers but function by removing the heat from a fire via novel hole sizes and patterns.

Figure 8-6 – A fire test on a passive fire-retarding surface (200 L of burning fuel)

Note1 - The good thermal conductivity of aluminium, coupled with the fuel flow profile, facilitates a rapid cooling effect on the burning fuel, extinguishing any fire that flows into the decking. These systems, when used in combination with a water-only DIFFS, have been demonstrated to show that any residual fire burning over the surface of the heliport remains insignificant given that the fuel source is constantly draining away to a safe area. Figure 8-7 illustrates on a passive fire-retarding surface how burning fuel rapidly drains away to collection troughs (approximately 22 seconds after the start of the fire).

Note2 - Practical testing (see Figures 8-6 and 8-7) has consistently demonstrated that even without the addition of water for cooling, a passive fire-retarding surface is proven to be effective in suppressing running fuel fires by channelling liquids away via the holes on the surface, through the decking sub surface into the perimeter gutters and onwards into the drainage system.

Figure 8-7 – A fire test on a passive fire-retarding surface (180 L of fuel is collected)

8.4.22. Where a passive fire-retarding surface is selected in lieu of a solid plate deck surface, the requirement to use foam as the primary extinguishing agent should be re-considered since most of the fuel is directed immediately away from the surface restricting the intensity of the subsequent fire and what residual fire does remain above the surface is insignificant and can be extinguished with the use of water (see Figure 8-8 which shows an elevated heliport with a water-only DIFFS coupled with a passive fire-retarding surface). One of the issues with most passive systems is the year-round tendency to collect debris or contaminants which could result in a reduction of efficacy. The heliport maintenance program should include the regular inspection and clearing of such debris and contaminants when using passive system.

Figure 8-8 – A water-only DIFFS on a heliport with a passive fire-retarding surface

Installation and Maintenance of Foam Application System

8.4.23. All portable and fixed foam application systems including foam components and fittings shall not penetrate the safety area or approach and take-off surfaces at the heliport.

8.4.24. All portable and fixed foam application systems should be subject to testing and inspection by a competent person and containers pressure tested in accordance with manufacturer's recommendations.

8.4.25. Foam concentrates should not be mixed and heliport operators should verify requirements with the foam material safety data sheet (MSDS). It is important to ensure that foam containers and tanks are correctly labelled and records of compliance are held. When selecting type of foam concentrates for used at heliports, considerations should be given to its environmental impact. Where environmental-friendly foam is selected, a safety risk assessment should be conducted to assess its firefighting performance in meeting the standards specified by ICAO.

Note - Contact GCAA for guidance.

8.4.26. Foam induction equipment should ensure that water and foam concentrates is mixed in the correct proportions. Settings of adjustable inductors, if installed, should correspond with the strength of concentration used.

8.4.27. All portable and fixed foam application systems including all components, fittings and 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 while ensuring compliance with any relevant pollution regulations.

8.4.28. Consideration should be given to the effects of the weather on static firefighting equipment. All equipment forming part of the RFF response 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. The effects of condensation on stored equipment should also be considered.

8.4.29. The minimum capacity of the FFAS should depend on the D-value of the design helicopter, the required foam application rate at the heliport, the discharge rates of installed equipment (i.e. capacity of main fire pump) and the expected duration of application. It is important to ensure that the capacity of the main heliport fire pump is sufficient to guarantee that finished foam can be applied at the appropriate induction ratio, application rate and for the minimum duration to the whole of the landing area, when all monitors are being discharged simultaneously.

8.4.30. The application rate is dependent on the types of foam concentrate in use and the types of foam application equipment selected. For fires involving aviation kerosene, ICAO has produced a performance test, which assesses and categorizes the foam concentrate. Foam concentrate manufacturers should be able to advice on the performance of their concentrates against these tests. A foam certificate of conformity should be provided. Table 8-4(a) provides examples of calculating the application rate and Table 8-4(b) for examples of calculating the minimum operational reserve foam stocks.

Table 8-4(a) - Calculation of the application rate

Example based on the D-circle for an S92 (for the purpose of illustration assumed to be the design helicopter with a D = 20.88):
For a foam meeting performance level B Application rate = 5.5 x π x r2 (5.5 x 3.142 x 10.44 x 10.44) = 1 883 litres per minute
For a foam performance level C foam (or water) Application rate = 3.75 x π x r2 (3.75 x 3.142 x 10.44 x 10.44) = 1 284 litres per minute

Table 8-4(b) - Calculation of minimum operational foam stocks

Using the 20.88 m example as shown Table 9-4(a) above:
A 5 per cent performance level ‘B’ foam solution discharged over five minutes at the minimum application rate will require: 1 883 (litres/min) x 0.05 x 5 mins = 470 litres of foam concentrate.
A 3 per cent performance level ‘C’ foam solution discharged over five minutes at the minimum application rate will require 1 284 (litres/min) x 0.03 x 5 mins = 193 litres of foam concentrate

8.4.31. At elevated heliports, the overall capacity of the foam system should exceed that which is necessary for the initial suppression and extinction of the fire. Five minutes of foam application capability for a solid plate helideck should be acceptable. In the case of a passive fire-retarding surface with a water-only DIFFS, the discharge duration may be reduced to three minutes.

Management of Extinguishing Media Stocks

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

8.4.33. The mixing of different types of foam concentrate may cause serious density issues and result in the possible malfunctioning of foam production systems. Unless evidence is given to the contrary, it should be assumed that different types are incompatible. In the event of mixing, it is essential that the tank(s), pipe work and pump (if fitted) should be thoroughly cleaned and flushed prior to the new concentrate being introduced.

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

Additional hand-controlled foam branches for the application of aspirated foam

8.4.35. It is an important consideration that not all heliport fires are capable of being accessed by FFAS. In addition to FFAS, at least two hose lines with hand-controlled foam branch pipes should be deployed for the application of aspirated foam at a minimum rate of 225-250 litres/minute through each hose line.

Note - In certain heliport fire scenarios, the use of FFAS may endanger helicopter occupants who are seeking to escape from the fire.

8.4.36. A single hose line, capable of delivering aspirated foam at a minimum application rate of 225-250 litres/minute, should be provided, where the hose line is a sufficient length, and the hydrant system of sufficient operating pressure for the effective distribution of foam to any part of the practical critical area, regardless of wind strength or direction.

8.4.37. Taking account of the open-air environment in which firefighting equipment is expected to perform, a low expansion foam should be used. An inline foam inductor is provided to induct the foam concentrate into the water stream to supply a proportioned solution of concentrate and water to foam producing equipment (see Figure 8-9). The inline inductor should be set to the appropriate rate corresponding to the strength of the foam concentrate used e.g. 3 or 6 per cent.

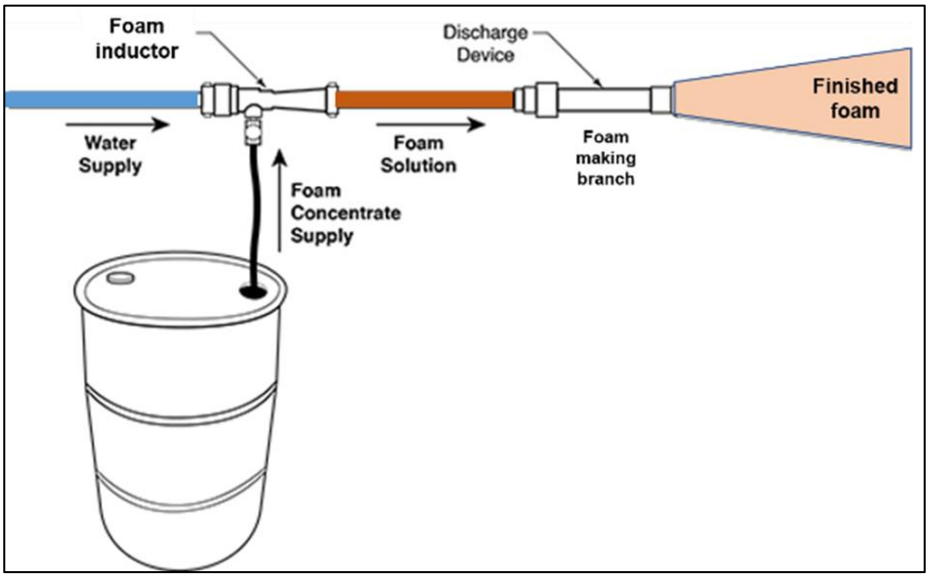


Figure 8-9 – Example of an Inline Foam Inductor

8.4.38. The hose line(s) provided should be capable of being fitted with a foam making branch/nozzle able to apply water in the form of a jet or spray pattern for cooling, or for specific firefighting tactics (see Figure 8-10).

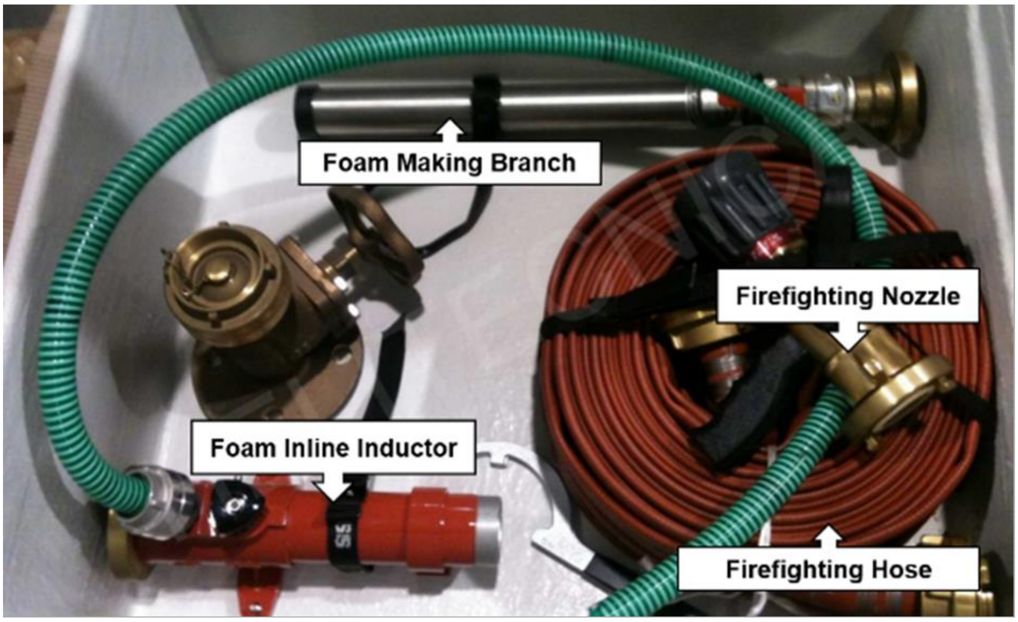


Figure 8-10 – Examples of Hose lines with Foam Making Branch /Nozzle

Summary of Different Heliport Firefighting Solutions

8.4.39. The appropriate heliport firefighting solutions should be selected based on heliport design and physical characteristics. Table 8-5 provides a summary of different heliport firefighting options.

Table 8-5 Summary of Heliport Firefighting Options

Heliport type	Application method	Critical area assumptions	Discharge duration	Primary extinguishing agent	Response time objective
Surface level	Solid stream PFAS	Fuselage dimensions H0 – H3	2 minutes	Level B / C foam	2 minutes
Elevated	Solid stream PFAS	Fuselage dimensions H0 – H3	5 minutes	Level B / C foam	15 seconds
Elevated / surface level	Dispersed pattern solid plate	TLOF + load-bearing FATO	3 minutes	Level B / C foam	15 seconds
Elevated / surface level	Dispersed pattern passive fire-retardant deck	TLOF + load-bearing FATO	2 minutes	Water only	15 seconds

8.5. Fire and Life Safety Protection

8.5.1. At a surface-level heliport, fire and life safety protection shall be as follows:

a) above ground flammable liquid storage tanks, compressed gas storage tanks, and liquefied gas storage tanks are located at least 30-metres from the edge of the FATO;

b) at least one access point that provides rapid access to firefighting or civil defence personnel;

c) sloped so that drainage flows away from access points and passenger holding areas; and

d) no smoking signs are erected at access and egress points of the heliport.

8.5.2. At an elevated heliport, fire and life safety protection shall be as follows:

a) main structural support beams that could be exposed to a fuel spill have a fire-resistance rating acceptable to UAE Fire Code and/or Building Control Authorities.

b) FATO/TLOF is pitched to provide drainage that flows away from passenger holding areas, access points, stairways, elevator shafts, ramps, hatches, and other openings not designed to collect drainage;

c) FATO/TLOF surface is constructed of non-combustible, non-porous materials;

d) at least two means of egress from the FATO/TLOF, including sufficient illumination at night, are provided;

e) at least two access points from the FATO/TLOF, including sufficient illumination at night, are provided for rapid access by firefighting or civil defence personnel;

f) where buildings are provided with a fire alarm system, a manual pull station is provided near each designated means of egress from the roof;

g) no smoking signs are erected at access and egress points of the heliport; and

h) flammable liquids, compressed gas and liquefied gas are not be permitted within the FATO/TLOF and safety area.

8.6. Response Time

8.6.1. At surface level heliports, the operational objective of the rescue and firefighting response shall be to achieve a response time not exceeding two minutes in optimum conditions of visibility and surface conditions.

Note1 - Response time is calculated from the time between the initial call to the rescue and firefighting service and the time when the first responding PFAS is in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 8-2.

Note2 - The most important factors bearing on effective escape in a survivable helicopter accident at a heliport are the speed of initiating a response and the effectiveness of that response. The response time for heliports can be defined as the period that lapses between the occurrence of the incident or accident and the first application of primary extinguishing agent to the fire, except for a surface-level heliport where primary extinguishing agent is applied as a solid stream from an appropriately equipped *rescue and firefighting vehicle. In this case, response time is measured from the initial call to the RFFS to the time when the first responding vehicles are in place to apply foam at a rate of at least 50 per cent of the required discharge rate.*

Note3 - Applying a common timeline to a similar scale incident or accident, which occurs either on a confined-area heliport, using a FFAS, or at a remote surface level FATO, where intervention is via an appropriately equipped rescue vehicle (PFAS), it is reasonable to assume that the fire situation occurring in the first case will be brought under control, or even extinguished, before a PFAS is even on-scene at a remote FATO on a surface-level heliport (where a 2 minute response time objective in optimum conditions is permitted). This means that the confined-area heliport is very favourably positioned when considering the most important factors bearing on effective escape in a survivable helicopter accident: the speed of initiating the response and the effectiveness of that response.

8.6.2. At elevated and limited-size surface level heliports, the operational objective of an FFAS should be to achieve a response time not exceeding 15 seconds measured from the time of system activation to the time primary media is discharged at the required application rate.

Note1 - This is to ensure that the an FFAS is able to bring under control a heliport fire associated with a crashed helicopter within 1 minute measured from the time the system is activated and producing foam/water at the required application rate for the range of weather conditions prevalent for the helicopter operating environment.

Note2 - A fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent.

Note3 - For an FFAS located at an elevated heliport, the initial response should be comparatively quick because primary extinguishing agent-dispensing equipment will already be located adjacent to the scene of the incident (or accident) and 100 per cent discharge capability can be achieved in a relatively short space of time (up to 15 seconds after activation of the system). Where it is necessary to move PFAS equipment to the scene of the helicopter accident, the response time is likely to be more protracted (up to 2 minutes in optimum conditions of visibility and surface conditions).

8.6.3. Where a surface-level heliport is laid out in a similar design to a fixed wing airport, with a remote FATO serviced by a taxiway system linking to an apron with one or more stands, the rescue and firefighting response should be provided by a PFAS, i.e. a specialist vehicle, and in this case, following a crash alarm, PFAS equipment should be capable of rapid respond to the scene of the helicopter accident.

8.6.4. Where rescue and firefighting personnel are provided at heliports, they should be immediately available in full PPE on or in the safe vicinity of the heliport while helicopter movements are taking place.

8.7. Rescue Arrangements

8.7.1. Rescue arrangements commensurate with the overall risk of the helicopter operation shall be provided at the heliport.

Note - Guidance on the rescue arrangements, e.g. options for rescue and for personal protective equipment to be provided at a heliport, is given in ICAO Heliport Manual (Doc 9261).

8.7.2. Rescue arrangements should include, but are not limited to, an assisted-rescue or self-rescue model predicated on the results of a risk assessment. Where a self-rescue model is promoted, it is especially important to establish the respective roles and interfaces between agencies on and off the heliport. This should form part of the heliport emergency plan and be periodically tested.

8.7.3. Minimum rescue equipment should be provided to ensure effective rescue arrangements are in place at the heliport in accordance with Table 8-6. Rescue equipment should be fit for purpose and only be used by personnel who have received adequate information, instruction and training.

Table 8-6 - Minimum list of rescue equipment at heliports

Equipment type	Quantity
Adjustable wrench	1
Rescue axe, large (non-wedge or aircraft type)	1
Cutters, bolt	1
Crowbar, large	1
Hook, grab or salving	1
Hacksaw (heavy duty) and six spare blades	1
Blanket, fire resistant	1
Ladder (two-piece) *	1
Lifeline (5 mm circumference x 15 m in length) plus rescue harness	1
Pliers, side cutting (tin snips)	1
Set of assorted screwdrivers	1
Harness knife and sheath or harness cutters	**
Man-Made Mineral Fibre (MMMF) Filter masks	**

Gloves, fire resistant	**
Power cutting tool***	1
* For access to casualties in an aircraft that may be on its side, the ladder should be of appropriate type and length. ** This equipment is required for each heliport crew member. *** Requires additional approved training by competent personnel. Equipment only specified for helicopters with a D-value above 24m.	

Note - Contact GCAA for guidance.

8.7.4. Rescue equipment should be located within the safe vicinity of the heliport for rapid access by rescue and firefighting personnel but should not penetrate the safety areas of the FATO/TLOF area. A responsible person should be appointed to ensure that the rescue equipment is checked and maintained before the start of flight operations. Rescue equipment should be stored in clearly marked and secure watertight cabinets or chests. An inventory checklist of equipment should be held inside each equipment cabinet/chest. See Figure 8-11 for examples of rescue equipment storage.

Figure 8-11 – Examples of rescue equipment storage

8.7.5. Rescue equipment should be regular inspected and tested and records maintained throughout the life of equipment.

Note - For guidance, refer to AMC 35 – Testing and Inspection of Rescue Equipment

8.7.6. Minimum quantities of medical equipment resources appropriate to the sizes and types of helicopter should be provided in accordance with Table 8-7. Where there is an increased in helicopter movements, an assessment of the medical equipment to be provided should be undertaken to determine additional quantity.

Table 8-7 – Minimum list of medical equipment

Contents of the First Aid Box	Numbers
Large Emergency Wound Dressings	3
Extra Large Emergency Wound Dressings	3
Triangular Bandages	3
Scissors – suitable for cutting clothing	1
Eye Dressings	1
Sterile Eyewash (bottle 500 ml)	1
Blankets	Each helicopter occupant

8.8. Communication and Alerting System

8.8.1. A suitable alerting and/or communication system shall be provided in accordance with the heliport emergency plan.

8.8.2. A discrete communication system should be provided linking the rescue and firefighting service with central control and RFF vehicles (when provided). The mobilization of all parties and agencies required to respond to an aircraft emergency on a large heliport will require the provision and management of a complex communications system.

Note - Guidance on the communication system requirement is given in ICAO Airport Services Manual, Part 7 – Airport Emergency Planning, Chapter 12 (Doc 9137).

8.8.3. An alerting system for RFF personnel should be provided at their base facility and be capable of being operated from that location, at any other areas where RFF personnel congregate, and in the air traffic control tower (when provided). Examples include:

a) direct telephone line to the rescue control center or service room of the rescue personnel;

b) alarm button for direct alarm of the fire brigade;

c) heat sensor for alarm and/or automatic switching of the FFAS; or

d) monitored video surveillance.

Note - Detailed guidance on communication and alarm requirements is detailed in the ICAO Airport Services Manual, Part 1 – Rescue and Fire Fighting, Chapter 4 (Doc 9137).

8.9 Rescue and Firefighting Personnel

8.9.1. Rescue and firefighting personnel shall be provided and sufficient for the required tasks at the heliport.

8.9.2. The sufficient number of rescue and firefighting personnel to be provided at the heliport should be determined by a task resource analysis. Appendix I-I provides an example of task resource analysis

8.9.3. Rescue and firefighting personnel should be fit to perform their assigned duties effectively during a helicopter accident/incident. Medical and physical fitness assessments should be established for rescue and firefighting personnel.

Note - It is important that rescue and firefighting personnel are assessed for aerobic, anaerobic and flexibility fitness. Guidance in determining the fitness assessment for rescue and firefighting personnel is given in CAR Part XI.

8.9.4. Rescue and firefighting personnel shall be trained to perform their duties with initial competence achieved through a Structured Learning Programme (SLP) and maintained their competence through a Maintenance of Competence plan (MOC).

8.9.5. The minimum training syllabus covering the necessary subject areas for initial and continued competency trainings for rescue and firefighting personnel should be in accordance with Table 8.8. The objective to prepare the rescue and firefighting personnel with the necessary competencies in the safe and effective use of rescue and firefighting equipment and to apply defined actions to save persons or assist in the removal of persons in a helicopter accident.

8.9.6. Rescue and firefighting personnel should be fit to participate in practical trainings. The responsibility for declaring any known current or pre-existing medical conditions that could have adverse effects to the individual's state of health while undertaking the training and/or assessment activities lies with the individual and/or company sponsoring the individual.

8.9.7. Where rescue and firefighting training required individuals to wear respiratory protective equipment (breathing apparatus), they should maintain the area of the seal free from hair (facial or head). Failure to do so could impair the efficiency of the seal and avoidable safety hazard to the BA wearer.

Note - Guidance on respiratory protective equipment (breathing apparatus) can refer to AMC 45 – Breathing Apparatus Operational Guidance

Table 8-8 – Minimum Structured Learning Programme for Heliport RFF Personnel

Practical Elements	Practical Elements where the candidate participates in practical elements as an individual or team member.
Technical Elements	Technical Elements where the main focus is for the candidate to understand the technical elements of the function.
Safety Critical Functions	Individual tasks that collectively or individually contribute to safe operations. These critical tasks need to be formally assessed.
Assessment Method	Formal methods and process of making judgments about performance. The means by which evidence of performance is collected and compared with the required competency standard and a judgment about performance is made and also fully recorded.
Practical Assessment	Practical Demonstration of operational skills & use of equipment
Technically Assessment	Technical Written Examination Paper to assess fully the knowledge and understanding of training objectives

Oral Assessment	Oral Technical Spoken Word Assessment to support the technical assessment in the knowledge and understanding of training objectives

Discipline	**Initial Training**	**Refresher Training**
Heliport rescue and firefighting personnel (HRFF)	3-days Structured Learning Programme	2-days Structured Learning Programme every 3 years
	Company On Job Training	Ongoing Competency Assessment
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment	Ongoing Competency Assessment

First Aid	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Carryout primary and secondary surveys for life threatening injuries	P/O	80%	20%	
Establish airway	P/O	80%	20%	
Carry out cardiopulmonary resuscitation.	P/O	80%	20%	
Identify and treat internal/external bleeding	P/O	80%	20%	
Identify and treat casualty suffering from shock	P/O	80%	20%	
Identify injuries to skull, spine, chest and extremities	P/O	80%	20%	
Identify internal injuries	P/O	80%	20%	
Place casualties in recovery position	P/O	80%	20%	
Move casualties	P/O	80%	20%	
Treat burns	P/O	80%	20%	

Fire-fighting Equipment & Fire-Fighting Actions	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Fire Extinguisher Identification	Practicable Oral	80%	20%	YES
Fire Extinguisher Testing & Inspection	Practicable Oral	80%	20%	
Fire Hose & Branches Identification	Practicable Oral	80%	20%	YES
Fire Hose Reels Identification	Practicable Oral	80%	20%	YES
Fire Monitors Identification	Practicable Oral	80%	20%	YES
Fire Blankets Identification	Practicable Oral	80%	20%	YES
Fixed Monitor System (FMS) / Deck Integrated Fire Suppression System (DIFFS) / Ring Main System (RMS) - Identification	Practicable Oral	20%	80%	YES
Fire – Emergency Call Points	Practicable Oral	80%	20%	YES
Rescue Equipment Requirements	Practicable Oral	80%	20%	
Introduction to breathing apparatus	Practicable Oral	80%	20%	YES
Working in smoke and confined spaces using breathing apparatus	Practicable Oral	80%	20%	YES
Rescue Equipment Testing & Inspection	Practicable Oral	80%	20%	YES
Rescue Equipment use	Practicable Oral	80%	20%	YES

Water Fire Extinguisher	Practicable Oral	80%	20%	YES
Foam Fire Extinguisher	Practicable Oral	80%	20%	YES
Dry Powder Fire Extinguisher	Practicable Oral	80%	20%	YES
CO2 Fire Extinguisher	Practicable Oral	80%	20%	YES
Rescue & Fire-Fighting Practical Exercise 1	Practicable Oral	100%		YES
Rescue & Fire-Fighting Practical Exercise 2	Practicable Oral	100%		YES
Rescue & Fire-Fighting Practical Exercise 3	Practicable Oral	100%		YES
Heliport Emergency Planning (ERP)	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Introduction to heliport emergency planning	Technical Oral		100%	
Elements of an heliport emergency plan	Technical Oral		100%	
Roles & Responsibilities	Technical Oral		100%	
Coordinating with Agencies	Technical Oral		100%	
Types of Emergencies	Technical Oral		100%	
Emergency Orders/Instructions	Technical Oral		100%	
Planning and conducting emergency drills and exercises	Technical Oral		100%	

Emergency Exercise Day	Practicable Oral	100%		
Emergency Exercise Night	Practicable Oral	100%		

8.1.9.8. Organisations / training providers delivering heliport rescue and firefighting competence-based training and assessment shall be certified by the GCAA in accordance with the requirements stated in Chapter 1-2, paragraph 2.4.4.

8.1.9.9. Rescue and firefighting personnel shall be provided with protective equipment.

8.1.9.10. Rescue and firefighting personnel should be provided with appropriate personal protective equipment (PPE) and where required, respiratory protective equipment (RPE) to allow them to carry out their duties safely and effectively.

8.1.9.11. Trained rescue and firefighting personnel operating PFAS or FFAS equipment should be dressed in PPE prior to helicopter movements taking place. In addition, equipment should only be used by personnel who have received adequate information, instruction and training. PPE should be fit for purpose and accompanied by suitable safety measures, e.g. protective devices, markings and warnings. Specifications for PPE and RPE should meet one of the international standards shown in Table 8-9.

8.1.9.12. A competent person should be appointed to ensure that all PPE and RPE are installed, stored, used, checked and maintained in accordance with the manufacturer's instructions. Facilities should be provided for the cleaning, drying and storage of PPE and RPE when crews are off duty (see Figure 8-12 for examples of PPE storage). Facilities should be well-ventilated and secure.

Note - Guidance on respiratory protective equipment can refer to AMC 45 – Breathing Apparatus Operational Guidance

Table 8-9: International Standards on PPE & RPE

Item	NFPA (US)	EN (EU)	BS (UK)
Helmet with visor	NFPA 1971	EN 443	BS EN443
Gloves	NFPA 1971	EN 659	BS EN 659
Boots (footwear)	NFPA 1971	EN ISO 20345	EN ISO 20345
Tunic and trousers	NFPA 1971	EN 469	BS EN ISO 14116

Flash-hood	NFPA 1971	EN 13911	BS EN 13911
Breathing apparatus	NFPA 1981	EN 137	BS EN 137

Note - Contact GCAA for further guidance

Figure 8-12 – Example of PPE Storage

8.10. Means of escape

8.10.1. Elevated heliports shall be provided with a main access and at least one additional means of escape.

8.10.2. Access points should be located as far apart from each other as is practicable.

Note - The provision of an alternative means of escape is necessary for evacuation and for access by rescue and firefighting personnel. The size of an emergency access/egress route may require consideration of the number of passengers and of special operations like Helicopter Emergency Medical Services (HEMS) that require passengers to be carried on stretchers or trolleys.

Chapter I-9 - Emergency Planning

Note1 - Heliport emergency planning is the process of preparing a heliport to cope with an emergency that takes place at the heliport or in its vicinity. Examples of emergencies include crashes on or off the heliport, medical emergencies, dangerous goods occurrences, fires and natural disasters.

Note2 - The primary objective of a heliport emergency planning is to minimize the impact of an emergency by saving lives and maintaining helicopter operations.

9.1 Heliport Emergency Plan

9.1.1. A heliport emergency plan shall be established commensurate with the helicopter operations and other activities conducted at the heliport.

Note - The purpose of a heliport emergency plan is to establish the procedures for coordinating the response of heliport agencies or services (air traffic services unit, rescue and firefighting services, heliport administration, medical and ambulance services, aircraft operators, security services and police) and the response of agencies in the surrounding community (civil defence, police, medical and ambulance services, hospitals, military, and harbour patrol or coast guard) that could be of assistance in responding to the emergency.

9.1.2. The heliport emergency plan should provide for the coordination of the actions to be taken in the event of an emergency occurring at a heliport or in its vicinity.

9.1.3. Where an approach/departure path at a heliport is located over water, the plan should identify which agency is responsible for coordinating rescue in the event of a helicopter ditching and indicate how to contact that agency.

9.1.4. The heliport emergency plan should include the availability of, and coordination with, appropriate specialist rescue services to respond to emergencies where a heliport is located close to water or swampy areas and/or where a significant portion of approach or departure operations takes place over these areas.

9.1.5. At those heliports located close to water, swampy areas or difficult terrain, the heliport emergency plan should include the establishment, testing and assessment at regular intervals of a predetermined response for the specialist rescue services.

9.1.6. The heliport emergency plan should include, as a minimum, the following information:

a) the types of emergencies planned for;

b) how to initiate the plan for each emergency specified;

c) the name of agencies on and off the heliport to contact for each type of emergency with telephone numbers or other contact information;

d) the role of each agency for each type of emergency;

e) a list of pertinent on-heliport services available with telephone numbers or other contact information;

f) copies of any written agreements with other agencies for mutual aid and the provision of emergency services; and

g) grid map of the heliport and its immediate vicinity.

9.1.7. The heliport emergency plan should include possible emergencies to plan for and how to initiate the plan for each emergency. Possible emergencies:

a) involving helicopter:

1) helicopter on-heliport accident; and

2) helicopter off-heliport on-land accident (in the vicinity):

3) helicopter off-heliport on-water accident (outside vicinity);

4) helicopter on ground incidents;

5) sabotage including bomb threat; and

6) unlawful seizure;

b) not involving helicopter:

1) fire on the building and/or nearby buildings;

2) sabotage including bomb threat;

3) natural disaster;

4) dangerous goods occurrences; and

5) medical emergencies;

c) compound emergencies:

1) helicopter/structures;

2) helicopter/fuelling facilities;

3) helicopter/helicopter; and

4) helicopter/aeroplane.

9.1.8. The different helicopter emergencies for which rescue and firefighting services may be required should be classified as:

a) accident: a helicopter accident or crash which has occurred on or in the vicinity of the heliport

b) full emergency: when it is known that a helicopter approaching the heliport is, or is suspected to be, in such trouble that there is danger of an accident

c) local standby: when a helicopter approaching the heliport is known, or is suspected, to have developed some defect, but the problem is not such as would normally involve any serious difficulty in effecting a safe landing; and

d) ground incident: where a helicopter on the ground is known to have an emergency situation other than an accident, requiring the attendance of rescue and firefighting services

9.1.9. The heliport emergency plan should include a set of emergency instructions dealing with the arrangements designed to meet emergency conditions and steps that should be taken to see that the provisions of the instructions are periodically tested. See Table 8-10(a) and 8-10(b) for examples for developing procedures for a variety of heliport firefighting, evacuation and rescue scenarios etc. that should be included in the heliport emergency plan.

Table 8-10(a) – Example of Heliport Emergency Instructions

Crash on Heliport In the event a crash on the heliport, the HLO should: Raise the alarm – call civil defence Direct first response firefighting activities. Contact the operator at the earliest opportunity Establish and maintain contact with the civil defence throughout any subsequent firefighting and rescue operations. Report incident to the GCAA
Crash on Heliport, Major Spillage with No Fire In the event of a crash on the heliport with a major spillage but no fire, the HLO should: Raise the alarm. Call civil defence

Direct Fire Team to lay a foam blanket around and under the helicopter Direct/manage the evacuation of the helicopter. Establish and maintain contact with the civil defence Contact the operator at the earliest opportunity. Ensure fire team safety and support is provided. g) Report incident to the GCAA
Emergency Evacuation by Helicopter In the event of evacuation by helicopter, the HLO should: Prepare the heliport to receive incoming aircraft Report incident to the GCAA.
Helicopter Incident on Landing In the event of a helicopter incident on landing, the HLO should: Hold the helicopter on the heliport and advise the pilot of his observations. Inform the helicopter operator of the nature of the incident. The helicopter operator and pilot will decide if the flight is to proceed. d) Report incident to the GCAA.
Dangerous Goods Spill/Release In the event a Dangerous Goods Spill/Release the HLO should: Raise the alarm call civil defence Evacuate the heliport and surrounding area, taking into account wind direction and surface slope. Establish and maintain contact with the radio room, Central Control Room (CCR) or incident room throughout. Seek further information on the hazardous substance Ensure limited contamination. Ensure area is fully cleaned once the spillage/release is contained Ensure all affected personnel are not contaminated, decontamination may be required.

Ensure all affected equipment remains/is fit for purpose i) Report the incident to the GCAA

Table 8-10(b) – Example of Emergency Response Call-Out Notification

EMERGENCY CALL OUT INSTRUCTION

IN THE EVENT OF AN HELICOPTER CRASH / ENGINE FIRE / ACCIDENT THE FOLLOWING ACTION IS TO BE UNDERTAKEN IMMEDIATELY

CALL IMMEDIATELY!

CIVIL DEFENCE / FIRE SERVICE	998 / +971 XX XXX XXXX
AMBULANCE SERVICE	997
POLICE	999
HELIPORT OPERATOR/OWNER	+971 XX XXX XXXX
GCAA DUTY INVESTIGATOR	+971 50 641 4667

PROVIDE THE FOLLOWING INFORMATION

METHANE FORM

Time		**Date**	
Organisation			
Name of Caller		**Tel No**	

M	Major incident (Crash / Fire)	Has a Major Incident been declared? YES/NO	
E	Exact Location	What is the exact location or geographical area of incident? Any landmarks?	
T	Type of Incident	What kind of incident is it? (crash on land on/off	

		heliport, on water, fire, collision, etc)	
H	Hazards	What hazards or potential hazards can be identified?	
A	Access	What are the best routes for access and egress into the scene?	
N	Number of casualties	How many casualties are there and what condition are they in?	
E	Emergency Services	Which and how many emergency responder assets/personnel are required or are responding/ already on-scene?	

9.2. Coordinating Agencies

9.2.1. The heliport emergency plan shall identify all agencies, which could be of assistance in responding to an emergency at the heliport or in its vicinity.

9.2.2. All agencies should be consulted about their roles and responsibilities in the plan.

9.2.3. The heliport emergency plan should identify agencies that could assist or respond to an emergency at the heliport or in its vicinity. Names of agencies on and off the heliport, for each type of emergency, with telephone numbers or other contact information, should be included. The plan should also identify the role of each agency for each type of emergency, and a list of pertinent on-heliport services available with telephone numbers or other contact information.

9.2.4. The heliport emergency plan should set out the procedures for coordinating the response of heliport agencies or services (air traffic services unit, firefighting services, heliport administration, medical and ambulance services, aircraft operators, security services and police) and the response of agencies in the surrounding community (fire departments, police, medical and ambulance services, hospitals, military and harbour patrol and/or coastguard agencies). Copies of any written agreements with other agencies for mutual aid and the provision of emergency services should be contained within the emergency plan.

9.3. Review of Emergency Plan

9.3.1. The heliport emergency plan shall be reviewed and the information in it updated regularly.

9.3.2. The heliport emergency plan should be reviewed and its information updated at least yearly. After an actual emergency, a review of the heliport emergency plan should be conducted to identify any deficiencies arising as a result of the actual emergency.

9.4. Testing of Emergency Plan

9.4.1. The heliport emergency plan shall be tested periodically.

9.4.2. Testing of the heliport emergency plan should include:

a) an emergency drill conducted, at least, every 6-month covering different emergency scenarios mentioned in paragraph 8.2.1.7; and

b) a full-scale emergency exercise, at least, once every three years with the participation of those agencies identified in 8.2.2. The GCAA should be notified at least 1-month before the planned exercise.

c) observations/findings arising from drills and exercises are addressed and records maintained.

Chapter I-10 – Heliport Operations

10.1 Heliport Operations

10.1.1 The heliport operator should provide an initial assessment to establish the obstacle environment surrounding the heliport with reference to the Obstacle Limitation Surfaces (OLS) specified in Chapter 6. This should be validated annually by a Validation Assessment carried out by an aeronautical survey service provider (ASSP) approved by the authority as stipulated in CAR - ASSP. Action should be taken to ensure that the Obstacle Limitation Surfaces remain clear of all permanent and semi-permanent obstructions.

10.1.2 For areas outside the heliport, safeguarding arrangements should be made with the local municipalities to aid the control of potential buildings or other structures which may affect helicopter operations.

10.1.3 The Heliport Operator shall establish written policy, procedures and other relevant documentation as well as provide appropriate facilities and equipment to ensure that the heliport can be operated and maintained in a condition that does not impair the safety of helicopter operations.

Note - For guidance on the establishment of heliport operational procedures refer to Appendix F.

10.1.4 The heliport operator shall ensure that this information is made available to all applicable personnel and is reviewed and amended so that it remains current.

10.1.5 The heliport operator shall ensure that there are sufficient trained and competent personnel for the planned tasks and activities to be performed in accordance with the heliport operator's policy and procedures.

10.1.6 A safety management system (SMS) including quality assurance should be established, that include the following:

a) sets the targets and standards to be achieved, and makes clear to people what their responsibilities and accountabilities are;
b) identifies hazards, assessing risks and introducing control measures;
c) monitors that controls are in place and are effective. This should include proactive monitoring, such as inspection; reactive monitoring, such as accident investigation and data trend analysis; and audit and review of standards;
d) Documents the procedures outlined above and relevant key information, including policies, risk assessments and reports from monitoring activities.

Note - Appendices B and F provides guidance on the information that should be provided and maintained for the heliport. The level of information provided may be determined based on the scope and complexity of the heliport and helicopter operations.

10.1.7 Equipment and training records shall be maintained and retained for future reference.

10.2 MARSHALLING SIGNALS

From a signalman to an aircraft

10.2.1 Prior to using the following signals, the signalman shall ascertain that the area within which an aircraft is to be guided is clear of objects which the aircraft, in complying with the following:, might otherwise strike.

a) Upon observing or receiving any of the signals given in this section, aircraft shall take such action as may be required by the interpretation of the signal given in that Appendix.

b) The signals under this section shall, when used, have the meaning indicated therein. They shall be used only for the purpose indicated and no other signals likely to be confused with them shall be used.

c) A signalman shall be responsible for providing standard marshalling signals to aircraft in a clear and precise manner using the signals shown under this section.

d) No person shall guide an aircraft unless trained, qualified and approved by the appropriate authority to carry out the functions of a signalman.

e) The signalman shall wear a distinctive fluorescent identification vest to allow the flight crew to identify that he or she is the person responsible for the marshalling operation.

f) Daylight-fluorescent wands, table-tennis bats or gloves shall be used for all signalling by all participating ground staff during daylight hours. Illuminated wands shall be used at night or in low visibility.

Note1.— These signals are designed for use by the signal- man, with hands illuminated as necessary to facilitate observation by the pilot, and facing the aircraft in a position:

a) for fixed-wing aircraft, on left side of aircraft, where best seen by the pilot; and
b) for helicopters, where the signalman can best be seen by the pilot.

Note2.— The meaning of the relevant signals remains the same if bats, illuminated wands or torchlights are held.

Note3.— The aircraft engines are numbered, for the signalman facing the aircraft, from right to left (i.e. No. 1 engine being the port outer engine).

Note4.— Signals marked with an asterisk (*) are designed for use to hovering helicopters.

Note5.— References to wands may also be read to refer to daylight-fluorescent table-tennis bats or gloves (daytime only).

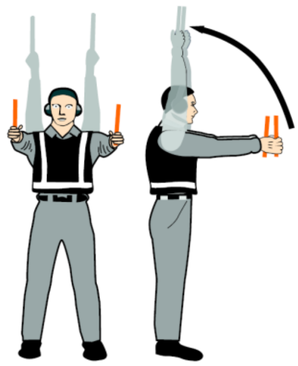
Note6. — References to the signalman may also be read to refer to marshaller.

Note7.— The design of many aircraft is such that the path of the wing tips, engines and other extremities cannot always be monitored visually from the flight deck while the aircraft is being manoeuvred on the ground.

1. Wingwalker/guide

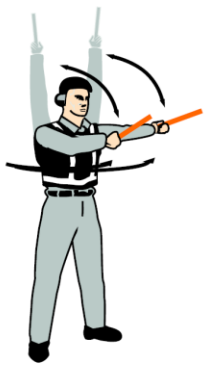
Raise right hand above head level with wand pointing up; move left-hand wand pointing down toward body.

Note.— This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/ marshaller/ push-back operator, that the aircraft movement on/off a parking position would be unobstructed.



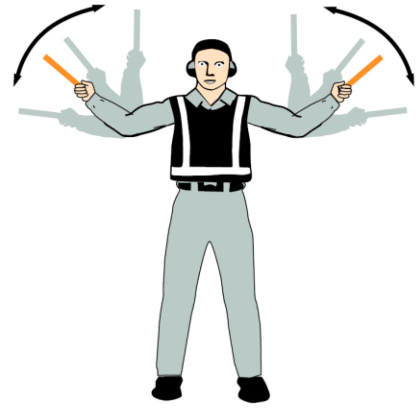
2. Identify gate

Raise fully extended arms straight above head with wands pointing up.



3. Proceed to next signalman or as directed by tower/ground control

Point both arms upward; move and extend arms outward to sides of body and point with wands to direction of next signalman or taxi area.



4. Straight ahead

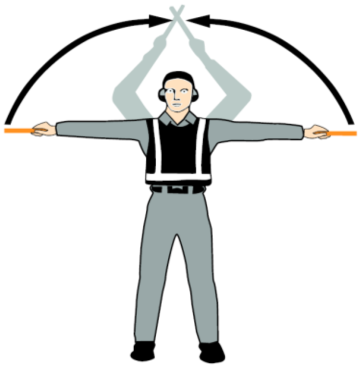
Bend extended arms at elbows and move wands up and down from chest height to head.

5 a). Turn left
(from pilot's point of view)

With right arm and wand extended at a 90-degree angle to body, make "come ahead" signal with left hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

5 b). Turn right
(from pilot's point of view)

With left arm and wand extended at a 90-degree angle to body, make "come ahead" signal with right hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

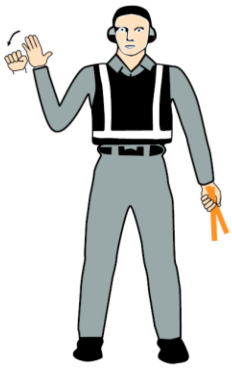


6 a). Normal stop

Fully extend arms and wands at a 90-degree angle to sides and slowly move to above head until wands cross.

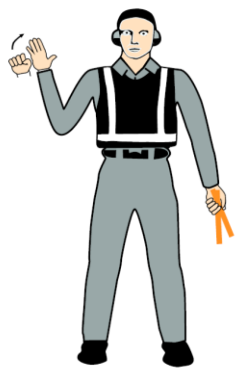
6 b). Emergency stop

Abruptly extend arms and wands to top of head, crossing wands.



7 a). Set brakes

Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. **Do not** move until receipt of "thumbs up" acknowledgement from flight crew.



7 b). Release brakes

Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. **Do not** move until receipt of “thumbs up” acknowledgement from flight crew.

8 a). Chocks inserted

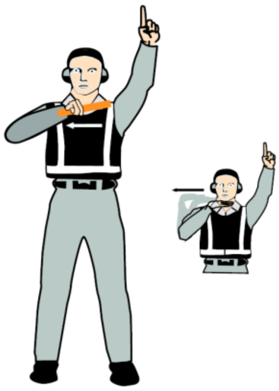
With arms and wands fully extended above head, move wands inward in a “jabbing” motion until wands touch. **Ensure** acknowledgement is received from flight crew.

8 b). Chocks removed

With arms and wands fully extended above head, move wands outward in a “jabbing” motion. **Do not** remove chocks until authorized by flight crew.

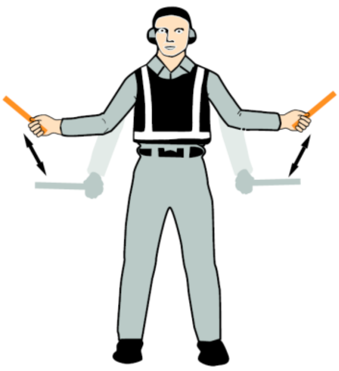
9. Start engine(s)

Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started.



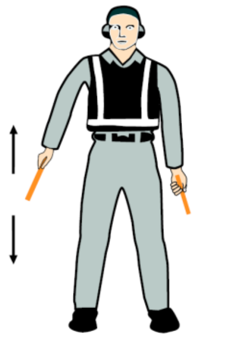
10. Cut engines

Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.



11. Slow down

Move extended arms downwards in a “patting” gesture, moving wands up and down from waist to knees.



12. Slow down engine(s) on indicated side

With arms down and wands toward ground, wave either *right* or *left* wand up and down indicating engine(s) on *left* or *right* side respectively should be slowed down.

13. Move back

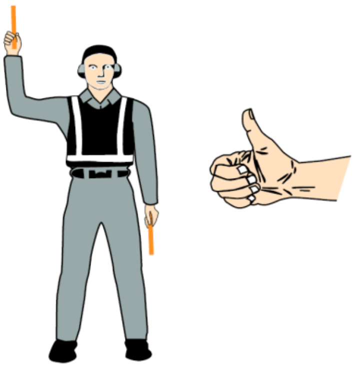
With arms in front of body at waist height, rotate arms in a forward motion. To stop rearward movement, use signal 6 a) or 6 b).

14 a). Turns while backing (for tail to starboard)

Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.

14 b). Turns while backing (for tail to port)

Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.



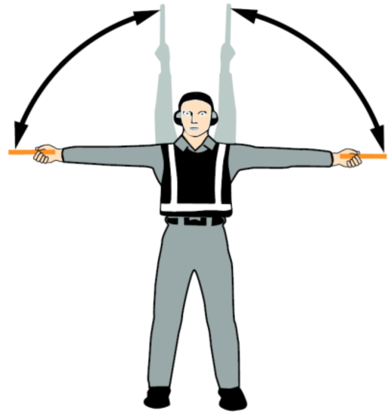
15. Affirmative/all clear

Raise right arm to head level with wand pointing up or display hand with "thumbs up"; left arm remains at side by knee.

Note.— This signal is also used as a technical/ servicing communication signal.

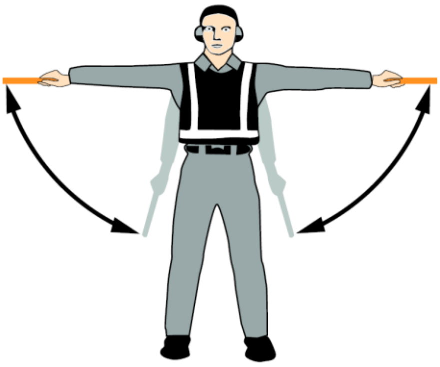
***16. Hover**

Fully extend arms and wands at a 90-degree angle to sides.



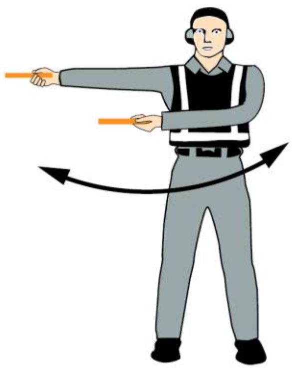
***17. Move upwards**

Fully extend arms and wands at a 90-degree angle to sides and, with palms turned up, move hands upwards. Speed of movement indicates rate of ascent.



***18. Move downwards**

Fully extend arms and wands at a 90-degree angle to sides and, with palms turned down, move hands downwards. Speed of movement indicates rate of descent.

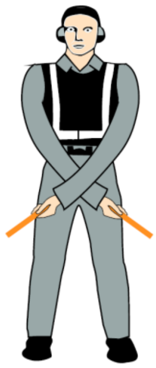


***19 a). Move horizontally left (from pilot's point of view)**

Extend arm horizontally at a 90-degree angle to right side of body. Move other arm in same direction in a sweeping motion.

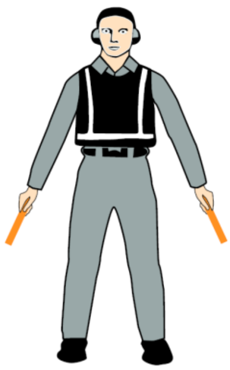
***19 b). Move horizontally right (from pilot's point of view)**

Extend arm horizontally at a 90-degree angle to left side of body. Move other arm in same direction in a sweeping motion.



***20. Land**

Cross arms with wands downwards and in front of body.

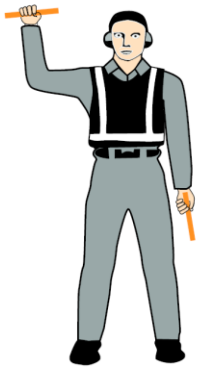


21. Hold position/stand by

Fully extend arms and wands downwards at a 45-degree angle to sides. Hold position until aircraft is clear for next manoeuvre.

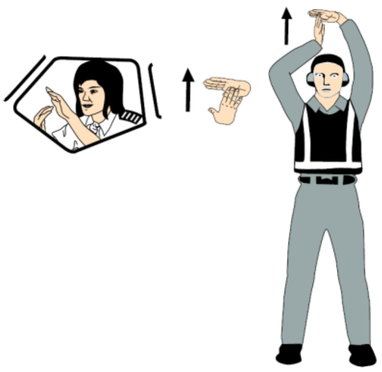
22. Dispatch aircraft

Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.



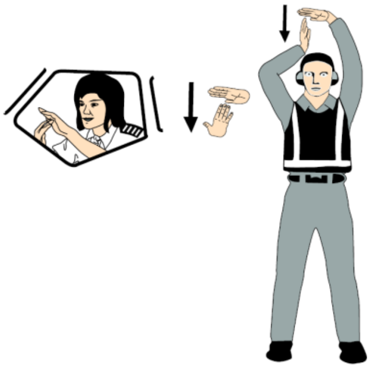
23. Do not touch controls (technical/servicing communication signal)

Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.



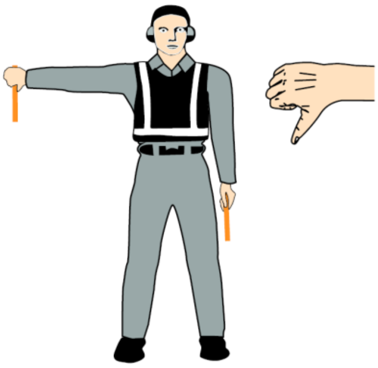
24. Connect ground power (technical/servicing communication signal)

Hold arms fully extended above head; open left hand horizontally and move finger tips of right hand into and touch open palm of left hand (forming a “T”). At night, illuminated wands can also be used to form the “T” above head.



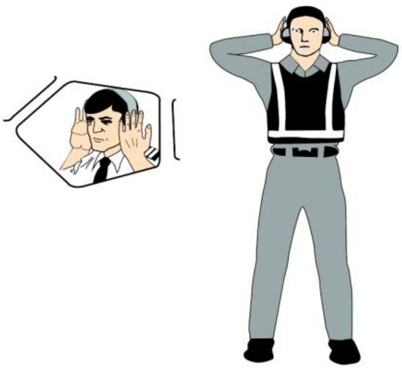
25. Disconnect power (technical/servicing communication signal)

Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a "T"); then move right hand away from the left. **Do not** disconnect power until authorized by flight crew. At night, illuminated wands can also be used to form the "T" above head.



26. Negative (technical/servicing communication signal)

Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with "thumbs down"; left hand remains at side by knee.



27. Establish communication via interphone (technical/servicing communication signal)

Extend both arms at 90 degrees from body and move hands to cup both ears.

28. Open/close stairs (technical/servicing communication signal)

With right arm at side and left arm raised above head at a 45-degree angle, move right arm in a sweeping motion towards top of left shoulder.

Note.— This signal is intended mainly for aircraft with the set of integral stairs at the front.

Standard emergency hand signals

The following hand signals are established as the minimum required for emergency communication between the aircraft rescue and firefighting (ARFF) incident commander/ARFF firefighters and the cockpit and/or cabin crews of the incident aircraft. ARFF emergency hand signals should be given from the left front side of the aircraft for the flight crew.

Note.— In order to communicate more effectively with the cabin crew, emergency hand signals may be given by ARFF firefighters from other positions.

1. Recommend evacuation

Evacuation recommended based on ARFF and incident commander's assessment of external situation.

Arm extended from body and held horizontal with hand upraised at eye level. Execute beckoning arm motion angled backward. Non-beckoning arm held against body.

Night — same with wands.

2. Recommended stop

Recommend evacuation in progress be halted. Stop aircraft movement or other activity in progress.

Arms in front of head, crossed at wrists.

Night — same with wands.

3. Emergency contained

No outside evidence of dangerous conditions or "all-clear."

Arms extended outward and down at a 45-degree angle. Arms moved inward below waistline simultaneously until wrists crossed, then extended outward to starting position (umpire's "safe" signal).

Night — same with wands.

4. Fire

Move right-hand in a "fanning" motion from shoulder to knee, while at the same time pointing with left hand to area of fire.

Night — same with wands.

Chapter I-11 – Training and Development for Heliport Personnel

11.1 Training and Development

11.1.1. General

11.1.2. All personnel assigned as an HLO or HPA duties on the heliport should be fully trained to carry out their duties to ensure competence in role and task.

11.1.3. Where heliport personnel are performing duties as rescue and firefighting personnel, regular training in the use of all emergency response equipment, helicopter familiarization and rescue tactics and techniques should be carried out and all such training should be formally recorded.

11.1.4. Structured Learning Programme (SLP)

11.1.5. The aim of Structured Learning Program is to provide heliport personnel with the knowledge, skill and understanding, which will enable them to perform their tasks commensurate with their role within the organization efficiently, safely and competently.

11.1.6. All heliport personnel should commence the process of acquiring initial competence through a Structured Learning Programme (SLP) and continued competence through a Maintenance of Competence Plan (MOC).

11.1.7. SLPs will provide Heliport personnel with the initial acquisition of knowledge and skills in a controlled training/development environment. They should also have a MOC plan to refresh, enhance or attain additional skills to enable them to be fully competent in their current role.

11.1.8. The full list of heliport duties and the environment in which they are to be carried out should be considered in detail. To be acceptable, heliport personnel selected for a given operation should be able to clearly demonstrate safety in all operations.

11.1.9. The following Tables 2-1(a) and 2-1(b) provide guidance on the elements and assessment methods that should be considered for the basis of a Structured Learning Programme for HOM, HLO and HPA. Not all elements will be applicable to all heliports.

Table 2-1(a) – Duration and Frequency of Training

Discipline	Initial Training	Refresher Training
Heliport Operations Post Holder	4 days Structured Learning Programme	2 days Structured Learning Programme every 3 years
	Company On Job Training	Ongoing Competency Assessment

	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment	Ongoing Competency Assessment
Heliport Landing Officer (HLO)	4 day Structured Learning Programme	3 day Structured Learning Programme every 2 years
	Company On Job Training	Ongoing Competency Assessment
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment Safety Critical Functions	Ongoing Competency Assessment (SCF)
	Work place Exercises and Drills	Ongoing records to be maintained
Heliport Assistant (HPA)	3 days Structured Learning Programme	2 days Structured Learning Programme every 2 years
	Company On Job Training	Ongoing records to be maintained
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment Safety Critical Functions	Ongoing records to be maintained
	Work place Exercises and Drills	Ongoing records to be maintained

Note1. — When developing training programs, the above course duration is the minimum expected and has not taken into account meals and prayer breaks.

Note2. — If any candidate fails to complete any course fully they should be not be deemed competent in acquisition, they should complete the course in full before a certificate can be issued

Table 2-1(b) – Structured Learning Programme

Practical Elements	Practical Elements where the candidate participates in practical elements as an individual or team member.
Technical Elements	Technical Elements where the main focus is for the candidate to understand the technical elements of the function.
Safety Critical Functions	Individual tasks that collectively or individually contribute to safe operations. These critical tasks need to be formally assessed.
Assessment Method	Formal methods and process of making judgments about performance. The means by which evidence of

	performance is collected and compared with the required competency standard and a judgment about performance is made and also fully recorded.
Practical Assessment	Practical Demonstration of operational skills & use of equipment
Technically Assessment	Technical Written Examination Paper to assess fully the knowledge and understanding of training objectives
Oral Assessment	Oral Technical Spoken Word Assessment to support the technical assessment in the knowledge and understanding of training objectives

Heliport Operations	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**

<u>Heliport Planning</u> Status of ICAO, GCAA and other international regulations for heliport planning and design Legal binding principles ICAO standards and recommended practices on heliport requirements Types of heliports (surface-level heliports, elevated heliports, helidecks and shipboard heliports) Heliport data Certification of helicopters Helicopter flight characteristics, aerodynamics of rotor systems Relevant helicopter performance parameters (performance classes 1, 2 and 3) and classification of helicopters Geometric dimensioning of helicopters (overall length, rotor diameter, undercarriage width/length) Declared distances (TODAH, RTODAH, LDAH)	Technical Oral		100%	YES

<u>Heliport Design</u> Heliports and aerodromes Final approach and take-off area (FATO) Helicopter clearways Safety area Touchdown and lift-off area (TLOF) Helicopter ground taxiways and ground taxi-routes Helicopter air taxiways, air taxi-routes and air transit routes Aprons Visual Aids - markings and markers	Technical Oral		100%	YES
<u>Obstacle Control</u> Regulations regarding obstacle limitation surfaces and sectors subject to type and usage of heliport Control of obstacles at heliports	Technical Oral		100%	YES
<u>Rescue and fire fighting services</u> Levels of protection at on-shore heliports and off-shore helidecks Types and quantities of extinguishing agents (principal & complementary agents) Portable and fixed foam application systems Personnel requirements (task resource analysis) Consideration of response areas (on and off heliport area) Testing and inspection of rescue and firefighting equipment	Technical Oral		100%	YES

<u>Emergency planning</u> Heliport emergency plan Coordination with agencies Accident investigation Disabled helicopter removal plan Conducting exercises/drills	Technical Oral		100%	YES
<u>Safety management system</u> Safety policy and objectives Safety risk management Safety assurance including quality assurance Safety promotion Audits/inspections	Technical Oral		100%	YES
Heliport Physical Characteristics	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Heliport physical characteristics, to include: 'D value'	Technical Oral		100%	YES
Access and Escape routes	Technical Oral		100%	YES
Heliport visual aids, marking and lights	Technical Oral		100%	YES
Power supplies emergency power back-up systems	Technical Oral		100%	YES
Obstacle-protected surfaces, to include:	Technical Oral		100%	YES
Heliport perimeter safety nets	Technical Oral		100%	YES
Safety Working practices on Heliports	Technical Oral		100%	YES

Heliport equipment and systems	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Plant and equipment for routine and non-emergency response operations	Technical Oral	20%	80%	YES
Fire Fighting Equipment – guidance on when and where to use various media	Technical Oral	20%	80%	YES
Primary Media requirements: foam type, delivery and testing	Technical Oral	20%	80%	YES
Complimentary media requirements	Technical Oral	20%	80%	YES
Portable and fixed foam application system (FMS/DIFFS/RMS)	Technical Oral	20%	80%	YES
Testing & Inspecting heliport systems Daily – Monthly – Annual Checks.	Technical Oral	20%	80%	YES
Reporting heliport and systems defects	Technical Oral	20%	80%	YES
Heliport Operational Hazards	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Poor visibility effect on heliport operations	Technical Oral		100%	YES
Rotors running – personnel contact with main or tail rotors	Technical Oral		100%	YES
Excessive wind turbulence.	Technical Oral		100%	YES
Obstacles on heliport	Technical Oral		100%	YES
Noise hazard	Technical Oral		100%	YES

Loose items (baggage, freight, netting etc.) being sucked air intake.	Technical Oral		100%	YES
Passenger Transfer	Technical Oral		100%	YES
Baggage and cargo goods transfer	Technical Oral		100%	YES
Responsibilities during Helicopter Landing and Departure	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
The role of the Heliport Landing Officer	Technical Oral		100%	
The key responsibilities of the HLO	Technical Oral		100%	
How the HLO is identifiable to the helicopter crew.	Technical Oral		100%	
Heliport procedures prior to landing	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Helicopter type identification.	Technical Oral		100%	
30 minutes before helicopter ETA	Technical Oral		100%	YES
10 minutes before helicopter ETA	Technical Oral		100%	YES
Immediately before landing	Technical Oral		100%	YES
After landing - rotors running turnaround	Technical Oral		100%	YES
After landing - engines shut down and rotors not running	Technical Oral		100%	YES
Helicopter tie-down	Technical Oral		100%	YES

Helicopter start-up.	Technical Oral		100%	YES
Communications with all relevant personnel, heli-admin, personnel, pilot, fire crews, HPAs, loaders and passengers (simulated)	Technical Oral		100%	
HLO and flight crew radio transmissions restricted to essential dialogue.	Technical Oral		100%	
How to ensure that the correct and agreed protocol for “clear to lift” signal to the pilot is understood	Technical Oral		100%	YES
HLO-to-pilot coms protocols are conducted correctly, to include ‘heliport available’ or ‘do not land’ call to pilot.	Technical Oral		100%	YES
Limitation of radio coms and correct use of hand signals (Marshalling)	Technical Oral		100%	YES
Monitoring of environmental conditions and change in conditions	Technical Oral		100%	YES
Checking heliport equipment availability.	Practicable Oral	80%	20%	YES
Checking and testing radio equipment	Practicable Oral	80%	20%	YES
HLO to ensure that the heliport surface is free from any contamination, debris or damage after take-off.	Practicable Oral	80%	20%	YES
HLO ensuring that the HPA duties and responsibilities are clearly understood during helicopter landing and departure.	Practicable Oral	80%	20%	YES
Briefing the HPAs prior to heliport operations, to include a ‘tool-box-talk’.	Practicable Oral	80%	20%	YES
Ensuring HPAs are in the correct location	Practicable Oral	80%	20%	YES

Ensuring the HPAs are prepared for helicopter emergencies	Practicable Oral	80%	20%	YES
Ensuring and HPAs are equipped with appropriate PPE.	Practicable Oral	80%	20%	YES
Heliport protocols	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Safe-to-approach, Helicopter agreed with operating company	Practicable Oral	80%	20%	YES
Supervision of Passenger and Cargo Handling	Practicable Oral	80%	20%	YES
Helicopter freight loading limitations and requirements and how these will vary for different types of helicopters.	Practicable Oral	80%	20%	YES
Checking freight manifests (inbound and outbound)	Practicable Oral	80%	20%	YES
Preparing for, and supervising, correct loading and unloading of freight and baggage. (HLOs should not become involved in manual activity, such as carrying bags, at the expense of their supervisory role).	Practicable Oral	80%	20%	YES
Supervising passenger baggage reclamation	Practicable Oral	80%	20%	YES
Supervise passenger handling	Practicable Oral	80%	20%	YES
Checking and interpreting information on passenger manifest and routing plans	Technical Oral		100%	YES
Receiving incoming manifest from pilot and handing over outgoing manifest to pilot.	Technical Oral		100%	YES
Supervising passenger safe access and egress on heliport.	Practicable Oral	80%	20%	YES

Supervising passenger entry into helicopter.	Practicable Oral	80%	20%	YES
Supervising passenger exit from helicopter.	Practicable Oral	80%	20%	YES
Conducting passenger checks, to include: checking that passengers are wearing required PPE for region of operations, ear protection and seat belt harnesses are secure.	Practicable Oral	80%	20%	YES

11.2 Heliport Training Provider Certification

11.2.1 General

11.2.1.1 Any organisation conducting commercial heliport operations competency-based training and assessment shall be certified by the GCAA.

11.2.1.2 An organisation applying as a heliport training provider (the applicant) shall be either a heliport operator or any commercial organisation located within the UAE. If the training facility is located outside the UAE, the organisation shall bear all costs for the initial certification and subsequent audits/inspections conducted by the GCAA.

Note – Audits and inspections by the GCAA will also include third-party contracted services/activities.

11.2.1.3 The applicant shall be subjected to the following certification processes:

a) Phase 1 – A discussion phase at which the GCAA's overall requirements will be explained;
b) Phase 2 – An assessment phase in which the submission details including all relevant personnel, training documentations and facilities will be reviewed; and
c) Phase 3 - An inspection phase where all resources provided for the design, delivery, evaluation and control of training and assessments for heliport operations personnel will be evaluated.

Note - A formal confirmation will be issued to the applicant to confirm GCAA acceptance after each phase. Where there are findings raised during the certification process, the applicant has up to 6 months to address the findings. If no satisfactory response is received thereafter, the application will be cancelled. Any extension is subjected to the approval of the GCAA. The applicant must formally inform GCAA if the application is withdrawn. Upon successful completion of certification process, a heliport training provider certificate will be issued.

11.2.2 Application

11.2.2.1 The applicant shall submit for a formal application for an initial certification and for a change/variation to an existing certification via the GCAA e-Services website (***https://www.gcaa.gov.ae/en/***).

11.2.2.2 An application for an initial certification or change/variation to an approval shall include the following information:

a) the registered name and address of the training organisation;
b) the address of the organization requiring the initial certification or change/variation to the certification;
c) the intended scope of approval or change/variation to the scope of certification;
d) the name and signature of the accountable manager; and
e) the date of application.

11.2.3 Training facility requirements

11.2.3.1 The size and structure of training facilities shall commensurate with the type of heliport and/or helideck training provided. Training facilities should ensure protection from the prevailing weather elements and proper operation of all planned training and examination on any particular day. A training facilities analysis should be carried out to determine appropriate training simulator/s and training aids required.

11.2.3.2 Fully enclosed appropriate accommodation separate from other facilities shall be provided for the instruction of theory and the conduct of knowledge examinations.

a) The maximum number of students undergoing knowledge training during any training course shall be defined.
b) The size of accommodation for examination purposes shall be such that no student can read the paperwork or computer screen of any other student from his/her position during examinations.
c) The accommodation environment shall be maintained such that students are able to concentrate on their studies or examination as appropriate, without undue distraction or discomfort.
d) In the case of a practical training, facilities separate from training classrooms shall be provided for practical instruction appropriate to the planned training course. If, however, the organisation is unable to provide such facilities, arrangements may be made with another organisation to provide such workshops and/or maintenance facilities, in which case a written agreement shall be made with such organisation specifying the conditions of access and use thereof. The GCAA shall require access to any such contracted organisation and the written agreement shall specify this access.
e) The maximum number of students undergoing practical training during any training course shall be safely determined. Where a high-risk practical training is involved e.g. live fire evolution training, the maximum number should not exceed 7 per instructor

or assessor. If a trained assistant is provided, a maximum number of student should not exceed 3 per assistant.

f) Office accommodation shall be provided for instructors and assessors of a standard to ensure that they can prepare for their duties without undue distraction or discomfort.

g) Secure storage facilities shall be provided for examination papers and training records. The storage environment shall be such that documents remain in good condition for the retention period of a minimum of 5 years. The storage facilities and office accommodation may be combined, subject to adequate security.

11.2.3.3 A maintenance program shall be established and implemented for all training facilities.

11.2.4 Training personnel requirements

11.2.4.1 The applicant shall appoint an accountable manager who has full authority for ensuring that all training commitments can be financed and carried out to the standard required by this regulation.

11.2.4.2 The applicant shall appoint a training post holder who will be responsible for managing the overall delivery of the training programs in accordance with these requirements.

11.2.4.3 The applicant shall provide sufficient staff to plan/perform knowledge and practical training, conduct examinations and assessments in accordance with these requirements, which include but not limited to instructor and assessor.

11.2.4.4 The experience and qualifications of instructors and assessors shall be appropriate to the training provided and established in accordance with these requirements, and/or with competence standards agreed by the GCAA.

11.2.4.5 Instructors and assessors shall be specified in the organisation manual for the acceptance of such staff.

11.2.4.6. Due to the size and complexity of the organisation, additional staff such course developers, maintenance team, administrative, safety, quality, etc maybe employed.

11.2.4.7 Instructors and assessors shall maintain their training competencies, at least, every 2 years relevant to current technology, practical skills, human factors and the latest training techniques appropriate to the knowledge being trained or examined.

11.2.5 Records of instructors and assessors

11.2.5.1 The training organisation shall maintain a record of all instructors and assessors. These records shall reflect the experience and qualification, training history and any subsequent trainings undertaken.

11.2.5.2 Terms of reference shall be drawn up for all instructors and assessors.

11.2.5.3 The following minimum information relevant to the scope of activity should be kept on record in respect of each instructor and assessor:

a) Name
b) Date of Birth
c) Personnel Number
d) Experience
e) Qualifications
f) Training history (before entry)
g) Subsequent Training
h) Scope of activity
i) Starting date of employment/contract
j) If appropriate – ending date of employment/contract.

11.2.5.4 The record should be kept in any format but should be under the control of the organisation's quality management system.

11.2.5.6 Persons authorised to access the records should be maintained at a minimum to ensure that records cannot be altered in an unauthorised manner or that such confidential records become accessible to unauthorised persons.

11.2.5.7 The records system shall be investigated by GCAA for initial and continued certification or when the GCAA has cause to doubt the competence of a particular person.

11.2.6 Instructional equipment

11.2.6.1 Each classroom shall have appropriate presentation equipment of a standard that ensures students can easily read presentation text/drawings/diagrams and figures from any position in the classroom. Presentation equipment shall include representative synthetic training devices to assist students in their understanding of the particular subject matter where such devices are considered beneficial for such purposes.

11.2.6.2 Training facilities shall have all tools and equipment necessary to perform the approved scope of training. Training facilities should, at least, include physical & virtual simulators, personal protective equipment, rescue and firefighting equipment, respiratory protection, smoke chambers, firefighting simulators. Additional tools and equipment should be added where relevant.

11.2.6.3 Practical training facilities shall have appropriate selection of helicopter simulations including fuselage, engines, cabin parts, rotary components and avionics equipment at both dry and wet practical training areas. All students shall be provided with appropriate personal protective equipment for all practical trainings. Where training involves working in smoke environment, respiratory protective equipment (breathing apparatus) shall be provided to all students. Appropriate safety briefing shall be conducted before each practical training including use of PPE and/or RPE.

11.2.6.4 A maintenance program shall be established and implemented for all instructional equipment.

11.2.7 Training materials

11.2.7.1 Training course material shall be provided to all students, which, at least, include:

a) a training syllabus consisting of a full training programme, lesson plan, instructor guide, student notes, assessment, presentation materials; and
b) type of course content for each structured learning programme.

11.2.7.2 Training course notes, diagrams and any other instructional material should be accurate. Where an amendment service is not provided, a written warning to this effect should be given.

11.2.8 Student Records

11.2.8.1 The applicant shall keep all records including student training, examination and assessment records for a minimum of 5 years.

11.2.9 Safety and quality management systems

11.2.9.1 The applicant shall establish sufficient procedures acceptable to the GCAA to ensure proper training standards and compliance with all relevant requirements.

11.2.9.2 The applicant shall establish management systems which, at least, contain:

a) safety and quality management procedures
b) implementation of a management of change of the full training process
c) an independent audit function to monitor training standards, the integrity of knowledge examinations and practical assessments, compliance with and adequacy of the procedures
d) evaluation of training effectiveness e.g. course evaluation, customer engagement, industry visit, etc
e) a feedback system of audit findings to the person(s) and ultimately to the accountable manager to ensure, as necessary, corrective and preventive actions

11.2.9.3 The independent audit procedure should ensure that all aspects of compliance are checked at least annually and may be carried out as one complete single exercise or subdivided over a 12-month period in accordance with a scheduled plan.

11.2.9.4 Where the applicant is also approved to conduct training based on another GCAA regulation requiring a quality management system, then such system may be combined.

11.2.9.6 Where a part of the training or assessment is contracted to a third-party organisation:

a) a pre-audit procedure should be established whereby the training organisation should audit a prospective sub-contractor to determine whether the services of the sub-contractor meet the intent of this regulation.
b) an internal audit of the subcontractor should be performed at least once every 12 months to ensure continuous compliance with this regulation.
c) the sub-contract control procedure should record audits of the sub-contractor and to have a corrective action follow-up plan.

11.2.9.7 The independence of the audit system should be established by always ensuring that audits are carried out by personnel not responsible for the function or procedure being checked.

11.2.10 Training Conduct

11.2.10.1 The applicant shall ensure all students meet the necessary training pre-requisites requirements. Where practical training is involved, the fitness status of the students shall be verified by the organisation.

a) If the fitness status of a student is in doubt, he/she should be removed from the training course to seek the advice of an occupational medical physician to confirm the suitability of the student to continue with the training. Where relevant, students should submit a fitness declaration form.
b) Certain practical trainings may require above average fitness levels. Training organisations should determine the appropriate fitness levels for different practical trainings.

11.2.10.2 Training facilities should be regularly checked prior to the delivery of the training course. Where practical training is involved, a safety inspection should be conducted around the training area. Safety briefing including walk around may be necessary to familiarise students with the training area, facility and equipment.

11.2.10.3 Safe management procedures shall be implemented including use of personal protective equipment, health and safety arrangements, where practical training involves:

a) the use of flammable liquids or liquefied gases including determination of safe allowable quantity and exposure limit
b) working at height
c) working in confined spaces
d) working in smoke
e) manual handling
f) working in heat and humidity

11.2.10.4 The applicant shall ensure the validity and security of the competency-based training and assessment system.

a) Knowledge examinations and practical assessment can either be computerised or hard copy or a combination of both.
b) The methodologies to be used in a particular examination and assessment should be determined by the assessors

11.2.11 Training manual

11.2.11.1 The applicant shall provide a manual describing the organisation and its procedures and containing the following information:

a) a statement signed by the accountable manager confirming that the training organisation documentation and any associated manuals define the training organisation's compliance with this regulation and shall be complied with at all times.
b) the title(s) and name(s) of the person(s) nominated in accordance with this regulation
c) the duties and responsibilities of the person(s) specified in subparagraph 2.4.4.4, including matters on which they may deal directly with the GCAA on behalf of the training organisation.
d) a training organisation chart showing associated chains of responsibility of the person(s) specified in subparagraph 2.4.4.4.
e) a list of the training instructors and assessors.
f) a general description of the training and examination facilities located at each address specified in the training organisation's certificate, and if appropriate any other location, as required.
g) a list of the training courses which form the extent of the certification.
h) the training organisation's documentations amendment procedures.
i) the training organisation's procedures.
j) the training organisation's safety management system including quality assurance procedure, when authorised to conduct training, examination and assessments in locations different from those specified.
k) a list of the locations if more than 1 training location.
l) a list of subcontract organisations, if appropriate.

11.2.11.2 The applicant's documentations and any subsequent amendments shall be accepted by the GCAA

11.2.11.3 Notwithstanding paragraph 11.2.11.2, minor amendments to the documentation may be approved through a documentation procedure.

11.2.12 Approval Validity

11.2.12.1 Upon issuance of a heliport training provider certificate, it shall remain valid subject to:

a) the organisation remaining in compliance with this regulation, in accordance with the provisions related to the handling of findings as specified in this regulation; and
b) the GCAA being granted full access to the organisation to determine continued compliance with paragraph 2.4.4; and
c) the certificate not being surrendered or revoked.

11.2.12.2. Upon surrender or revocation of the heliport training provider certificate, the document shall be returned to the GCAA.

Appendix I-A: Certificate or Landing Area Acceptance

All heliports shall hold either a Heliport Certificate or a Landing Area Acceptance in accordance with the following Table.

NOTE 1: The categorisation of flights for Public Transport may differ for Flight Crew Licensing, Flight Operations and Airworthiness. Applicable Regulation should therefore apply. The issue of a Heliport Certificate or Landing Area Acceptance, does not constitute an "approval" from Flight Operations Department, with reference to CAR AIR OPS.

NOTE 2: The GCAA may issue a Heliport Certificate or Landing Area Acceptance (whichever is deemed appropriate), once the criteria have been met; however, the responsibility for the maintenance and condition of the landing area, the facilities and for obstacle control, remains with the Certificate / Acceptance Holder.

Use of heliport		**Certificate or Landing Area Acceptance (LAA)**
1	**Public heliport** The heliport is open to the public and served by helicopters performing commercial air transport operations offering services to the public either on demand or to a published schedule.	Certificate
2	**Hospitality and tourism** The heliport is available for use by the public or guests of the hotel, resort, tourist attraction or organized event.	Certificate
3	**Private heliport** The heliport is not open to the public and is available for use only with the prior permission of the heliport operator.	LAA
4	**Flight Training** The heliport is used for providing flight training and the passengers carried are only those involved in the training.	LAA
5	**Hospitals / Clinics / HEMS** The heliport is used for operations associated with Helicopter Emergency Medical Services	LAA
6	**Corporate facility** The heliport is used by a company for the transport of passengers, goods or mail as an aid to the conduct of company business.	LAA
7	**Shipboard heliport**	LAA

	The heliport is used for private operations and located on a ship that is registered in the UAE.	Contact GCAA for details
8	**Oil and gas** The heliport is located on-shore (either on the mainland UAE or surrounding islands) used for mineral exploitation (for the exploration of oil and gas), research or construction.	LAA
9	**Emergency Evacuation Helipad** A clear area on a roof of a tall building that is not intended to function fully as a heliport, yet is capable of accommodating helicopters engaged in the emergency evacuation of building occupants.	No Certificate or LAA required. Refer Appendix H
10	**Temporary use** A landing location that is not identifiable as a heliport and is only used on a temporary or infrequent basis. Helicopter operations to these locations shall comply with the requirements of CAR AIR OPS.	No Certificate or LAA required
11	**Off-Shore Helideck Operations** Dedicated operations to off-shore helideck sites.	Refer to CAR-HVD PART II: OFFSHORE HELIDECKS

Appendix I-B: Heliport Operation Manual Checklist

The following checklist may be used by the applicant and/or holder of a Heliport Certificate to ensure compliance with the requirement in Chapter I-2.4.3 to provide and maintain written policy, procedures and other information on the operation of the heliport. This information should be kept in a single document but where a particular requirement is contained in another document maintained by the heliport operator, then the checklist should make reference to the document and location.

The level of information provided may be determined based on the scope and complexity of the heliport and helicopter operations.

Section	Compliance Status			Manual Page Reference
Part 1 – General Information	Yes	No	N/A	
Purpose and Scope of the Heliport Operations Manual				
Conditions for Use of the Heliport				
Limitations on the Operation of the Heliport				
Name and contact details of responsible person(s)				
Obligations of the heliport operator				
Part 2 - Particulars of the Heliport Site	Yes	No	N/A	
Location Plan				
Heliport Plan showing markings and lighting				
General Information	Yes	No	N/A	
Heliport Name				
Heliport Location				
Heliport Reference Point WGS 84				
Heliport Elevation				
Heliport Dimensions & Related Information	Yes	No	N/A	
FATO, TLOF and Safety Area				

Description of Visual Aids				
Significant Obstacles –Geographic Coordinates				
Description of Pavement Surfaces				
Description of emergency response (refer Part 5)				
Part 3	Yes	No	N/A	
Reserved for Aeronautical Information Publication				
Part 4 – Operating Procedures	Yes	No	N/A	
Access to the Heliport Movement Area	Yes	No	N/A	
Procedures for preventing unauthorised access onto movement area including				
Role of each agency with key responsibility for Heliport security				
Procedures to control access of personnel and contractors				
Procedures to control access of vehicles and equipment				
Heliport Movement Area Inspections	Yes	No	N/A	
Procedures for inspection of movement area including:				
Description of inspections undertaken including frequency				
Inspection checklists				
Description of defect reporting, record keeping and corrective actions				
Heliport Maintenance	Yes	No	N/A	
Description of the procedures for the inspection and maintenance of the visual aids including markings and lighting				
Inspection checklists				
Details of record keeping and tracking of corrective actions				

Procedures for reporting results and for defect rectification				
Description of preventative maintenance program				
Heliport Works Safety	Yes	No	N/A	
Procedures for works on or in the vicinity or the movement area or those that may extend above the OLS including:				
Works notification and work authority permit process				
Procedures for closing off and reopening work areas				
Formal acceptance of work areas prior to return them to service				
Supervisory oversight of works in progress				
Wildlife Hazard Management	Yes	No	N/A	
Description of methods to deal with dangers caused by wildlife on or in the vicinity of the Heliport or in the flight path				
Obstacle Control	Yes	No	N/A	
Description of system to control and remove obstacles both on and off the heliport.				
Frequency of obstacle assessment or confirmation				
Methodology to control new obstacles				
Description of systems to remove existing obstacles				
Process to notify the GCAA of obstacles				
Process to notify the GCAA of removed obstacles				
Refuelling	Yes	No	N/A	
Details of special areas set-up for storage of aviation fuel				
Description for method for accepting delivery				
Description for method for storage				
Description for method for dispensing				

Description of system for testing the quality of aviation fuel prior dispensing into aircraft				
Procedures for ensuring apron safety during fuelling operations				
Procedures for ensuring apron safety during defueling operations				
Part 5 – Emergency response	Yes	No	N/A	
Types and amounts of media provided				
Manning levels				
Levels of supervision				
Polices or letters of agreement with third party organisations that provide essential equipment for safe operation of the Heliport (e.g. water rescue)				
Contingency plans if organisations providing essential equipment not available				
Process for ensuring initial and continued competence of Emergency Response Personnel				
Description of available medical equipment including location				
Description of any tool kit provided				
Integrated Emergency Planning	Yes	No	N/A	
Description of arrangements for determining and implementing plans ensuring the integrated management of response to an aircraft incident/accident. These arrangements should take account of the complexity and size of the helicopter operations.				
Policy statement of the distance the Emergency Response Personnel would respond to an off-heliport accident				
Additional information/instructions within the emergency plan based upon the heliport operator's hazard/risk registry				

Appendix I-C: Structural Design

C1 Introduction

Elevated heliports may be designed for a specific helicopter type though greater operational flexibility will be obtained from a classification system of design. The FATO should be designed for the largest or heaviest type of helicopter that it is anticipated will use the heliport, and account taken of other types of loading such as personnel, freight, refueling equipment, etc.

For the purpose of design, it is to be assumed that the helicopter will land on two main wheels, irrespective of the actual number of wheels in the undercarriage, or on two skids if they are fitted. The loads imposed on the structure should be taken as point loads at the wheel centres, shown in Table B1.

The FATO should be designed for the worse condition derived from consideration of the following.

C2 Helicopter on landing

When designing a FAT0 on an elevated heliport, and in order to cover the bending and shear stresses that result from a helicopter touching down, the following should be taken into account:

Dynamic load due to impact on touchdown

This should cover the normal touchdown, with a rate of descent of 1.8 m/s (6 ft/s), which equates to the serviceability limit state. The impact load is then equal to 1.5 times the maximum take-off mass of the helicopter.

The emergency touchdown should also be covered at a rate of descent of 3.6 m/s (12 ft/s), which equates to the ultimate limit state. The partial safety factor in this case should be taken as 1.66. Hence:

the ultimate design load = 1.66 impact load

= (1.66 x 1.5) maximum take-off mass

= 2.5 maximum take-off mass

To this should be added the sympathetic response factor below.

Sympathetic response on the FATO.

The dynamic load should be increased by a structural response factor dependent upon the natural frequency of the platform slab when considering the design of supporting beams and columns. This increase in loading will usually apply only to slabs with one or more freely supported edges. It is recommended that the average structural response factor (R) of 1.3 should be used in determining the ultimate design load.

Over-all superimposed load on the FATO (SHa).

To allow for personnel, freight and equipment loads, etc., in addition to wheel loads, an allowance of 0.5 kN/m^2 should be included in the design.

Lateral load on the platform supports.

The supports of the platform should be designed to resist a horizontal point load equivalent to 0.5 maximum take-off mass of the helicopter, together with the wind loading (see below), applied in the direction which will provide the greater bending moments.

Dead load of structural members.

The partial safety factor to be used for the dead load should be taken as 1.4.

Wind loading.

In making the assessment of wind load, the basic wind speed (V), appropriate to the location of the structure, is the three second gust speed estimated to be exceeded, on the average, once in 50 years. The basic wind speed is then multiplied by three factors- the topography factor (ground roughness), the factor of building size and height above ground and a statistical factor which takes into account the period of time in years during which there will be exposure to wind. This will give the design wind speed (Vs) which is then converted to dynamic pressure (q) using the relationship $q=kVs^2$ where k is a constant. The dynamic pressure is then multiplied by an appropriate pressure coefficient Cp to give the pressure (p) exerted at any point on the surface of the structure.

Punching shear.

Check for the punching shear of an undercarriage wheel or skid using the ultimate design load with a contact area of 65 x 10^3 mm^2.

Note - The above design loads for helicopters on landing are summarized in Table C-2.

C3 Helicopter at rest

When designing a FATO on an elevated heliport, and in order to cover the bending and shear stresses from a helicopter at rest, the following should be taken into account:

Dead load of the helicopter.

Each structural element must be designed to carry the point load, in accordance with Table C-2, from the two main wheels or skids applied simultaneously in any position on the FATO so as to produce the worst effect from both bending and shear.

Over-all superimposed load (SHb).

In addition to wheel loads, an allowance for over-all superimposed load given in Table C-2, over the area of the FATO, should be included in the design.

Dead load on structural members and wind loading.

The same factors should be included in the design for these items as given for a helicopter landing.

Note.- The above design loads for helicopters at rest are summarized in Table C-2.

Normally, the upper load limit of the helicopter category selected should be used for design purposes except as follows:

In order to avoid over-design in the platform the upper limit in any band may be exceeded by 10 per cent should the maximum take-off mass of a helicopter fall just into the next highest category. In such cases, the upper limit of the lower helicopter category should be used in the design.

Table C-1 – Details of point loads and over-all superimposed loads

Helicopter category	Maximum take-off mass		Point load for each wheel	Undercarriage wheel centre	Superimposed load	Superimposed load
	(kg)	(kN)	(kN)	(m)	(SHa)	(SHb)
1	Up tp 2300	Up to 22.6	12.0	1.75	0.5	1.5
2	2301 – 5000	22.6 – 49.2	25.0	2.0	0.5	2.0
3	5001 – 9000	49.2 – 88.5	45.0	2.5	0.5	2.5
4	9001 – 13500	88.5 – 133.0	67.0	3.0	0.5	3.0
5	13501 – 19500	133.0 – 192.0	96.0	3.5	0.5	3.0
6	19501 – 27000	192.0 – 266.0	133.0	4.5	0.5	3.0

Table C-2 – Summary of Design Loads

Design load for helicopter on landing	
Superimposed loads	
Helicopter	2.5 L_HR distributed as two point loads at the wheel centres for the helicopter category in Table 1. Average value for R = 1.3

Lateral load	1.6 $L_H/2$ applied horizontally in any direction		
Overall superimposed load	Load at platform level with the maximum wind loading. 1.4 Sha over the whole area of the platform (Sha given in Table 1)		
Dead load	1.4G		
Wind loading	1.4W		
Punching Shear check	2.5 L_HR load over the tyre or skid contact area or 64.5 x 10^3 mm^2		
Design load for helicopter on at rest			
Superimposed loads			
Helicopter	1.6L_H distributed as two point loads at the wheel centres for the helicopter category in Table 1.		
Overall superimposed load (personnel, freight etc.)	1.6 SHb over the whole area of the platform. SHb given in Table 1.		
Shear check	Check as appropriate		

Symbol	Meaning	Partial load factors	
L_H	Maximum take-off mass of helicopter	Dynamic load (ultimate design load)	2.5
G	Dead load of structure	Live load	1.6
W	Wind loading	Dead load	1.4
R	Structural response factor	Wind loading	1.4
SHa	Superimposed load helicopter landing		
SHb	Superimposed load helicopter at rest		

Appendix I-D: Instrument Heliports with Non-Precision and/or Precision Approaches and Instrument Departures

D1 Introduction

This CAR-HVD PART I contains information that prescribes the physical characteristics and obstacle limitation surfaces to be provided for at heliports, and certain facilities and technical services normally provided at a heliport. It is not intended that these specifications limit or regulate the operation of an aircraft.

The specifications in this appendix describe additional conditions beyond those found in the main sections this CAR-HVD PART I, that apply to instrument heliports with non-precision and/or precision approaches. All specifications contained within the main chapters of this CAR-HVD PART I, are equally applicable to instrument heliports, but with reference to further provisions described in this Appendix.

D2 Heliport Data

Heliport elevation

The elevation of the TLOF and/or the elevation and geoid undulation of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority to the accuracy of:

one-half metre or foot for non-precision approaches; and

one-quarter metre or foot for precision approaches.

Note — Geoid undulation must be measured in accordance with the appropriate system of coordinates.

Heliport dimensions and related information

The following additional data shall be measured or described, as appropriate, for each facility provided on an instrument heliport:

distances to the nearest metre or foot of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth; and

elevation antenna of a microwave landing system (MLS) in relation to the associated TLOF or FATO extremities.

D3 Physical Characteristics -- Surface-level and elevated heliports

Safety areas

A safety area surrounding an instrument FATO shall extend:

laterally to a distance of at least 45 m on each side of the centre line; and

longitudinally to a distance of at least 60 m beyond the ends of the FATO.

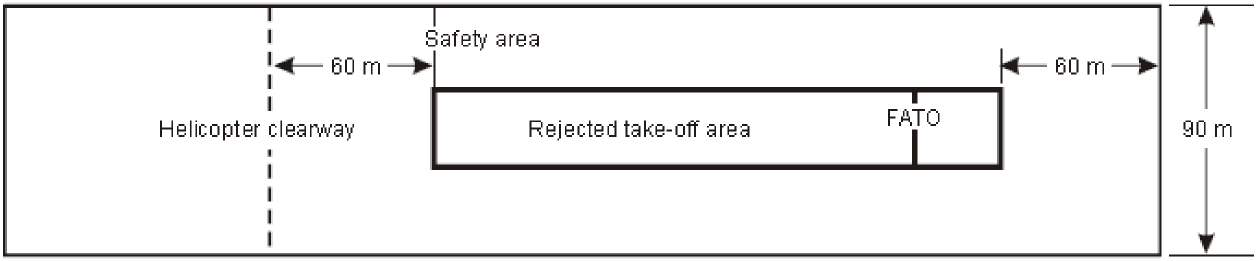


Figure D-1 – Safety Area for instrument FATO

D4 Obstacle limitation surfaces and sectors

Approach surface

The limits of an approach surface shall comprise:

an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the safety area, perpendicular to the centre line of the approach surface and located at the outer edge of the safety area;

two side edges originating at the ends of the inner edge;

for an instrument FATO with a non-precision approach, diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO;

for an instrument FATO with a precision approach, diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO, to a specified height above FATO, and then diverging uniformly at a specified rate to a specified final width and continuing thereafter at that width for the remaining length of the approach surface; and

an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height above the elevation of the FATO.

Obstacle limitation requirements

The following obstacle limitation surfaces shall be established for an instrument FATO with a non-precision and/or precision approach:

take-off climb surface;

approach surface and

transitional surfaces.

Note — See Figure D-2 to D-5.

The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than, those specified in Tables D-1 to D-3.

D5 Visual Aids: Lights

Approach Lighting Systems

Where an approach lighting system is provided for a non-precision FATO, the system should not be less than 210 m in length.

Recommendation —The light distribution of steady lights should be as indicated in Figure 7-1, Illustration 2 except that the intensity should be increased by a factor of three for a non-precision FATO.

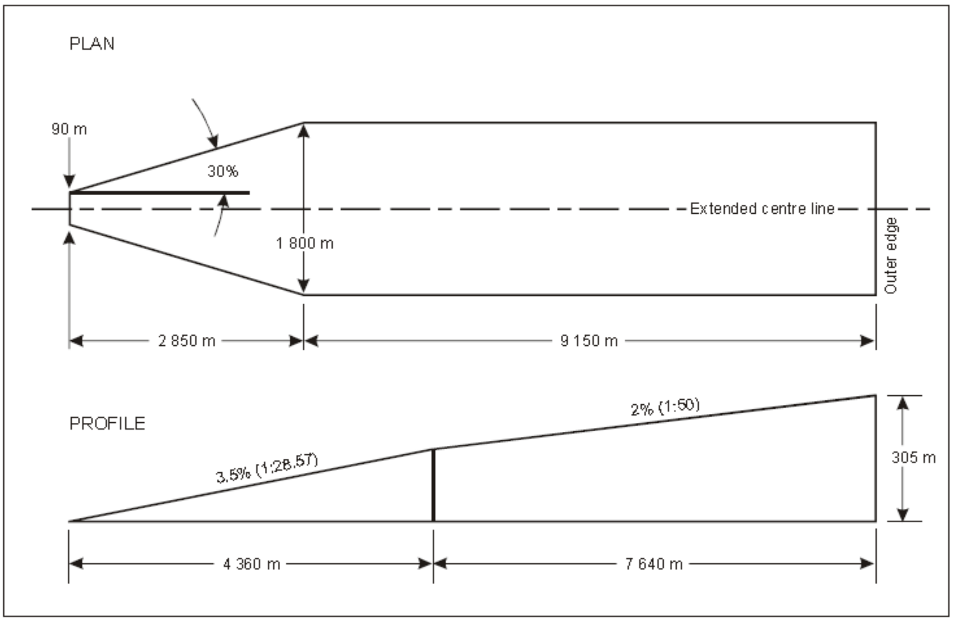


Figure D-2 – Take-off climb surface for instrument FATO

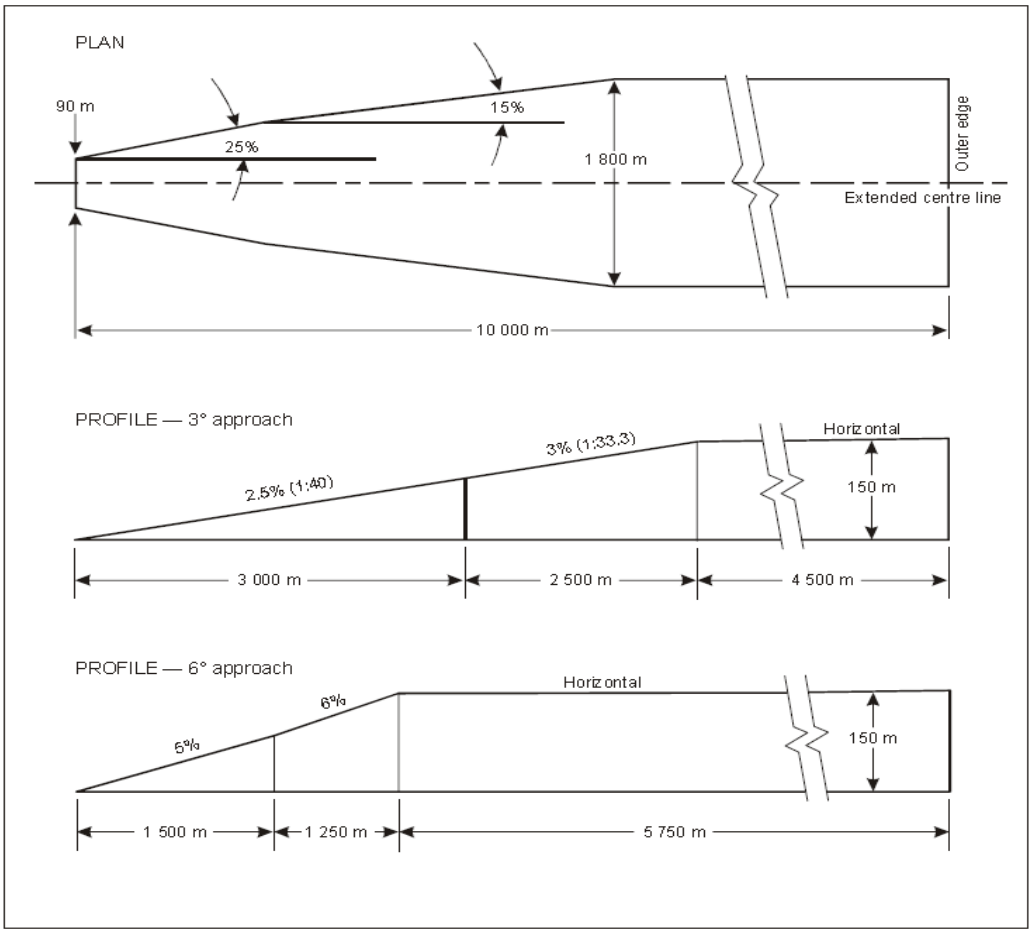


Figure D-3 – Approach surface for precision approach FATO

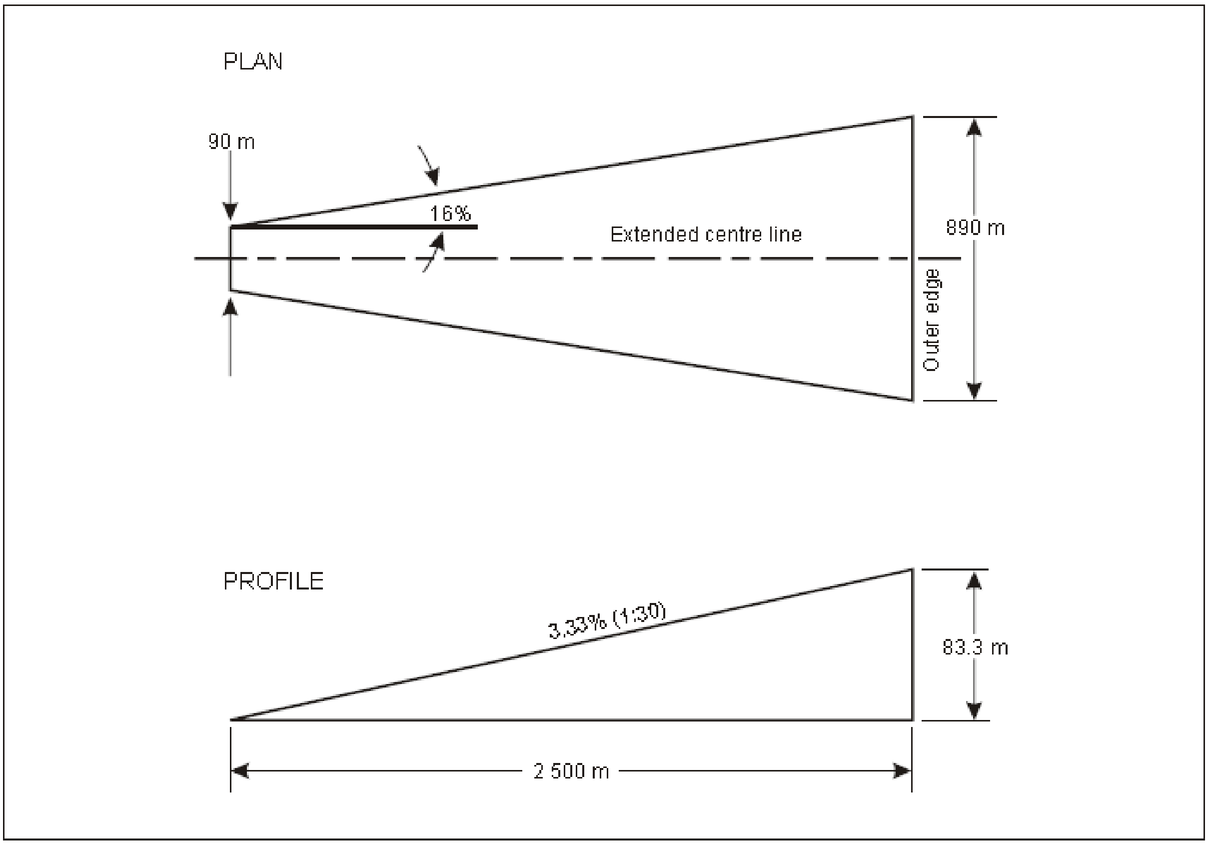


Figure D-4 – Approach surface for non-precision approach FATO

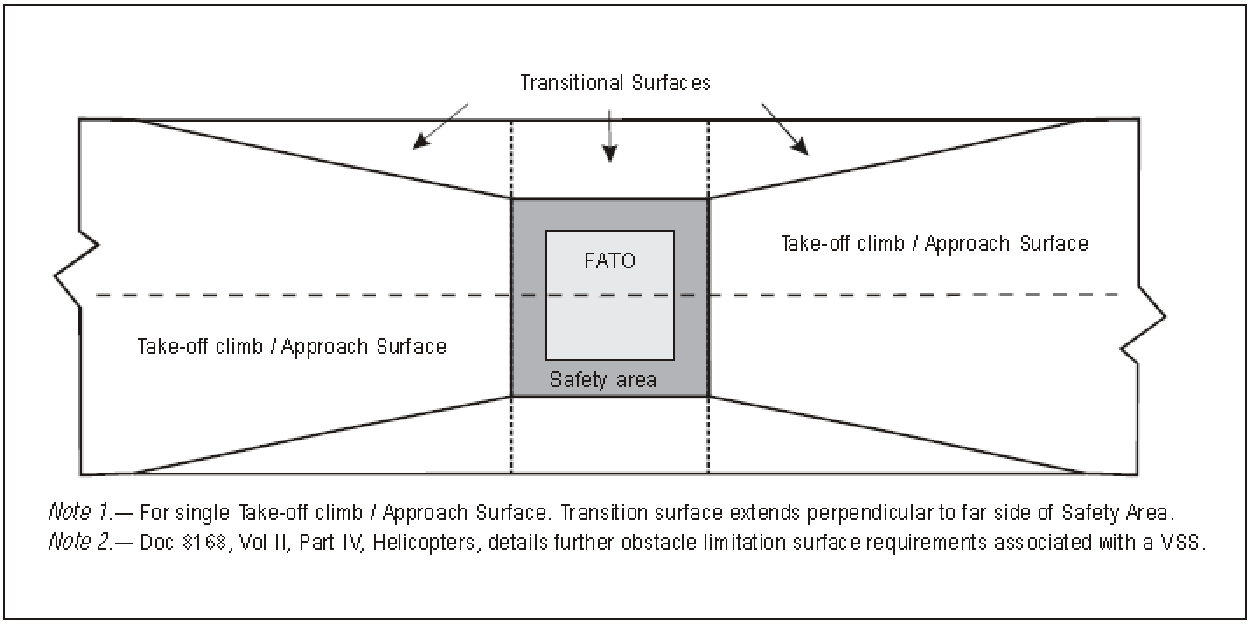


Figure D-5 – Transitional surfaces for an instrument FATO with a non-precision and/or precision approach

Table D-1 – Dimensions and slopes of obstacle limitation surfaces Instrument (Non-precision) FATO

Surface and Dimensions	
APPROACH SURFACE	
Width of inner edge	Width of safety area
Location of inner edge	Boundary of safety area
First Section	
Divergence	16%
Length	2500 m
Outer width	890 m
Slope (maximum)	3.33%
Transitional	20%

Slope Height	45 m

Table D-2 – Dimensions and slopes of obstacle limitation surfaces Instrument (Precision) FATO

Surface and dimensions	*3 deg approach* *Height above FATO*				*6 deg approach* *Height above FATO*			
	90 m (300 ft)	*60 m (200 ft)*	*45 m (150 ft)*	*30 m (100 ft)*	*90 m (300 ft)*	*60 m (200 ft)*	*45 m (150 ft)*	*30 m (100 ft)*
APPROACH SURFACE								
Length of inner edge	90 m	90 m	90 m	90 m	90 m	90 m	90 m	90 m
Distance from end of FATO	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence each side to height above FATO	25%	25%	25%	25%	25%	25%	25%	25%
Distance to height above FATO	1745 m	1163 m	872 m	581 m	870 m	580 m	435 m	290 m
Width at height above FATO	962 m	671 m	526 m	380 m	521 m	380 m	307.5 m	235 m
Divergence to parallel section	15%	15%	15%	15%	15%	15%	15%	15%
Distance to parallel section	2793 m	3763 m	4246 m	4686 m	3380 m	3187 m	3090 m	2993 m
Width of parallel section	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m
Distance to outer edge	5462 m	5074 m	4882 m	4686 m	3380 m	3187 m	3090 m	2993 m
Width at outer edge	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m
Slope of first section	2.5% (1:40)	2.5% (1:40)	2.5% (1:40)	2.5% (1:40)	5% (1:20)	5% (1:20)	5% (1:20)	5% (1:20)
Length of first section	3000 m	3000 m	3000 m	3000 m	1500 m	1500 m	1500 m	1500 m
Slope of second section	3% (1:33.3)	3% (1:33.3)	3% (1:33.3)	3% (1:33.3)	6% (1:16.66)	6% (1:16.66)	6% (1:16.66)	6% (1:16.66)
Length of second section	2500 m	2500 m	2500 m	2500 m	1250 m	1250 m	1250 m	1250 m
Total length of surface	10000 m	10000 m	10000 m	10000 m	8500 m	8500 m	8500 m	8500 m

TRANSITIONAL								
Slope	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m

STRAIGHT TAKE-OFF

Table D-3 – Dimensions and slopes of obstacle limitation surfaces

Surface and Dimensions	**Instrument**
TAKE-OFF CLIMB	
Width of inner edge	90 m
Location of inner edge	Boundary of end of clearway
First Section	
Divergence	30%
Length	2850 m
Outer width	1800 m
Slope (maximum)	3.5%
Second Section	
Divergence	Parallel
Length	1510 m
Outer width	1800 m
Slope (maximum)	3.5%*
Third Section	
Divergence	Parallel
Length	7640 m
Outer width	1800 m
Slope (maximum)	2%

*This slope exceeds the maximum mass one-engine inoperative climb gradient of many helicopters which are currently operating.

Table D-4 – Dimensions and slopes of the obstacle protection surface

Surface and Dimensions	Non-Precision FATO
Length of inner edge	Width of safety area
Distance from end of FATO	60 m
Divergence	15%
Total length	2500 m

Appendix I-E: Heliport Data

To aid the process for an assessment of a heliport, the following table may be used with reference to the helicopter performance characteristics and dimensions:

Helicopters operated in: Performance class 1 Performance class 2 or 3 Visual Instrument Precision Approach FATO Non-precision Approach FATO Non-instrument FATO	
Greatest overall dimension (D) of the largest helicopter the FATO is intended to serve	
Largest helicopter maximum take-off mass (MTOM)	
Heliport name	
Heliport reference point (WGS-84 coordinates)	
Heliport elevation	
Heliport type: surface-level, elevated or heliport	
TLOF: dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1000 kg)	
FATO: true bearing to one-hundredth of a degree designation number (where appropriate) length width to the nearest metre slope surface type	
Safety area: length width	

surface type	
Helicopter ground taxiway, air taxiway and air transit route: designation width surface type	
Apron: surface type helicopter stands	
Clearway: length ground profile	
Visual aids: visual aids for approach procedures markings lighting of FATO, TLOF, taxiways and aprons	

Distances to the nearest metre of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of a microwave landing system (MLS) in relation to the associated TLOF or FATO extremities.	
Declared Distances: take-off distance available rejected take-off distance available landing distance available	
Obstacle Limitation Surfaces: dimensions and slopes: Transitional Surface Slope: Height: Approach Surface* Width inner edge: Location of inner edge: First section: Divergence: Length:	

Outer width: Slope: Second section: Divergence: Length: Outer width: Slope: Third section: Divergence: Length: Outer width: Slope: Inner Horizontal Surface Height: Radius: Conical Surface Slope: Height: Take-Off Climb Surface Inner Edge: First section: Divergence: Length: Outer width: Slope: Second section: Divergence: Length: Outer width: Slope: Third section: Divergence: Length: Outer width: Slope: *****For Instrument (Precision Approach) FATO, refer to refer to Table 5.8	

Appendix I-F: Heliport Operations Guidance Material

The material contained in this Appendix is provided as an aid to assist heliport operators who have been issued with a Landing Area Acceptance and may also be used as a basis for the written Heliport Operational Procedures required by Chapter I-2.4.3 for Certificated Heliports.

This guidance material should be made available to all personnel that are involved in the operation, maintenance or inspection of the heliport, and those involved in the provision of an Emergency Response Team.

The information contained in this Appendix will be regarded by the GCAA as the primary indication of the standards likely to be achieved by the heliport operator. A copy of this Appendix is available from the GCAA on request as a standalone document.

الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY
United Arab Emirates

Heliport Operations Manual - Guidance

Part 1 – General Information

1.1 Purpose

The purpose of this guidance material is to ensure, as far as is practicable, the safe operation of the heliports by stating policy and providing instructions and information to enable the heliport operating staff to carry out their duties in a safe, responsible and efficient manner. The related sections are intended to achieve this aim.

1.2 Conditions of Use

For a heliport that has been issued with a Landing Area Acceptance, the heliport is only available for private (not Air Service) operations. Operations by helicopters conducting an Air Service or using instrument approach or departure procedures are only permitted at Certificated Heliports.

No helicopter should take-off or land at the heliport unless such emergency response, medical services and emergency arrangements, as are required in respect of such a helicopter, are provided there. Such services, equipment and facilities should at all time, when the heliport is available for the take-off or landing of helicopters, be kept fit and ready for immediate use.

Changes in the physical characteristics of the heliport including the erection of new buildings and alterations to existing buildings or to visual aids should not be made without prior assessment in line with the Guidance provided in CAR-HVD PART I (ONSHORE HELIPORT).

If the heliport is available for the take-off and landing of helicopters at night, such systems of lighting the heliport, as described in CAR-HVD PART I (ONSHORE HELIPORT), shall be in operation at all times when helicopters are taking-off or landing at night.

1.3 Distribution of the Guidance Material

This guidance material should be made available to every member of the heliport operating staff.

Part 2 – Heliport Operating Procedures and Safety Measures

2.1 Access to Heliport Movement Area

Safeguards should be in place to prevent inadvertent entry of animals and deter the entry of unauthorised persons or vehicles to the heliport movement area. Safeguards should be in place to ensure that there is reasonable protection of persons and property from helicopter rotor wash.

All access to the heliport movement area should be controlled, and access to the movement area only permitted for passengers, authorised persons or vehicles.

All vehicular entrances to the heliport and movement areas should have gates or barriers. Barriers should be high enough to present a positive deterrent to persons inadvertently entering an movement area and yet low enough to be non-hazardous to helicopter operations.

Heliport operators may choose to secure their movement areas via the use of security guards and a mixture of fixed and movable barriers. Training of personnel should be considered as a part of any operational procedure. All users of the heliport should comply with rules applicable to the heliport as regards keeping gates and barriers closed.

All vehicular entrances should be provided with appropriate warning notices.

No vehicle should proceed onto the manoeuvring area without authorisation. Vehicles should give way to helicopters at all times and all vehicles operating on the manoeuvring should display their vehicle hazard warning lights.

Drivers should be briefed and vehicles should be escorted, if considered necessary.

2.2 Heliport Movement Area Inspections

The heliport should be inspected prior to the commencement of helicopter operations. Additional inspections should be carried out taking into account:

a) the frequency of operations;

b) duration of operations;

c) types of helicopter served;

d) the heliport environment; and

e) the complexity of operations and the size of the heliport.

These inspections should ensure that the Movement Area is clear of foreign objects, harmful irregularities, temporary obstructions or hazardous conditions. These inspections should include the condition of the TLOF, signs, markings, lighting and the wind direction indicator. Details of each inspection should be recorded and should include any corrective action taken.

During periods of unusual weather conditions, additional inspections may be required.

In the event of any unserviceability that cannot be corrected within a reasonable time, helicopter operators that normally use the heliport should be made aware of the unserviceability.

A surface inspection of the appropriate area should be carried out whenever an accident or incident occurs, or a report of debris on the helicopter movement area is made.

2.3 Heliport Movement Area Surface Condition and Maintenance

The heliport facilities should be maintained in a condition that does not impair the safety, security, regularity or efficiency of helicopter operations.

Assessments of the condition and bearing strength of the TLOF area should be carried out during routine and non-routine surface inspections.

The bearing strength should be assessed with reference to the maximum all up weight (MAUW) of the largest helicopter likely to use the heliport.

Where the assessment reveals a critical condition, the decision should be made on whether the surface conditions justify withdrawal of part or all of the manoeuvring area.

Heliport users and operators of should be advised of any changes in the heliport operational state.

2.4 Heliport visual aids

Each visual aid for navigation should provide reliable and accurate Guidance to heliport users and any unserviceable or deteriorated items should be restored back into service without undue delay.

2.5 Heliport Works Safety

Works and maintenance on the movement area should only be allowed with prior approval and working parties should be briefed, having regard to the circumstances prevailing.

Short term work on or near the FATO or TLOF in use, or within the protected surfaces, should be continuously monitored.

All temporary obstacles and equipment, including personnel and vehicles, should be removed prior to the arrival or departure of helicopters.

Areas of work should to be clearly defined, and drivers of vehicles should adhere to briefed routes to and from such areas. Conduct of the work and vehicle movements should to be monitored throughout operational hours.

If works are in progress on the movement area, it should be suitably marked.

2.6 Wildlife Hazard Management

The heliport management has a duty of care toward helicopter operators and should meet this responsibility as far as is reasonably practicable. This is achieved by providing an active Wildlife Management Control Programme utilising available staff and other resources in an efficient and effective manner, thereby reducing the bird strike hazard to helicopter on and around the heliport and to restrict access of animals entering the heliport.

The heliport and the visible surrounding areas should be monitored for wildlife activity, taking appropriate action when a hazard is detected. A warning should be issued to pilots by RTF (if possible) whenever birds are flocking on or near to the FATO and dispersal action is not complete or has not been fully effective.

All bird strikes and near misses, whether observed or reported, are to be notified to the GCAA via the Voluntary Occurrence Reporting System (VORSI) on the GCAA website.

Refer to Part 2.10 for reporting of Safety Incidents.

2.7 Obstacle Control

An initial assessment should be undertaken to establish the obstacle environment surrounding the heliport with reference to the Obstacle Limitation Surfaces (OLS) specified in CAR-HVD PART I (ONSHORE HELIPORT) Chapter 6. This should be validated annually by a Validation Assessment as described in AMC 61.

Action should be taken to ensure that the Obstacle Limitation Surfaces remain clear of all permanent and semi-permanent obstructions.

For areas outside the heliport, safeguarding arrangements should be made with the local municipalities to aid the control of potential buildings or other structures which may affect helicopter operations.

2.8 Reporting of accidents

The following notification procedure should be followed when a helicopter accident has occurred on or in the vicinity of the heliport;

if any person suffers death or serious injury; or

if the helicopter suffers substantial damage, or structural failure requiring major repairs; or

if a helicopter is missing or completely inaccessible.

A nominated person should telephone the GCAA Duty Inspector to report a helicopter accident or serious incident on +971 50 641 4667, and pass as much of the following information as is available:

a) helicopter type, model, nationality and registration

b) name of owner and operator

c) name of pilot in command

d) date and time (UTC) of accident

e) last point of departure and next point of intended landing of the helicopter

f) location of the accident

g) number of persons on board the helicopter at the time of the accident

h) number of persons killed or seriously injured

i) number of persons killed or injured elsewhere than on the helicopter

j) nature of the accident and brief description of damage to the helicopter

2.9 Disabled Helicopter Removal

The wreckage of a helicopter must not be removed or interfered with unless specific permission has been given by the GCAA except for the following purposes:

The extrication of persons, animals or mail

To prevent further destruction by fire or other danger

To remove an obstruction to the public, to air navigation or other transport.

If no immediate danger to persons, animals or mail exists, and specific permission has been given by the GCAA to move the wreckage, sketches and photographs of the incident and surrounding areas should be obtained with as much detail as possible prior to moving the wreckage, to assist in any subsequent investigation.

2.10 Reporting of Safety Incidents

The GCAA has developed a voluntary reporting system (VORSY) available on the GCAA website *www.gcaa.gov.ae/en/vorsy/eform.aspx*. Guidance on the GCAA's voluntary reporting is found in AMC 57 – Voluntary Occurrence Reporting System.

A VORSY report may be reported when there is information that may help in improving aviation safety but it has not been reported through an existing channel, or the heliport operator wishes for others to learn and benefit from a safety event or hazard without disclosing their identify.

For less significant or minor incidents details should be kept and include:

Date of occurrence;

Action taken; and

Photos and Drawings.

Part 3 –Safety Management System Guidance Material

This guidance material is written for small, non-complex organisations. Whether or not this guidance material is suitable for your organisation will depend on various factors including the size, complexity and the level of risk associated with your activities. For further guidance, please refer to CAR Part X (Safety Management System Requirements).

3.1 Introduction

This Guidance Material has been developed to direct all personnel in the safe operations of the organisation and defines the policy that governs the operation of the heliport.

SMS is a pro-active, integrated approach to safety management. SMS is part of an overall management process in order to ensure that the goals of the organisation can be accomplished. It embraces the principle that the identification and management of risk increases the likelihood of accomplishing the mission. Hazards can be identified and dealt with systematically through the Hazard Reporting Program that facilitates continuing improvement and professionalism. Auditing and monitoring processes ensures that helicopters are operated in such a way as to minimize the risks inherent in-flight operations.

3.2 Safety Management Plan

Safety holds the key to this organisation's future and affects everything we do.

The Safety Management Plan is the tool used to define how SMS supports the organisation's Operations Plan. Organisation management is committed to the SMS, and is required to give leadership to the program and demonstrate through everyday actions, the commitment to safety and its priority in the achievements of the organisation.

The processes in place in the Safety Management Plan include the active involvement of all personnel, who, through planning and review, must continue to drive efforts for continuing improvement in safety and safety performance. The term "Safety Management" should be taken to mean safety, security, health, and environmental management. The key focus is the safe operations of airworthy helicopter.

Safety audits are essential components of the Safety Management Plan. They review systems, identify safety issues, prioritize safety issues, must involve all personnel, and enhance the safety of operations.

3.3 Safety Principles

Management embraces the following safety principles:

a) Always operate in the safest manner practicable

b) A culture of open reporting of all safety hazards in which management will not initiate disciplinary action against any personnel, who in good faith, due to unintentional conduct, disclose a hazard or safety incident

c) Never take unnecessary risks

d) Safe does not mean risk free

e) Everyone is responsible for the identification and management of risk

f) Familiarity and prolonged exposure without a mishap leads to a loss of appreciation of risk

3.4 Key Personnel

The Heliport Operator has overall accountability for safety and the safe management of operational services and systems planned, provided and operated by the heliport. Safety accountabilities include:

a) All operations are conducted in the safest manner practicable.

b) Ensuring the safety of all employees, customers, passengers and visitors.

c) Development of long-term safety objectives, including establishment of safety policies and practices.

d) Implementation of management systems that will establish and maintain safe work practices.

e) Ensuring the heliport's business plan is sufficiently resourced to enable the success of the safety policy and management system.

f) Taking a leadership role in the heliport's safety programme and ensuring that safety does not become subordinate to financial matters.

g) Appointing competent and safety conscious persons and monitoring their performance to ensure that safety is given a high priority within their training and development plans.

h) Setting safety targets and objectives and monitoring achievements.

3.5 Compliance with Standards

All personnel have the duty to comply with approved standards. These include organisation policy, procedures; helicopter manufacturer's operating procedures and limitations, and government regulations. Research shows that once you start deviating from the rules, you are almost twice as likely to commit an error with serious consequences.

Breaking the rules usually does not result in an accident; however, it always results in greater risk for the operation, and the organisation supports the principle of, "NEVER take unnecessary risks."

3.6 Intentional Non-compliance with Standards

Behaviour is a function of consequences. Management is committed to identifying deviations from standards and taking immediate corrective action. Corrective action can include counselling, training, discipline, grounding or removal. Corrective action must be consistent and fair.

Organisation management makes a clear distinction between honest mistakes and intentional non-compliance with standards. Honest mistakes occur, and they should be addressed through counselling and training.

Research has shown that most accidents involve some form of flawed decision-making. This most often involves some form of non-compliance with known standards. Non-compliance rarely results in an accident; however, it always results in greater risk for the operation.

Organisation policy agrees with the following conclusions:

a) Compliance with known procedures produces known outcomes

b) Compliance with standards helps guarantee repeatable results

c) Bad rules produce bad results

d) Complacency affects the safe operation of the helicopter and cannot be tolerated

e) Standards are mechanisms for change

f) The hardest thing to do, and the right thing to do are often the same thing

3.7 Rewarding People

Reward systems are often upside down. Reinforced bad behaviour breeds continued bad behaviour. This is unacceptable. This organisation is committed to the principle that people should be rewarded for normal, positive performance of *their* duties that complies with organisation standards. Personnel will not be rewarded for accomplishing the mission by breaking the rules.

3.8 Safety Promotion

Safety is promoted as a "core value." Procedures, practices and allocation of resources and training must clearly demonstrate the organisation's commitment to safety. We must change the perception that the mission is what's most important no matter the risk. The following methods are used to promote safety:

a) Posting the Safety Policy in prominent locations around the base of operations

b) Starting meetings with a comment or review about safety issues

c) Having a safety bulletin board

d) Having an employee safety feedback process

3.9 Document and Data Information Control

All safety documents should be controlled through the technical library. This includes the SMS, operations, maintenance and training manual. Change control procedures should be incorporated into each of these documents.

The Safety Officer should be responsible for maintaining and safekeeping safety related data, including the minutes of safety meetings, information on hazard and risk analysis, risk management, remedial action, incident and accident investigations, and audit reports.

3.10 Hazard Identification and Risk Management

Risk management is the identification and control of risk and is the responsibility of every member of the organisation. The first goal of risk management is to avoid the hazard. The organisation should establish sufficient independent and effective barriers, controls and recovery measures to manage the risk posed by hazards to a level as low as practicable. These barriers, controls and recovery measures can be equipment, work processes, standard operating procedures, training or other similar means to prevent the release of hazards and limit their consequences should they be released. The organisation should ensure that all individuals responsible for safety critical barriers, controls, and recovery measures are aware of their responsibilities and competent to carry them out. The organisation should establish who is doing what to manage key risks and ensure that these people and the things they should do are up to the task.

The systematic identification and control of all major hazards is foundational. The success of the organisation depends on the effectiveness of the Hazard Management Program.

The purpose of the risk assessment process is to identify risks, assess them in terms of severity and likelihood so that appropriate mitigation measures can be implemented to either eliminate the risk or reduce the risk to as low as reasonably practicable. The assessment process also allows the risks to be ranked in order of risk potential so that priorities can then be established and resources can be targeted more effectively.

The risk assessment process starts with identifying the hazards associated with the heliport operation and then the actual risks associated with the hazard. It is important to include people with the relevant expertise and experience in the risk assessment process to ensure the robustness of the process. All risk assessments are reliant on the quality of the information used to make the assessment and the knowledge of the people conducting the assessment.

The hazard/risk identification process should be both proactive and reactive and depending on the size and complexity of the heliport the following methods may be useful to identify safety hazards and the risks associated with them:

Brainstorming, where any relevant persons meet to identify/review potential hazards and associated risks at the heliport. This may be required for a range of items or to consider a specific risk.

Heliport incident reports.

Confidential voluntary reports.

Internal/external audits.

Either internal or external safety assessments/technical inspections.

Liaison with other similar heliports.

Generic hazard checklists.

Following the identification of a hazard, the risks associated with the hazard will need to be assessed. The risk should be assessed in terms of severity (the severity of the potential adverse consequences) and probability (the likelihood of the risk causing adverse consequences).

SEVERITY OF CONSEQUENCES		
Aviation definition	**Meaning**	**Value**
Catastrophic	Equipment destroyed. Multiple deaths.	A
Hazardous	A large reduction in safety margins, physical distress or a workload such that the personnel cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.	B
Major	A significant reduction in safety margins, a reduction in the ability of personnel to cope with adverse operating conditions as a result of the workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.	C
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	D
Negligible	Little consequence	E

PROBABILITY OF OCCURRENCE		
Qualitative definition	**Meaning**	**Value**
Frequent	Likely to occur many times	5
Reasonably probable	Likely to occur sometimes	4
Remote	Unlikely, but possible to occur.	3

Extremely remote	Very unlikely to occur	2
Extremely improbable	Almost inconceivable that the event will occur	1

When the levels of severity and likelihood have been defined, a Risk Tolerability Matrix can then be used to assess the tolerability of the risk. While the severity of the consequences can be defined relatively easily, the likelihood of occurrence (probability) may be more subjective and rely on a logical, common sense analysis of the inter-related facts.

Risk Tolerability Matrix

Probability

Severity	1 Extremely improbable	2 Improbable	3 Remote	4 Occasional	5 Frequent
A Catastrophic	Review	Review	Unacceptable	Unacceptable	Unacceptable
B Hazardous	Acceptable	Review	Review	Unacceptable	Unacceptable
C Major	Acceptable	Review	Review	Review	Unacceptable
D Minor	Acceptable	Acceptable	Review	Review	Review
E Negligible	Acceptable	Acceptable	Acceptable	Review	Review

From the risk tolerability matrix the risk can then be classified as either acceptable, to be reviewed or un-acceptable allowing a suitable risk mitigation strategy to be developed if required.

Unacceptable: If the risk is unacceptable, major mitigation will be necessary to reduce the severity of the consequences and/or the likelihood of the occurrence associated with the hazard.

Review: If the risk needs to be reviewed the severity of the consequences or the probability of occurrence is of concern; measures to mitigate the risk to as low as reasonably practicable should be sought. Where the risk is still in the review category after this action has been taken it may be that the cost or actions required to reduce the risk further are too prohibitive. The risk may be accepted, provided that the risk is understood and has the endorsement of the individual ultimately accountable for safety at the heliport.

Acceptable: If the risk is acceptable the consequence is so unlikely or not severe enough to be of concern; the risk is tolerable. However, consideration should still be given to reducing the risk further to as low as reasonably practicable in order to further minimise the risk of an accident or incident.

If the level of risk falls into the **unacceptable** or **review** categories, mitigation measures should be introduced to reduce the risk to an acceptable level. Mitigation strategies could include eliminating the risk altogether or taking measures to reduce the severity if the risk occurred or the likelihood of the risk occurring. Risks should be managed to be as low as reasonably practicable, which means that the risk must be balanced against the time, cost and difficulty of taking measures to reduce or eliminate the risk.

Where the risk cannot be further reduced by reasonably practicable means, the following actions are to be taken:

If a high severity risk, the matter is to be brought to the Safety Review Board (SRB). The risk will be reviewed by the SRB, and if accepted will be signed off by the Senior Manager/Accountable Manager. Or if deemed necessary, a more senior director.

For a risk with a less potential severity, the matter should be reviewed by another manager reporting to the Accountable Manager and signed off. The reviewing manager must note the reasons and considerations for accepting the risk.

The final outcomes of the risk assessment process will be recorded and filed.

Risk Assessment Form

<table>
<tr><td colspan="4">RECORD OF ASSESSMENT</td></tr>
<tr><td colspan="4">Ref. No.</td></tr>
<tr><td colspan="2">Base: Section/Department:</td><td colspan="2">Type of harm:</td></tr>
<tr><td colspan="2">Work Activity:</td><td>Injury</td><td></td></tr>
<tr><td colspan="2">Team:</td><td>Damage to environment</td><td></td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Assessor Name:</td><td colspan="3">Signature:</td></tr>
</table>

<table>
<tr><td colspan="3">Date of Assessment:</td><td colspan="2">Review date:</td></tr>
<tr><td colspan="5">Employees at risk:</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="5">Others who may be at risk:</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="4">IF ADDITIONAL CONTROL MEASURES ARE REQUIRED, CAN THEY BE IMPLEMENTED IMMEDIATELY</td><td>YES / NO</td></tr>
<tr><td colspan="5">IF NO, SUMMARISE ACTION PLAN BELOW</td></tr>
<tr><td>Action required:</td><td>Target Date</td><td>Action by:</td><td colspan="2">Completed by (Name & Date)</td></tr>
<tr><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="5">Date for full implementation of control measures:</td></tr>
<tr><td colspan="5">Assessment accepted by: (relevant manager):</td></tr>
<tr><td colspan="5">Title:</td></tr>
<tr><td colspan="5">Date:</td></tr>
</table>

Risk Assessment Form (continued)

RISK ASSESSMENT

Hazards/Risks	Severity	Probability	Risk Rating	Additional control measures required	Residual Risk Rating		

3.11 Occurrence and Hazard Reporting

All occurrences and hazards identified by an employee should be reported using a reporting system. An example of an Occurrence and Hazard Report is given below.

Occurrence Report -- Hazard Identification Report	
Date:	Time:
Location:	Employee name:
Event or unsafe act(s) observed:	
Injuries/Illnesses experienced:	
Corrective action(s) taken:	
Causal Factors:	
Comments/*Recommendation*s:	
Safety Officer's Signature:	Date:

Occurrence - Definition

An occurrence is defined as: Any unplanned safety related event, including accidents and incidents that could impact the safety of guests, passengers, organisation personnel, equipment, property or the environment.

Hazard – Definition

A hazard is defined as: Something that has the potential to cause harm to a persons, loss of or damage to equipment, property or the environment.

Occurrences

All relevant comments and agreed actions should be recorded in the report. Reports should be closed when all actions have been taken. Occurrences should be reviewed on a monthly basis.

Personnel may anonymously report hazards using the same report.

Personnel who report should be treated fairly and justly, without punitive action from management except in the case of known reckless disregard for regulations and standards, or repeated substandard performance.

3.12 Management of Change (MOC)

The systematic approach to managing and monitoring organisational change is part of the risk management process. Safety issues associated with change are identified and standards associated with change are maintained during the change process.

Procedures for managing change include:

a) Risk assessment
b) Identification of the goals and objectives and nature of the proposed change
c) Operational procedures are identified
d) Changes in location, equipment or operating conditions are analyzed
e) Maintenance and operator Manuals are posted with current changes
f) All personnel are made aware of and understand changes
g) Level of management with authority to approve changes identified
h) The responsibility for reviewing, evaluating and recording the potential safety hazards from the change or its implementation
i) Approval of the agreed change and the implementation procedure(s)

There are methods for managing the introduction of new technology. All personnel should be consulted when changes to the work environment, process or practices could have health or safety implications. Changes to resource levels and competencies associated risks are assessed as part of the change control procedure.

Therefore an objective of the safety management system is to provide a framework for managing change and addressing risks when introducing or changing:

a) Equipment
b) Systems
c) Procedures
d) Personnel structures

All such changes must be adequately addressed to ensure that safety is not degraded during or as a consequence of such changes and that wherever practical, safety is enhanced by such changes.

Part 4 – Heliport Emergency Services

4.1 Principle Objective

The principal objective of a Heliport Emergency Response Team is to save lives. For this reason, the provision of means for dealing with a helicopter accident/incident occurring at or in the immediate vicinity of a heliport provides the greatest opportunity for saving lives.

Helicopter Rescue is defined as actions taken to save persons involved in a helicopter accident/incident, support self-evacuation, and to assist the removal of injured / trapped persons.

The operational objective is to staff the Heliport Emergency Response Team and respond as quickly as possible to any helicopter accident/incident.

4.2 Equipment Inspection

At the start of each initial flight, all the appropriate rescue equipment should be inspected, be in position and available for immediate use.

4.3 Training

The Emergency Response Team should be provided with training and be competent in the safe use of fire extinguishers.

Equipment and training records should be maintained and retained for future reference.

Training should be conducted in the following subjects depending on the complexity of the operations.

Training
Familiarization of heliport
Familiarization of helicopter
Familiarization of fire extinguishers/Diffs
Familiarization of emergency call out procedures
Practical emergency exercise
Heliport Inspection Familiarization/Training
Helicopter Start up Procedure Training

Helicopter landing Procedure Training
Helicopter Fuelling Procedure Training

4.4 Emergency Response

EMERGENCY CALL OUT INSTRUCTION

IN THE EVENT OF AN HELICOPTER CRASH / ENGINE FIRE / ACCIDENT THE FOLLOWING ACTION IS TO BE UNDERTAKEN IMMEDIATELY

CALL IMMEDIATELY!

CIVIL DEFENCE / FIRE SERVICE	998 / +971 XX XXX XXXX
AMBULANCE SERVICE	997
POLICE	999
HELIPORT OPERATOR/OWNER	+971 XX XXX XXXX
GCAA DUTY INVESTIGATOR	+971 50 641 4667

PROVIDE THE FOLLOWING INFORMATION

METHANE FORM

Time		**Date**	
Organisation			
Name of Caller		**Tel No**	

M	Major incident (Crash / Fire)	Has a Major Incident been declared? YES/NO	
E	Exact Location	What is the exact location or geographical area of incident? Any landmarks?	
T	Type of Incident	What kind of incident is it? (crash on land on/off heliport, on water, fire, collision, etc)	
H	Hazards	What hazards or potential hazards can be identified?	

A	Access	What are the best routes for access and egress into the scene?	
N	Number of casualties	How many casualties are there and what condition are they in?	
E	Emergency Services	Which and how many emergency responder assets/personnel are required or are responding/ already on-scene?	

Appendix I-G: Design Acceptance

G1 General

G1.1 For new heliports, the heliport operator should obtain a Design Acceptance prior to commencing construction. A Design Acceptance will provide assurance that the proposed heliport will comply with the physical characteristic requirements contained in this CAR-HVD PART I.

G.1.2 The issue of a Design Acceptance by the GCAA does not provide approval to commence construction of the heliport.

G2 Request

G2.1 To request a Design Acceptance, the applicant must have access to the ANA e-Services as detailed in Chapter I-2.2, and commence the process to request a Heliport Certificate or a Landing Area Acceptance.

G2.2 A request for a Design Acceptance will be subject to the payment of any applicable GCAA Services Fees.

G3 Information

G3.1 The information required to support the request for a Design Acceptance shall include design drawings and a design report or other documentation which provides details on the:

a) physical size and layout of the facility;
b) Airspace (Classification, height, etc)
c) the obstacle environment surrounding the heliport and areas of public
d) location of the heliport with regards to buildings and areas of public use;
e) size, colour and layout of any markings;
f) layout, location and colour of any lighting and other visual aids; and
g) details of the Emergency Response to be provided in accordance with Chapter 9 paragraphs 9.6, 9.7 and 9.8.
h) surface and/or pavement characteristics

G3.2 The GCAA may ask for clarification or additional information. Once satisfied, the GCAA will issue a Design Acceptance of the proposal.

G4 Acceptance

G4.1 A Design Acceptance shall be valid for a period of one year. If construction of the heliport has not been completed by that time, the applicant should request another Design Acceptance to ensure that the proposal remains in compliance with GCAA Regulations.

G4.2 The issue of a Design Acceptance does not permit the heliport to be used for helicopter operations when construction is completed. The heliport operator must still obtain a Heliport Certificate or a Landing Area Acceptance as detailed in Chapter I-2.

Appendix I-H: Emergency Evacuation Helipad

1 Introduction

1.1 An emergency evacuation helipad is a clear area on a roof of a tall building that is not intended to function fully as a heliport, yet is capable of accommodating helicopters engaged in emergency evacuation operations.

1.2 To facilitate emergency evacuation operations, local building requirements (where applicable) may require structures over a specified height to provide a clear area on the roof capable of accommodating a helicopter. Since the cleared area is not intended to function as a heliport, there is no requirement to apply for certification or acceptance from the GCAA, however permissions or approvals may be required from the appropriate authorities, municipalities or the Civil Defence.

1.3 An emergency evacuation helipad shall not show the Heliport Identification Marking detailed in Chapter I-7.2.

1.4 The owner/occupier of a building with an emergency evacuation helipad shall provide details of the emergency evacuation helipad to the GCAA at ***ana@gcaa.gov.ae***. This information shall include the name of the building, its geographic location in WGS-84 coordinates and the D-Value.

1.5 The D-value is the largest overall dimension of the largest helicopter intended to use the helipad. It is 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 helicopter structure.

1.6 Operators of emergency evacuation helipads should also advise the local air traffic services of the facility and should produce supporting procedures.

1.7 If the emergency evacuation helipad is no longer intended to be used, all markings shall be removed or the Closed Marking detailed in Chapter 7.16 shall be painted on the helipad.

2 Final Approach and Take-Off (FATO) Areas

2.1 An emergency evacuation helipad should be provided with a final approach and take-off area (FATO) that should be obstacle free.

2.2 The dimension of the FATO should of sufficient size and shape to contain an area within which can be drawn a circle of 1.25 D.

3 Touchdown and Lift-Off (TLOF) Area

3.1 An emergency evacuation helipad should be provided with a touchdown and lift-off area (TLOF), with the centre of the TLOF co-located with the centre of the FATO.

3.2 The TLOF should be of sufficient size to contain a circle of diameter of at least 0.83 D.

3.3 The TLOF should be dynamic load bearing.

3.4 A TLOF perimeter marking should be displayed along the edge of the TLOF.

3.5 A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

4 Helipad Identification Marking

4.1 An emergency evacuation helipad should be provided with a helipad identification marking located at the centre of the TLOF.

4.2 The helipad identification marking should consist of a yellow colored ‘E’ as depicted in Figure 11-1, with dimensions no less than those shown.

5 Maximum Allowable Mass

5.1 A marking indicating the maximum allowable mass for which the helipad has been designed to accommodate should be displayed at an emergency evacuation helipad.

5.2 A maximum allowable mass marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

5.3 The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter “t”.

6 D-Value Marking

6.1 The D-value marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

6.2 The D-value marking should be white. It should be rounded down to the nearest whole number, followed by the letter “m”.

7 Building Fire Protection

7.1 The buildings fire protection system shall be designed so as to afford fire protection for the evacuation helipad to support its operational function.

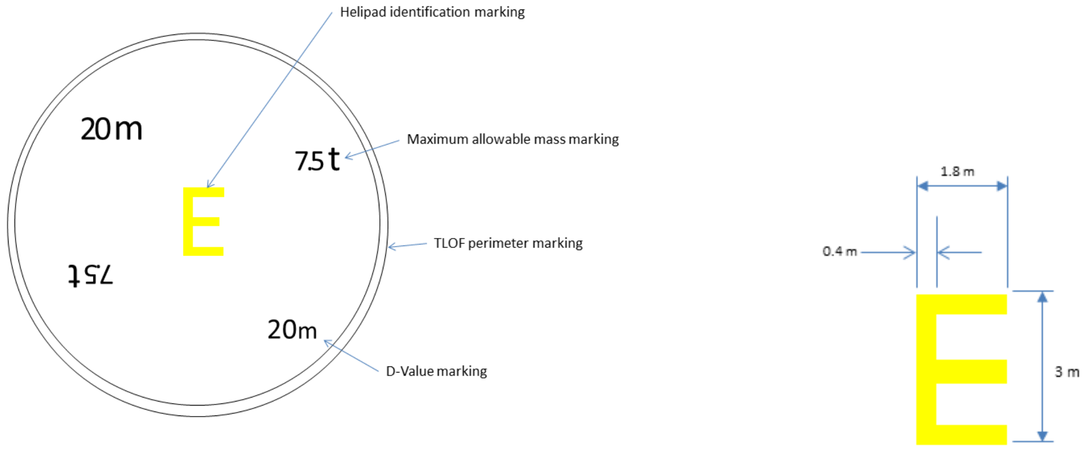


Figure H-1 – Emergency Evacuation Helipad Markings

Appendix I-I: Task Resource Analysis Example

Note. — For additional guidance on task/resource analysis, see ICAO Doc 9137 — Part 1, Chapter 10.5.

1. Scope

1.1. A task/resource analysis (TRA) describes the stages to be considered by a heliport operator and justifies the minimum number of qualified personnel needed to deliver an effective RFFS and deal with a helicopter incident/accident at the heliport.

2. Purpose

2.1 A risk-based approach that focuses on probable worst-case scenarios should be used where the purpose of the analysis is to identify the minimum number of personnel required to undertake identified tasks in real time, before supporting external services are on location able to assist the RFFS

3. Considerations

3.1 When conducting the analysis, consideration should be given to the types of aircraft using the heliport and the need for personnel to use PPE, RPE, hand lines, ladders and other rescue and firefighting equipment provided.

4. Task Analysis/Risk Assessment

4.1 A TRA should primarily consist of a qualitative analysis of the RFFS response to a realistic, worst-case aircraft incident scenario. The purpose should be to review the current and future staffing levels of the RFFS deployed at the heliport. The qualitative analysis may be supported by a quantitative risk assessment to estimate the reduction in risk. This risk assessment could be related to the reduction in risk to passengers and aircrew from deploying additional personnel. The impact of any pinch-points identified by the qualitative analysis must be assessed. The quantitative assessment should not be utilized to reduce the minimum number of RFFS personnel defined by the qualitative analysis.

Note. - A pinch-point is defined as a point in the procedure where the task demand exceeds the capability of the firefighter(s) or crew to undertake a task effectively without performance becoming degraded.

5. Procedure for workload assessmne – Pinch points

5.1 If a pinch-point occurs when a task is critical to the success of the overall activity, the risk may be significantly increased. Workload assessment indicators are:

a) task criticality, i.e. the importance of the task to the success of the overall activity; and

b) task difficulty, defined in terms of:

1) (C) cues necessary to initiate or complete the task;

2) (T) time limitations imposed upon the staff to complete the task within a given window of time;

3) (P1) precision or skill required to undertake the task which, if excessive, could influence performance;

4) (M) mental demands, i.e the necessary skill and knowledge required from staff for a successful performance; and

5) (P) physical: demands upon staff due to heavy or sustained physical effort for successful task performance.

5.2 To evaluate the demands on each team member, the workload assessment indicators are rated for criticality or difficulty on a scale of one to three. An overall rating of three identifies pinch-points. The ratings are allocated as follows:

Appendix I-I Table 1: Workload assessment indicators

Rating	Task criticality	Task difficulty
1	Not critical to overall success of response.	Not difficult or not relevant to task.

2	Critical to success of sub-task.	Difficult but within capability of firefighter.
3	Essential for success of activity.	Very difficult causing loss of performance.

6. Workload assessment indicators

6.1 The overall rating of a task is determined by the following rule: if a rating of 3 occurs in one or more of the ‘task difficulty indicators, the overall rating is assigned as 3, but only if the task criticality is also equal to 3. Otherwise, the overall rating takes the next highest value of the assessments for task difficulty (1 or 2) regardless of task criticality. This ensures that only tasks that are critical to the overall success are considered as potential pinch-points.

Note.— Although the result is numerical, it is indicative only of the relative effect of the task on overall performance. It enables comparisons to be made between different modes of personnel deployment or the use of different types of equipment or technique. A qualitative assessment is required.

6.2 A TRA and workload assessment should be used to identify the effectiveness of the current staffing level and to identify the level of improvement resulting from additional staffing. A worst-case scenario should be analysed to assess the relative effectiveness of at least two levels of RFFS staffing. The following items will assist in determining the basic contents of the analysis:

Note.— The list is not exhaustive and should only act as a guide.

a) description of heliport;

b) RFFS category;

c) response criteria;

d) current rate of movements;

e) operational hours;

f) current structure and establishment;

g) level of personnel;

h) level of supervision;

i) extraneous duties;

j) alerting system;

k) appliances and media availability;

l) specialist equipment;

m) medical facilities (role responsibility);

n) pre-determined attendance: appropriate authority (police, fire and ambulance);

o) Incident task analysis (worst case scenario, workload assessment, human performance);

p) appraisal of existing RFFS provision;

q) future requirements (heliport development and expansion); and

r) enclosures (maps, event trees etc.).

7. Conduct of assessment

7.1 The objective of RFFS is to save lives. The aim is to establish and maintain a team of competent personnel equipped with the required specialized equipment to provide an immediate response to an aircraft incident/accident to achieve that objective.

7.2 An assessment to establish the likely achievement of this aim should be conducted in a number of stages, each answering a specific question

Stage 1: Have the required tasks been identified that personnel should carry out?

The following tasks should be evaluated:

a) meet the required response time;

b) extinguish an external fire;

c) protect exit routes;

d) assist in self-evacuation;

e) extinguish an internal fire; and

f) rescue trapped personnel

Note.— The list is not exhaustive and should only act as a guide.

Stage 2: Has the team identified a selection of realistic accidents that could occur at the heliport?

This could be achieved by a statistical analysis of previous accidents at airports and heliports and by analysing data from both international and national sources. For example:

a) internal aircraft fire;

b) helicopter engine failure with a fire;

c) helicopter into helicopter with a fire; and

d) helicopter into terminal buildings with a fire.

Note.— All accidents/incidents should involve fire to represent worst-case scenarios.

Stage 3: Have the types of aircraft commonly in use at the heliport been identified?

This is important as the type of helicopters and their configuration have a direct bearing on the resources required in meeting Stage 1.

Stage 4: Has a worst-case location (in respect of the 4 km radius around the heliport reference point (HRP)) in which an aircraft incident could occur been identified?

To confirm the location of the worst-case scenario, a facilitator carries out this assessment using a team of experienced fire service personnel knowledgeable of the heliport and the locations in which an accident is likely to occur.

The team may have identified that the following factors contributed to a worst-case location:

- travel time;
- route to the accident site (hard or soft ground);
- terrain, including surface conditions;
- crossing active runways or FATOs;
- aircraft congestion;
- communications;
- supplementary water supplies;
- adverse weather conditions; and
- additional lighting.

Stage 5: Has the complete incident (worst-case scenario) been developed by combining the incident types described in Stage 2, with the aircraft types identified in Stage 3 and the worst-case locations described in Stage 4?

Stage 6: Has the worst-case scenario been subject to a TRA in a series of table-top exercises?

- Has the TRA and workload assessment been combined in a spreadsheet or matrix?
- Does the spreadsheet/matrix identify activities and sub-tasks in a logical sequence in real time?
- Does the spreadsheet/matrix identify staff utilization and vehicle deployment (as required)?
- Does the workload assessment identify task criticality, cues, time, precision, mental, physical and overall rating? Are they scored appropriately?
- Have any pinch-points been identified?
- Is there appropriate mitigation of the identified pinch-points?

8. Assessment conclusion

8.1 Following this assessment, the applicant's TRA is either acceptable or is required to address the issues raised in this assessment.

PART II: OFFSHORE HELIDECKS

Chapter II-1 – Introduction

1.1 Applicability

1.1.1 These regulations are applicable to all Primary Accountable Organisations who are accountable for the safety oversight of helideck operating companies and to operators of helidecks in the UAE.

1.1.2 A Primary Accountable Organisation is required to hold an Approval from the GCAA with reference to this part of CAR-HVD.

1.1.3 Helideck operators are required to demonstrate compliance for all installations with reference to this part of CAR-HVD.

1.2 General

1.2.1 In this publication the term ‘helideck’ refers to all helicopter landing areas on fixed or floating off-shore facilities used for mineral exploitation (for the exploration of oil and gas), research or construction. For helicopter landing areas on vessels (private or commercial use), the term 'shipboard helideck' may be used in preference to ‘helideck’.

1.3 Purpose

1.3.1 The regulation within this publication will ensure compliance with the UAE Civil Aviation Law and Civil Aviation Regulations and conformance with the international standards of ICAO Annex 14, Volume II.

1.3.2 Civil Aviation Regulation, Part III (General Regulations), Chapter 5 states that “An aircraft shall not land at, or take-off from, any place unless; the place is authorized by the GCAA; and the place is suitable for use as an aerodrome (helideck) for the purposes of the landing and taking-off of aircraft in safety, having regard to all circumstances, including the prevailing weather conditions”.

1.3.3 The regulation set out in this Part II indicates the minimum requirements to determine the suitability of a helideck and its continued use.

1.3.4 The purpose of this Part II is to provide regulation, guidance material and information on UAE off-shore installations to Primary Accountable Organisations (accountable for the safety oversight of helideck operating companies), and to helideck operators.

1.3.5 For land-based helicopter landing areas, reference should be made to Part I – Onshore Heliports: Air Service and Private Use (Not Air Service).

1.4 References

a) CAR DEF
b) CAR AIR OPS
c) GCAA CAR Part VI: Aviation Safety Regulations, Chapter 2: Transport of Dangerous Goods by Air
d) CAR Part IX (Aerodromes)
e) CAR Part X (Safety Management Requirements)
f) CAR Part XI (Aerodrome Emergency Services, Facilities and Equipment)
g) ICAO Annex 14 Volume II (Aerodromes) – Heliports
h) ICAO Heliport Manual Doc 9261-AN/903
i) ICAO Doc 9137 Airport Service Manual Part 1 Rescue and Fire-Fighting
j) National Fire Protection Association (NFPA) 418 Standards for Heliports
k) AMC-22 (Safety Incident Reporting)
l) AMC-35 (Inspecting and Testing of Rescue and Fire-Fighting Equipment)
m) AMC-36 (Runway and Movement Area Inspections)
n) AMC-43 (Foreign Object Debris – FOD)
o) AMC-57 (Voluntary Occurrence Reporting System)
p) CAR-HVD – PART I Onshore Heliports: Air Service and Private Use (Not Air Service)
q) ICAO Annex 15 (Aeronautical Information Services)

1.6 Policy

1.6.1 The GCAA will approve the Primary Accountable Organisation, once the criteria have been met; the safety oversight for the maintenance and condition of the helideck, the facilities, and for obstacle control, remains with the approved Primary Accountable Organisation.

1.6.2 For information which relates to helideck data / aeronautical data quality requirements, SMS, and mandatory reporting (ROSI), then in addition, reference shall be made to **CAR Part IX Aerodromes and CAR X**. For requirements relating to on-shore facilities, then in addition, reference shall be made to CAR-HVD-Part I - Heliports.

1.6.3 CAR AIR OPS provides regulation specifically for helicopter operations. Helideck operators should make reference to this document as an appreciation of the helicopter operators' responsibilities as holder of an air operator certificate (AOC). Such helicopter operators shall ensure that all pilots are familiar with the regulations and procedures pertinent to the performance of their duties.

1.7 Definitions

Accepted Landing Area.	An aerodrome or heliport whose operator has been granted a Landing Area Acceptance.
Accuracy.	A degree of conformance between the estimated or measured value and the true value. Note: For measured positional data, the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.
Approved by the Authority.	Documented by the Authority as suitable for the purpose intended.
Assessor	A designated examiner for assessment of the theoretical and practical competencies of a trainee for the issuance of a certificate of competency after successful completion of a given structured learning program in accordance with the training standards defined in this regulation

Authority Publication.	Any applicable document published by the Authority including, but not limited to Civil Aviation Regulations (CARs), Safety Alerts, Standalone GM, Standalone AMC, Standards, Informational Bulletins, Notice to Aerodrome Certificate Holders (NOTAC); Operational Directives (DIR) or any other applicable document published as an e-Publication as part of the GCAA website.
Certified Heliport	A heliport whose operator has been granted a Heliport Certificate by the GCAA under applicable regulations for the operation of a heliport.
Deck integrated firefighting system (DIFFS)	a fixed firefighting system consisting practical a series of flush-mounted nozzles positioned over the surface of the practical critical area which, upon activation, are capable of delivering primary extinguishing agent to the entire loadbearing area of the heliport.
Design D.	The D of the design helicopter
Design Helicopter	The helicopter type having the largest overall length and greatest maximum certificated take-off mass for which a helideck or shipboard helideck has been designed. Both attributes may not reside in the same helicopter.
Dispersed pattern application	Foam or water delivered over a wider area from nozzles mounted in the deck surface, e.g. DIFFS.
D-value	A limiting dimension, in terms of ‘D’, for a heliport, helideck or shipboard heliport, or for a defined area within.
Elevated heliport	A heliport located on a raised structure on land.
Elongated.	When used with TLOF or FATO, elongated means an area which has a length more than twice its width.
Emergency Evacuation Helipad	An emergency landing area on top of a building, solely for the purpose of emergency evacuation of the building.

Falling gradient	A surface extending downwards on a gradient of 5:1 measured from the edge of the safety netting (or shelving) located around the TLOF below the elevation of the helideck or shipboard helideck to water level for an arc of not less than 180 degree which passes through the centre of the TLOF and outwards to a distance that will allow for safe clearance of obstacles below the TLOF in the event of an engine failure for the type of helicopter the helideck or shipboard helideck is intended to serve. Where high-performing helicopters are exclusively used, consideration may be given to relaxing the falling gradient from a 5:1 to a 3:1 slope.
Fire control time	a fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent.
Fixed application system (FAS)	a variation of an FFAS that is capable of applying water-only in a dispersed pattern. An FAS is only permitted when it is used in tandem with a passive fire-retarding surface
Fixed foam application systems (FFAS)	a fixed firefighting system capable of delivering a primary foam extinguishing agent at the required application rate and over the assumed practical critical area. An FFAS may include, but not necessarily be limited to FMS, a DIFFS or a RMS.
Fixed monitor system (FMS)	a fixed foam application system consisting of 2, 3 or 4 monitors installed at the periphery of a heliport capable of delivering finished foam as a solid straight stream application to the landing area at or above the minimum application rate.
Foam certificate of conformity	a documentary evidence issued by an authorized party (sometimes by the foam manufacturer or an independent laboratory), which states that the foam product meets the required standards and specifications established by ICAO.
Foam meeting performance level B	a type of foam concentrate, which complies with the minimum ICAO foam performance specifications based on an application rate of 5.5 $L/min/m^2$
Foam meeting performance level C	a type of foam concentrate, which complies with the minimum ICAO foam performance specifications based on an application rate of 3.75 $L/min/m^2$.

GCAA Inspector	An Inspector from any discipline within the GCAA, dependent upon the discipline being inspected or audited.
GCAA Service Fees	Those fees on the General Civil Aviation Authority website, as varied from time to time and in respect to a service delivered by the GCAA, which are required to be paid to the General Civil Aviation Authority pursuant to federal government decisions.
Helicopter taxiway	A defined path on a heliport intended for the ground movement of helicopters and that may be combined with an air taxi-route to permit both ground and air taxiing.
Helideck Facilities and Equipment	Facilities and equipment, inside or outside the boundaries of the helideck, that are constructed or installed, operated and maintained for the arrival, departure and surface movement of aircraft.
Helideck Operations Manual	The Manual that forms part of the application for Acceptance.
Heliport	An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure or surface movement of helicopters.
Heliport Certificate	A Certificate issued by the GCAA under CAR-HVD for the operation of a heliport.
Heliport elevation	The elevation of the highest point of the FATO.
Heliport facilities and equipment	Facilities and equipment, inside or outside the boundaries of the heliport, that are constructed or installed, operated and maintained for the arrival, departure and surface movement of aircraft.
Heliport Operations Manual	The Manual that forms part of the application for a certification process of a Heliport, including any amendments thereto accepted by the GCAA.
Heliport Operator	In relation to a certified Heliport, the Heliport Certificate holder or in relation to an accepted landing area, the Helicopter Landing Area Acceptance holder.

Heliport response area	all areas used for the manoeuvring, landing, take-off, rejected take-off, ground taxiing, air-taxiing and parking of helicopters that are in the direct control of the heliport operator
Instructor	a training specialist who possesses the relevant qualifications, competencies and has the responsibility to deliver a given structured learning program to trainees in accordance with the training standards defined in this regulation
Limited-sized heliport	a heliport where the firefighting capacity is concentrated at the FATO/TLOF and there is no requirement to move foam and/or water dispensing equipment.
Obstacle Free Sector	A sector, not less than 210 degrees, extending outwards to a distance that will allow for an unobstructed departure path appropriate to the helicopter the TLOF is intended to serve, within which no obstacles above the level of the TLOF are permitted. (For helicopters operated in PC1 or PC2 the horizontal extent of this distance will be compatible with the one-engine inoperative capability of the helicopter type to be used).
Passive fire-retarding surface	a heliport surface incorporating numerous drain holes to allow fuel (and other liquids) to drain through the surface.
Portable foam application systems (PFAS)	any equipment capable of being transported to the accident location which, having been moved to the fire location is then capable of distributing primary extinguishing agent at the required application rate over the assumed practical critical area.
Practical critical area	a critical area concept for rescue of the occupants of a helicopter, which is representative of actual helicopter accident conditions. The objective is to attempt to control and extinguish the entire fire, it seeks to control only that area of fire adjacent to the fuselage. The objective is to safeguard the integrity of the fuselage and maintain tolerable conditions for its occupants.
Primary Accountable Organisation	The primary accountable organisation with accountability for the safety oversight of several helideck operating companies, individual helideck operator and/or helidecks for which the organisation holds responsibility.

Ring main system (RMS)	another form of foam dispensing equipment, capable of delivering primary extinguishing agent in a dispersed pattern that consists of equally spaced nozzles are located around the perimeter of the practical critical area, just above the surface, capable of directing extinguishing agent from the perimeter towards the centre of the landing area
Solid plate surface deck	a heliport surface that is impervious to liquids.
Solid stream application	foam delivered to a concentrated area in the form of a jet, e.g. foam monitors.
Task resource analysis	a risk-based approach to establish the minimum number of competent personnel required to deliver an effective RFF service to deal with a worst-case credible helicopter accident at the heliport
Technical Inspection	An inspection of a heliport conducted by the GCAA to confirm compliance with the physical characteristics' requirements of these requirements
Touchdown positioning circle (TDPC).	A touchdown positioning marking (TDPM) in the form of a circle used for omnidirectional positioning in a TLOF.
Touchdown positioning marking (TDPM).	A marking or set of markings providing visual cues for the positioning of helicopters.

1.8 Abbreviations

cm	Centimetre
AIP	Aeronautical Information Publication
ASPSL	Arrays of Segmented Point Source Lighting
DCP	Dry Chemical Powder
DIFFS	Deck Integrated Fire Fighting Systems System
FATO	Final approach and take-off area
FAS	Fixed application system
FFAS	Fixed foam application system
FMS	Fixed monitor system
FOD	Foreign Object Debris
GCAA	General Civil Aviation Authority
GNSS	Global navigation satellite system
HAPI	Helicopter Approach Path Indicator
HEMS	Helicopter Emergency Medical Services
HFM	Helicopter Flight Manual
HLO	Heliport Landing Officer
HPA	Heliport Assistant
ICAO	International Civil Aviation Organisation
LED	Light Emitting Diodes
LP	Luminescent Panel
Lpm	Litre per minute
MAPt	Missed approach point
MTOM	Maximum take-off mass
NVIS	Night vision imaging system (NVIS)
OFS	Obstacle-free sector
OLS	Obstacle limitation surface
PAPI	Precision approach path indicator
PFAS	Portable foam application system
PinS	Point-in-space
RFFS	Rescue and firefighting service
RTOD	Rejected take-off distance
RTODAH	Rejected take-off distance available
SMS	Safety Management System
TLOF	Touchdown and Lift-Off Area
UCW	Width of undercarriage

Chapter II-2 – Introduction to the GCAA Regulatory Oversight Process

2.1 General

2.1.1 The GCAA regulatory oversight is applicable for helicopter landing areas on fixed or floating off-shore facilities used for mineral exploitation (for the exploration of oil and gas), research or construction, limited to the UAE and within UAE territorial waters.

2.1.2 The GCAA regulatory oversight process of helidecks for the oil and gas industry is conducted through an auditable approach with focus on regulatory compliance and the effectiveness of the Safety Management System and Quality Assurance processes of the Primary Accountable Organisation.

2.1.3 In order to aid the prioritisation process for compliance with GCAA regulations, Primary Accountable Organisations, helideck operating companies and helideck operators shall undertake a safety assessment of the facilities for which they are responsible. The safety assessment and resulting Action Plan shall be made available to the GCAA on request.

2.1.4 The safety assessment should be based on a safety risk management model, which should include hazard identification, safety risk assessment and mitigation processes. Appendix A (Designation of Helidecks: Class of Use), provides a classification of facilities, against which reference may be made.

Note. – For additional reference, Appendix B: PART II - *Helideck Compliance Checklist.*

2.2 Primary Accountable Organisations

2.2.1 The GCAA regulatory oversight process will focus on the Primary Accountable Organisation. This is the primary accountable organisation holding full responsibility for helideck operating companies or specific helidecks operators. They are required to have a safety management framework in place which enables an effective safety oversight of the helideck companies or helideck operators for which they are responsible.

2.2.2 Primary Accountable Organisations will be subject to:

a) An initial GCAA Approval Assessment. *(Reference, Appendix C:* PART II*: GCAA Approval Assessment Checklist).*

b) Following the issue of Approval, the GCAA regulatory oversight process will be conducted as part of the GCAA Periodic Audit Programme, *(refer to Chapter II-2.8 – GCAA Continued Safety Oversight - Primary Accountable Organisation).*

2.3 Helideck Operating Companies and Helideck Operators

2.3.1 Helideck operating companies and helideck operators are required to have an effective aviation-based safety management system (SMS) and to be able to demonstrate compliance with PART II and GCAA regulations. Primary Accountable Organisations are responsible for the safety oversight of helideck operating companies and helideck operators. As part of the GCAA audit process of the Primary Accountable Organisation, helideck operating companies and helideck operators may also be subject to audit and on-site inspections. *(Refer to Chapter II-4).*

2.4 Helideck owners

2.4.1 Helideck owners are required to demonstrate compliance with PART II for the design criteria and infrastructure. Demonstration of compliance is required prior to operating or leasing the facility to the helideck operating company or Primary Accountable Organisation.

2.4.2 The GCAA may choose to follow a more detailed assessment, which may involve site inspections and this may be undertaken by the following departments:

a) **Air Navigation and Aerodrome Department:** will assess visual aids and the Helideck Operations Manual in relation to CAR Part IX Aerodromes, CAR Part X, CAR Part XI; PART II and any ANS such as CNS, MET, AIS, Airspace, ATS in relation to CAR Part VIII.

b) **Aviation Security Affairs Sector:** Aviation security is an integral part of aerodrome planning and operations. Contact should be made with GCAA Aviation Security

Affairs Sector for details regarding security requirements[1] and authorisation of the carriage of dangerous goods, with reference to GCAA CAR Part VI, Chapter 2: Transport of Dangerous Goods by Air.

2.5 ANA E-Service Application

2.5.1 Applicants must have secure access to the ANA e-Services, available on the GCAA website: www.gcaa.gov.ae.

2.5.2 Organisation applicants must supply a copy of their Trade License or equivalent.

2.5.3 Individual applicants on behalf of their organization, must supply a copy of their Emirates ID or their passport.

2.5.4 After receiving access to ANA e-Services, the applicant shall complete the details required in the on-line form for the issue of a Primary Accountable Organisation Approval.

2.6 GCAA Approval Application Process – Primary Accountable Organisation

2.6.1 The GCAA application process for the Primary Accountable Organisation Approval shall consist of the following actions:

a) The applicant shall initiate a meeting with the GCAA to discuss the GCAA regulatory requirements and oversight process required for GCAA approval. This meeting should be scheduled prior to the submission of the application and relevant documentation.

b) The applicant shall submit sufficient documentation to demonstrate compliance with GCAA requirements as referred to in Chapter II-3.

c) Documents required are:

a)	Safety Management System Structure

b)	Policy and Procedures for Safety Oversight of Helideck Operating Company or Helideck Operator

2.6.2 The GCAA will conducted an assessment of the requirements as detailed in Chapter II-3.

2.6.3 The GCAA will produce an assessment report identifying any shortfalls in compliance with the application.

2.6.4 If shortfalls in compliance are identified during the assessment, the applicant will be required to provide an action plan with timescales in order to rectify the shortfalls.

2.6.5 The GCAA will only issue an Approval when completely satisfied that all regulatory elements have been adequately addressed. The Approval will only be applicable within the UAE and UAE territorial waters.

2.6.6 GCAA Approval signifies that the Primary Accountable Organisation has in place:

a) an acceptable safety management structure;

b) policies, procedures and objectives for the safety oversight of helideck operating companies and helideck operators for which it is responsible;

c) a trained and qualified audit team(s); and

d) systems for reporting and communication to the GCAA, in accordance with the requirements of this Part II. *(Refer to Chapter II-3).*

2.7 Service Fees Applicable to the Primary Accountable Organisation

2.7.1 Applicants undertake to pay GCAA Service Fees in respect of an initial Approval.

2.7.2 Payment of the GCAA Service Fee does not guarantee the grant or continuation of an approval.

2.8 GCAA Continued Safety Oversight – Primary Accountable Organisation

2.8.1 Following the issue of an Approval, regulatory oversight will continue as part of the GCAA Periodic Audit Programme, the frequency of which shall be determined by the GCAA.

2.8.2 The aim of the GCAA audit is to verify continued compliance with Civil Aviation Law, Regulations and GCAA Publications. It also aims to ensure that the organisation’s policies and procedures are appropriately documented and followed. This will be conducted through the examination of relevant documentation and documented evidence relating to the compliance of helideck operating companies and helideck operators, which may include on-site inspections.

Chapter II-3 – Requirements for a Primary Accountable Organisation

3.1 General

3.1.1 The Primary Accountable Organisation shall have an aviation focused safety management structure in place to enable an effective safety oversight of the helidecks for which the organisation is responsible.

3.1.2 The Primary Accountable Organisation may be required to provide access to the helideck for competent authority's inspectors.

3.1.3 The Primary Accountable Organisation shall be required to provide access to all safety related documents for the purpose of regulatory oversight to the GCAA.

3.2 Requirements for a Safety Management Structure

3.2.1 The safety management and quality assurance systems shall be documented and shall include the following:

a)	Clearly defined lines of responsibility and accountability throughout the organisation, including a direct accountability for safety on the part of senior management.
b)	A statement of accountabilities – with named responsible persons: Accountable Manager, and those responsible for Safety and Quality Assurance; Operations; Maintenance; Rescue and Fire-Fighting Service (RFFS).
c)	A safety assessment: The Primary Accountable Organisation shall develop, implement and maintain a process that ensures analysis, assessment, and acceptable control of the safety risks associated with identified hazards. *(Reference Chapters II-2, 2.1.4)*
d)	A description of the overall philosophies and principles of the organisation with regard to aviation safety, referred to as the "Safety Policy", signed by the Accountable Manager; this shall include a clear statement about the provision of the necessary resources for the implementation of the safety policy and achievement of the safety objectives.

e)	A policy statement and documented agreement between the Primary Accountable Organisation and the named helideck operating companies for the system of safety oversight.
f)	A policy to ensure that the Primary Accountable Organisation's audit team are sufficiently trained and qualified for the planned tasks and activities to be performed.
g)	The means to verify the safety performance of the organisation in reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls.
h)	A formal process to review the safety management system, identify the causes of substandard performance of the management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes.
i)	for quality assurance aspects CAR PART IX ADR Chapter 4, Section 4.6 shall be followed.

3.2.2 Policy and procedures for the oversight of helidecks shall be documented and shall include the following:

a)	A current list of helideck operating companies and data for each fixed facility, detailing: location, "Class of Use" (refer to Appendix A), D-value and unique number.
b)	A policy and procedure for the audit process and content, (i.e. audit scope, audit periodicity; audit plan; audit programme; definition of findings).
c)	A policy and procedure for the follow-up process on audit findings, (i.e. actions to be taken for safety critical issues; identifying causal factors and corrective actions; agreement on action plans; agreement on timescales).
d)	A policy and procedure for notification of safety critical issues / findings to stakeholders and the GCAA.
e)	A policy and procedure for document control of audits, reports and records.
f)	A policy and procedure for investigations (safety incidents and accidents; ROSI[2]).

[2] GCAA AMC-22: Safety Incident Reporting

g)	A policy and procedure for communicating with the GCAA (refer to Section 3).
h)	An Audit Programme (periodicity).
i)	An Audit Plan (i.e. scope).

3.2.3 The audit team or person shall include the following:

a)	Demonstration impartiality from helideck operators. This shall be achieved through separation, at functional level between the Primary Accountable Organisation and the helideck operators (persons not involved in the operation of the helidecks).
b)	To be of sufficient number of qualified personnel to perform their allocated tasks and have the necessary knowledge, experience, initial, on-the-job and recurrent training to ensure continuing competence.
c)	That the person responsible for the compliance monitoring and quality assurance may perform all audits and inspections himself/herself, or appoint one or more auditors by choosing personnel having the related competence.
d)	The Primary Accountable Organisation should establish a training programme for its helideck inspectors, and a plan for its implementation. The training programme should include at least the following: 1) aviation legislation, organisation, and structure; 2) the applicable requirements and procedures; 3) safety management systems, including safety assurance principles; 4) acceptability and auditing of safety managements systems; 5) change management; 6) aeronautical studies, safety assessments, and reporting techniques; 7) evaluation and review of helideck manuals; 8) human factors principles; 9) helideck design; 10) helideck signs, markings and lighting; 11) helideck maintenance; 12) helideck operations, including: a. obstacle limitation surfaces assessment b. airspace (Classification, height, etc)

	c. rescue and firefighting; d. emergency planning; e. adverse weather operations; f. wildlife management; g. helideck safety management; h. handling of dangerous goods; and i. fuel, facilities, storage and handling; and 13) other suitable technical training appropriate to the role and tasks of the personnel.
e)	Ensure that training records for helideck inspectors are to be retained and available for the GCAA audit.

3.3 Required Communication with the GCAA

3.3.1 The Primary Accountable Organisation shall provide the GCAA with following, on request:

a)	A current list of helidecks operators' companies and data for each fixed facility.
b)	The Annual Audit Programme.
c)	Safety assessment of non-compliant PART II elements, including all safety critical issues with actions and mitigations.

Note: all information submitted to the GCAA will be held in confidence.

Chapter II-4 – Requirements for a Helideck Operator

4.1 General

4.1.1 The helideck operator shall:

a) have an aviation focused safety management system in place to enable an effective safety oversight of helideck operations (as detailed in Section 2); and

b) demonstrate regulatory compliance for each helideck with reference to PART II (as detailed in Section 3); and

c) be required to provide access to all safety related documents for the purpose of safety oversight and provision of evidence of compliance to the Primary Accountable Organisation (and to the GCAA on request).

4.1.2 The helideck owner shall provide:

a) evidence of compliance with the design criteria and infrastructure; and

b) evidence of compliance prior to leasing the facility within the UAE; this shall include commissioning requirements of equipment (examples: fire-fighting systems, lighting systems).

4.1.3 Evidence required in paragraph 1.2 shall be made available to the helideck operator.

4.2 Requirements for a Safety Management System (SMS)

4.2.1 The helideck operator shall implement a safety management system, as referred to in GCAA CAR Part X: Safety Management Systems (SMS) and framework shown in Table 4-1.

Table 4-1 SMS Framework

COMPONENT	ELEMENT
SAFETY POLICY AND OBJECTIVE	Management commitment and responsibilities
	Safety accountabilities
	Appointment of key safety personnel

	Coordination of emergency response planning
	SMS documentation
SAFETY RISK MANAGEMENT	Hazard identification
	Safety risk assessment and mitigations
SAFETY ASSURANCE	Safety performance monitoring and measurement
	management of change
	Continuous Improvement of the SMS
SAFETY PROMOTION	Training and education
	Safety communication

4.2.2 The safety management system shall be documented and shall include the following:

a)	A description of the overall philosophies, objectives and principles of the operator with regard to aviation safety, referred to as the "Safety Policy", signed by the Accountable Manager.
b)	Clearly defined lines of responsibility and accountability throughout the helideck operating company, including a direct accountability for safety on the part of senior management.
c)	Statement of accountabilities – with named responsible persons, (Accountable Manager, Helideck Safety and Quality Assurance; Operations; Maintenance; Rescue and Fire-Fighting Service (RFFS).
d)	A policy and procedure for a systematic approach to hazard identification and risk management. (Develop, implement and maintain a process that ensures analysis, assessment, and acceptable control of the safety risks associated with identified hazards).
e)	A safety assessment: reference to 4.2.2 d) above. *(Reference Chapter II-2)*
f)	A policy and procedure for notification of safety critical issues / findings to stakeholders; Primary Accountable Organisation.

g)	A policy and procedure for ensuring that accidents, serious incidents, unlawful interferences as well as safety events identified as mandatorily reportable in CAR Part IX Aerodromes are reported to the GCAA through the Reporting of Safety Incidents[3] (ROSI). *Note. - GCAA AMC-22: Safety Incident Reporting*
h)	A policy and procedure to educate their personnel of how to report an actual or potential safety deficiency through the Voluntary Reporting[4] (VORSY) System. *Note. - AMC-57: Voluntary Occurrence Reporting System*
i)	A policy and procedure for the acceptance and transfer of contracted vessels to assure compliance with GCAA regulations.
j)	A policy and procedure to ensure sub-contractor compliance with GCAA regulations.
k)	A policy and procedure for an internal safety oversight and auditing system
l)	The means to verify the safety performance of the organisation with reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls.
m)	A process to review the safety management system, identify the causes of substandard performance of the safety management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes.
n)	A safety training programme that ensures personnel involved in the operation, rescue and fire-fighting, maintenance and management of the helideck are properly trained and have been certified as competent to perform their duties safely.
o)	A formal means for safety communication that ensures that personnel are fully aware of the safety management system, conveys safety critical information, and explains why particular safety actions are taken and why safety procedures are introduced or changed.

p)	A coordination of the safety management system with the helideck emergency response plan; and coordination of the helideck emergency response plan with the emergency response plans of those organisations it must interface with during the provision of helideck services.
q)	A policy and procedure for the maintenance of compliance against PART II for contracted helidecks.
r)	A policy and procedure for recording the number of helicopter movements.

4.3 Regulatory Compliance with PART II

4.3.1 Policy and procedures shall be documented and shall include the following:

a)	An up-to-date Helideck Operations Manual (including or referencing policies and procedures).
b)	A method to monitor compliance with relevant GCAA requirements.
c)	Evidence to support regulatory compliance with PART II.
d)	This should include a PART II compliance matrix of each facility, which should include details of: location; “Class of Use” (refer to Appendix II-B); D-value and unique number. Completion of the GCAA PART II Helideck Checklist (refer to Appendix II-C). Frequency of a PART II audit should be based on the outcome of the safety assessment referred to in Chapter II-2, and industry best-practice (two-yearly).

4.4. Helideck Operations Manual

4.4.1 The helideck operator shall have an up-to-date Helideck Operations Manual.

4.4.2 The Helideck Operations Manual is a fundamental requirement of the regulatory process. It shall contain all the pertinent information concerning helideck landing area, facilities, services, equipment, operating procedures, organisation, standards, conditions and the levels of services and management including Safety Management System. The information presented in the Helideck Operations Manual shall demonstrate that the helideck conforms to regulation and that there are no apparent shortcomings that would adversely affect the safety of aircraft operations.

4.4.3 Each off-shore helicopter landing area shall be assessed based on limitations, warnings, instructions and restrictions to determine its acceptability with respect to the following that, as a minimum, should cover the factors listed in paragraph 2.1.

4.4.4 The Helideck Operations Manual relating to the specific helidecks should contain both the listing of helideck limitations in a Helideck Limitations List (HLL) and a pictorial representation (template) of each helideck showing all necessary information of a permanent nature. The HLL shall show, and be amended as necessary to indicate, the most recent status of each helideck concerning non-compliance with this document, limitations, warnings, cautions or other comments of operational importance. An example of a typical template is shown in Table 4-2. All helideck limitations should be included in the HLL. Helidecks without limitations should also be listed. With complex installations and combinations of installations (e.g. co-locations), a separate listing in the HLL, accompanied by diagrams where necessary, may be required.

4.4.5 The content of the Helideck Operations Manual should include the following as a minimum:

a) Policy, Safety Management System (SMS) and procedures

b) Operational procedures

c) Listing of helideck limitations in a Helideck Limitations List (HLL) – and pictorial representation of the helideck showing all the necessary information of a permanent nature

d) List of warnings, cautions and comments

e) The physical characteristics of the helideck including:

1) Measured dimension

2) Declared D-Value

3) Load bearing capability

f) Preservation of the obstacle protected surfaces:

1) The minimum 210° Obstacle Free Sector (OFS) surface

2) The 150° Limited Obstacle Sector (LOS) surface; and

3) The minimum 180° falling 5:1 gradient surface with respect to significant obstacles.

Note. - If these sectors/surfaces are infringed, even on a temporary basis and/or if an adjacent installation or vessel infringes the obstacle protected surfaces related to the landing area, procedures should be in place to conduct an assessment to determine whether it is necessary to impose operating limitations and/or restrictions to mitigate any non-compliance with the criteria.

g) Marking and lighting – Assessments, procedures, inspection records relating to:

1) Helideck perimeter lighting

2) Helideck touchdown marking lighting (TD/PM Circle lighting) and/or floodlighting

3) Status lights (for day and night operations) – if used

4) Dominant obstacle paint schemes and lighting

5) Helideck markings and

6) General installation lighting levels

Note. - Where inadequate helideck lighting exists the Helideck Limitation List (HLL) should be annotated 'daylight only operations'.

h) Deck surface - Assessments, procedures, inspection records relating to:

1) Surface friction

2) Helideck net (as applicable)

3) Drainage system

4) Deck edge perimeter safety netting

5) System of tie-down points adequate for the range of helicopters in use; and

6) Cleaning of all contaminants

i) Environment – Assessments, procedures, inspection records relating to :

1) Obstacle controls

2) Foreign object debris / damage

3) Physical turbulence generators

4) Bird control measures

5) Air quality degradation due to exhaust emissions, hot gas vents or cold gas vents

6) Adjacent helidecks may need to be included need to be included in the air quality assessment, and

7) Flares

j) Rescue and fire-fighting – Assessments, procedures, inspection records relating to:

1) Primary and complementary media types, quantities, capacity and systems

2) Personal protective equipment (PPE) and clothing

3) Breathing apparatus, and

4) Crash box

k) Communications and navigation - Assessments, procedures, inspection records relating to:

1) Aeronautical radio(s)

2) Radio/telephone (R/T) call sign to match helideck name and side identification which should be simple and unique

3) Non-Directional Beacon (NDB) or equivalent (as appropriate); and

4) Radio log

l) Fuel facilities – Assessments, procedures, inspection records

m) Additional operational and handling equipment – Assessments, procedures, inspection records relating to:

1) Windsleeve

2) Meteorological information

3) Helideck motion system recording and reporting (where applicable)

4) Passenger briefing system

5) Chocks - compatible with helicopter undercarriage/wheel configurations

6) Tie-downs and

7) Weighing scales - calibrated, accurate scales for passenger baggage and freight weighing

n) Qualified Personnel – Assessments, procedures and records relating to:

1) Training and maintenance of competency for helicopter landing area staff (e.g. helicopter landing officer/helicopter deck assistant and fire-fighters, etc.).

2) Training of persons and maintenance of competency for those required to assess local weather conditions or communicate with the helicopter by radio telephony.

Table 4-2 Helicopter Landing Area Template

<table>
<tr><td colspan="4">Helicopter Landing Area Template
Doc Ref: xx/xx/xx
الهيئـــة الـعـامــة للطيـــران الـمـدنـــي
GENERAL CIVIL AVIATION AUTHORITY</td></tr>
<tr><td colspan="2">INSTALLATION / VESSEL NAME:</td><td>R/T CALL-SIGN:</td><td>HELIDECK ID:</td></tr>
<tr><td colspan="2">HELIDECK ELEVATION (feet AMSL):</td><td>MAX. HEIGHT (feet):</td><td>SIDE ID:</td></tr>
<tr><td colspan="3">TYPE OF INSTALLATION/VESSEL[1] (fixed / mobile; manned / unmanned):</td><td>D-VALUE (metres):</td></tr>
<tr><td colspan="3">POSITION (LAT. & LONG.) DEG / MIN & DECIMAL OF MINS:</td><td>NAME OF OPERATOR[2]:</td></tr>
<tr><td rowspan="5">COM:</td><td rowspan="5">VHF FREQ (AVN):</td><td rowspan="5">NAV:</td><td>ATIS:
VHF</td></tr>
<tr><td>NDB IDENT:</td></tr>
<tr><td>GNSS:</td></tr>
<tr><td>VOR/DME:</td></tr>
<tr><td>Not Applicable:</td></tr>
<tr><td colspan="4">HELIDECK DRAWINGS / PHOTOS:</td></tr>
</table>

FUEL AVAILABLE[3]: Y/N/CAP/UNITS	GPU: Y/N/28v DC:	HELIDECK "H" HEADING:
MTOM / DECK RATED FOR (METRIC TONS/ LBS):	STATUS LIGHTS[4] (if used):	FIRE-FIGHTING EQUIPMENT[5]:
LIMITATIONS / WARNINGS / NOTES:		REVISION DATE:

1. Fixed permanently attended, fixed not permanently attended; vessel type (e.g. diving support vessel); MODU - semi-submersible MODU - jack-up; FPSO, tanker
2. Name of operator of the installation/vessel
3. Pressure/gravity; pressure; gravity; no
4. Yes; no (as required by applicable codes e.g. IMO MODU Code)
5. Type of foam (e.g. 3% aqueous film forming foams (3% AFFF)) and nature of primary media delivery (e.g. deck integrated fire-fighting system (DIFFS))

The following can be considered as guidance:

a) For a fixed facility the helideck elevation is measured at the highest point of the FATO (or FATOs) and recorded on the Helicopter Landing Area Template. Helideck elevation (metres) is the height of the FATO (or FATOs) above mean sea level (AMSL).

b) For floating installations and vessels, the helideck elevation is measured from the keel of the installation/vessel to the highest point of the FATO. The profile information is independent from the draft marking and the actual elevation above the water level. The installation/vessel crew has to calculate the current height above the water level by subtracting the current draft at the perpendicular closest to the helideck and providing this to the helicopter operator. (The helicopter operator should include the corrected elevation information supplied by the installation/vessel operator in the helideck template).

c) A Helideck Limitations List entry (HLL) should promulgate additional information for the helicopter landing area including the D-value of the FATO, whether expressed in metres and the limit on the maximum allowable mass of the helicopter permitted to operate to the FATO, a marking expressed in metric tonnes (known as the t-value). The D-value, in metres, corresponds to the size (diameter) of the FATO (and where coincident, to the size (diameter) of the TLOF) while the maximum allowable mass is a t-value marking expressing metric tonnes, that equates to the load bearing strength of the TLOF.

Chapter II-5 – Helideck: Design Factors

5.1 Structural Design

5.1.1 The helicopter landing area and any parking area provided should be of sufficient size and strength and laid out so as to accommodate the heaviest and largest helicopter requiring to use the facility (referred to as the design helicopter). The structure should incorporate a load bearing area designed to resist dynamic loads without disproportionate consequences from the impact of an emergency landing anywhere within the area bounded by the TLOF perimeter markings. Consideration should be given to the possibility of accommodating an unserviceable helicopter in a parking area (where provided) adjacent to the helideck to allow a relief helicopter to land.

Note — If the contingency is designed into the construction and operating philosophy of the installation or vessel, the helicopter operator should be advised of any mass restrictions imposed on a relief helicopter due to the presence of an unserviceable helicopter; whether elsewhere on the landing area or removed to a parking area, where present.

5.1.2 The helicopter landing area and its supporting structure should be fabricated from steel, aluminium alloy or other suitable materials designed and fabricated to applicable standards. Where differing materials are to be used in near contact, the detailing of the connections should be such as to avoid the incidence of galvanic corrosion.

5.1.3 Both the ultimate limit states (ULS) and the serviceability limit states (SLS) should be assessed. The structure should be designed for the SLS and ULS conditions appropriate to the structural component being considered as follows:

a) for deck plate and stiffeners

1) ULS under all conditions;

2) SLS for permanent deflection following an emergency landing

b) for helicopter landing area supporting structure

1) ULS under all conditions;

2) SLS

5.1.4 The supporting structure, deck plates and stringers should be designed to resist the effects of local wheel or skid actions acting in combination with other permanent, variable and environmental actions. Helicopters should be assumed to be located within the TLOF perimeter markings in such positions that maximise the internal forces in the component being considered. Deck plates and stiffeners should be designed to limit the permanent deflection (deformation) under helicopter emergency landing actions to no more than 2.5% of the clear width of the plates between supports. Webs of stiffeners should be assessed locally under wheels or skids and at the supports, so as not to fail under landing gear actions due to emergency landings. Tubular structural components forming part of the supporting structure should be checked for vortex-induced vibrations due to wind.

Note — For the purposes of the following sections it may be assumed that single main rotor helicopters will land on the wheel or wheels of two landing gear or on both skids, where skid fitted helicopters are in use. The resulting loads should be distributed between two main undercarriages. Where advantageous a tyre contact area may be assumed within the manufacturer's specification.

5.1.5 Case A – Helicopter Landing Situation

5.1.5.1 A helideck or a purpose-built shipboard helideck should be designed to withstand all the forces likely to act when a helicopter lands. The load and load combinations to be considered should include:

a) *Dynamic load due to impact landing*

1) This should cover both a heavy landing and an emergency landing. For the former an impact load of 1.5 x MTOM of the design helicopter should be used while 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 g) inclusive. Normally the emergency landing case will govern the design of the structure.

b) *Sympathetic response of the landing platform*

1) After considering the design of the helideck structures supporting beams and columns and the characteristics of the design helicopter, the dynamic load (see a) above) should be increased by a suitable structural response factor (SRF) to take account of the sympathetic response of the helicopter landing area structure. The factor to be applied for the design of the helicopter landing area framing depends on the natural frequency of the deck structure.

2) Unless specific values are available based upon particular undercarriage behaviour and deck frequency, a minimum SRF of 1.3 should be assumed.

c) *Overall superimposed load on the landing platform*

1) To allow for any appendages that may be present on the deck surface, such as helideck nets or lighting, in addition to the wheel loads, an allowance of 0.5kN/m2 should be applied over the whole area of the helideck.

d) *Lateral load on landing platform supports*

1) The helicopter landing platform and its supports should be designed to resist concentrated horizontal imposed actions equivalent to 0.5 x maximum take-off mass (MTOM) of the design helicopter, distributed between the undercarriages in proportion to the applied vertical loading in the horizontal direction that will produce the most severe loading for the structural component being considered.

e) *Dead load of structural members*

1) This is the normal gravity load on the element being considered.

f) *Environmental actions on the helideck*

1) Wind actions on the helideck structure should be applied in the direction, which together with the horizontal impact actions, produce the most severe load case for the component considered. The wind speed to be considered should be that restricting normal (non-emergency) helicopter operations at the landing area. Any vertical up and down action on the helideck structure due to the passage of wind over and under the helideck should be considered.

2) Inertial actions due to platform motions – the effect of accelerations and dynamic amplification arising from the predicted motions of the fixed or floating platform in a storm condition with a 10-year return period should be considered.

g) *Punching Shear*

1) Where helicopters with wheeled undercarriages are operated, a check should be made for the punching shear from a wheel of the landing gear 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.

5.1.6 Case B – Helicopter At Rest Situation

5.1.6.1 In addition to Case A, a helideck or a purpose-built shipboard helideck should be designed to withstand all the applied forces that could result from a helicopter at rest; the following loads should be taken into account:

a) *Imposed load from helicopter at rest*

1) All parts of the helideck or shipboard helideck should be assumed to be accessible to helicopters, including any separate parking area (see Chapter II-14) and should be designed to resist an imposed (static) load equal to the MTOM of the design helicopter. This load should be distributed between all the landing gear, and applied in any position so as to produce the most severe loading on each element considered.

b) *Overall superimposed load*

2) To allow for personnel, freight, refuelling equipment and other traffic, and rotor downwash effects etc., a general area imposed action of 2.0kN/m2 should be added to the whole area of the helideck or shipboard helideck.

c) *Horizontal actions from a tied down helicopter including wind actions*

1) Each tie-down should be designed to resist the calculated proportion of the total wind action on the design helicopter imposed by a storm wind with a minimum one-year return period.

d) *Dead load*

1) This is the normal gravity load on the element being considered and should be regarded to act simultaneously in combination with a) and b). Consideration should also be given to the additional wind loading from any parked or secured helicopter (see also e) (1) below).

e) *Environmental actions*

1) Wind loading

a. Wind loading should be allowed for in the design of the platform. The 100-year return period wind actions on the helicopter landing area structure should be applied in the direction which, together with the imposed lateral loading, produces the most severe load condition on each structural element being considered.

2) Acceleration forces and other dynamic amplification forces

a. The effects of these forces arising from the predicted motions of mobile installations or vessels, the appropriate environmental conditions corresponding to a 10-year return period should be considered.

Note — Not all helicopter landing areas on ships consist of purpose-built structures and some helicopter landing areas may alternatively utilise areas of the ship's deck which were not specifically designed for helicopter operations e.g. main decking on a ship's side, a large hatch cover, etc. In the case of a non-purpose built structure it should be established, before authorising a landing area, that the area selected can withstand the dynamic and static loads imposed for the types of helicopters for which it is intended.

5.2 Design - Environmental Effects

Note — In the following sections the term "helideck" is used throughout to denote a heliport on a fixed or floating facility such as an exploration and/or production unit used for the exploitation of oil and gas. Where helidecks are located on ships it will be for the designer to assess whether each aspect of design is appropriate for the "shipboard helidecks" under consideration. A stand-alone section (paragraph 2.5) is provided to address special considerations for floating facilities and ships which have particular applicability to all shipboard helidecks as well as to helidecks located on floating off-shore facilities

5.2.1 General Design Considerations

The following can be considered as guidance:

a) The location of a helideck is often a compromise between the conflicting demands of the basic design requirements, the space limitations on often cramped topsides of off-shore facilities and the need for the facility to provide for a variety of functions. It is almost inevitable that helidecks installed on cramped topsides of off-shore structures will suffer to some degree from their proximity to tall and bulky structures, and to gas turbine exhausts or flares. The objective for designers becomes to create topside designs incorporating helidecks that are safe and 'friendly' to helicopter operations by minimising adverse environmental effects (mainly aerodynamic, thermal and wave motion) which can affect helicopter operability.

Note — Where statutory design parameters cannot be fully met it may be necessary for restrictions or limitations to be imposed upon helicopter operations which could, in severe cases, lead to a loss of payload when the wind is blowing through a turbulent sector.

b) Helidecks are basically flat plates and so are relatively streamlined structures. In isolation they would present little disturbance to the wind flow, and helicopters would be able to operate safely to them in a more or less undisturbed airflow environment. Difficulties may arise however, when the wind has to deviate around the bulk of the off-shore installation causing large areas of flow distortion and turbulent wakes and/or because the producing facility itself is a source of hot or cold gas emissions. The effects fall into three main categories:

1) The flow around the bulk of the off-shore facility. Platforms in particular are slab-sided, non-streamlined assemblies (bluff bodies) which create regions of highly distorted and disturbed airflow in the vicinity

2) The flow around large items of superstructure such as cranes, drilling derricks and exhaust stacks, generates turbulence that can affect helicopter operations (paragraph 2.2). Like the platform itself, these are bluff bodies which encourage turbulent wake flows to form behind the bodies

3) Hot gas flows emanating from exhaust outlets and flare systems (paragraph 2.3) and/or cold faring (paragraph 2.4)

c) For a helideck on a fixed or floating off-shore facility it should ideally be located at or above the highest point of the main structure. This will minimise the occurrence of turbulence downwind of adjacent structures. However, whilst this is a desirable feature it should be appreciated that in many parts of the world, for a helideck much in excess of 60m above sea level the regularity of helicopter operations may be impacted by low cloud base conditions. Conversely low elevation helidecks may also adversely affect helicopter operations where one-engine inoperative (dropdown) performance is an operational requirement for a State i.e. due to the insufficient drop-down between the landing area and the sea surface. Consequently, a trade-off may need to be struck between the height of the helideck above surrounding structures and its absolute height above mean sea level (AMSL).

d) A key driver for the location of the helideck is the need to provide a generous sector clear of physical obstructions for the approaching/departing helicopters and also sufficient vertical clearance for multi-engine helicopters to lose altitude after take-off in the event of an engine failure. This will entail a design incorporating a minimum 210-degree obstacle free sector with a falling gradient below the landing area over at least 180 degrees of this arc (refer to Chapter II-9). From an aerodynamic point of view the helideck should be as far away as possible from the disturbed wind flow around the platform and in order to achieve this, in addition to providing the requisite obstruction free areas described above, it is recommended that the helideck be located on the corner of the facility with as large an overhang as possible.

e) In combination with locating the helideck at an appropriate elevation and, providing a vital air gap (see 6.2.1.8), the overhang will encourage the disturbed airflow to pass under the helideck leaving a relatively clean 'horizontal' airflow above the deck. It is recommended that the overhang should be such that the centre of the helideck is vertically above or outboard of the corner of the facility's superstructure.

f) When determining a preference for which corner of the facility the helideck should overhang, a number of considerations should be evaluated which are listed as follows:

1) The helideck location should facilitate a direct approach whenever possible;

2) The helideck location should provide for a clear overshoot;

3) The helideck location should minimise the need for sideways or backwards manoeuvring;

4) The helideck location should minimise the environmental impact due to turbulence, thermal effects etc.;

5) The helideck location should allow, wherever possible, an approach to be conducted by the commander of the helicopter.

g) The relative weighting between these considerations will change depending on factors such as wind speed. However, generally the helideck should be located such that winds from prevailing directions carry turbulent wakes and exhaust plumes away from the helicopter approach path. To assess if this is likely to be the case, for fixed facilities, it will usually be necessary for designers to overlay the prevailing wind direction sectors over the centre of the helideck to establish prevailing wind directions and wind speed combinations and to assess the likely impact on helicopter operations for a helideck if sited at a particular location.

h) The height of the helideck above mean sea level (AMSL) and the presence of an air gap between the helicopter landing area and a supporting module are the most important factors in determining wind flow characteristics in the helideck environment. In combination with an appropriate overhang, an air gap separating the helideck from superstructure beneath it will promote beneficial wind flow over the landing area. If no air gap is provided then wind conditions immediately above the landing area are likely to be severe, particularly if mounted on top of a large multi-storey accommodation block — it is the distortion of the wind flow that is the cause. However, by building in an air gap, typically of between 3m and 6m, this has the effect of ‘smoothing out’ distortions in the airflow immediately above the helideck. Helidecks mounted on very tall accommodation blocks will require the largest clearance (typically 5-6m) while those on smaller blocks, and with a very large overhang, will tend to require smaller clearances (typically 3-4 m). For shallow super-structures of three storeys or less, such as are often found on semi-submersible drilling facilities, a 1 m air gap may be sufficient; but there is scope to increase the air gap as long as the size and presence of a more generous air gap does not have an adverse effect on the stability of a floating facility or the sea-keeping qualities of a ship.

Note — To avoid wave loading on the helideck, the air gap required by 5.2.1, h), is also provided to clear the maximum wave height that might be encountered during transportation and for operational conditions. For a shipboard helideck mounted on the deck of a floating vessel, the maximum vertical displacement due to vessel motion should also be taken into account.

i) It is important that the air gap is preserved throughout the operational life of the facility, and care is taken to ensure that the gap between the underside of the helideck structure and the super-structure beneath does not become a storage area for bulky items that might otherwise hinder the free-flow of air through the gap.

j) Where it is likely that necessary limitations and/or restrictions would have a significant effect on helideck operability, being caused by issues that cannot easily be ‘designed out’, an option may exist for providing a second helideck which could be made available when the wind is blowing through the restricted sector for the primary helideck.

5.3 Effects of Structured-Induced Turbulence

The following can be considered as guidance:

a) It is almost inevitable that helidecks installed on cramped topsides of off-shore structures will suffer to some degree from their proximity to tall and bulky structures such as drilling derricks, flare towers, cranes or gas turbine exhausts stacks; it is often impractical to site the helideck above every tall structure. So, any tall structure above and/or in the vicinity of the helideck may generate areas of turbulence or sheared flow downwind of the obstruction; and so potentially pose a hazard to the helicopter. The severity of the disturbance will be greater the bluffer the shape and the broader the obstruction to the flow. The effect reduces with increasing distance downwind from the source of turbulence.

b) An assessment of the optimum helideck position should also take into account the location and configuration of drilling derricks, which can vary in relative location during the field life. A fully clad derrick, being a tall and solid structure, may generate significant wake downwind of the obstacle. As the flow properties of the wake will be unstable, if the helideck is located downwind of a clad derrick it is likely to be subject to large and random variations in wind speed and direction. As a guide on wake decay from bluff bodies it should be assumed that the wake effects will not fully decay for a downwind distance of some 10-20 structure widths (for a 10m wide clad derrick this corresponds to a decay distance of between 100-200m). Consequently, it is preferable that a helideck is not placed closer than 10 structure widths from a clad derrick.

c) However, few off-shore facilities will be large enough to facilitate such clearances in their design and any specification for a clad derrick has potential to result in operational limitations being applied when the derrick is upwind of the helideck. In contrast, unclad derricks are relatively porous and whilst a wake still exists, it will be of a much higher frequency and smaller scale due to the flow being broken up by the lattice element of the structure. Consequently, a helideck can be safely located closer to an unclad derrick than to its clad equivalent. As a rule of thumb separations of at least 5 derrick widths at helideck height should be the design objective. Separations of significantly less than 5 structure widths, may lead to the imposition of operating restrictions in certain wind conditions.

d) of structure-induced turbulence by forming a physical blockage to the air flow over the helideck and creating a turbulent wake (as well as presenting a potential hazard due to the hot exhaust). As a rule of thumb, to mitigate physical turbulence effects at the helideck, it is recommended that a minimum of 10 structure widths ideally be established between the obstruction and the helideck.

e) Other potential sources of turbulence may be present on off-shore facilities which could give rise to turbulence effects for example, large structures in close proximity to the helideck or a lay-down area in the vicinity of the helideck. In the latter case, bulky or tall items placed in lay-down areas close to the helideck could present a source of turbulence, and being only of a temporary nature, their presence may increase the hazard, since pilots otherwise familiar with a particular facility would not be expecting turbulence if the source is a temporary obstruction. Ideally, a platform design should seek to ensure that any proposed lay-down areas are significantly below helideck level and/or are sufficiently remote from the helideck so as not to present a problem for helicopter operations.

5.4 Temperature Rise Due to Hot Exhausts

The following can be considered as guidance:

a) Increases in ambient temperature at the helideck are a potential hazard to helicopters as increased temperatures result in less rotor lift and less engine power margin. Rapid temperature changes are a significant hazard, as the rate of change of temperature in the plume has potential to cause engine compressor surge or stall (often associated with an audible 'pop'), which can result in loss of engine power, damage to engines and/or helicopter components and, ultimately, engine flame-out. It is therefore extremely important that helicopters avoid these conditions by ensuring occurrence of higher than ambient conditions are foreseen and mapped, and, where necessary, that steps are taken to reduce payload to maintain an appropriate performance margin.

b) Gas turbine power generation systems are often a significant source of hot exhaust gases on fixed off-shore facilities, while diesel propulsion or auxiliary power system exhausts occurring on some floating off-shore facilities may also need to be considered. For certain wind directions the hot gas plumes from the exhausts will be carried by the wind directly across the helideck. The hot gas plume then mixes with the ambient air to increase the size of the plume, at the same time reducing its temperature by dilution.

c) Appropriate modelling designed to evaluate likely temperature rise would indicate that for gas turbine exhausts, with not untypical release temperatures up to 500°C and flow rates of between 50-100kg/s, the minimum range at which the temperature rise in the plume drops to 2°C above ambient temperature would be in the range of 130-190m downwind of the source. Even where gas turbine generation systems incorporate waste heat recovery systems, resulting in lower gas temperatures of about 250°C, with the same flow rate assumptions the minimum distance before the temperature rise in the plume drops to 2°C above ambient is still in the range of 90-130m downwind of the source.

d) In consideration of 5.4-c), except for the very largest off-shore facilities, it implies regardless of design there will always be a wind condition where temperature rise above the helideck exceeds the 2°C threshold. Consequently, it may be impossible to design a helideck that is compliant with these criteria for all conditions. The design aim then becomes one of minimising the occurrence of high temperatures over the helideck rather than necessarily eliminating them completely. This can be achieved by ensuring that the facility layout and alignment directions are such that these conditions are only experienced rarely.

e) If it is necessary to locate power generation modules and exhausts close to the helideck, then this can be an acceptable location provided that the stacks are high enough to direct the exhaust gas plume clear of arriving/departing helicopters. It is also important to ensure that the design of the stacks does not compromise helideck obstacle protection surfaces or are so wide as to present a source of structure-induced turbulence.

f) The helideck should be located so that winds from the prevailing wind direction(s) carry the plume away from the helicopter approach/departure paths. To minimise the effects for other wind directions, the exhausts should be sufficiently high to ensure that the plumes are above all the likely helicopter approach/departure paths. To achieve this, it is recommended that exhaust outlets are no less than 20-30 m above the helideck. The provision of downward-facing exhausts that initially direct hot exhaust gases towards the sea should be avoided as experience has shown that hot plumes can rise from the sea surface and disperse in an unpredictable way, particularly in light and variable wind conditions.

g) In situations where it is difficult or impractical to reduce the potential interaction between the helicopter and the turbine exhaust plume to a sufficiently low level, consideration should be given to installing a gas turbine exhaust plume visualisation system on facilities having a significant gas turbine exhaust plume problem, in order to highlight the hazard to pilots when operating by day, so minimising the potential effect of the plume by making it easier to see and avoid a plume encounter.

h) Helicopter performance may also be significantly impaired as a result of the combined radiated and convection heat effects from flare plumes under certain wind conditions. In moderate or strong winds, the radiated heat from a lit flare is rapidly dissipated and usually presents little problem for the helicopter, provided flight through the flare plume is avoided. However, in calm or light wind conditions, potential changes in air temperature in the vicinity of the helideck could be much greater and so have a marked effect on the performance of the helicopter. Therefore, designers should exercise great care in the location and elevation of flare towers in relation to helicopter operations.

5.5 Cold Flaring and Rapid Blow-Down Systems

The following can be considered as guidance:

a) Hydrocarbon gas can be released as a result of the production process on the installation or from drilling facilities at various times. It is important to ensure that a helicopter does not fly into a cloud of hydrocarbon gas because even relatively low levels of concentration (typically above 10% lower flammable limit [LFL]) can cause a helicopter engine to surge or flame-out with a consequent risk to the helicopter. Also, in these conditions, the helicopter poses a risk to the off-shore facility because it is a potential ignition source for any hydrocarbon gas that may be present in the atmosphere. Consideration therefore needs to be given to ensuring that gas release points are as remote as possible from the helideck and from the helicopter flight path and that, in the event of any unforeseen gas release occurring during helicopter operations, the pilot of a helicopter is given sufficient warning so that, if necessary, he can break off his approach to the helideck. Planned gas releases should only occur when helicopters are not in the area.

b) The blow-down system on a production facility depressurises the process system releasing hydrocarbon gas. It will normally be designed to reduce the pressure down to half its operating value in about 15 minutes. However, for a large facility this could feasibly require the release of 50 tonnes of gas, or more. Once down to the target pressure, in 15 minutes or less, the remainder of the gas will continue to be released from the system. A blow-down may be automatically triggered by the detection of a dangerous condition in the process or alternatively manually triggered.

c) The blow-down system should have venting points that are as remote as possible from the helideck, and for prevailing winds, are downwind of the helideck. It is not uncommon to have this vent on the flare boom, and this will normally be a good location. However, it should be borne in mind that dilution of the gas to acceptably low levels of concentration (to <10% LFL) may not occur until the plume is a considerable distance from the venting point. This distance may be anywhere between 200m and 500m depending on the size of the vent, the rate of venting and the prevailing wind speed.

d) Drilling facilities often have ‘poor-boy degassers’ which are used to release gas while circulating a well, but, except for a sudden major crisis such as a blow-out on a drilling facility, are unlikely to release significant quantities of gas without warning. As with production facilities, it is not likely to be possible to locate the helideck sufficiently distant from the potential source of gas to always guarantee low levels of concentration at the helideck or in the helicopter flight path, and so the drilling facility may need to curtail helicopter flights when well circulation activity is going on, or when problems are experienced down the well.

5.6 Special Conditions for Floating Facilities and Ships

The following can be considered as guidance:

a) As well as experiencing the aerodynamic effects and potential hazards highlighted within this Chapter II-6, floating installations and ships experience dynamic motions due to ocean waves. These motions are a potential hazard to helicopter operations, and motion limits for executing a safe landing will need to be established in order to avoid unsafe conditions. The recording and reporting of deck motions for the safe landing of helicopters is discussed in more detail in Chapter II-20.

b) The setting of helideck performance/motion limitations due to floating installation and ship dynamic motions is usually the responsibility of the helicopter operator and will be influenced by the type of facility or ship to which they are operating, the types of helicopters being operated, the operating conditions (e.g. whether day or night) and the location of the helideck (a helicopter operator may, for example, discuss landing limits with the Ship's Master). Limitations typically apply both to vertical linear motions in heave and to angular motions expressed as pitch and roll. Some operators may consider additional parameters such as helideck inclination.

c) The angle of pitch and roll is the same for all points on a facility or ship but the amount of heave, sway or surge motion experienced will vary considerably depending on the precise location of the helideck. The severity of helideck motions will depend on:

1) The wave environment

2) The size of the floating facility or ship (a smaller facility/ship generally tends to exhibit larger and faster wave induced motions than a large facility/ship where the Response Amplitude Operator (RAO) is lower)

3) The characteristics of the floating facility or ship (certain hull forms exhibit larger wave induced motions than others, or are sensitive to particular sea conditions)

4) Whether the floating facility or ship is moored, underway or under tow

5) The location of the helideck on a ship (vertical motions tend to be greater at the bow or stern of a ship than at the amidships location, and sway motions due to roll tend to increase with helideck height)

d) Sea states are usually characterised in terms of a significant wave height, an associated wave period and a wave energy spectrum. The motions of a ship or floating facility generally become larger as the significant wave height and period increase, but can be especially severe at certain wave periods (e.g. at natural roll or pitch periods) and may be sensitive to the range in frequency content of the wave spectrum experienced. The motion characteristics of a floating facility or ship may be reliably predicted by recourse to well-established computer models or to physical model testing. Helideck downtime will occur whenever the motions of the floating facility or ship exceed the derived criteria.

e) The operability of a helicopter landing area depends on its location on a floating facility or ship, both longitudinally and transversely. For ships and ship-shaped floating facilities, such as FPSOs, the pitching motion is such that the vertical heave motion experienced at the helideck on the bow or stern will generally be much greater than if the helideck is located amidships. Bow mounted helidecks can be particularly vulnerable to damage from green seas spilling over the superstructure of the ship, unless mounted high above deck level. Helidecks located off the vessel centreline, and cantilevered over the side (which usually provides the benefit of an unobstructed falling gradient over at least 180 degrees) may experience downtime due to heave motions caused by roll; although generally downtime for a helideck located amidships will be less than for a helideck located at the bow or stern of a ship or ship-shaped facility.

Note 1 — The location of the helideck particularly on drilling facilities is generally determined by factors other than the need to minimise heave motions, and it maybe that the central area of an FPSO or drillship, for example, is otherwise occupied by processing or drilling equipment. A helideck located at the bow or stern may be more accessible to the temporary refuge and/or accommodation on board the facility which is another factor to consider particularly where the helideck is designated to be a primary means of escape in the event of an incident occurring.

Note 2 — Some thrusters-assisted FPSOs and dynamically positioned facilities or ships have the ability to turn to a desired heading which can be used operationally to minimise helideck downtime due to wave motions and aerodynamic effects. Where dynamic positioning (DP) systems are used to maintain heading control, it is important to ensure that the heading control system has adequate integrity (operability and redundancy) to maintain heading control at all times during helicopter operations.

5.7 Environmental Criteria

The following can be considered as guidance:

a) The design criteria given in the following paragraphs represent the current best information available and may be applied to new fixed or floating facilities or ships, and to significant modifications to existing facilities or ships and/or where operational experience has highlighted potential issues. When considering the volume of airspace to which the following criteria apply, 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 considered to be a height above the helideck corresponding to 9.14m (30 feet) plus wheels-to-rotor height plus one rotor diameter. For the Sikorsky S92, for example, this equates to a column of air approximately 31m (or 102 feet) above helideck surface level. The formula is clearly type specific being predicated on two of the dimensional aspects of the design helicopter which are specific to type.

b) As a general rule, in respect to turbulence, a limit on the standard deviation of the vertical airflow velocity of 1.75m/s should not be exceeded. Where these criteria are significantly exceeded (i.e. where the limit exceeds 2.4m/s), there is the possibility that operational restrictions will be necessary. Fixed or floating facilities or ships where there is a likelihood of exceeding the criteria should be subjected to appropriate testing e.g. a scale model in a wind tunnel or by Computational Fluid Dynamics (CFD) analysis, to establish the wind environment in which helicopters will be expected to operate.

c) Unless there are no significant heat sources on the facility or ship, designers should commission a survey of ambient temperature rise based on a Gaussian Dispersion model and supported by wind tunnel testing or CFD analysis. Where the results of such modelling and/or testing indicate there may be a rise of air temperature of more than 2 degrees Celsius averaged over a 3-second time interval, there is the possibility that operational limitations and/or restrictions may need to be applied.

d) For permanent multiple platform configurations, normally consisting of two or more bridge-linked modules in close proximity to each other, the environmental effects of hazards emanating from all constituent modules 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 which carries any exhaust plumes from a bridge-linked module in the direction of the helideck.

e) For temporary combined operations where typically one or more mobile facilities and/or ships are operated in close proximity to another (usually fixed) facility, the environmental effects emanating from one facility or ship should be fully considered for all facilities located together in temporary combined operations.

5.8 Design – Helideck Access Points

5.8.1 General

5.8.1.1 Helideck access points shall be located at two or preferably three locations around the landing area to give passengers embarking or disembarking direct access to and from the helicopter without a need to pass around the tail rotor or under the main rotor of those helicopters with a low main rotor profile. The need to preserve, as far as possible, an unobstructed falling gradient over at least 180° should be carefully weighed against the size and design of the access platform in needing to accommodate vital helideck safety equipment (e.g. fire-fighting equipment) plus access stairs and signage so that any infringement to the falling gradient is the smallest possible, and preferably not at all.

5.8.1.2 When deciding the normal access and emergency escape routes to and from the helideck, a safe and efficient route should be provided for passengers between the helideck and arrival / departure areas.

5.8.1.3 The helideck normal access and emergency escape routes design analysis should take into account the following:

a) Limiting the steepness of access-ways to assist safe personnel passage

b) Providing the most direct route for the primary access from the helideck

c) Being able to secure the helideck properly from unauthorised or inadvertent access during helideck operations, etc.

d) Provision of efficient passenger controls

e) Sufficient space for, and ease of laying fire hoses

f) Easy and unrestricted access to rescue equipment

g) Easy stretcher access

h) Easy access for freight handling

i) Easy access for baggage handling

j) Separation of passenger movement from refuelling operations

k) Provision of good clearances from helicopter tail rotor position for deck crew and passengers

l) The need to accommodate aircraft positioning in various wind directions

5.8.2 Emergency Escape Routes

5.8.2.1 There shall be a minimum of two primary escape routes from the helideck, preferably three.

5.8.2.2 Escape routes shall be of a suitable size to enable quick and efficient movement of the maximum number of personnel who may require to use them, and to facilitate easy manoeuvring of fire-fighting equipment and use of stretchers.

5.8.2.3 Typical dimensions for width of escape routes should be 1.2m for main escape routes and 0.7m for secondary escape routes, with consideration given to areas for manoeuvring a stretcher.

5.8.3.4 One escape route should be a ladder system if a platform and stairs prove to be an unworkable option.

5.8.3.5 Escape routes should be at least 90-degrees to each other; they shall not be sited together.

Note - Preferred option is for routes to be positioned opposite each other.

5.8.3.6 Escape routes shall take into account fire monitor positioning and the likely effect of water blast impeding passenger escape.

5.8.3.7 Escape routes shall be positioned so as not to impede rescue operations.

5.8.3.8 Fire-fighting equipment and rescue equipment should be positioned close to exits.

5.8.3.9 Where foam monitors are selected for fire-fighting and co-located on an access platform, care should be taken to ensure that the presence of a monitor does not impede or cause injury to escaping personnel due to the operation of the monitor in an emergency situation.

5.8.3.10 Escape routes should be designed to direct passengers immediately away from the helicopter, in particular the tail rotor area.

5.8.3.11 Escape routes shall provide easy access and quick arrival at a place of safety below helideck level.

5.8.3.12 Fire-fighters and helideck crew escape from fixed monitor platforms should have access to the fire-fighting pumping switch.

5.8.3.13 Vessels with helidecks on the foredeck may be unable to provide a tertiary escape other than via a hatch system to below deck. The designer should provide alternative options for the tertiary escape route, should a stricken helicopter hinder the use of the hatchway.

5.8.3.14 Vessels with foredeck helidecks will sometimes offer a very good escape route to protected areas behind the bridge. The designer should take advantage of this option.

5.8.4 Stairways

5.8.4.1 The primary helideck access stairways should be designed with extra width where possible.

5.8.4.2 Long, very steep stairways should be avoided. It is preferable to have intermediate landings.

5.8.4.3 Handrails associated with access platforms may need to be made collapsible, retractable or removable where the height constraints of permitted objects cannot be otherwise met and should be painted yellow / black for increased conspicuousity.

5.8.4.4 Similar to walkways, where possible, stairways should have high-sided handrail systems particularly where the outboard helideck access routes are likely to be exposed to high winds and on vessels subject to wave motions.

5.8.4.5 Ladders for normal access should be unacceptable.

5.8.4.6 If chains are to be used to restrict access to helideck stairways, then they shall be frangible (plastic).

Chapter II-6 – Physical Characteristics: Helidecks

Note1. - In respect to D and D-value referenced in the following sections, it should be noted that this corresponds to the largest overall dimension of a single main rotor helicopter when rotors are turning, being measured, and expressed in metres, 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 helicopter structure.

Note2 - Were the criteria cannot be met in full for a particular type of helicopter, it may be necessary to promulgate operational restrictions in order to compensate for deviations from these criteria. Helicopter operators are to be notified of any restrictions through the Helideck Limitations List (HLL).

Note3 - For helidecks that have a 1 D or larger FATO it is presumed that the FATO and the TLOF will always occupy the same space and have the same load bearing characteristics so as to be coincidental.

Note4 - For helidecks that are less than 1 D, the reduction in size is only applied to the TLOF which is a load bearing area. In this case, the FATO remains at 1 D but the portion extending beyond the TLOF perimeter need not be load bearing for helicopters. The TLOF and the FATO may be assumed to be co-located but are not coincidental.

6.1 Final Approach and Take-Off Areas (FATO) and Touchdown and Lift-Off Areas (TLOF)

6.1.1 A helideck shall be provided with one FATO and one coincident or co-located TLOF.

6.1.2 A FATO may be any shape but shall be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1 D of the largest helicopter the helideck is intended to serve.

6.1.3 A TLOF may be any shape but shall be of sufficient size to contain:

a) for helicopters with an MTOM of more than 3,175 kg, an area within which can be accommodated a circle of diameter not less than 1 D of the largest helicopter the helideck is intended to serve; and

b) for helicopters with an MTOM of 3,175 kg or less, an area within which can be accommodated a circle of diameter not less than 0.83 D of the largest helicopter the helideck is intended to serve.

Note. - For helicopters with a MTOM of 3,175 kg or less, the TLOF should be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1 D of the largest helicopter the helideck is intended to serve. (Refer to 6.1.15 (d))

6.1.4 A helideck shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO. *(Refer to Chapter II-5)*.

6.1.5 The FATO should be located so as to avoid, as far as is practicable, the influence of environmental effects, including turbulence, over the FATO, which could have an adverse impact on helicopter operations. *(Refer to Chapter II-5)*.

6.1.6 The TLOF shall be dynamic load-bearing.

6.1.7 The TLOF shall provide ground effect.

6.1.8 No fixed object shall be permitted around the edge of the TLOF except for frangible objects, which, because of their function, must be located thereon.

6.1.9 For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25 cm.

6.1.10 For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF should be as low as possible and in any case not exceed a height of 15 cm.

6.1.11 For any TLOF designed for use by helicopters having a D-value of 16.0 m or less, and any TLOF having dimensions of less than 1D, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5 cm.

Note. — Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.

6.1.12 Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

Note — Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.

6.1.13 Safety devices such as safety nets or safety shelves shall be located around the edge of a helideck but shall not exceed the height of the TLOF.

6.1.14 Safety devices around a helideck should be tested annually.

6.1.15 The surface of the TLOF shall be skid-resistant to both helicopters and persons and be sloped to prevent pooling of water. *(Refer to Chapter II-8).*

The following can be considered as guidance:

a) From a point on the periphery of the FATO 1D-circle, an obstacle free approach and take-off sector should be provided which extends over an angle of at least 210 degrees. Within this sector obstacle accountability should be considered out to a distance from the periphery of the FATO that will allow for an unobstructed departure path appropriate to the least well performing helicopter the FATO is intended to serve. The height limitation for obstacles in the obstacle free sector is 25 cm for a TLOF of greater than 16.0m and/or 1D or greater and 5 cm for a TLOF 16.0m or less and/or less than 1D. For helicopters that are operated in Performance Class 1 or 2, the horizontal extent of this distance from the edge of the FATO will be based on the one-engine-inoperative capability of the type to be used.

b) It is essential the TLOF provides sufficient space for the landing gear configuration and sufficient surface area to promote helpful “ground cushion” effect from rotor downwash. The area provided should also allow adequate room for passengers and crew to alight or embark the helicopter and to transit to and from the operating area safely. In addition, space consideration needs to be given to allow essential on-deck operations, such as baggage handling, tying down the helicopter or helicopter refuelling, to occur safely and efficiently, and, in the event of an incident or accident occurring, for rescue and fire-fighting teams to always have good access to the landing area from an upwind location (see also Chapter II-5).

c) The design should allow for sufficient clearance from the main rotor and tail rotor of the helicopter to essential objects permitted to be around the perimeter of the TLOF, including obstacles that may be present in the limited obstacle sector. It should be clearly understood that a FATO of 1D is the minimum dimension sufficient for containment of the helicopter; in this case, where a precise landing is completed, the main and tail rotors will a-but the edge of the 1D circle. For this reason, it is important that the yellow touchdown/positioning marking circle is accurately and clearly marked and is used by aircrew every time for positioning the helicopter during the touchdown manoeuvre.

d) Sufficient margins to allow for touchdown/positioning inaccuracies as a result of normal variations or handling difficulties, for example due to challenging meteorological conditions, aerodynamic effects and/or dynamic motions due to ocean waves, should be allowed for in the design. The helideck and environs should provide adequate visual cues and references for aircrew to use throughout the approach to touchdown manoeuvre from initial helideck location and identification (acquisition) through final approach to hover and to landing. In addition, adequate visual references should be available for the lift-off and hover into forward flight.

e) In consequence of the considerations stated in a), b) and c), except where an Aeronautical Study is able to demonstrate otherwise, the minimum size for the new-build design of a TLOF for single main rotor helicopters is deemed to be an area which can accommodate a circle whose dimension is no less than 1.0x the overall length including rotors of the largest helicopter that the helideck is intended to serve. For helicopters with a MTOM of 3175kg or less, it is permitted, on the basis of a risk assessment to shrink the overall size of the TLOF so that it is less than 1D, but is not less than 0.83D.

f) A FATO of 1D provides full containment of the helicopter where touchdown markings are used correctly and precisely. For a helideck that has a dynamic load bearing surface (TLOF) of less than 1D, elements of the helicopter will inevitably extend beyond the edge of the TLOF. For this reason, the TLOF is surrounded by a circle with a diameter of 1D — which is obstacle free with the exception of the permitted obstacles. In essence this obstacle free area represents the standard 1D FATO from which the limited obstacle sector extends. To ensure obstacle clearance, it is important that the diameter of the touchdown/positioning marking circle is 0.5 of the notional FATO (not of the smaller landing surface (TLOF)) and is located at the centre of the FATO.

Chapter II-7 – Physical Characteristics: Shipboard Helideck

Note 1 - When helicopter operating areas are provided in the bow or stern of a ship or are purpose-built above the ship's structure, they shall be regarded as purpose-built shipboard helidecks.

Note 2 - Except for the arrangement described in paragraph 1.6 b), for shipboard helidecks it is presumed that the FATO and the TLOF will be coincidental.

7.1 Final Approach and Take-Off Areas (FATO) and Touchdown and Lift-Off Areas (TLOF)

7.1.1 A shipboard helidecks shall be provided with one FATO and one coincidental or co-located TLOF.

7.1.2 A FATO may be any shape but shall be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1 D of the largest helicopter the helideck is intended to serve.

7.1.3 The TLOF of a shipboard helideck shall be dynamic load-bearing.

7.1.4 The TLOF of a shipboard helideck shall provide ground effect.

7.1.6 For purpose-built shipboard helidecks provided in a location other than the bow or stern, the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the helideck is intended to serve.

7.1.7 For purpose-built shipboard helidecks provided in the bow or stern of a ship, the TLOF shall be of sufficient size to:

a) contain a circle with a diameter not less than 1 D of the largest helicopter the helideck is intended to serve; or

b) for operations with limited touchdown directions, contain an area within which can be accommodated two opposing arcs of a circle with a diameter not less than 1 D in the helicopter's longitudinal direction. The minimum width of the helideck shall be not less than 0.83 D (see Figure 7-1).

Note1 — The ship will need to be manoeuvred to ensure that the relative wind is appropriate to the direction of the helicopter touchdown heading.

Note2 — The touchdown heading of the helicopter is limited to the angular distance subtended by the 1 D arc headings, minus the angular distance which corresponds to 15 degrees at each end of the arc.

7.1.8 For non-purpose-built shipboard helidecks, the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the helideck is intended to serve.

7.1.9 A shipboard helideck shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO. *(Refer to Chapter II-5)*

7.1.10 The FATO shall be located so as to avoid, as far as is practicable, the influence of environmental effects, including turbulence, over the FATO, which could have an adverse impact on helicopter operations. *(Refer to Chapter II-5).*

7.1.11 No fixed object shall be permitted around the edge of the TLOF, except for frangible objects, which, because of their function, must be located thereon.

7.1.12 For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25 cm.

7.1.13 For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF should be as low as possible and in any case not exceed a height of 15 cm.

7.1.14 For any TLOF designed for use by helicopters having a D-value of 16.0 m or less, and any TLOF having dimensions of less than 1D, objects in the obstacle-free sector, whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5 cm.

Note — Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.

7.1.15 Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

7.1.16 Safety devices such as safety nets or safety shelves shall be located around the edge of a shipboard helideck, except where structural protection exists, but shall not exceed the height of the TLOF.

7.1.17 Safety devices around a helideck should be tested annually.

7.1.17 The surface of the TLOF shall be skid-resistant to both helicopters and persons.

The following can be considered as guidance:

a) A shipboard helideck may be purpose built or non-purpose built and be provided in the bow or stern of a ship, have an over-side location (usually cantilevered), be amidships on or close to the centre line of the ship, be located on the ships side or, subject to structural considerations, utilise other non-purpose built areas of the ship such as over a hatch cover (Refer to Chapter II-5).
b) For a shipboard helideck, regardless of whether it is purpose built or non-purpose built, where the diameter of the landing area is 1D or larger it is presumed that the FATO and TLOF will always be coincidental and therefore the TLOF is assumed to include the FATO when used throughout the requirements of PART II. A shipboard helideck commonly incorporates one TLOF, notwithstanding that for a large ship, to improve operational flexibility, there may be opportunity to provide an additional landing area elsewhere on the facility.
c) For a purpose built shipboard helideck provided in the bow or stern of a ship, where operations are conducted within limited touchdown directions only (see Figure 7-1), consideration may be given to reduce the load bearing surface dimension athwart-ships; provided in the helicopter's longitudinal (landing) direction the TLOF dimension is at-least 1D, the width of the TLOF in the athwart-ships direction may be reduced to no less than 0.83D. Across both axes the minimum dimension of the FATO is 1D, so athwart-ships the FATO will typically overlap the perimeter netting (or safety shelving) on both the port and starboard sides. This portion of the FATO, which for a minimum size (0.83D TLOF), extends either side beyond the TLOF by 0.085D, is assumed to be non-load bearing for helicopters. Any reductions should be supported by an Aeronautical Study.
d) The basic size of the FATO and TLOF for a shipboard helideck is, of necessity, a compromise for off-shore operations where space is often limited. The landing and take-off (load bearing) area should provide sufficient space for the landing gear configuration and a sufficient surface area to promote helpful "ground cushion" effect from rotor downwash. The surface area should allow adequate room for passengers and crew to alight or embark the helicopter and to transit to and from the operating area safely. In addition, space consideration needs to be given to allow essential on-deck operations, such as baggage handling, tying down the helicopter or helicopter refuelling, to occur safely and efficiently, and, in the event of an incident or accident

occurring, for rescue and fire-fighting teams to have good access to the landing area, at all times from an upwind location.

e) The design should allow for sufficient clearance from the main rotor and tail rotor of the helicopter to objects permitted to be around the perimeter of the TLOF, including objects that may be present in the limited obstacle sector. It should be clearly understood that a FATO of 1D is sufficient only for containment of the helicopter; the main and tail rotors will always be at the edge of the 1D circle — even when the helicopter is perfectly positioned. For this reason, it is important that the touchdown/positioning marking circle is accurately and clearly marked and is used by aircrew for positioning the helicopter during the touchdown manoeuvre.

f) Sufficient margins to allow for touchdown/positioning inaccuracies as a result of normal variations or handling difficulties, for example due to challenging meteorological conditions, aerodynamic effects and/or dynamic motions due to ocean waves, should be allowed for in the design. Finally, the helideck and the environs should provide adequate visual references for the aircrew throughout the approach to touchdown manoeuvre from initial helideck location and identification (acquisition) through final approach to hover and to landing. In addition, adequate visual references should be available for lift-off and hover.

g) In consequence of the considerations stated in d), e) and f), the minimum size of the FATO and the TLOF for single main rotor helicopters is deemed to be an area which can accommodate a circle whose dimension is no less than 1.0x the overall length including rotors of the largest (design) helicopter that the shipboard helideck is intended to serve.

h) In the case of a purpose built shipboard helideck provided in the bow or stern of a narrow-beam ship, where operations are conducted with limited touchdown directions it is permissible to make a case for operations to shipboard helidecks that are less than 1D, but are no less than 0.83D in the athwart-ships direction. Any reductions should be supported by an Aeronautical Study.

i) One of the important elements relating to the minimum size of the FATO and TLOF is the requirement for sufficient clearance to exist from the main or tail rotor of the helicopter to essential objects which may need to be present around a TLOF. For a shipboard helideck, which has an overall dimension less than 1.0D and/or has a D-value of 16.00m or less, the height of essential permitted objects around the TLOF perimeter should be no greater than 5cm above the level of the landing area, whilst for a shipboard helideck having an overall dimension of 1.0D or greater, assuming also a D-value greater than 16.00m, the height of essential permitted objects around the TLOF perimeter should be no greater than 25cm above the level of the landing area. Essential objects may include guttering with or without a raised kerb, where provided, perimeter lighting systems, including perimeter floodlighting and foam monitors where a Fixed Monitor System (FMS) is the primary means for fire-fighting and any handrails or signage associated with the shipboard helideck which may not be capable of complete retraction or removal during helicopter operations.

j) Essential objects, which because of their function are required to be located around the TLOF perimeter, should be of a suitable construction when assessed against the undercarriage design of helicopters operating to the shipboard helideck. For a purpose-built shipboard helideck having an overall dimension of 1D or larger, assuming also a D-value greater than 16.00m, where the construction of permitted objects around the TLOF could present a threat to the undercarriage and tail rotor systems of helicopters passing over the TLOF perimeter at low altitude and at low airspeed, more demanding obstacle height restriction for objects around the TLOF should be considered; so that essential objects are restricted to a height no greater than 15cm above helideck level.

k) With the exception of the operation illustrated in Figure 7-1, a FATO and TLOF for a shipboard helideck may be any shape as long as it can contain a usually ‘hypothetical’ circle with the minimum prescribed dimensions of 1D. Although purpose built shipboard helidecks may be square, circular or rectangular — a common shape used for early designs — new build purpose built shipboard helidecks are more likely to be hexagonal or octagonal in shape. Consisting of a series of straight sides/edges, these arrangements provide some advantages over early design shapes. For example, multi-sided straight lines can provide better visual cues at night than either a circular or a square arrangement.

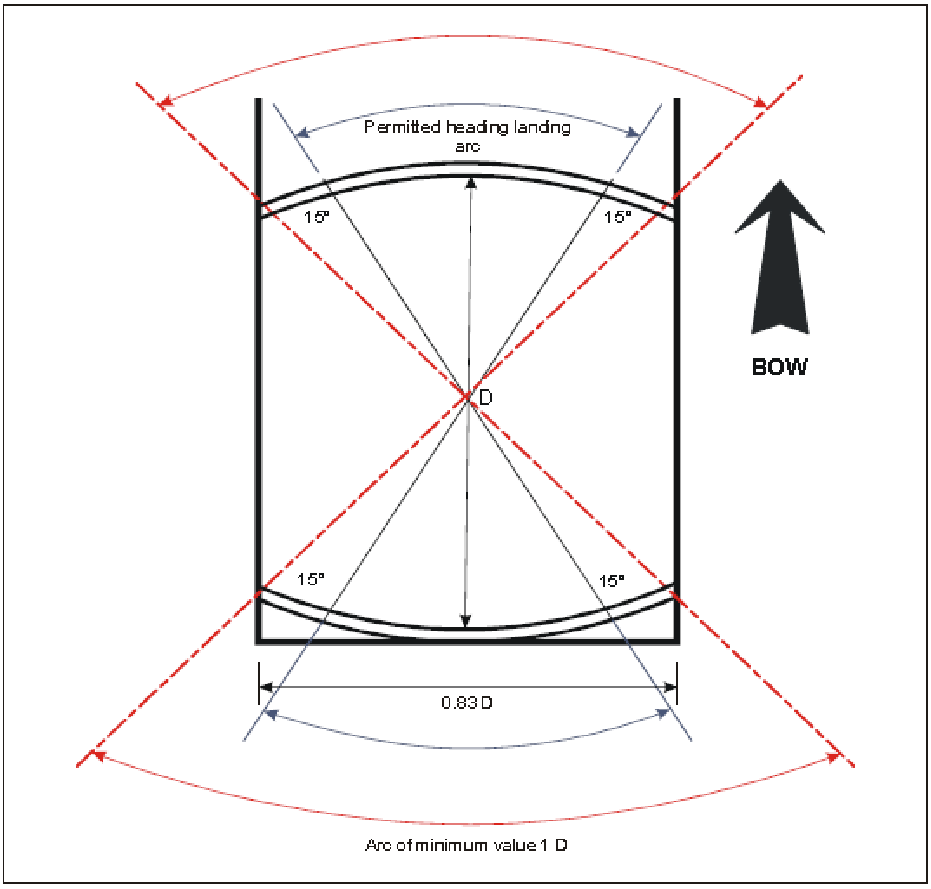


Figure 7-1 Shipboard permitted landing headings for limited heading operations

Chapter II-8 – Helideck Surface Arrangements: Objects, Slopes, Friction, Tie-Down Points, Perimeter Safety Net

8.1 Objects

8.1.1 Objects which due to their function are required to be located on the surface of the TLOF, such as helideck nets and helideck touchdown marking lighting systems, where provided, should not exceed a height above surface level prior to installation of more than 2.5cm and may only be present if they do not represent a hazard to helicopter operations. It should be appreciated that the presence of raised fittings on a helideck has potential to induce dynamic roll over for helicopters fitted with skids and extra care should be taken when incorporating deck-mounted fittings to helidecks intended for use by skid-fitted helicopters. As a consequence, because of the possible adverse effects of skid tips becoming enmeshed in helideck surface netting, it is recommended that skid fitted helicopters not operate to helidecks while a net is present. In addition, because of the concerns of dynamic rollover, helicopters should only operate to helidecks fitted with deck mounted touchdown marking lighting systems where the system components are suitably finished, and the installed height of the system does not exceed 2.5cm. This would include proper arrangements for the chamfering of components (e.g. panels) and the maintenance of suitable friction surface finishes for each element of the system.

Note — For a non-purpose built shipboard helideck there may be circumstances where non-essential, and otherwise immoveable surface mounted obstructions are located within or immediately adjacent to the landing area which, with robust operational controls may be assessed not to present a hazard to the helicopter, but which may need to be highlighted to be readily visible from the air. There is a scheme for marking of obstacles described in Chapter II-9 which also provides details of how to complete a helicopter landing area/operating area plan.

8.2 Slopes

8.2.1 The surface of the landing area should be sloped to prevent the pooling of water. To this end the landing area should be provided with a suitable drainage system capable of directing rainwater, seawater, fire-fighting media and fuel spills away from the helideck to a safe place. To ensure adequate drainage of a helideck located on a fixed facility, the surface of the helideck should be laid to a fall or cambered to prevent any liquids accumulating on the landing area. Such falls or cambers should be approximately 1:100

and should be designed to drain liquids away from the main structure. A system of guttering, and/or slightly raised kerb, should be provided around the perimeter of the TLOF to prevent spilled fuel falling onto other parts of the facility whilst directing any spillages to a safe storage or disposal area, which may include the sea surface (where permitted). The capacity of the drainage system should be adequate to contain the maximum likely spillage of fuel on the helideck taking account the design helicopter and its fuel capacity, typical fuel loads and uplifts. The design of the drainage system should preclude blockage by debris. Any deflection of the helideck surface, in service, due to static loads imposed by the helicopter while stationary should not modify the surface to the extent that it encourages pooled liquids to remain on the helideck.

8.3 Friction

8.3.1 The surface of the landing area should be prepared so as to be skid-resistant to both helicopters and personnel using the TLOF. This entails that all essential markings on the surface should have a coating of non-slip material.

Note — It is recognised that some designs of aluminium helidecks have holes in the topside construction for the purpose of the rapid drainage of fluids including fuel spills which could occur, for example, if a helicopter's fuel system is ruptured by the impact of a crash. In these cases, particular care should be taken to assess the qualities of skid-resistance prior to the helideck going into service. In addition, it is also important to ensure that the pattern, and especially the size of any holes, does not have a detrimental effect on helicopter operations in-so-far as the surface arrangement should not promote the breakdown of a helpful ground cushion beneath the helicopter to reduce beneficial ground effect.

8.3.2 The helideck surface should be rendered so as to meet the minimum friction coefficient.

8.3.3 The minimum average surface friction value of 0.65 should be achieved across the area inside the TD/PM, outside the TD/PM and on the paint markings themselves.

Table 8-1 Friction requirements

Average surface friction value	**Maximum period between tests**
0.85 and above	36 months
0.7 to 0.84	12 months

0.65 to 0.69	6 months
Less than 0.651	Net to be retained

The following can be considered as guidance:

a) The test method should involve a friction measuring device that:

1) employs the braked wheel technique;
2) is able to control the wetness of the deck during testing;
3) includes electronic data collection, storage and processing; and
4) allows the whole of the deck surface to be covered to a resolution of not less than 1 m2.

b) The minimum average surface friction value of 0.65 should be achieved across the area inside the TD/PM, outside the TD/PM and on the paint markings themselves.

8.3.4 However, where an acceptable minimum friction coefficient cannot be achieved for operations with wheeled helicopters, there is an option to provide a surface mounted tautly stretched helideck landing net to encompass the touchdown/positioning marking circle and the helideck identification “H” marking, so that for a normal touchdown, the wheeled undercarriage of the helicopter, is contained within the perimeter of the net. The net should not be so large as to compromise the clear interpretation of other markings; for example, the helideck-name marking or the maximum allowable mass marking — the helideck net may need to be modified to achieve this objective e.g. corners are cropped and removed.

8.3.5 It is preferable that the net be manufactured from material which is durable in consideration of the mass of the design helicopter and the forces acting on the net through the undercarriage. Materials selected should not be prone to wear and tear such as flaking caused by prolonged exposure to adverse weather conditions. The rope should be secured at regular intervals and tensioned to a suitable level (typically 2225N). As a rule of thumb, it should not be possible to raise any part of the net by more than 25cm above the helideck surface when applying a vigorous vertical pull by hand. The profile of the uninstalled net should ensure that it does not exceed the touchdown area height constraint requirements specified in paragraph 1.1. (It is not recommended that nets be provided for operations by skid-fitted helicopters as skids can easily become enmeshed in netting).

8.4 Tie-Down Points

9.4.1 Sufficient tie-down points, flush fitting to obviate damage to tyres or skids, should be provided for securing the design helicopter. Tie-downs should be located, and be of such construction, so as to secure the helicopter in severe weather conditions. Construction should take account of the inertial forces resulting from any movement of a floating facility. Tie down points should be compatible with the dimensions of tie down strop attachments.

8.5 Perimeter Safety Nets (Personnel Protection)

8.5.1 Personnel protection safety devices such as perimeter safety nets or safety shelves should be installed around the edge of the helideck except where structural protection already exists. Any safety device employed should not exceed the height of the outboard edge of the TLOF and so present a hazard to helicopter operations. The load bearing capability of the safety device should be assessed fit for purpose by reference to the shape and size of the workforce that it is intended to protect.

8.5.2 Where the safety device consists of perimeter netting, this should be of a flexible nature and be manufactured from a non-flammable material with the inboard edge fastened just below the edge of the helideck. The net itself should extend to a distance of at least 1.5m in the horizontal plane and be arranged with an upward slope of approximately 10°. The net should not act as a trampoline but should exhibit properties that provide a hammock effect to securely contain a person falling or rolling into it, without serious injury. When considering the securing of the net to the structure and the materials used, care should be taken to ensure each element will meet adequacy of purpose requirements, particularly that netting should not deteriorate over time due to prolonged exposure to the elements, including ultraviolet light. Perimeter nets may incorporate a hinge arrangement to facilitate the removal of sacrificial panels to allow for periodic testing.

8.5.3 Where the safety device consists of safety shelving rather than netting, it should be ensured that the construction and lay out of the shelving does not promote any adverse wind flow issues over the helideck (see Chapter II-5.3), whilst providing equivalent personnel safety benefits to 8.5.2, and that it is installed to the same minimum dimensions as the netting system described above (at least 1.5m in the horizontal plane beyond the edge of the helideck. This solid shelving offers some advantage for promoting helpful ground cushion, especially for helidecks which are sub-1D. It may also be further covered with netting to improve “grab” capabilities.

Chapter II-9 – Obstacle Environment

Note. - The objectives of the specifications in this chapter II-9 are to define the airspace around helidecks to be maintained free from obstacles so as to permit the intended helicopter operations at the helidecks to be conducted safely and to prevent the helidecks becoming unusable by the growth of obstacles around them. This is achieved by establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace.

9.1 Obstacle-Free Sector (OFS) / Surface - Helidecks

Description

9.1.1 A complex surface originating at and extending from a reference point on the edge of the FATO of a helideck. In the case of a TLOF of less than 1 D, the reference point shall be located not less than 0.5 D from the centre of the TLOF.

Characteristics

9.1.2 An obstacle-free sector/surface shall subtend an arc of specified angle.

9.1.3 A helideck obstacle-free sector shall comprise two components, one above and one below helideck level (see Figure 9-1):

a) *Above helideck level.* The surface shall be a horizontal plane level with the elevation of the helideck surface that subtends an arc of at least 210 degrees with the apex located on the periphery of the D circle extending outwards to a distance that will allow for an unobstructed departure path appropriate to the helicopter the helideck is intended to serve.

b) *Below helideck level.* Within the (minimum) 210-degree arc, the surface shall additionally extend downward from the edge of the FATO below the elevation of the helideck to water level for an arc of not less than 180 degrees that passes through the centre of the FATO and outwards to a distance that will allow for safe clearance from the obstacles below the helideck in the event of an engine failure for the type of helicopter the helideck is intended to serve.

Note. — For both the above obstacle-free sectors for helicopters operated in Performance Class 1 or 2, the horizontal extent of these distances from the helideck will be compatible with the one-engine-inoperative capability of the helicopter type to be used.

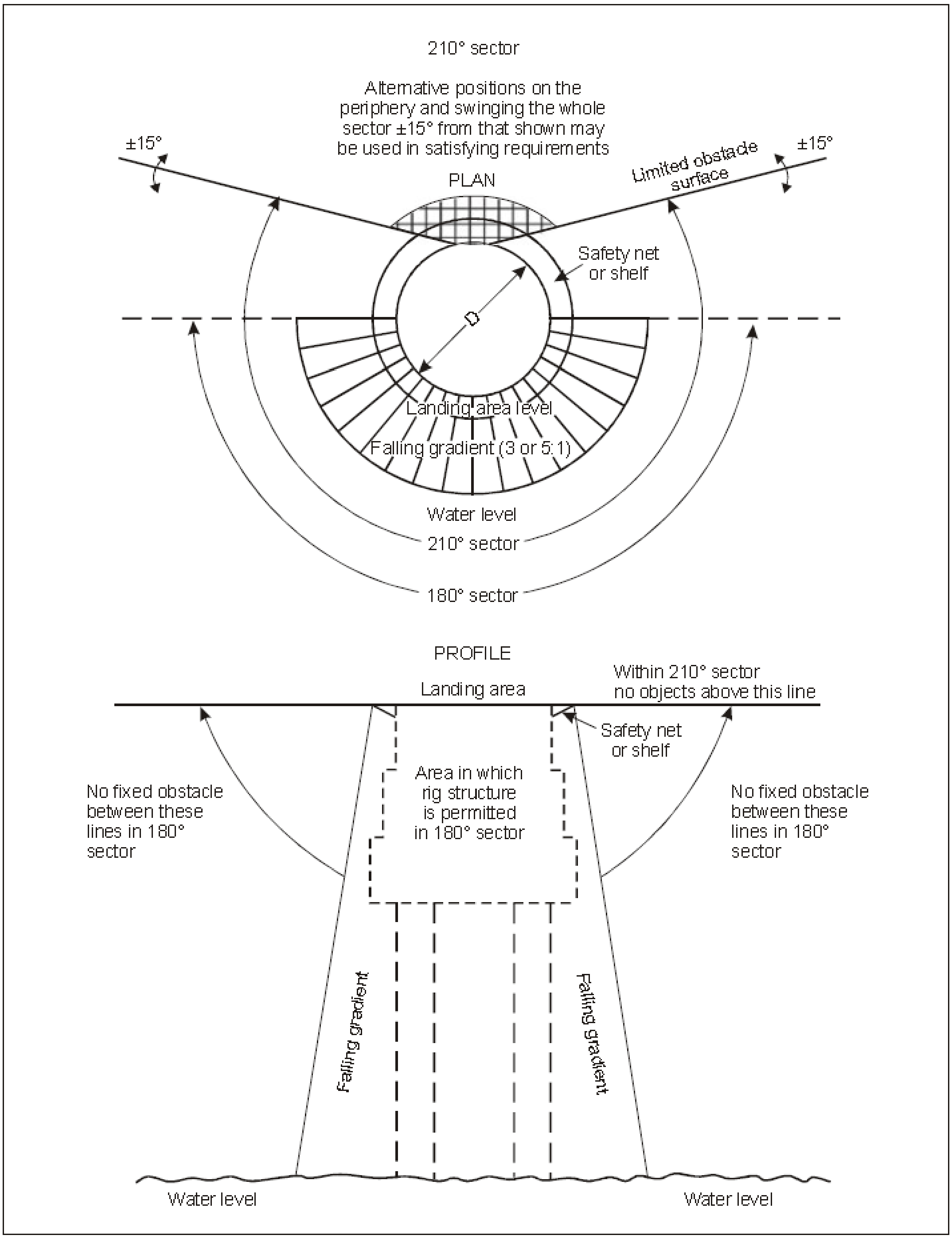

210° sector
Alternative positions on the periphery and swinging the whole sector ±15° from that shown may be used in satisfying requirements
±15°
±15°
Limited obstacle surface
PLAN
Safety net or shelf
D
Landing area level
Falling gradient (3 or 5:1)
Water level
210° sector
180° sector
PROFILE
Landing area
Within 210° sector no objects above this line
Safety net or shelf
Area in which rig structure is permitted in 180° sector
No fixed obstacle between these lines in 180° sector
No fixed obstacle between these lines in 180° sector
Falling gradient
Falling gradient
Water level
Water level

Figure 9-1 Helideck obstacle-free sector

9.2 Limited Obstacle Sector (LOS) / Surface - Helidecks

Note — Where obstacles are necessarily located on the structure, a helideck may have a limited obstacle sector (LOS).

Description

9.2.1 A complex surface originating at the reference point for the obstacle-free sector and extending over the arc not covered by the obstacle-free sector within which the height of obstacles above the level of the TLOF will be prescribed.

Characteristics

9.2.2 A limited obstacle sector shall not subtend an arc greater than 150 degrees. Its dimensions and location shall be as indicated in Figure 10-2 for a 1 D FATO with coincidental TLOF and Figure 10-3 for a 0.83 D TLOF.

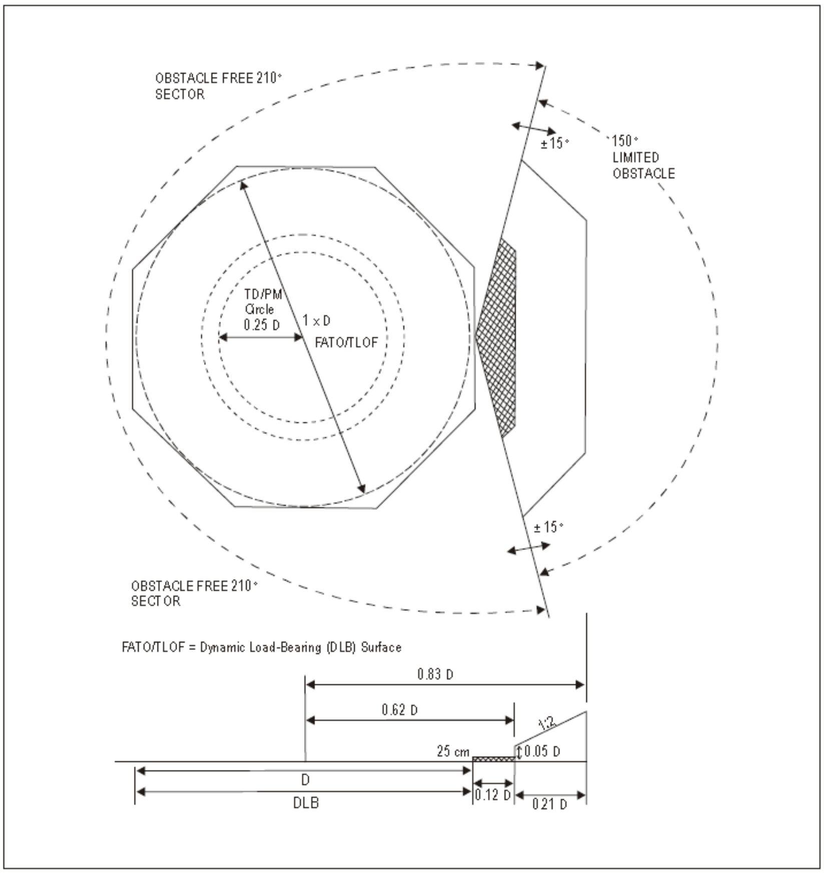


Figure 9-2 Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1 D and larger

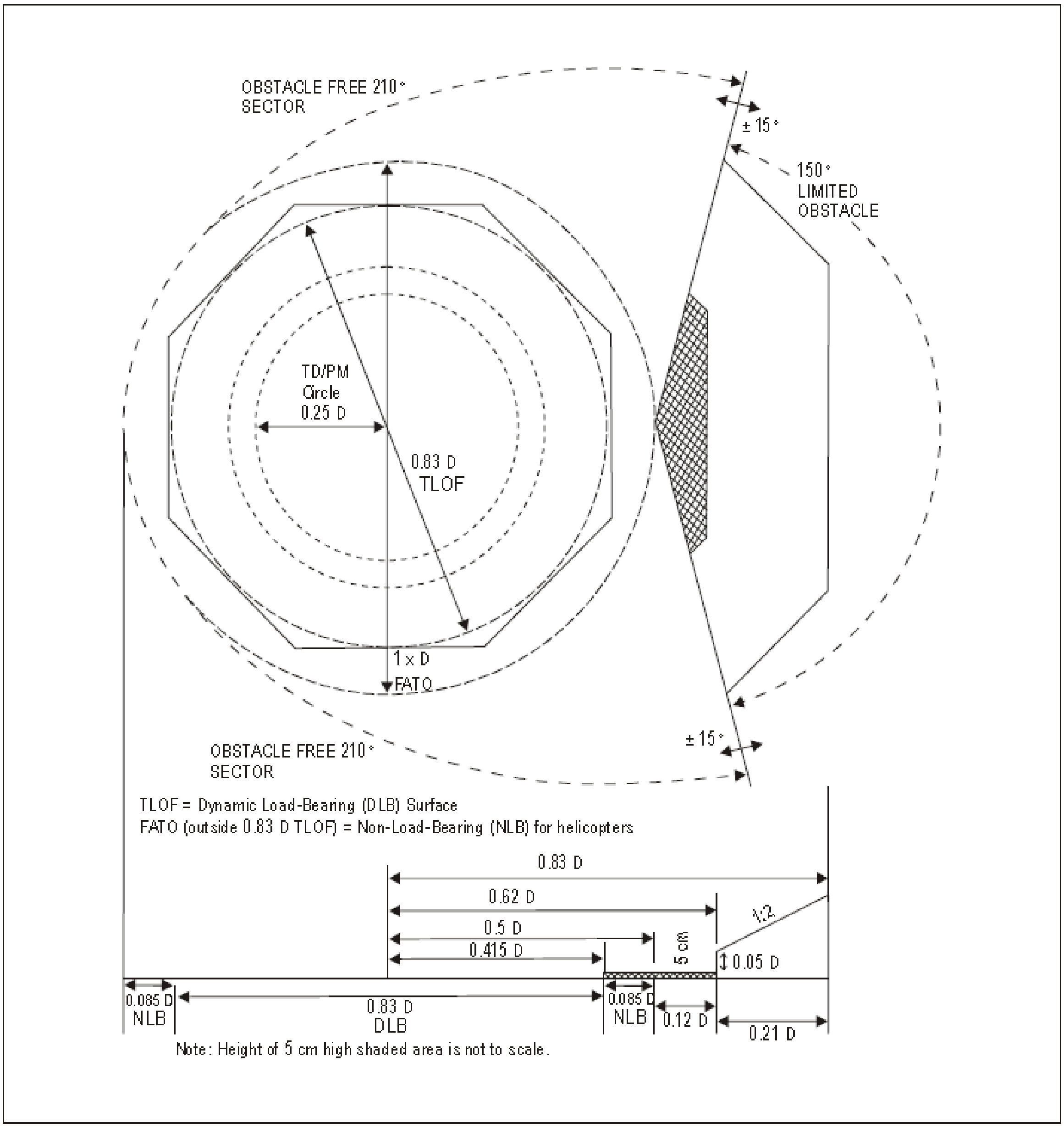


Figure 9-3 Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger

9.3 Obstacle Limitation Requirements - Helidecks

9.3.1 A helideck shall have an obstacle-free sector.

Note — A helideck may have a limited obstacle sector (LOS) (see 9.2.2).

9.3.2 There shall be no fixed obstacles within the obstacle-free sector above the obstacle-free surface.

9.3.3 In the immediate vicinity of the helideck, obstacle protection for helicopters shall be provided below the helideck level. This protection shall extend over an arc of at least 180 degrees with the origin at the centre of the FATO, with a descending gradient having a ratio of one unit horizontally to five units (5:1) vertically from the edges of the FATO within the 180-degree sector. This descending gradient may be reduced to a ratio of one unit horizontally to three units (3:1) vertically within the 180-degree sector for multi-engine helicopters operated in Performance Class 1 or 2 (see Figure 9-1).

Note. - Where there is a requirement to position, at sea surface level, off-shore support vessels (e.g. a Standby Vessel or tanker) essential to the operation of a fixed or floating off-shore facility, but located within the proximity of the fixed or floating off-shore facility's obstacle free sector (OFS), any off-shore support vessels would need to be positioned so as not to compromise the safety of helicopter operations during take-off, departure and approach to landing. (Refer to ICAO Doc 9261, 4.4 Multiplatform Configurations / Locations of Standby Vessels).

The following can be considered as guidance:

a) To account for the loss in height of a helicopter following an engine failure occurring during the early stages of the take-off manoeuvre, it is required that a clear zone be provided below landing area level covering a sector of at least 180 degrees with its origin based at the centre of the D-circle. The falling gradient is measured downwards to the sea surface from the edge of the safety netting or safety shelving on a vertical gradient. The surface should extend outwards for a distance that will allow for safe clearance from obstacles below the landing area in the event of an engine failure based on the least well performing helicopter that is serviced by the FATO. For helicopters operated in Performance Class 1 or 2, the horizontal extent of this distance from the landing area will be based on the one-engine inoperative capability of the helicopter type in use. All objects that are underneath the final approach and take-off paths will need to be assessed.

b) For a TLOF of 1 D and larger, within the 150-degree limited obstacle surface/sector out to a distance of 0.12 D measured from the point of origin of the limited obstacle sector, objects shall not exceed a height of 25 cm above the TLOF. Beyond that arc, out to an overall distance of a further 0.21 D measured from the end of the first sector, the limited obstacle surface rises at a rate of one unit vertically for each two units horizontally originating at a height 0.05 D above the level of the TLOF. (See Figure 9-2).

c) For a TLOF less than 1 D within the 150-degree limited obstacle surface/sector out to a distance of 0.62 D and commencing from a distance 0.5 D, both measured from the centre of the TLOF, objects shall not exceed a height of 5 cm above the TLOF. Beyond that arc, out to an overall distance of 0.83 D from the centre of the TLOF, the limited obstacle surface rises at a rate of one unit vertically for each two units horizontally originating at a height 0.05 D above the level of the TLOF. (See Figure 9-3).

Obstacle Protection Surfaces for Circular or Square Helidecks

9.3.4 Where the area enclosed by the TLOF perimeter marking is a shape other than circular, the extent of the LOS segments are represented as lines parallel to the perimeter of the TLOF rather than arcs. Figures 9-2 and 9-3 has been constructed on the assumption that an octagonal helideck arrangement is provided.

9.3.5 For circular helidecks or shipboard helidecks, the segments and sectors represented by straight lines are replaced using sectors shaped in an arc. Figures 9-4 to 9-7 provide examples.

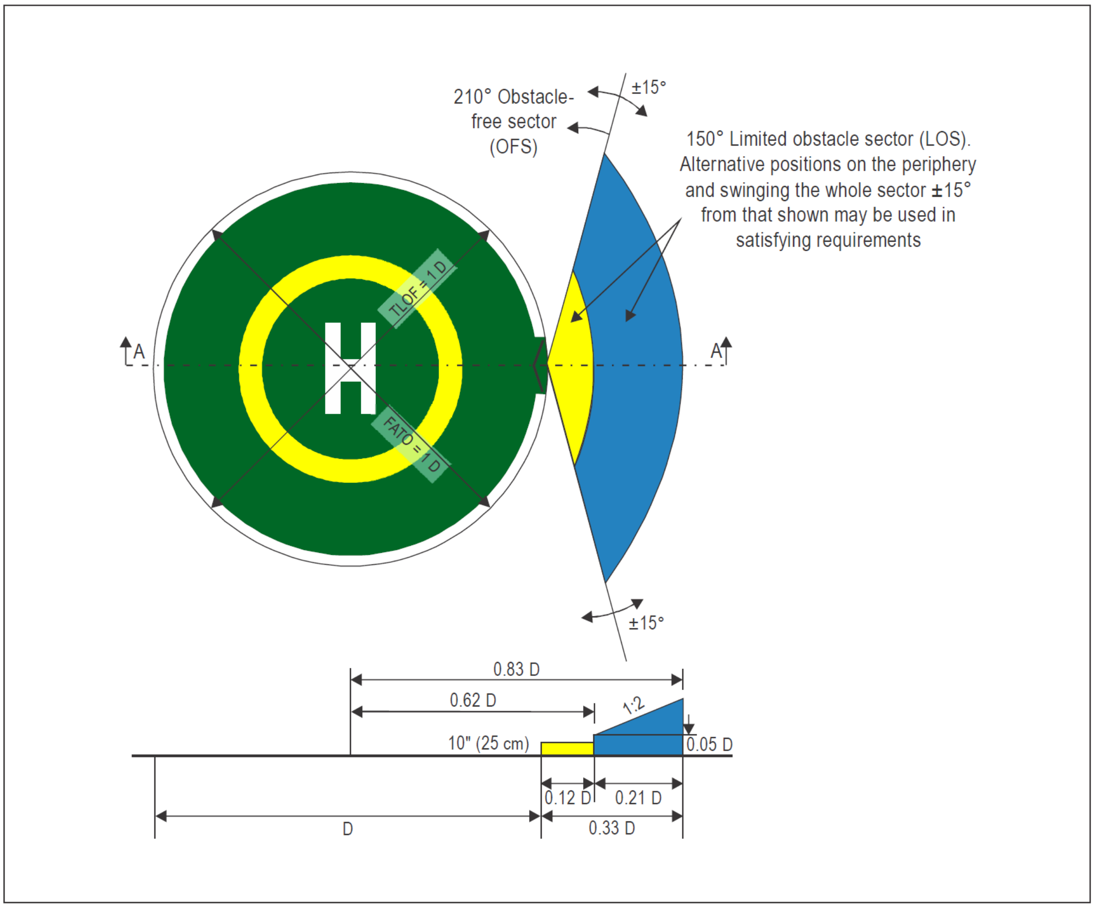


Figure 9-4 Circular obstacle limitation sectors and surfaces for 1D FATO and coincidental TLOF

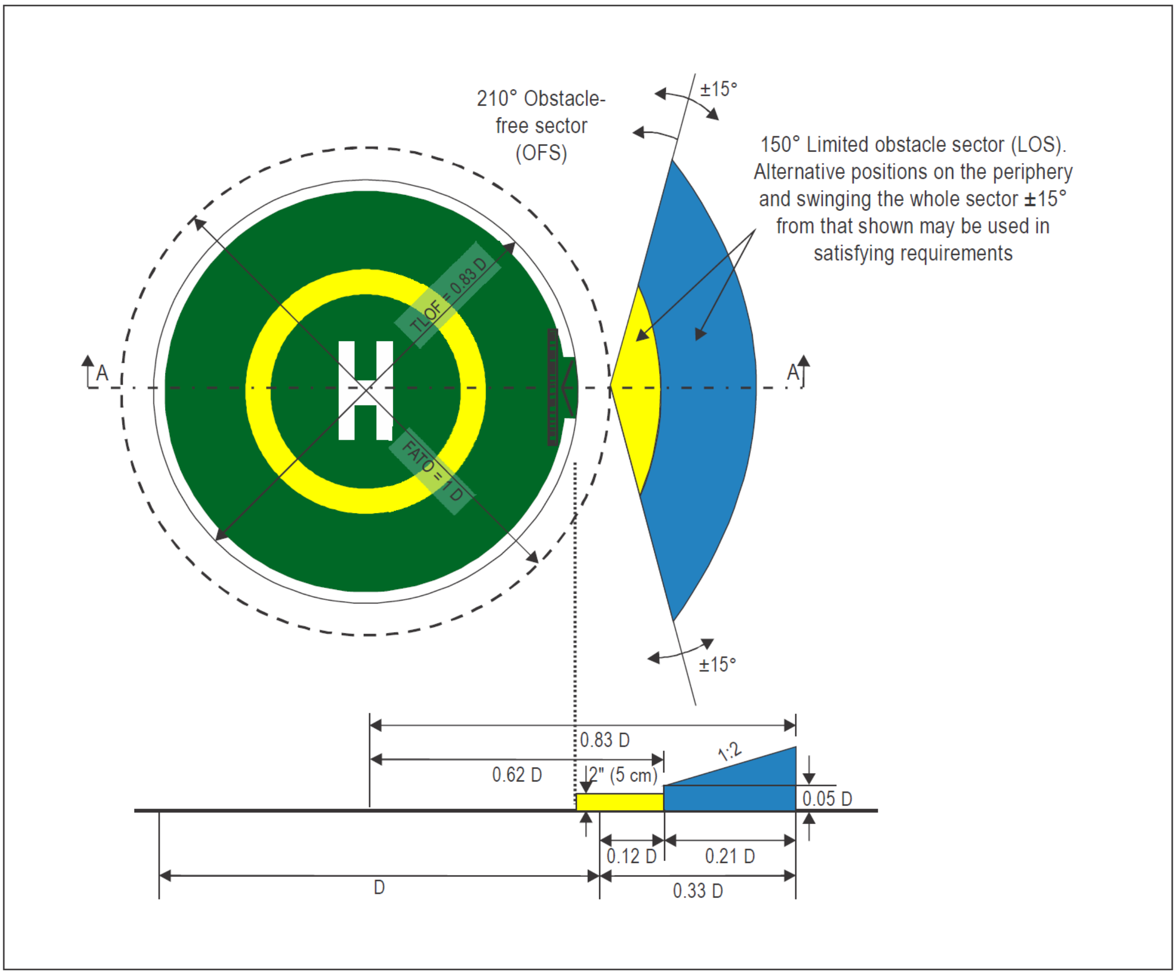


Figure 9-5 Circular obstacle limitation sectors and surfaces for 0.83D TLOF with co-located 1D TLOF

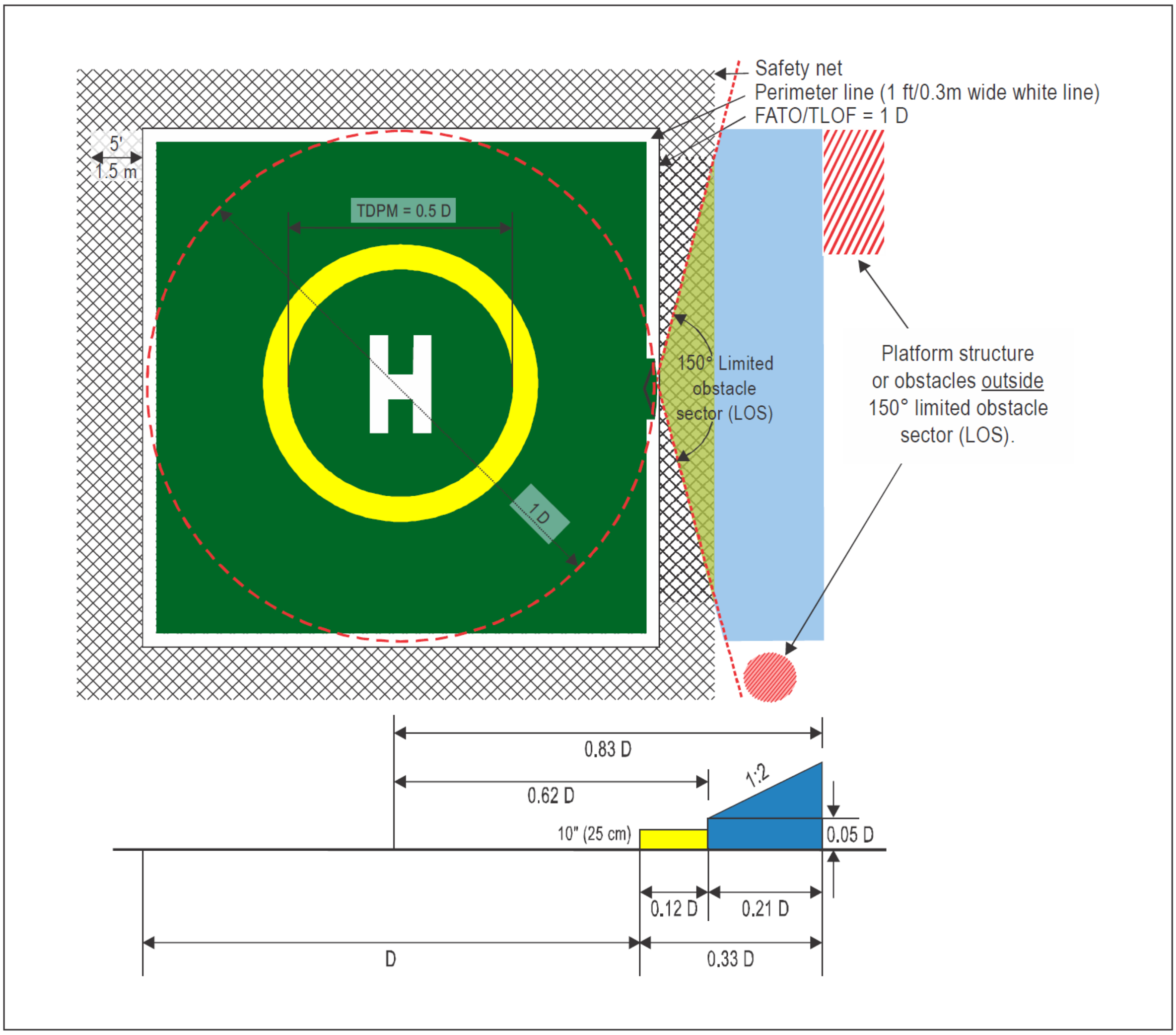


Figure 9-6 Square obstacle limitation sectors and surfaces for 1D FATO and coincidental TLOF

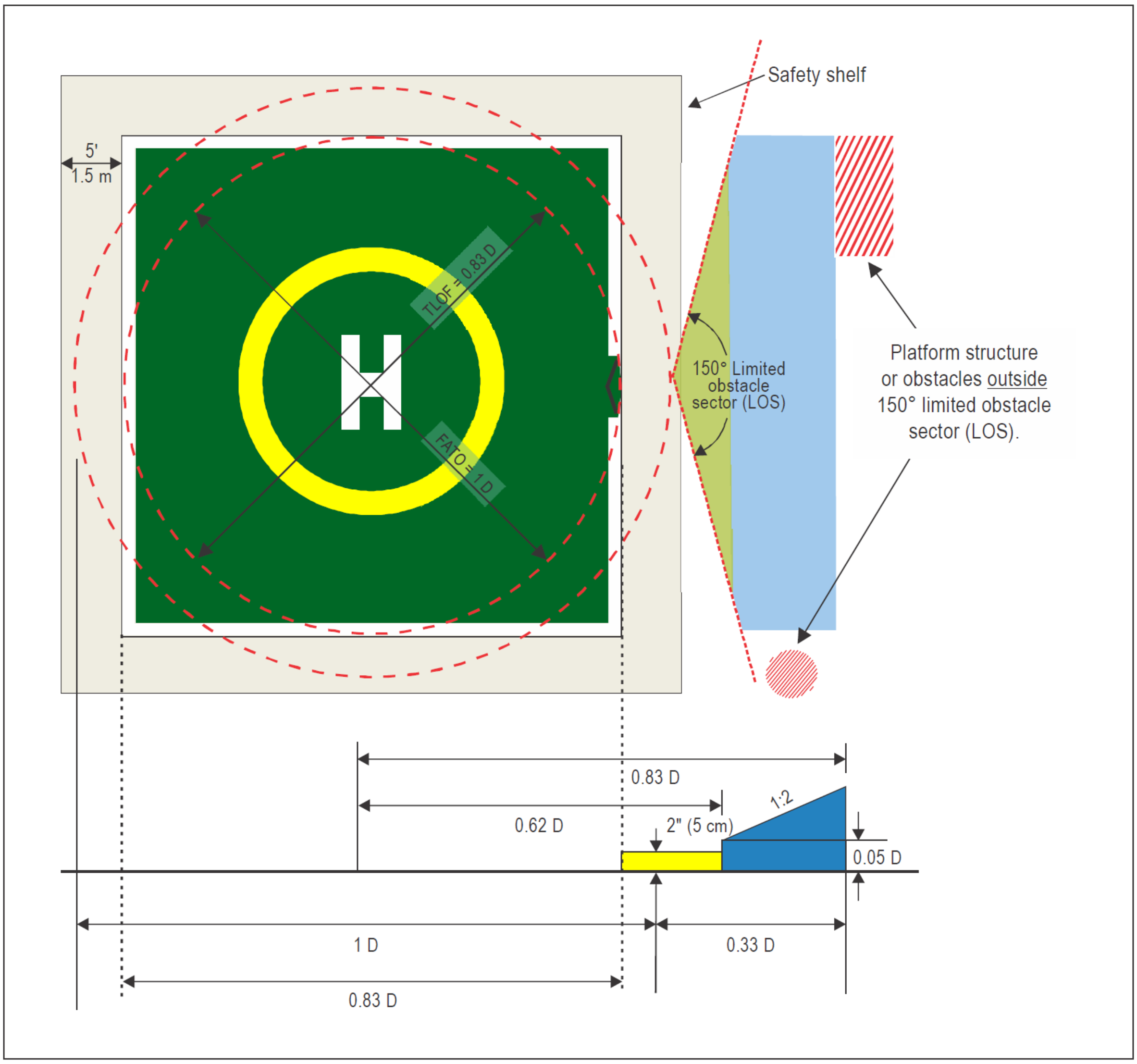


Figure 9-7 Square obstacle limitation sectors and surfaces for 0.83D TLOF with co-located 1D TLOF

9.4 Obstacle Limitation Requirements - Shipboard Helidecks

Shipboard helidecks - purpose-built helidecks located forward or aft

9.4.1 When helicopter operating areas are provided in the bow or stern of a ship, they shall apply the obstacle criteria for helidecks.

Amidships location - purpose-built and non-purpose-built

9.4.2 Forward and aft of a TLOF of 1 D and larger shall be two symmetrically located sectors, each covering an arc of 150 degrees, with their apexes on the periphery of the TLOF. Within the area enclosed by these two sectors, there shall be no objects rising above the level of the TLOF, except those aids essential for the safe operation of a helicopter and then only up to a maximum height of 25 cm.

9.4.3 Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

Note — Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.

9.4.4 To provide further protection from obstacles fore and aft of the TLOF, rising surfaces with gradients of one unit vertically to five units horizontally shall extend from the entire length of the edges of the two 150-degree sectors. These surfaces shall extend for a horizontal distance equal to at least 1 D of the largest helicopter the TLOF is intended to serve and shall not be penetrated by any obstacle. (See Figure 9-8).

Non-purpose-built helidecks - Ship's side location

9.4.5 No objects shall be located within the TLOF except those aids essential for the safe operation of a helicopter (such as nets or lighting) and then only up to a maximum height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

9.4.6 From the fore and aft mid-points of the D circle in two segments outside the circle, limited obstacle areas shall extend to the ship's rail to a fore and aft distance of 1.5 times the fore-to-aft-dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle. Within these areas there shall be no objects rising above a maximum height of 25 cm above the level of the TLOF. (See Figure 9-9). Such objects shall only be present if they do not represent a hazard to helicopters.

9.4.7 A limited obstacle sector horizontal surface shall be provided, at least 0.25 D beyond the diameter of the D circle, which shall surround the inboard sides of the TLOF to the fore and aft mid-points of the D circle The limited obstacle sector shall continue to the ship's rail to a fore and aft distance of 2.0 times the fore-to-aft dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle. Within this sector there shall be no objects rising above a maximum height of 25 cm above the level of the TLOF.

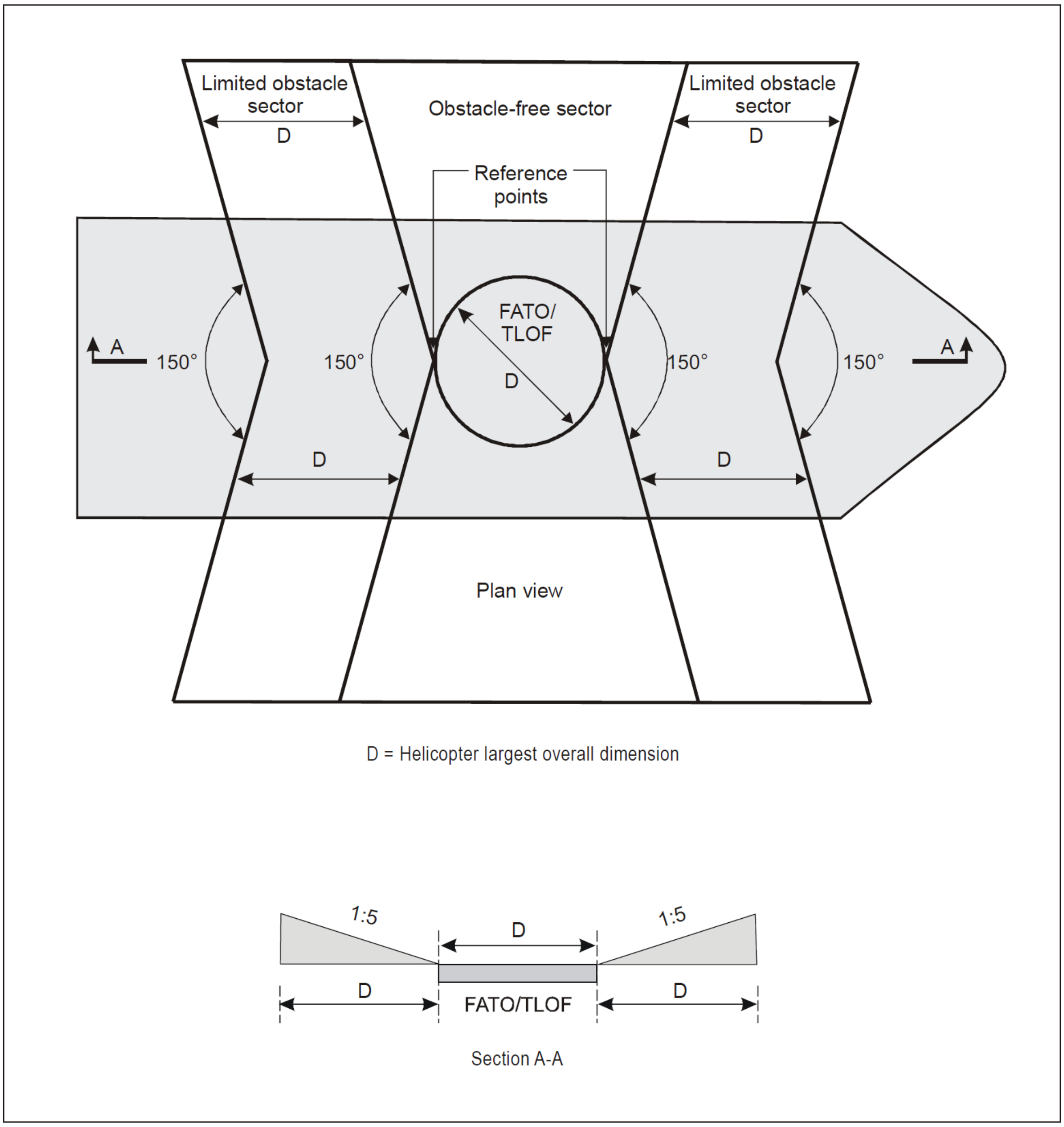
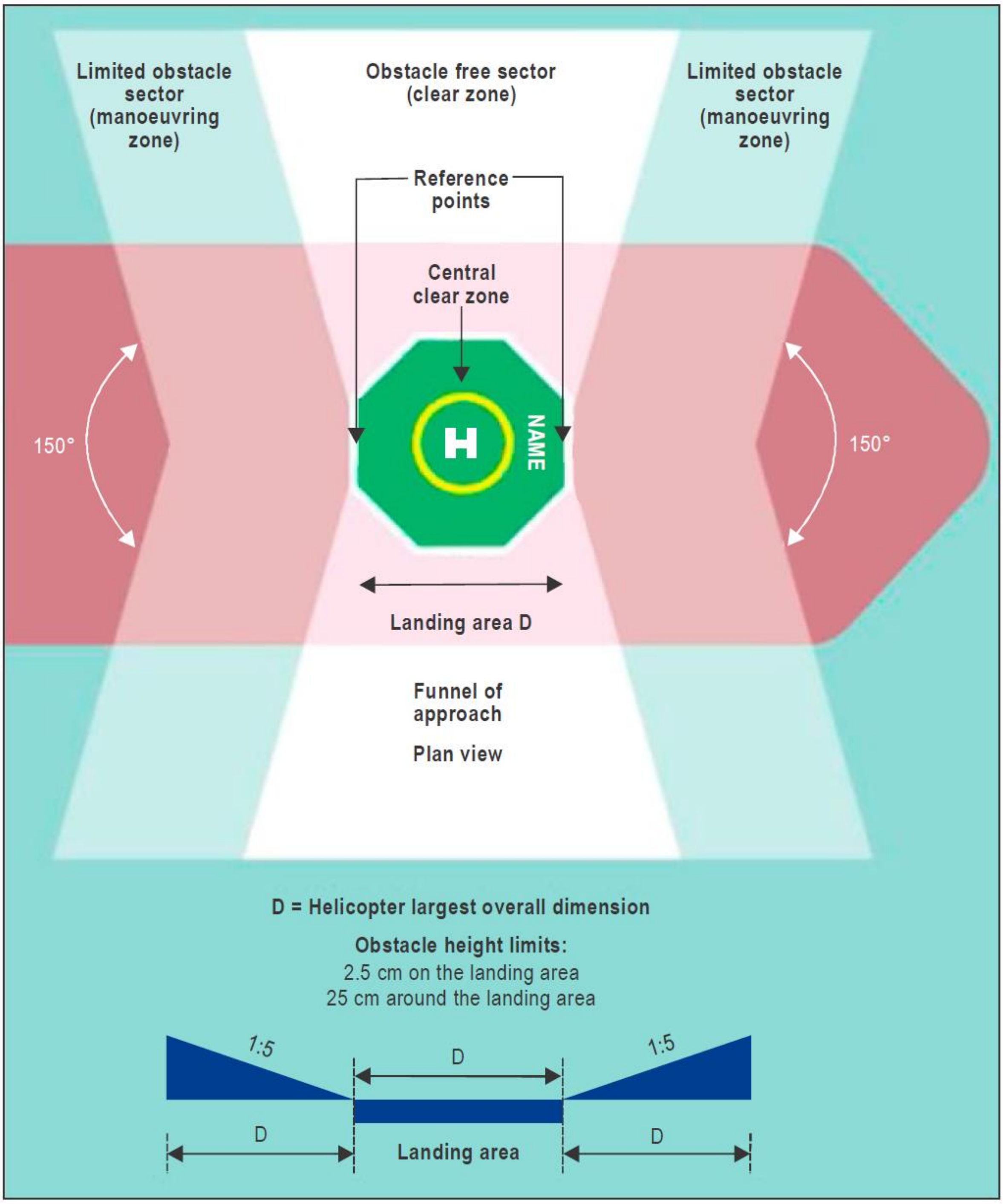


Figure 9-8a Amid-ship location – Shipboard helideck obstacle limitation surfaces



Limited obstacle sector (manoeuvring zone)
Obstacle free sector (clear zone)
Limited obstacle sector (manoeuvring zone)
Reference points
Central clear zone
150°
H
NAME
150°
Landing area D
Funnel of approach
Plan view
D = Helicopter largest overall dimension
Obstacle height limits:
2.5 cm on the landing area
25 cm around the landing area
1:5
D
1:5
D
Landing area
D

Figure 9-8b A purpose-built or non-purpose-built midship centreline landing area

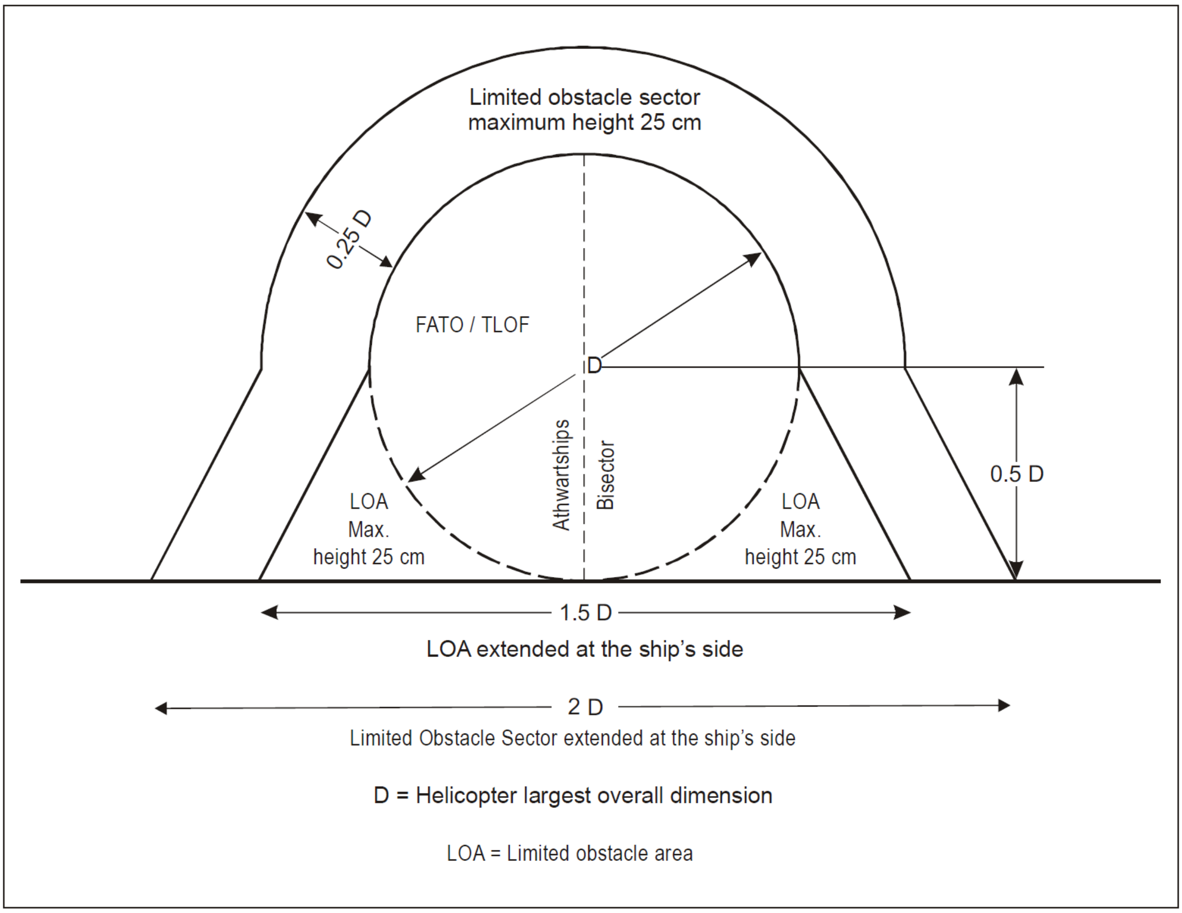


Figure 9-9 Ships-side non-purpose-built helideck obstacle limitation sectors and surfaces

Note — Where the D-value is 16.00m or less the obstacle height limitation around the landing area is restricted to 5cm.

Note — Where the D-value is 16.00m or less the obstacle height limitation around the landing area is restricted to 5cm.

Mapping of Obstacles on Non-Purpose Built Shipboard Helidecks

9.4.8 Any objects located within the areas described in Chapter II-5.7 and 3.6.7 that exceed the height of the TLOF are notified to the helicopter operator using a ship's helicopter landing area plan. For notification purposes it may be necessary to consider immoveable objects beyond the limit of the surface prescribed in 3.2.7 particularly if objects are significantly higher than 25 cm and in close proximity to the boundary of the LOS.

9.4.9 For a non-purpose built landing area located on a ship's side, which by design utilises an area of the ship's decking, the tight control of obstacles on the ship's surface is not as straightforward as it would be for any purpose built helideck structure. In the circumstances it is necessary to develop a system for mapping of obstacles so the operator is aware of their location and any potential impact on helicopter operations.

9.4.10 The Helicopter Landing Area Plan provides additional information regarding the vessel's surface and the helicopter landing area. The Plan should be prepared in advance of any intended helicopter operations and should be stored on the vessel and lodged with the helicopter operator. Amendments to the Plan should be made when appropriate.

9.4.11 The system described assumes paper versions of a Helicopter Landing Area Plan will be made, but this procedure lends itself just as easily to an electronic form of dissemination. Whichever method is used to create and file the Helicopter Landing Area Plan it should include templates annotated with vessel specific data including any obstructions within the FATO/TLOF (a 1D circular clear zone) or within the manoeuvring zone or limited obstacle area. Templates should be annotated with obstructions which exceed the height limits prescribed for the specific areas in Figure 9-9.

9.4.12 The template should ideally include a photograph showing the ship's helicopter operating area to provide a helicopter pilot with a quick reference guide to the ship, the helicopter operating area(s) and notable obstructions. Care in recording the nature and location of obstructions on the template is very important. Accurate measurement should be taken of the position and height of all significant obstructions relative to the helicopter touchdown markings.

9.4.13 Any identified obstacles should be colour coded on the template and painted on the physical surface of the vessel. Colour coding and painting will define the safety significance of an obstruction. For the purpose of standardisation, the following paint colour schemes are recommended:

a) RED and WHITE painted stripes should be used for marking the position of notifiable objects within the manoeuvring zone, the clear zone or the limited obstacle area where they exceed the height limits for these zones, (refer to Figure 9-10):
    1) Objects within the clear zone of a height exceeding 2.5cm
    2) Objects outside the clear zone but within the manoeuvring zone or limited obstacle area which exceed a height of 25cm
    3) Where the diameter of the clear zone is 16.00m or less limitation in the manoeuvring zone and LOA applies to objects which exceed a height of 5cm

b) YELLOW and BLACK painted stripes should be applied for marking objects beyond the manoeuvring zone to which it is considered appropriate to draw the attention of the helicopter pilot. This may also be used to mark objects within the manoeuvring zone, the clear zone and the LOA which though below the height limits for these sectors, are still considered appropriate to draw to the attention of the helicopter pilot.

9.4.14 Vessel details should be included on the template and a photograph that shows the location of the helicopter landing area should be scanned and forwarded to the helicopter operator in a colour presentation. An indication of the scale used should also be provided.

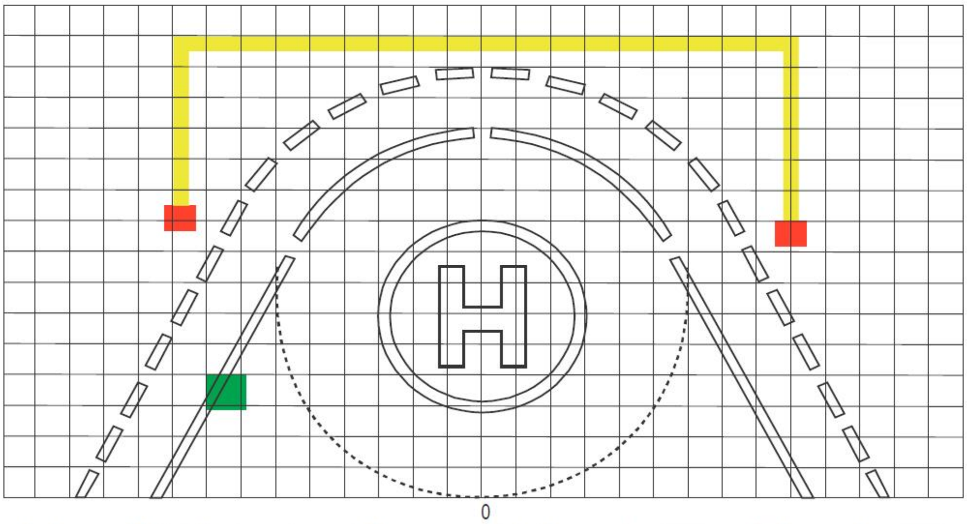
9.4.15 Figure 9-8 shows an example of a Helicopter Landing Area Plan for a ship's side non-purpose built helideck on a tanker. The red/yellow/green colour coding presentation corresponds to the absolute height of the obstruction above deck level. The Butterworth Lid at 30cm is shown in green. The tank wash line at 60cm (0.6m) is shown in yellow and the dominant vents at 230cm (2.3m) are shown in red.

Ship details

Date compilled	18 November 2008
Name of ship	SAMARINDA
Company name	Carthusian Shipping Line
Max Deck Height	26 m
D Value	19 m
Contact name	Capt David Wilkinson

Obstruction

Item	Description	Height
	Tank wash line	0.6 m
	Vent	2.3 m
	Butterworth Ltd	30 cm
	Vent	2.3 m



In box provided, indicate scale used; 1 square on grid = 1 sq. metre ☐ or 0.5 sq. metre ☐

Figure 9-10: An example of a Helicopter Landing Area Plan for a ship's side non-purpose-built

helideck on a tanker

9.5 Obstacle Limitation Requirements - Obstacle Controls

Obstacle Limitation Requirements (Helidecks and Shipboard Helidecks)

9.5.1 Obstacles that penetrate the LOS should be removed or so modified that they no longer constitute an infringement. Where an immoveable object penetrates the LOS, whether in the first and/or second segment (an example could be the leg of a self-elevating jack-up facility which is situated in the LOS and which cannot be moved or modified), it may be possible to mitigate the effects of the penetration by applying a Prohibitive Landing Sector (PLS) marking which ensures that a helicopter cannot land with the tail towards the obstacle, where the obstacle is not within the pilot's field of view. The benefit of a PLS marking may be maximised by applying it in conjunction with an offset touchdown/positioning marking. (The offset marking is discussed in further detail in Chapter II-11, Section 2 and illustrated in Figure 11.6). The application of a PLS, with or without an offset TD/PM, should not be used as a 'quick fix' to justify the presence of unwanted obstructions; it is always preferable, where practical, to remove, to relocate or to modify an obstacle which would otherwise penetrate through the surface of the LOS.

9.5.2 Experience suggests there can be a pressure to accommodate obstacles close to the extended boundary of the OFS, but outside the second segment on the limited obstacle side, where there are no specific obstacle restrictions/limitations. For the presence of a large solid object, whether a new permanent feature or a temporary one, this location so close to the helideck, has potential to promote turbulence over the helideck in some wind conditions and should be avoided. For the avoidance of doubt, any proposed siting near to the helideck should be subjected to appropriate modelling before it is introduced. Equally, locating a non-rigid (flexible) structure, such as a long whip aerial, in the area immediately adjacent to the helideck, can have an impact on the safety of helicopter operations if the whip aerial should bend into the OFS under the force of an approaching helicopter's rotor downwash. It is therefore recommended that flexible objects, such as whip aerials are not sited right at the edge of the OFS, where they could bend into the protected area.

9.6 Obstacle Limitation Requirements - Temporary Combined Operations

9.6.1 Temporary Combined Operations are essentially arrangements where two or more off-shore facilities, whether fixed or floating, are in close proximity 'alongside' or 'pulled away' from one another. They may be in place for a matter of hours, days or for up to several years. On occasions, combined operations may include vessels working alongside one or more fixed and/or mobile facilities. The close proximity of facilities and/or vessels to one another is likely to entail that one or more of the helidecks/shipboard helidecks is operationally restricted due to one or more of the obstacle protected surfaces being compromised and/or due to adverse environmental effects of one installation on the landing area of another (environmental effects are discussed in more detail in Chapter II-5).

9.6.2 For example, the facility pictured in the centre of Figure 9-11 has obstacle protected sectors and surfaces (extended OFS as well as the falling gradient) that are severely compromised by the proximity of the other two facilities. In these circumstances a landing prohibited marker (a yellow cross on a red background) is in place on the drilling facility (centre) to prevent operations to the helideck.

9.6.3 Where temporary combined operations are planned, prior to helicopter operations an assessment should be completed to assess the physical, as well as the environmental, impact of the arrangements and to assess any flight restrictions or limitations, including prohibitions, which might need to be disseminated to air crew (usually a temporary instruction). Helidecks (or shipboard helidecks) which are determined to be unavailable should display the relevant landing prohibited marker by day while, at night, all aeronautical lights should be extinguished.

9.6.4 Often, combined operations will involve both facilities and/or vessels being in close proximity 'alongside' one another (Figure 9-11), where the effect of one facility on the helideck obstacle protected surfaces of another is immediately obvious. However, during the life of a combined arrangement there may also be periods when mobile facilities and/or vessels are 'pulled-away' to a stand-off position, which could be some distance apart. It will be necessary for operators to re-appraise the situation for a combined operation now in the 'stand-off' configuration. With one or more installations or vessels 'pulled-away' there may be opportunity to relax or remove limitations imposed for the 'alongside' configuration. This is normally an assessment for the helicopter operator to make.

Figure 9-11 Temporary combined operation showing relative position of each helideck 210° sector

9.7 Obstacle Limitation Requirements - Multiplatform Configurations / Location of Standby Vessels

9.7.1 Where two or more fixed structures are permanently bridge linked the overall design should ensure that the sectors and surfaces provided for the helideck are not compromised by other modules which may form part of a multiple platform configuration. It is also important to assess the environmental impact of all modules on the flying environment around the helideck. *(Refer to Chapter II-5)*.

9.7.2 Where there is an intention to add new modules to an existing platform arrangement it is important to make an assessment on the potential impact that additional platforms might have on helideck operations. This will include an assessment of the sectors and surfaces for the helideck which should not be compromised due to the location of a new platform, or modification to an existing platform. This will include a detailed analysis of the environmental impact on the flying environment around the helideck which is addressed in further detail in *(Refer to Chapter II-5)*.

9.7.3 The presence of a Standby Vessel in the vicinity of a 'live' helideck operation is a legal requirement in many off-shore sectors. The location of the Standby Vessel, and any other vessel present on the sea surface, should not compromise the safety of the helicopter operation.

9.8 Control of Crane Movement in the Vicinity of the Landing Area

9.8.1 The 210^0 obstacle- free sector of the helideck shall not be infringed upon by any cranes or parts thereof during helicopter movements.

9.8.2 All cranes in the vicinity of the FATO which may, during their operation, encroach into the 210^0 sector or the 150^0 limited obstacle sector must cease movement during helicopter operations.

9.8.3 When helicopter movements take place (±5 minutes) crane work ceases and jibs, 'A' frames, etc. are positioned clear of the obstacle protected surfaces and flight paths.

Chapter II-10 – Winching Areas on Ships

10.1 Winching Areas

10.1.1 An area designated for winching on-board ships shall comprise a circular clear zone of diameter 5 m and extending from the perimeter of the clear zone, a concentric manoeuvring zone of diameter 2 D (see Figure 10-1).

10.1.2 The manoeuvring zone shall comprise of two areas:

a) the inner manoeuvring zone extending from the perimeter of the clear zone and of a circle of diameter not less than 1.5 D; and
b) the outer manoeuvring zone extending from the perimeter of the inner manoeuvring zone and of a circle of diameter not less than 2 D.

10.1.3 Within the clear zone of a designated winching area, no objects shall be located above the level of its surface.

10.1.4 Objects located within the inner manoeuvring zone of a designated winching area shall not exceed a height of 3 m.

10.1.5 Objects located within the outer manoeuvring zone of a designated winching area shall not exceed a height of 6 m.

The following can be considered as guidance:

a) Where practicable, the helicopter should always land rather than winch (an operation commonly referred to as heli-hoist operation (HHO)) because safety is enhanced when the time spent hovering is reduced. However, certain types of ships which need to engage helicopter support but are unable to provide the space and/or obstacle limitation surfaces needed to meet the requirements for a shipboard helideck, may need to consider a shipboard winching area in lieu of a shipboard helideck landing area.
b) The optimum position for a winching area will be determined primarily by the availability of a suitable space on the ship. However, a winching operation should be located over an area to which the helicopter can safely hover whilst winching to or from the ship. Its location should allow the pilot an unimpeded view of the whole of the winching area clear zone and the ship's topside layout. Where more than one area capable of accommodating a winching area exists, preference should be given to the location that best minimizes aerodynamic and wave motion effects. In addition, the winching area should preferably be clear of accommodation spaces and provide adequate deck areas adjacent to the manoeuvring zone to allow for safe access to the

winching area from at least two different directions. In selecting a suitable winching area, the desirability for keeping the winching (hoist) height to a minimum should also be borne in mind, such that the area chosen will allow a helicopter to hover at a safe height above the highest obstacle that may be present in the manoeuvring zone.

c) The clear zone should be a solid surface capable of accommodating personnel and/or stores for which the winching area is intended. It is not essential for the entire manoeuvring zone to be a solid surface, and a portion may be located beyond the ship's side over the water (the same obstacle height limitations would apply as for a solid surface).

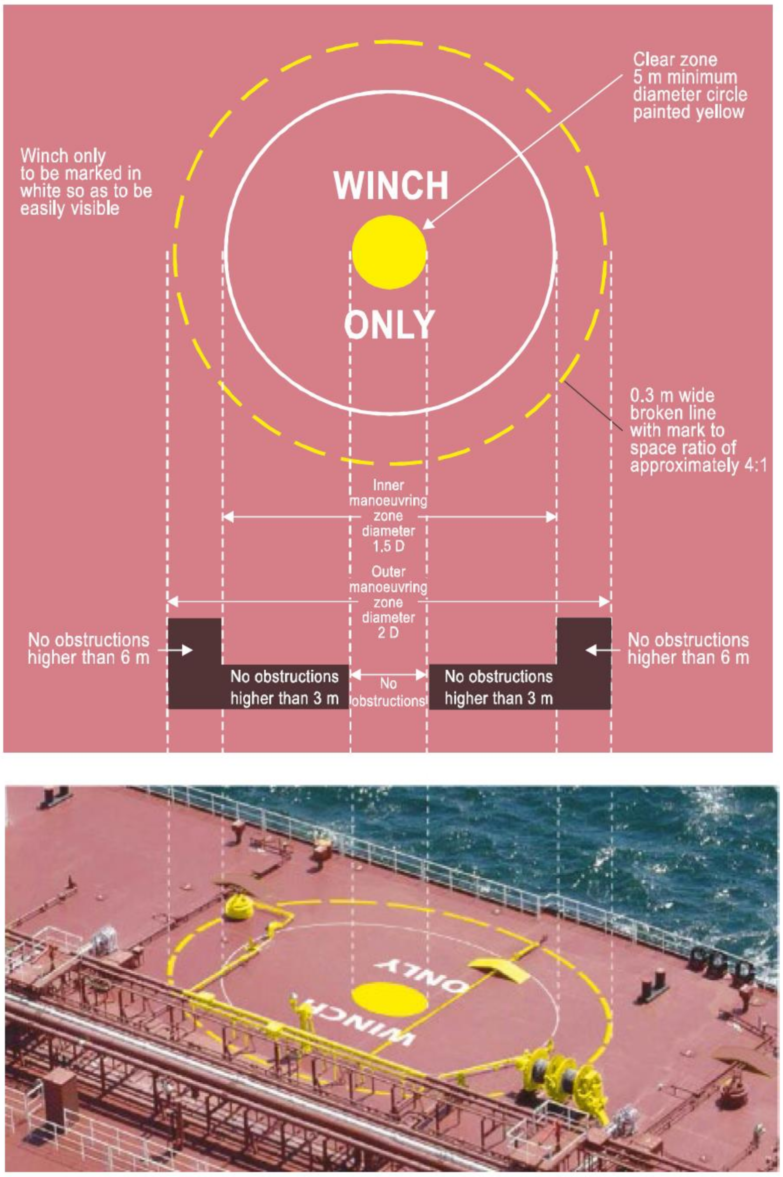


Figure 10-1 Winching area of a ship

10.2 Marking of Winching Areas

Application

10.2.1 Winching area markings shall be provided at a designated winching area (see Figure 10-1).

Location

10.2.2 Winching area markings shall be located so that their centre(s) coincides with the centre of the clear zone of the winching area.

Characteristics

10.2.3 Winching area markings shall comprise a winching area clear zone marking and a winching area manoeuvring zone marking.

10.2.4 A winching area clear zone marking shall consist of a solid circle of diameter not less than 5 m and of a conspicuous colour.

10.2.5 A winching area manoeuvring zone marking shall consist of a broken circle of line of 30 cm in width and of a diameter not less than 2 D and be marked in a conspicuous colour. Within it "WINCH ONLY" shall be marked to be easily visible to the pilot.

The following can be considered as guidance:

a) It is usually necessary to apply a paint scheme that provides a high friction coating to prevent personnel from slipping in the clear zone and/or stores from sliding due to the motion of the ship. Ideally the clear zone should be painted yellow. It is usually necessary to apply a paint scheme that provides a high friction coating to prevent personnel from slipping in the clear zone and/or stores from sliding due to the motion of the ship.
b) Ideally the clear zone should be painted yellow. It is usually necessary to apply a paint scheme that provides a high friction coating to prevent personnel from slipping in the clear zone and/or stores from sliding due to the motion of the ship.
c) While it is not a specific requirement to mark the periphery of the inner manoeuvring zone (with a diameter not greater than 1.5 D), it may be helpful, for the mapping of obstacles relative to the two obstruction segments in the manoeuvring zone, to do so. In this case it is recommended that a thin unbroken circle be painted around the periphery of the inner manoeuvring zone in a colour which contrasts with the adjacent ship's deck, but which is different from the colour used to define the outer manoeuvring zone. For standardisation it is recommended wherever possible that the inner manoeuvring zone circle, where marked, is painted white, with a line width of approximately 10cm.
d) Obstructions within or immediately adjacent to, the manoeuvring zone which may present a hazard to the helicopter need to be readily visible from the air and should be conspicuously

marked. The description for marking of obstacles is in CAR Part IX (Aerodromes), however, a protocol also exists

e) internationally which ship's Masters may find helpful to adopt particularly as it harmonises with colour schemes being proposed for a ship's helicopter landing area plan (see Chapter II-10 for details of how to complete a helicopter landing area/operating area plan). For objects within the height constraints specified for the two segments of the manoeuvring zone, to which it is necessary to draw the attention of the helicopter pilot, it is recommended that a yellow paint scheme be applied to highlight the position of these objects. Where, exceptionally, objects within the manoeuvring zone exceed the height constraints specified in 1.1.3, it is suggested that a paint scheme consisting of red and white stripes, in lieu of yellow, be applied to the object. In all cases it is necessary that the marking of objects contrasts effectively with the surface of the ship and therefore, some latitude may be required for precise colour schemes to be used. The suggestions given in this paragraph are intended to achieve standardisation of markings wherever possible.

10.3 Lighting of a Winching Area for Night Heli-Hoist Operations

Application

10.3.1 Winching area floodlighting shall be provided at a winching area intended for use at night.

Location

10.3.2 Winching area floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

Characteristics

10.3.3 The spectral distribution of winching area floodlights shall be such that the surface and obstacle markings can be correctly identified.

Note: The average horizontal luminance should be at least 10 lux, measured on the surface of the winching area.

The following can be considered as guidance:

a) To reduce the risk of a hoist hook or cable becoming fouled, all guard rails, awnings, stanchions, antennae and other obstructions within the vicinity of the manoeuvring zone should, as far as possible, be either removed, lowered or securely stowed. In addition, personnel should be kept well clear of any space immediately beneath the operating area. All doors, portholes, skylights, hatch-covers etc. in the vicinity of the operating area should be closed. This may also apply to deck levels that are below the operating area.

b) Rescue and firefighting personnel should be deployed in a ready state, but sheltered from the helicopter operating area. Rescue and Fire-Fighting Service requirements for landing areas are addressed in Chapter II-16.

Chapter II-11 – Visual Aids

Note — For a non-purpose-built helideck located on a ship's side the surface colour of the main deck can vary from ship to ship and therefore some discretion may need to be exercised in the colour selection of helideck paint schemes; the objective being to ensure that the markings are conspicuous against the surface of the ship and the operating background.

11.1 Wind Direction Indicators

11.1.1 A helideck shall be equipped with at least one wind direction indicator and at least one additional spare wind direction indicator of the same specification.

Location

11.1.2 A wind direction indicator shall be located so as to indicate the wind conditions over the FATO and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a helicopter in flight, in a hover or on the movement area.

11.1.3 Where a TLOF may be subject to a disturbed airflow, then additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

Characteristics

11.1.4 A wind direction indicator shall be constructed so that it gives a clear indication of the direction of the wind and a general indication of the wind speed.

11.1.5 An indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:

a) Length 1.2m; diameter (large end) 0.3m; diameter (small end) 0.15m

11.1.6 The colour of the wind direction indicator should be so selected as to make it clearly visible and understandable from a height of at least 200 m above the helideck, having regard to background. Where practicable, a single colour, preferably white or orange, should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands the first and last band being the darker colour.

11.1.7 A wind direction indicator at a helideck intended for use at night shall be illuminated.

11.1.8 This can be achieved by internal illumination, by a floodlight pointing through the wind cone. Alternatively, the windsock can be externally highlighted using, for example, area floodlighting. Care should be taken to ensure that any system used to illuminate a wind direction indicator highlights the entire cone section while not presenting a source of glare to a pilot operating at night.

11.2 Helideck Identification Marking ("H")

Application

11.2.1 Helideck identification markings shall be provided at a helideck.

Location

11.2.2 A helideck identification marking shall be located at or near the centre of the FATO.

11.2.3 A helideck identification marking shall be located in the centre of the FATO except where the results of an aeronautical survey indicate that an offset marking may be beneficial to helicopter operations and still allow for the safe movement of personnel around the helicopter; in which case the centre of the "H" may be offset by up to 0.1D towards the outboard edge of the FATO.

The following can be considered as guidance:

a) An example of where this measure may be used could be for an over-sized helideck — one that exceeds the minimum 1D dimensional requirement — but that also has immoveable obstructions close to the inboard perimeter, in the LOS. In this case moving the touchdown marking location away from the centre of the FATO towards the outboard edge will improve clearances from dominant obstacles, while, in theory, still facilitating adequate on-deck clearance around the helicopter for the safe movement of passengers and for the efficiency of helideck operations, such as refuelling.
b) If the touchdown/positioning marking is offset on a helideck, the helideck identification marking is established in the centre of the touchdown/positioning marking.

Characteristics

11.2.4 A helideck identification marking shall consist of a letter H, white in colour.

11.2.5 On a helideck the cross arm shall be on or parallel to the bisector of the obstacle-free sector. For a non-purpose-built shipboard helideck located on a ship's side, the cross arm shall be parallel with the side of the ship, Figure 11-1.

11.2.6 Where it is necessary for the obstacle-free sector (chevron) marking to be swung for a helideck (e.g. to clear an obstacle which might otherwise penetrate the 210-degree sector), it will be necessary to swing the "H" marking by the corresponding angle. The maximum swung sector should not exceed +/-15 degrees from the normal for the OFS. A 'swung' helideck identification "H" marking is illustrated in Figure 11-1.

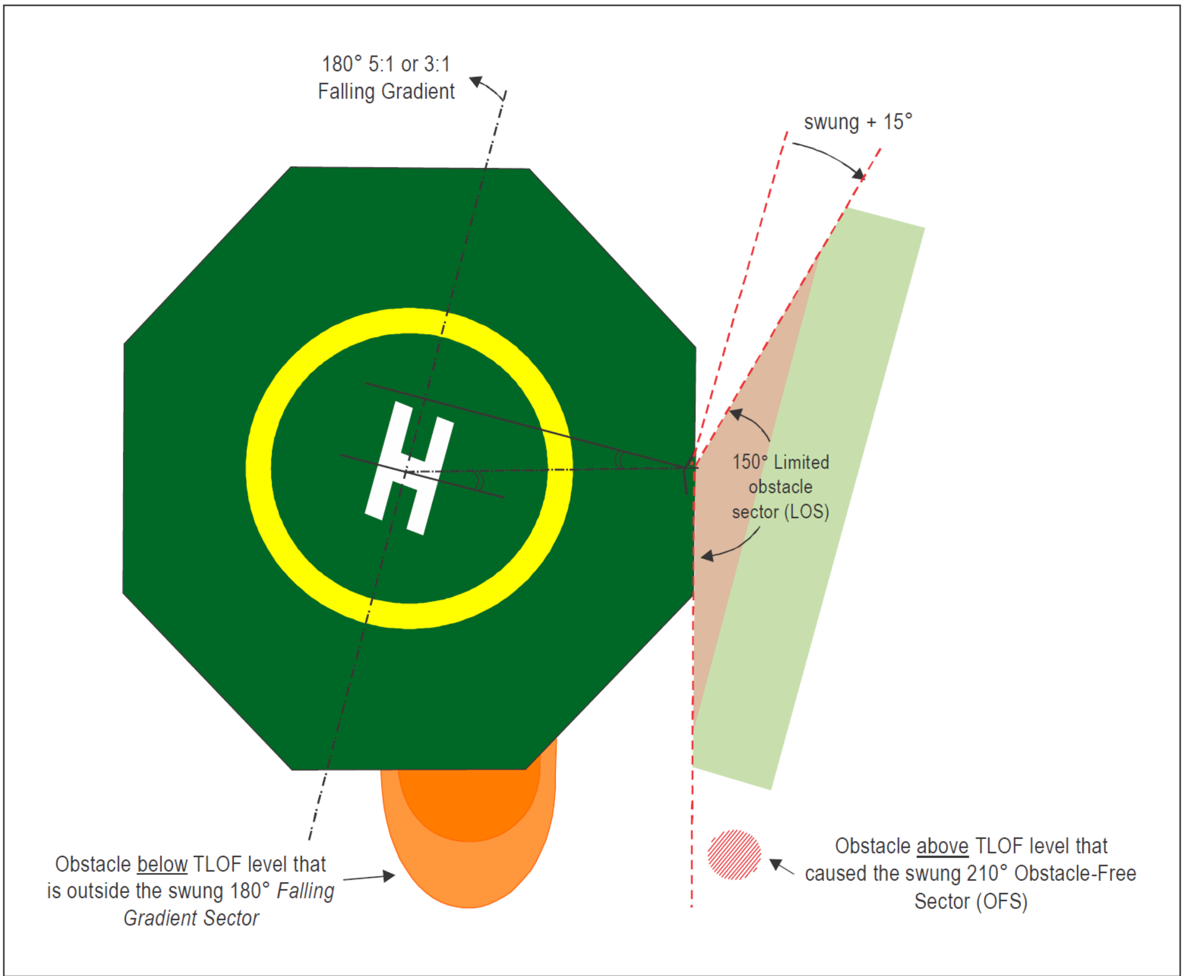


Figure 11-1 Helideck identification marking reflecting a swung obstacle free sector (in this case the OFS is swung by 15 degrees in a clockwise direction to avoid an obstacle)

Note — The bisector of the 210° Obstacle Free Sector (OFS) should normally pass through the Centre of the D-circle. The sector may be 'swung' by up to 15° in either direction from the normal. (A 15° clockwise swing is illustrated). If the 210° OFS is swung, then it would be normal practice (but not mandatory) to swing the 180° falling 5:1 gradient by a corresponding amount to indicate, and align with, the swung OFS.

12.2.7 On a helideck and or a shipboard helideck *where the D value is 16.0 m or larger*, the size of the helideck identification H marking should have a height of 4 m with an overall width not exceeding 3 m and a stroke width not exceeding 0.75 m. *Where the D value is less than 16.0 m, the size of the helideck identification H marking should have a height of 3 m with an overall width not exceeding 2.25 m and a stroke width not exceeding 0.5 m*.

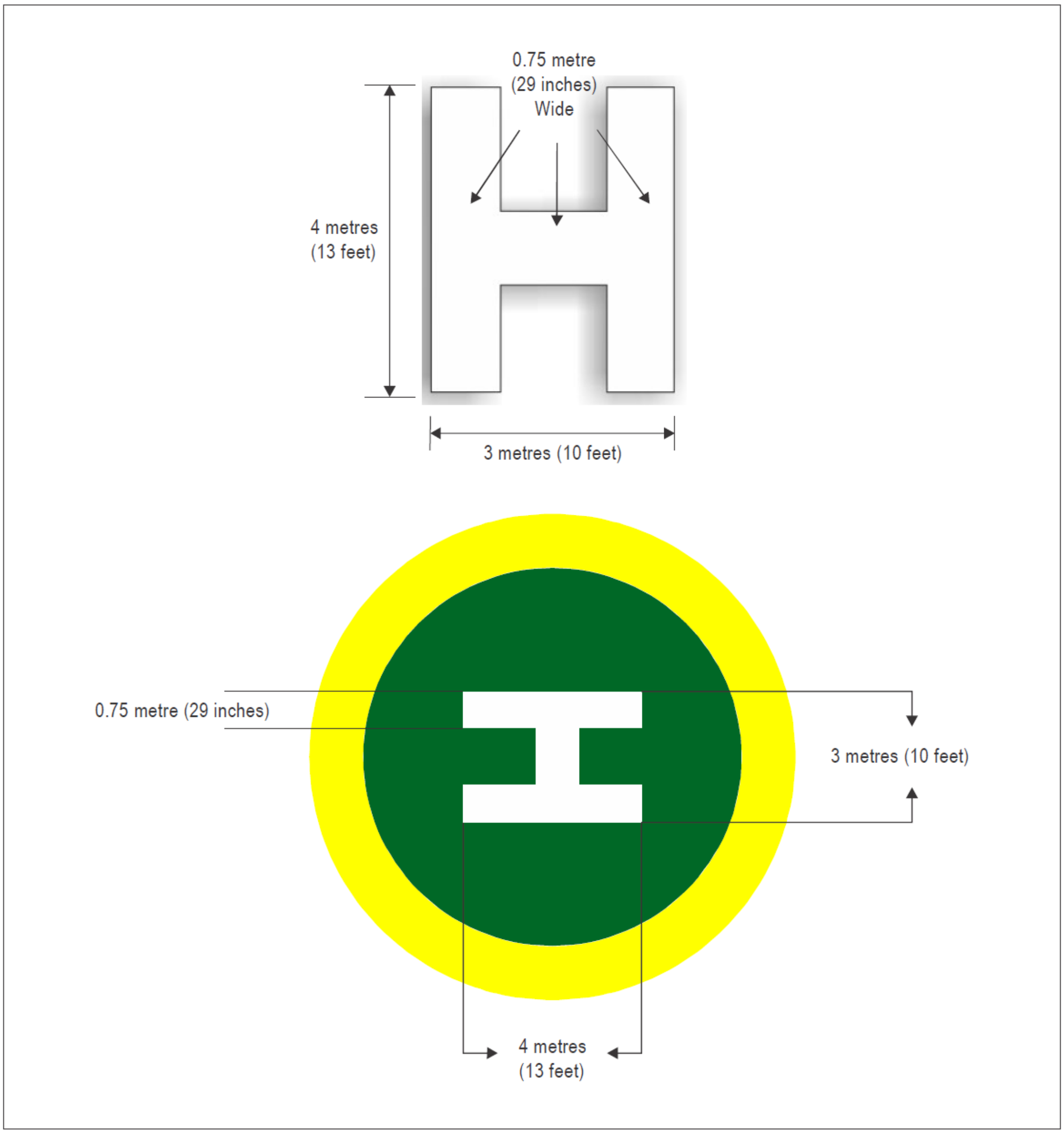


Figure 11-2 Dimensions of the Helideck Identification Marking “H”

11.3 FATO identification marking

Note. - The objective of the FATO identification markings is to provide the pilot with an identification of different FATOs at vertiport equipped with two or more FATOs.

Note. - FATO identification markings are not intended to be used in runway-type FATOs where the differentiation can be provided by the designation markings.

Application

11.3.1 Where appropriate for differentiation, FATO identification markings shall be provided.

Location

11.3.2 A FATO identification marking should be located within the FATO and so arranged as to be readable from the preferred final approach direction.

Characteristics

11.3.3 Each FATO identification marking should consist of an ordinal number, beginning with 1 and ending in the last of the numbered FATOs (see Figure 6-5). The demonstration of ordinal number could be replaced by QR code.

11.3.4 The numbers code will have the size and proportions shown in Figure 6-7. The QR code is proportional to the size as per following 6.3.5.

11.3.5 The FATO identification number will be inside a yellow square with diameter 175 cm as shown in Figure 6-4.

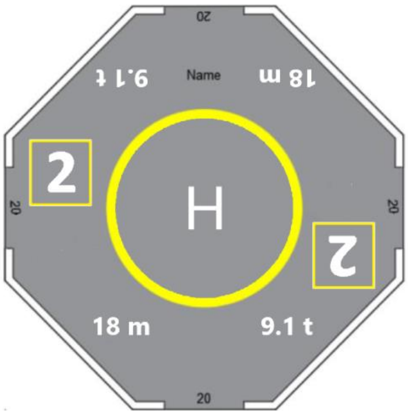


Figure 6-4. Helideck identification, FATO identification, maximum allowable mass and D-value markings

11.4 Maximum Allowable Mass Marking

Application

11.4.1 A maximum allowable mass marking shall be displayed at a helideck and a shipboard helideck.

Location

11.4.2 A maximum allowable mass marking should be located within the TLOF or FATO and so arranged as to be readable from the preferred final approach direction i.e. towards the OFS origin.

Characteristics

11.4.4 A maximum allowable mass marking shall consist of a one-, two- or three-digit number.

11.4.5 The marking shall be expressed in tonnes (1 000 kg) rounded to the nearest 1000 kg followed by a letter “t”.

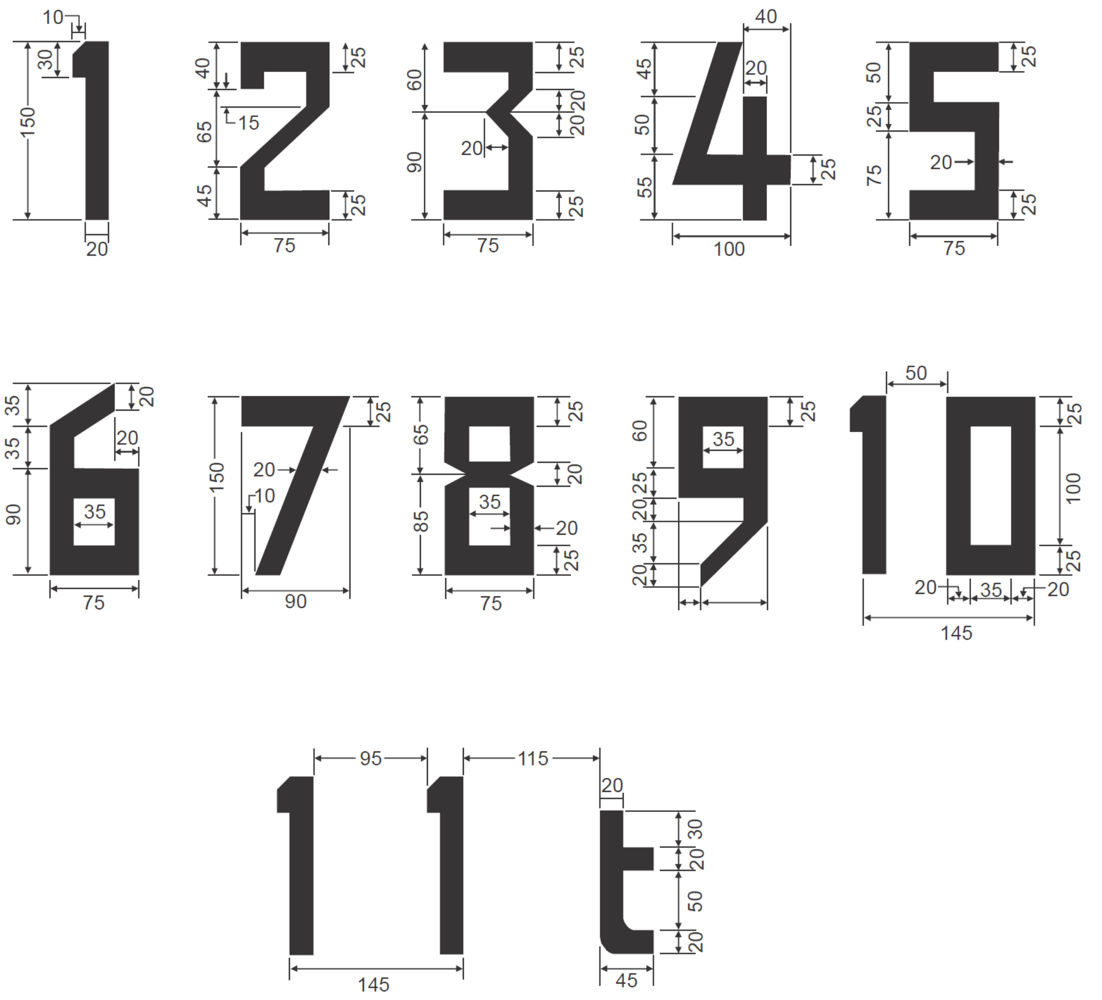
11.4.6 The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter “t”.

11.4.7 When the maximum allowable mass is expressed to 100 kg, the decimal place should be preceded with a decimal point marked with a 30 cm square.

11.4.8 The numbers and the letter of the marking shall have a colour contrasting with the background and should be in the form and proportion shown in Figure 11-3, for a FATO with a dimension of more than 30 m (with decimal point of 30cm). For a FATO with a dimension of between 15 m to 30 m the height of the numbers and the letter of the marking should be a minimum of 90 cm (with decimal point of 18cm), and for a FATO with a dimension of less than 15 m the height of the numbers and the letter of the marking should be a minimum of 60 cm (with decimal point of 12cm^2), each with a proportional reduction in width and thickness.

The following can be considered as guidance:

a) The maximum allowable mass marking should correspond to the maximum allowable mass of the heaviest helicopter permitted to use the TLOF in accordance with the structural requirements detailed in Chapter II-5. In most cases the maximum allowable mass marking will correspond to the MTOM for the design helicopter type, but this need not necessarily be the case if the structural calculations performed for the helideck or shipboard helideck confirm a structural limit that is different from (i.e. exceeding) the MTOM of the design helicopter.



Note 1.— All units are expressed in centimetres.

Note 2.— The numbers and letters used in diagrams in this manual are not of the font shown here.

Figure 11-3 Form and Proportions of Numbers and Letters

11.5 D-Value Marking

Application

11.5.1 The D-value marking shall be displayed at a helideck and at a shipboard helideck.

Location

11.5.2 Where there is more than one approach direction, additional D-value markings should be provided such that at least one D-value marking is readable from the final approach directions. For a non-purpose-built helideck located on a ship's side, D-value markings should be provided on the perimeter of the D circle at the 2 o'clock, 10 o'clock and 12 o'clock positions when viewed from the side of the ship facing towards the centre line.

11.5.3 D-value markings should be displayed within the broken white TLOF perimeter line at three locations presented in Figure 11.8 or Figure 11.9 so that at least one marking is readable from the final approach direction. For a purpose built shipboard helideck in an amidships location, having a chevron at either end (see Figure 11-4), two D-value markings are required to be displayed — one on the portside of the helideck and the other starboard side.

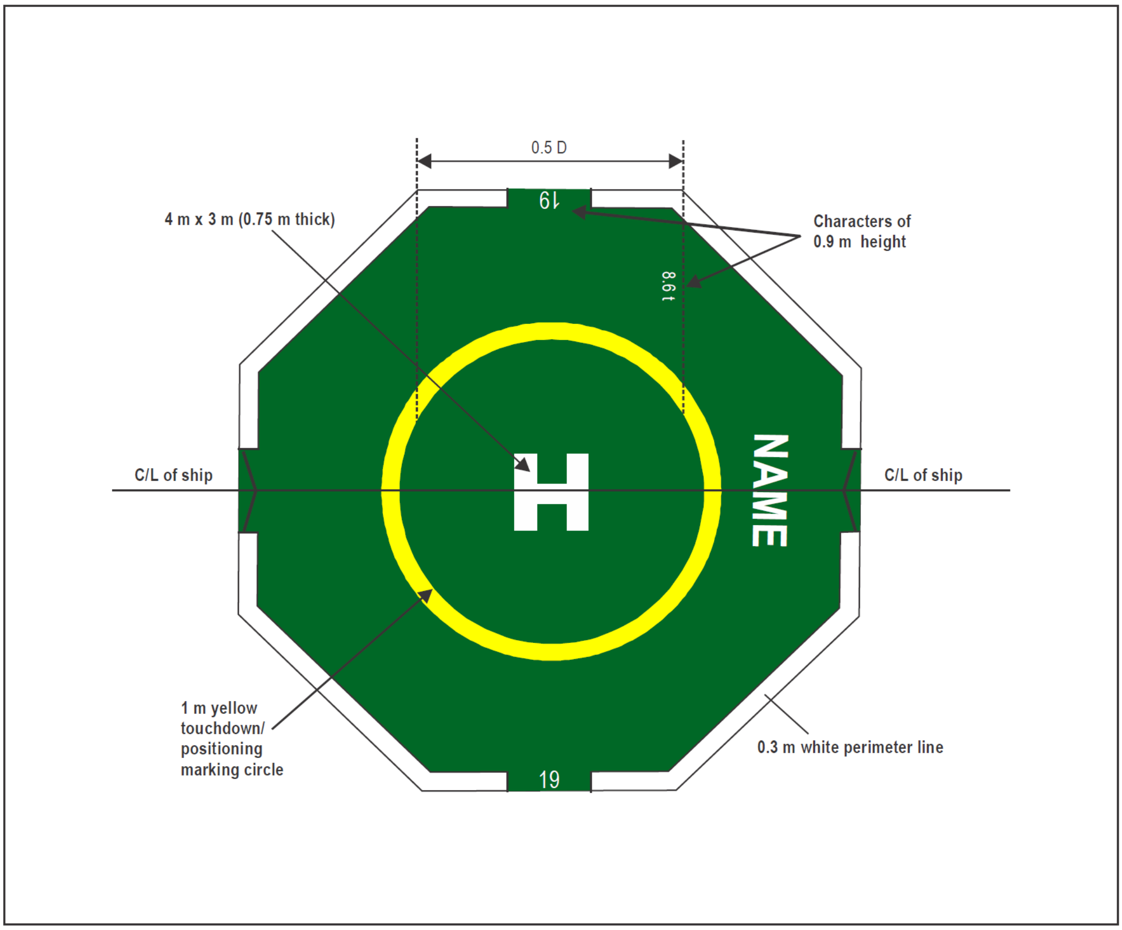


Figure 11-4 D-value markings for a purpose-built shipboard helideck in an amidships location

Characteristics

11.5.4 The D-value marking shall be white. The D-value marking shall be rounded to the nearest whole metre with 0.5 rounded down.

11.5.5 The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 11-3 for a FATO with a dimension of more than 30 m. For a FATO with a dimension of between 15 m to 30 m the height of the numbers of the marking should be a minimum of 90 cm, and for a FATO with a dimension of less than 15 m the height of the numbers of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

11.5.6 A method of designating the helideck limitations is to have the weight and D size marked in a ‘box’, outlined in red, in red numerals on a white background as shown below in Figure 11-5(a). The height of the figures should be 0.9 m with the line width of the ‘box’ approximately 12 cm. For smaller helidecks where space may be limited, provided the ‘box and numerals’ are discernible at a range which is compatible with a pilot’s landing decision point (LDP), giving sufficient time to affect a go-around if necessary, the height of the figures may be reduced to no less than 45 cm.

11.5.7 The weight/size limitation ‘box’ marking should be visible from the preferred direction of approach. It is recommended that on square or rectangular helidecks the ‘box’ should be located relative to the preferred direction of approach (when facing the helideck). For circular, hexagonal and similar shapes the ‘box’ should be located on right-hand side of the TLOF and outside the TDPM circle, when viewed from the preferred direction of approach.

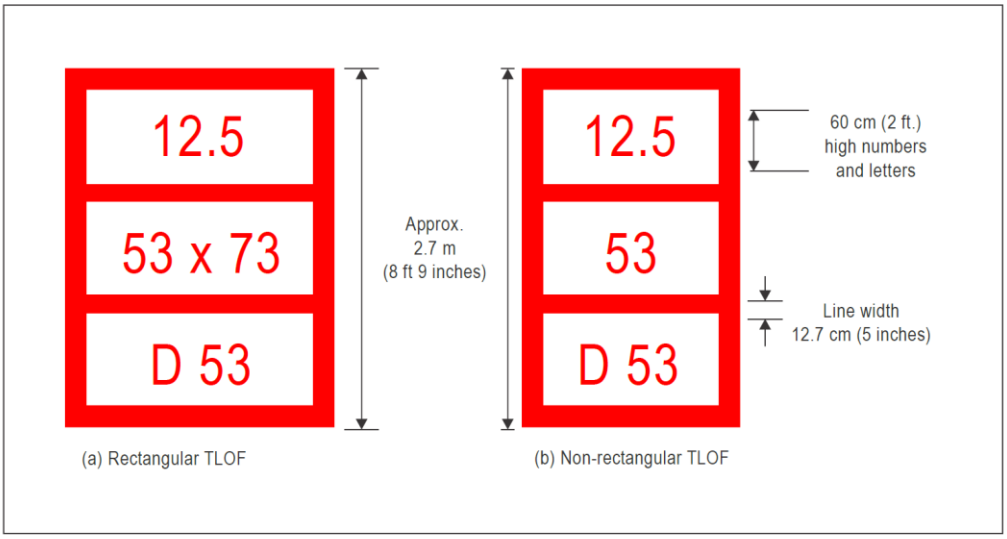


Figure 11-5 Helideck Limitation Markings

11.6 Touchdown and Lift-Off Area (TLOF) Perimeter Marking

Application

11.6.1 A TLOF perimeter marking shall be displayed on a helideck and a shipboard helideck.

Location

11.6.2 The TLOF perimeter marking shall be located along the edge of the TLOF.

Characteristics

11.6.3 A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

The following can be considered as guidance:

a) The TLOF perimeter line should follow the physical shape of the helideck or shipboard helideck, such that where the deck shape is octagonal or hexagonal, the shape of the painted white TLOF marking will correspond to an octagon or hexagon. A TLOF marking should only be circular where the physical shape of the helideck or shipboard helideck is also circular.

11.7 Touchdown / Positioning (TD/PM) Circle Marking

Application

11.7.1 A touchdown/positioning marking shall be provided where it is necessary for a helicopter to touch down and/or be accurately positioned by the pilot.

Location

11.7.2 A touchdown/positioning marking shall be located so that when the pilot's seat is over the marking, the whole of the undercarriage will be within the TLOF and all parts of the helicopter will be clear of any obstacle by a safe margin.

11.7.3 On a helideck the centre of the touchdown marking shall be located at the centre of the FATO, except that the marking may be offset away from the origin of the obstacle-free sector by no more than 0.1 D where an aeronautical study indicates such offsetting to be necessary and that a marking so offset would not adversely affect the safety. (Figure 11-6).

The following can be considered as guidance:

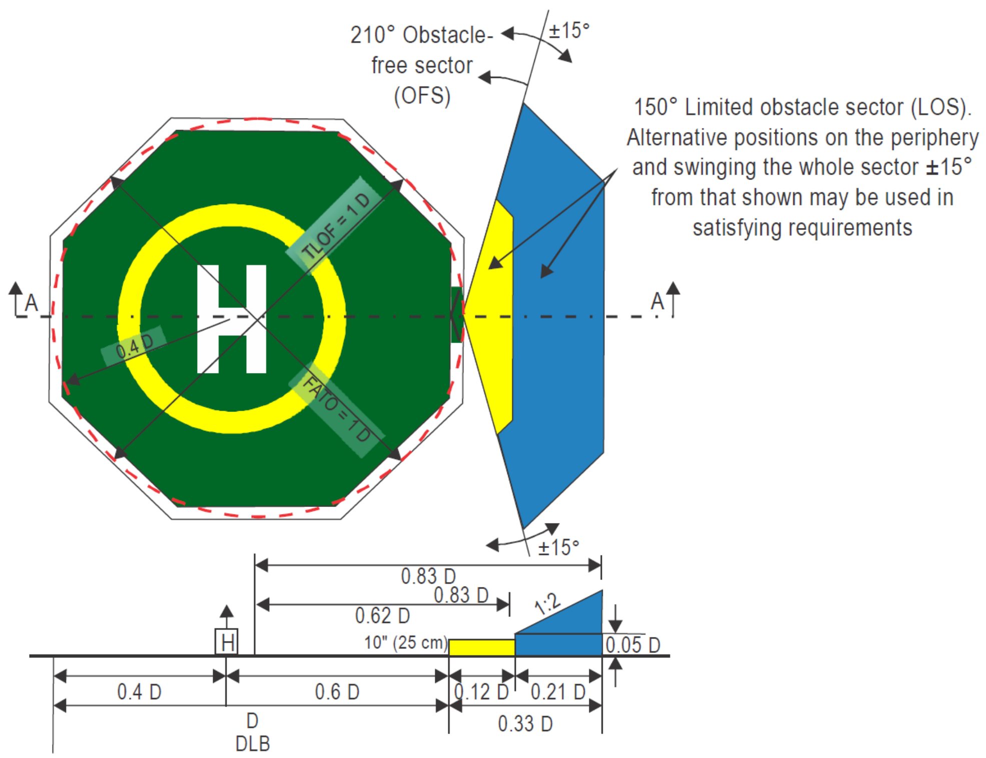
a) The touchdown/positioning marking is so located that when the pilot's seat is over the marking the whole of the undercarriage is comfortably within the TLOF and all parts of the helicopter are clear of any obstacles by a safe margin.

b) For helidecks which are less than 1D it is not recommended that an offset marking be utilised.

Characteristics

11.7.4 A touchdown/positioning marking shall be a yellow circle and have a line width of at least 0.5 m. For a helideck or a purpose-built shipboard helideck with a D value of 16.0 m or larger, the line width shall be at least 1 m.

11.7.5 The inner diameter of the circle shall be 0.5 D of the largest helicopter the TLOF is intended to serve.



Example B — Fully offset touchdown markings

Figure 11-6 Location of offset touchdown marking

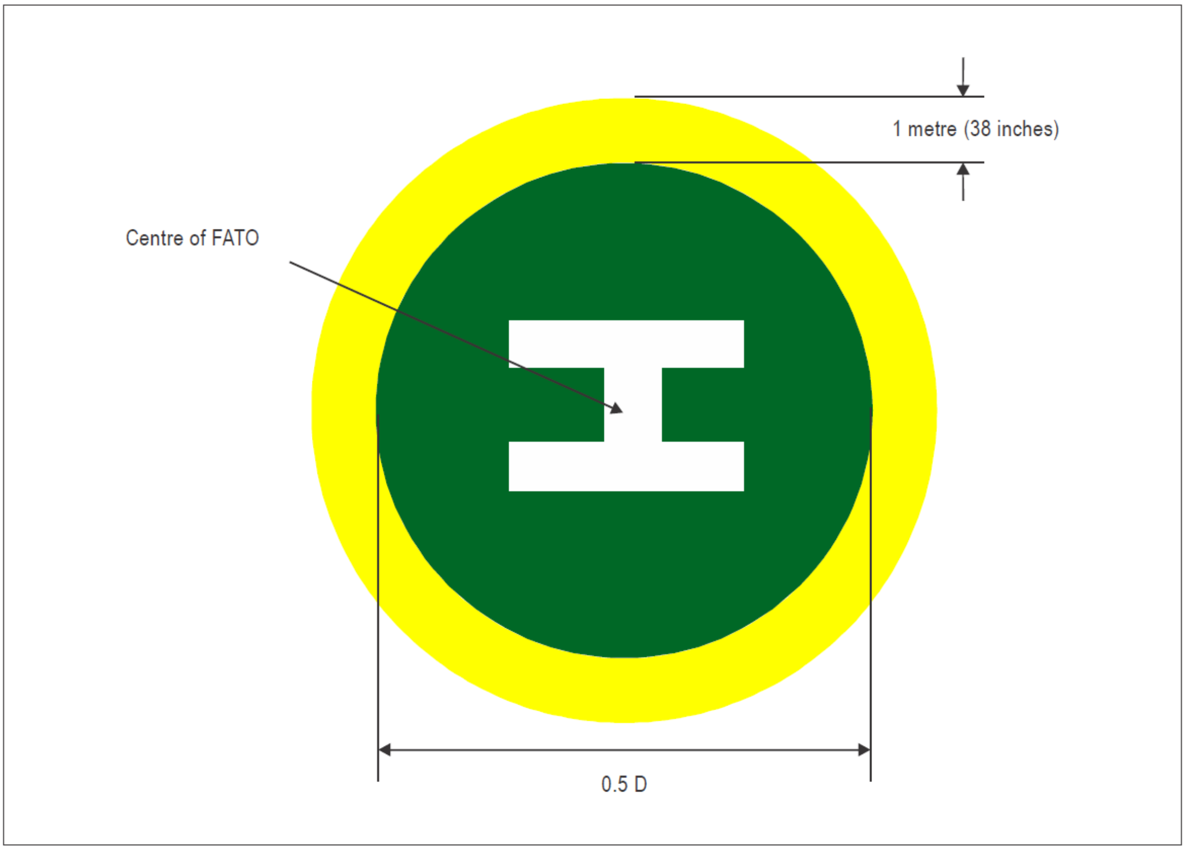


Figure 11-7 touchdown/positioning marking

11.8 Helideck Name Marking

Application

11.8.1 A helideck name marking should be provided at a helideck where there is insufficient alternative means of visual identification.

Location

11.8.2 The helideck name marking should be displayed on the helideck so as to be visible, as far as practicable, at all angles above the horizontal. Where an obstacle sector exists on a helideck the marking should be located on the obstacle side of the helideck identification marking. For a non-purpose-built helideck located on a ship's side the marking should be located on the inboard side of the helideck identification marking in the area between the TLOF perimeter marking and the boundary of the LOS.

Characteristics

11.8.3 A helideck name marking shall consist of the name or the alphanumeric designator of the helideck as used in the radio (R/T) communications.

11.8.4 The characters of the marking should be not less than 1.2 m on, helidecks and shipboard helidecks. The colour of the marking should contrast with the background and preferably be white.

The following can be considered as guidance:

a) To allow for recognition of the facility or vessel further up the approach manoeuvre, consideration should be given to increasing the character height of the helideck name marking from 1.2 m to 1.5 m. Where the character height is 1.5 m, the character widths and stroke widths should be in accordance with Figure 11-3. The character widths and stroke widths of nominal 1.2 m characters should be 80% of those prescribed by Figure 11-3. Where the helideck name marking consists of more than one word it is recommended that the space between words be approximately 50% of character height.
b) Some types of floating facilities and vessels may benefit from a second name marking diametrically opposite the first marking, with the characters facing the opposite direction (so that the feet of characters are located adjacent to the outboard edge of the touchdown/positioning marking circle. Having a name marking either end of the touchdown/positioning marking circle will ensure that one marking is always readable the right way up for aircrew on approach e.g. for a bow mounted helideck on a vessel that is steaming into wind, a second name marking oriented towards the main vessel structure (aft) and located between the outer edge of the circle and the outboard edge of the helideck, will be more easy to process for aircrew approaching into wind than will a helideck name marking located in the normal location. In this case aircrew would be required to process a marking which is upside down.

11.9 Helideck Obstacle-Free Sector (Chevron) Marking

Application

11.9.1 A helideck with adjacent obstacles that penetrate above the level of the helideck shall have an obstacle-free sector marking.

Location

11.9.2 A helideck obstacle-free sector marking shall be located, where practicable, at a distance from the centre of the TLOF equal to the radius of the largest circle that can be drawn in the TLOF or 0.5 D, whichever is greater.

Characteristics

11.9.3 The helideck obstacle-free sector marking shall indicate the location of the obstacle-free sector and the directions of the limits of the sector.

11.9.4 The height of the chevron shall not be less than 30 cm.

11.9.5 The chevron shall be marked in a conspicuous colour.

11.9.6 The colour of the chevron should be black.

The following can be considered as guidance:

a) The origin of the obstacle-free sector should be marked on the helideck or shipboard helideck by a black chevron, each leg being 79 cm long and 10 cm wide forming the angle of the obstacle free sector in the manner shown in Figure 11-8. Where the OFS is swung (by up to +/-15 degrees) then the chevron is correspondingly swung. Where there is insufficient space to accommodate the chevron precisely, the chevron marking, but not the point of origin of the OFS, may be displaced by up to 30 cm towards the centre of the TLOF.

b) The purpose of the chevron is widely misunderstood to provide a form of visual indication to the aircrew that the obstacle free sector is clear of obstructions. However, the marking is too small for the purposes of aircrew and instead is intended as a visual 'tool' for a Helideck Landing Officer (an HLO who has charge of the helideck operation 'on the ground') so that he can ensure that the 210-degree OFS is clear of any obstructions, fixed or mobile, before giving a helicopter clearance to land. The black chevron may be painted on top of the white TLOF perimeter line to achieve maximum clarity for helideck crew.

c) Adjacent to and where practical inboard of the chevron, the certified D-value of the helideck is painted in 10 cm alphanumeric characters. The D-value of the helideck should be expressed in metres to two decimal places (e.g. "D= 16.05 m").

d) For a TLOF which is less than 1D, but not less than 0.83D, the chevron is positioned at 0.5D from the centre of the FATO which will take the point of origin outside the TLOF. If practical this is where the black chevron marking should be painted. If impractical to paint the chevron at this location, then the chevron should be relocated to the TLOF perimeter on the bisector of the OFS. In this case the distance and direction of displacement along with the words "WARNING DISPLACED CHEVRON" are marked in a box beneath the chevron in black characters not less than 10 cm high. An example of the arrangement for a sub-1D helideck is shown in Figure 11-9.

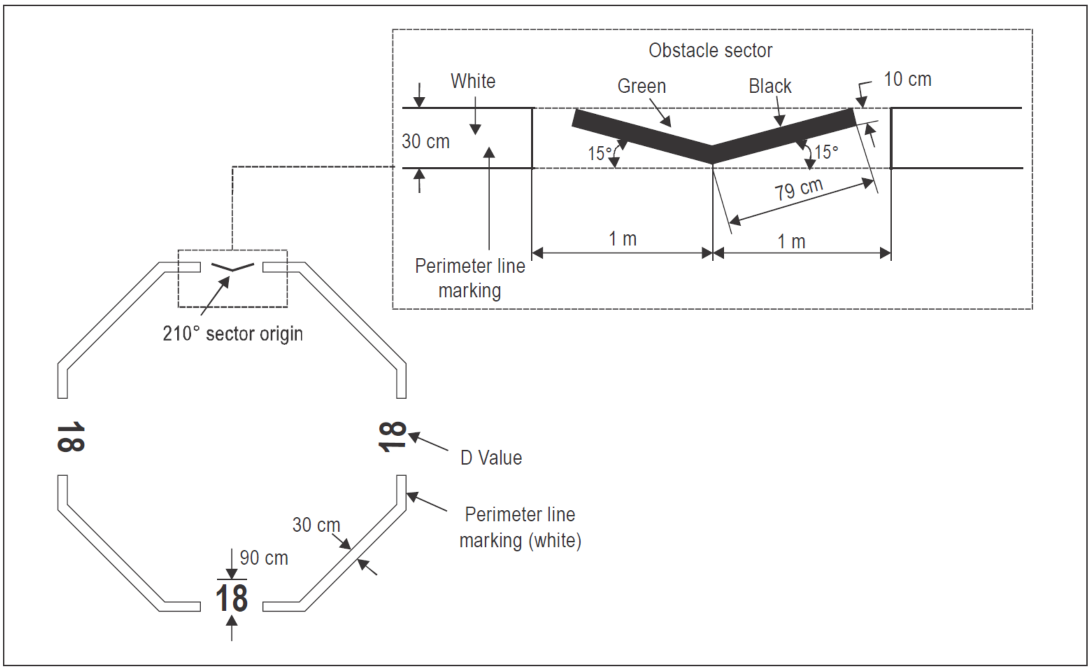


Figure 11-8 Chevron for a 1 D helideck and helideck D-value markings

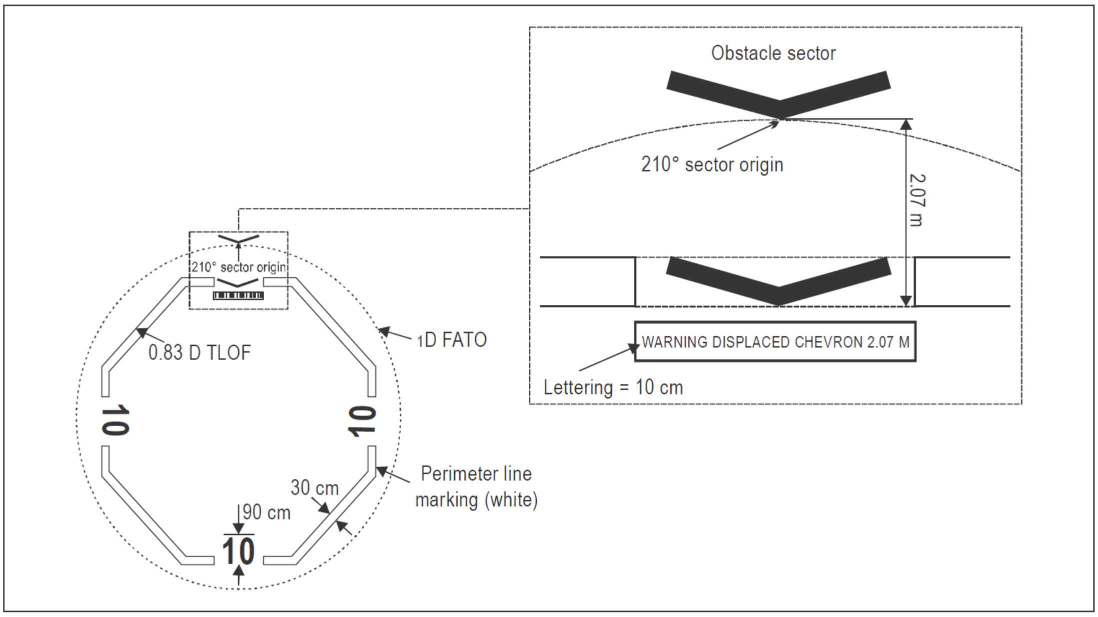


Figure 11-9 Chevron for a 0.83D helideck

11.10 Helideck and Shipboard Helideck Surface Marking

Application

11.10.1 A surface marking should be provided to assist the pilot to identify the location of the helideck or shipboard helideck during an approach by day.

The following can be considered as guidance:

a) The purpose is to protect the helicopter from landing or manoeuvring in close proximity to limiting obstructions which, being of an immoveable nature, may compromise the sectors and surfaces established for the helideck (an example might be a jack-up leg penetrating the 150-degree limited obstacle sector or a crane on the edge of the LOS).

Location

11.10.2 A surface marking should be applied to the dynamic load bearing area bounded by the TLOF perimeter marking.

Characteristics

11.10.3 The helideck or shipboard helideck surface bounded by the TLOF perimeter marking should be of dark green using a high friction coating.

Note — Where the application of a surface coating may have a degrading effect on friction qualities the surface might not be painted. In such cases the best operating practice to enhance the conspicuity of markings is to outline deck markings with a contrasting colour.

11.11 Helideck Prohibited Landing Sector Markings

Application

11.11.1 Helideck prohibited landing sector markings should be provided where it is necessary to prevent the helicopter from landing within specified headings.

Location

11.11.2 The prohibited landing sector markings should be located on the touchdown/positioning marking to the edge of the TLOF, within the relevant headings.

Characteristics

11.11.3 The prohibited landing sector markings shall be indicated by white and red hatched markings as shown in Figure 11-10.

Note — Prohibited landing sector markings, where deemed necessary, are applied to indicate a range of helicopter headings that are not to be used by a helicopter when landing. This is to ensure that the nose of the helicopter is kept clear of the hatched markings during the manoeuvre to land.

The following can be considered as guidance:

a) The arc of coverage should be sufficient to ensure that the tail rotor system will be positioned clear of the obstruction when hovering above, and touching down on, the yellow circle at any location beyond the prohibited landing sector marking. As a guide it is recommended that the prohibited landing sector marking extends by a minimum 10 to 15 degrees either side of the edge of the obstacle (this implies that even for a simple whip aerial infringement' the prohibited landing sector arc applied will be an arc no less than 20-30 degrees of coverage).

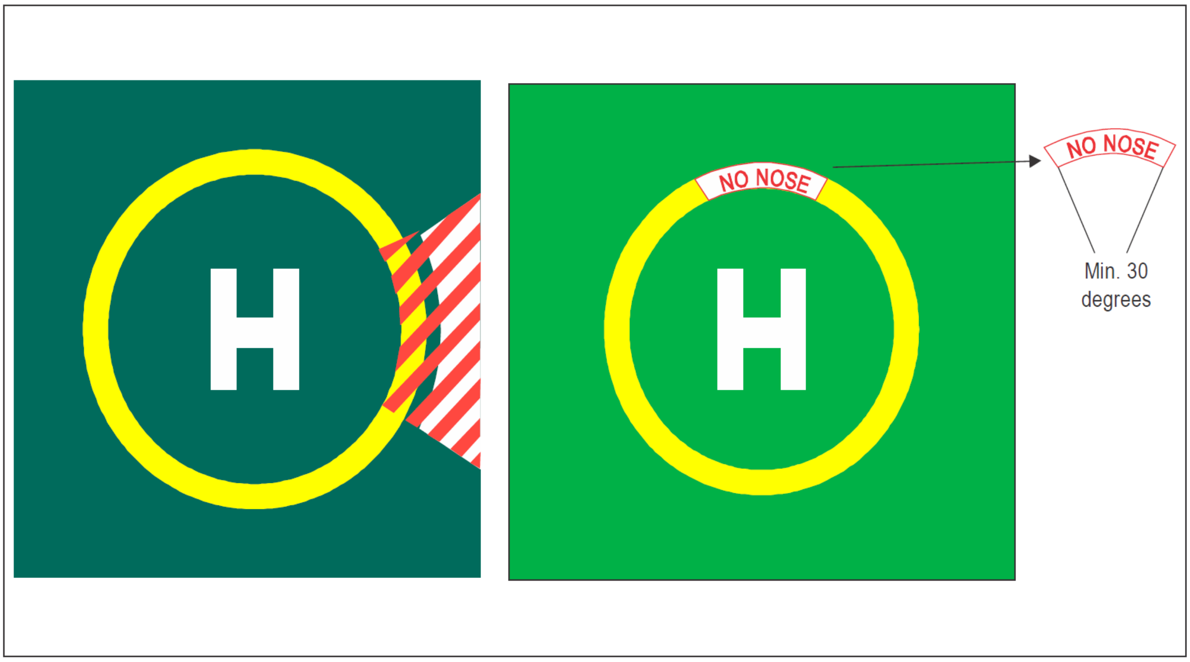


Figure 11-10 Examples of an alternative prohibited landing sector marking

b) The sector of the TD/PM circle, opposite from the personnel access point, should be bordered in red with the words “No Nose” clearly marked in red on a white background as shown in Figure 12-9. When positioning over the touchdown/positioning marking circle, helicopters should be manoeuvred so as to keep the aircraft nose clear of the “No Nose” marked sector of the TDPM circle at all times. The minimum prohibited “NO NOSE” marking should cover an arc of at least 30 degrees (see Figure 11-11).

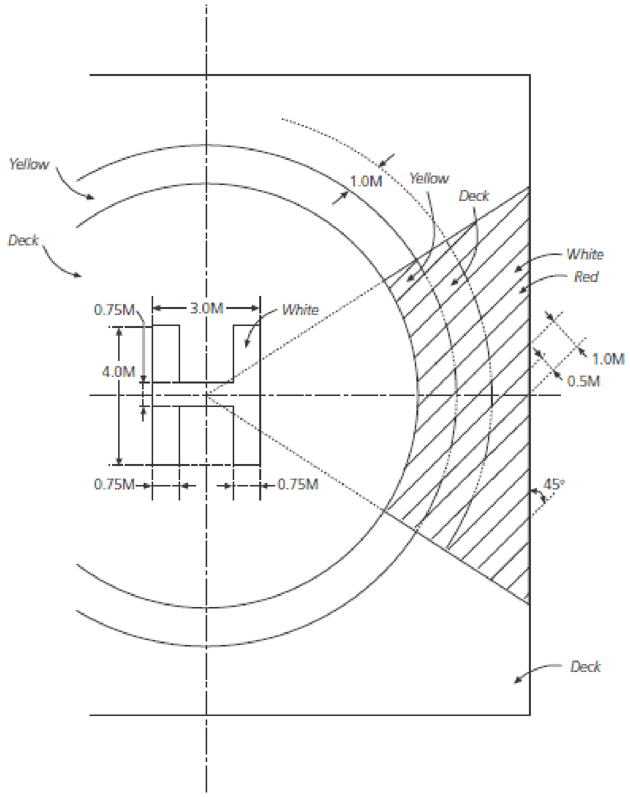


Figure 11-11 Example of an “No-Nose” marking covering an arc of at least 30 degrees

11.12 Visual Aids for Denoting Obstacles

Application, Location and **Characteristics**: refer to CAR Part IX (Aerodromes).

The following can be considered as guidance:

a) 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, or more than six metres wide. The colour should be chosen to contrast with the background to the maximum extent.

b) Obstacles to be marked in these contrasting colours include any lattice tower structures and crane booms which are close to the helideck or to the LOS boundary. Similarly, parts of the leg (or legs) of a self-elevating jack-up unit that are adjacent to the helideck and which extend, or can extend above it, should also be marked in the same manner.

11.13 Installation Closed Marking

Application

11.13.1 A closed marking shall be displayed on an installation which is permanently closed to the use of all helicopters.

Characteristics

11.13.2 The white closed marking shall be of the form as detailed in Figure 11-12, the size of the marking should be adjusted to cover the letter ‘H’ inside the TD/PM.

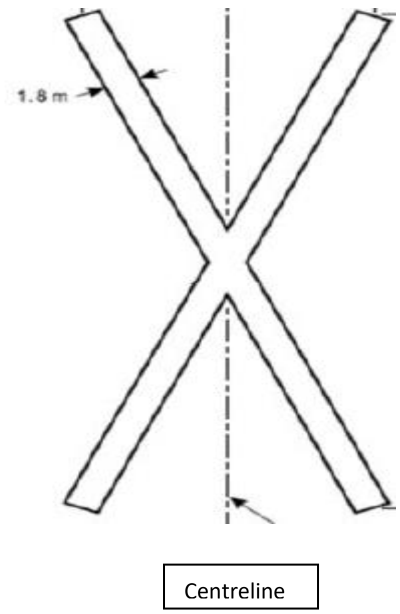


Figure 11-12 Helideck closed

11.14 Prohibition of Landing

Application

11.14.1 A prohibition of landing marking shall be displayed when landings are prohibited and when the prohibition is likely to be prolonged.

Characteristics

11.14.2 The marking shall be of the form as detailed in Figure 11-13, the size of the marking should be adjusted to cover the letter ‘H’ inside the TD/PM.

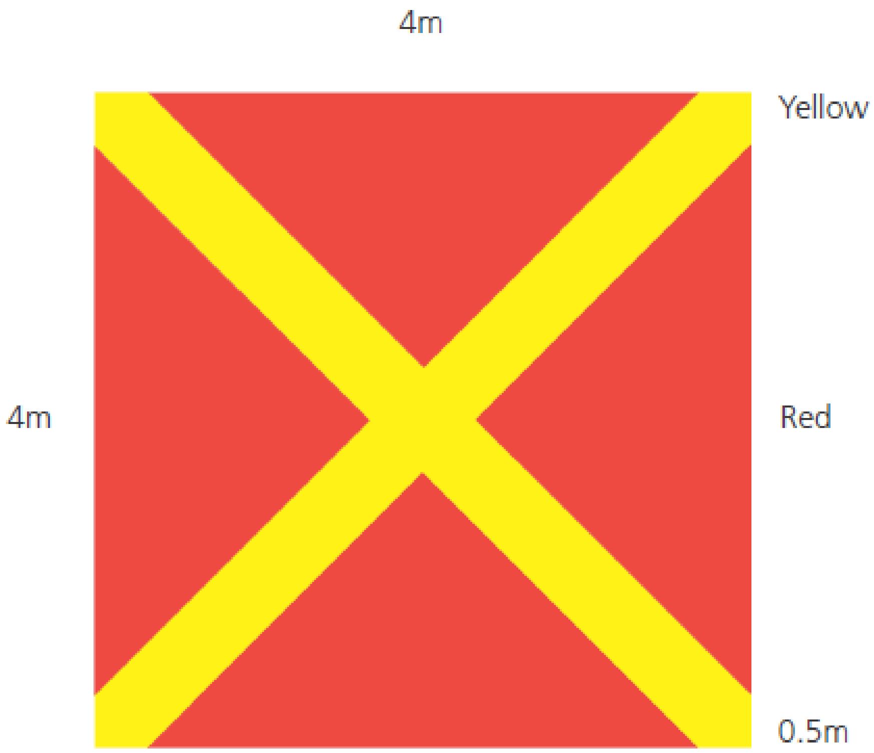


Figure 11-13 Prohibition of landing

Chapter II-12 – Aeronautical Lights

Note.1 - Helidecks located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.

Note.2 - The specification for the TLOF lighting system assumes that the performance of the lighting will not be diminished due to the relative intensity, configuration or colour of other lighting sources present on a fixed or floating facility or on a vessel. Where other non-aeronautical lighting has potential to cause confusion, or to diminish or prevent the clear interpretation of aeronautical ground lights, it will be necessary for the facility or vessel operator to extinguish, screen, or otherwise modify, non-aeronautical light sources to ensure the effectiveness of helideck or shipboard helideck lighting systems are not compromised. To achieve this, operators should give consideration to shielding any high intensity light sources from approaching helicopters by fitting screens or louvers.

12.1 Heliport Beacon

Application, Location and **Characteristics**: refer to CAR-HVD – PART I - Heliport.

12.2 Touchdown and Lift-Off Area (TLOF) Lighting System

Application

12.2.1 A TLOF lighting system shall be provided at a helideck intended for use at night.

12.2.2 The TLOF lighting system for a helideck shall consist of:

a) perimeter lights; and
b) Arrays of Segmented Point Source Lighting (ASPSL) and/or Luminescent Panels (LP) to identify the touchdown marking where it is provided and/or floodlighting to illuminate the TLOF.

Note — At helidecks, surface texture cues within the TLOF are essential for helicopter positioning during the final approach and landing. Such cues can be provided using various forms of lighting (ASPSL, LP, floodlights or a combination of these lights, etc.) in addition to perimeter lights. Best results have been demonstrated by the combination of perimeter lights and ASPSL in the form of encapsulated strips of light emitting diodes (LEDs) to identify the touchdown and helideck identification markings.

12.2.3 The TLOF lighting system may consist of a lit helideck identification (“H”). If utilised, the helideck identification marking lighting shall be omnidirectional showing green.

Location

12.2.4 TLOF perimeter lights, around the edge of the area designated for use as the TLOF shall be uniformly spaced at intervals of not more than 3m and should follow the shape of the helideck or shipboard helideck (e.g. for an octagonal shaped helideck, the TLOF perimeter lights should be arranged to form an octagon).

12.2.5 To avoid lights creating a trip hazard at points of access and egress it may be necessary to provide sources that are flush-mounted (i.e. recessed) into the surface. The pattern of lights should be formed using regular spacing. However, to avoid potential trip hazards, blocking foam dispensing nozzles, etc., it may be desirable to move lights to one side. In this case TLOF perimeter lights may be relocated by up to +/- 0.5 m such that the maximum gap between two adjacent TLOF perimeter lights is no more than 3.5 m and the minimum no less than 2.5m.

12.2.6 The TLOF perimeter lights shall be installed at a fixed helideck such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

12.2.7 The TLOF perimeter lights shall be installed at a floating helideck, such that the pattern cannot be seen by the pilot from below the elevation of the TLOF when the helideck is level.

12.2.8 When Luminescent Panels are used on a helideck to enhance surface texture cues, the panels should not be placed adjacent to the perimeter lights. They should be placed around a touchdown marking where it is provided.

12.2.9 TLOF floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

The following can be considered as guidance:

a) Floodlighting can easily become misaligned and the Helicopter Landing Officer (HLO) should instigate daily checks to ensure that misaligned lights are corrected and so not creating a hazard to flight operations by providing a source of glare (the glare issue may be reduced by fitting appropriate hoods [louvers] onto deck-mounted floodlights). Notwithstanding lights should be realigned when, in the opinion of air crew, they are creating a glare hazard during flight operations.

Note — ASPSL and LPs used to designate the touchdown marking have been shown to provide enhanced surface texture cues when compared to low-level floodlights. Due to the risk of *misalignment, where floodlights are used, there will be a need for them to be checked periodically to ensure they remain within the specifications.*

Characteristics

12.2.10 The TLOF perimeter lights shall be fixed omnidirectional lights showing green.

12.2.11 The chromaticity and luminance of colours of LPs shall conform to CAR Part IX Aerodromes:

Table 12-1 Colours for aeronautical ground lighting: Chromaticities

Perimeter Lights **GREEN**		**Touchdown/Positioning Lights** **YELLOW**	
Yellow Boundary	x = 0.360 – 0.080y	Red Boundary	y = 0.382
White Boundary	x = 0.650y	White Boundary	y = 0.790 – 0.667x
Blue Boundary	y = 0.39 – 0.171x	Green Boundary	y = x – 0.120

12.2.12 An LP shall have a minimum width of 6 cm. The panel housing shall be the same colour as the marking it defines according to Table 12-1.

12.2.13 The perimeter lights should not exceed a height of 25 cm and should be inset when a light extending above the surface could endanger helicopter operations.

12.2.14 The height of the installed TLOF perimeter lights and floodlights should not exceed 25cm above the level of the TLOF for helidecks which are 1D or greater and/or have a D-value greater than 16.00 m, and 5 cm for helidecks which are sub-1D, but not less than 0.83D, and/or have a D-value of 16.0 m or less.

12.2.15 The LPs shall not extend above the surface by more than 2.5 cm.

12.2.16 The light distribution of the perimeter lights should be as shown in Figure 12-3, Illustration 5.

12.2.17 The light distribution of the LPs should be as shown in Figure 12-3, Illustration 6.

12.2.18 The spectral distribution of TLOF area floodlights shall be such that the surface and obstacle marking can be correctly identified.

12.2.19 The average horizontal illuminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1 measured on the surface of the TLOF.

12.2.20 Lighting used to identify the touchdown marking should comprise a segmented circle of omnidirectional ASPSL strips showing yellow. The segments should consist of ASPSL strips, and the total length of the ASPSL strips should not be less than 50 per cent of the circumference of the circle.

12.2.21 The design of the perimeter lights should be such that the luminance of the perimeter lights is equal to or greater than that of the TD/PM Circle segments.

12.2.22 The perimeter lighting and touchdown/position marking lighting is considered serviceable provided that at least 90% of the lights are serviceable, and providing that any unserviceable lights are not adjacent to each other. A light shall be deemed to be unserviceable when the main beam average intensity is less than 50 per cent of the value specified in the appropriate illustration in Figure 12-3.

The following can be considered as guidance:

a) Deck-mounted floodlighting, given their ‘shallow angle of attack’ and the potentially very large area needing to be illuminated, especially over the touchdown markings, is what is commonly known as the ‘black-hole effect’. In this case adequate illumination is dispensed in areas adjacent to the perimeter lights, but a ‘black-hole’ is left in the centre of the landing area where the ‘throw’ of the lights is inadequate to reach the central touchdown area markings. Designers should aim to create a lighting environment which achieves an average horizontal illuminance of the floodlighting which is at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1, measured on the surface of the TLOF. Furthermore, the spectral distribution of TLOF area floodlights should ensure adequate illumination of the surface markings (especially the touchdown/positioning marking circle) and obstacle markings (this may include a prohibited landing sector marking, where present).

b) Given the challenges of meeting 12.2.17, designers may be tempted to provide multiple floodlighting units, in seeking to achieve the recommendations for spectral distribution and average horizontal illuminance for floodlighting. However, being very much brighter than the TLOF perimeter lights, floodlighting has a tendency to ‘wash out’ the pattern of the green perimeter lights, due to the number and intensity of much brighter floodlights. As the green pattern provided by the TLOF perimeter lights generates the initial source of helideck acquisition for aircrew, the desire to specify multiple sets of floodlights should be resisted. For all but the largest helidecks a compliment of between 4 and 6 floodlights should be sufficient (up to 8 for the largest helidecks). Providing technologies are selected which promote good sharp beam control, this should optimise their effectiveness and offer the best opportunity to effectively illuminate touchdown markings. To mitigate, as far as possible the glare issue, floodlights should be mounted so that the centreline of the floodlight beam is at an angle of 45 degrees 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. Figure 12-1 illustrates a typical floodlighting arrangement.

c) As well as providing the visual cues needed for helideck recognition for approach and landing, helideck floodlighting may be used at night to facilitate on-deck operations such as passenger movements, refuelling operations, freight handling etc. Where there is potential for floodlights to dazzle a pilot during the approach to land or during take-off manoeuvres, they should be switched off for the duration of the approach and departure. Therefore, all floodlights should be capable of being switched off at a pilot’s request. All TLOF lighting should be fed from an uninterrupted power supply (UPS) system.

d) For some helidecks or shipboard helidecks, it may be possible to site additional high-mounted floodlighting away from the TLOF perimeter, such as a ship’s bridge or pointing down from a hangar. In this case, extra care should be taken to ensure additional sources do not cause a source of glare to a pilot, especially when lifting in the hover to transition into forward flight, and do not present a competing source to the green TLOF perimeter lights. Screens or louvers should be considered for any additional high-mounted sources.

The following can be considered as guidance:

a) The helideck and shipboard helideck lighting systems are designed on the assumption that operations occur in typical night viewing conditions, with an assumed eye threshold illuminance of Et = 10-6.1. If there is an expectation for aeronautical lighting to be used in more demanding viewing conditions, such as at twilight or during typical day conditions, (where Et = 10-5.0 for twilight and Et = 10-4.0 for normal day), there needs to be recognition that the ‘true night’ viewing ranges achieved by the system design will decay considerably in more demanding viewing conditions (i.e. the range at which a particular visual aid becomes detectable and conspicuous at night will decrease if that same aid is used at twilight or by day; because the higher background brightness leads to decreasing probability of detection).

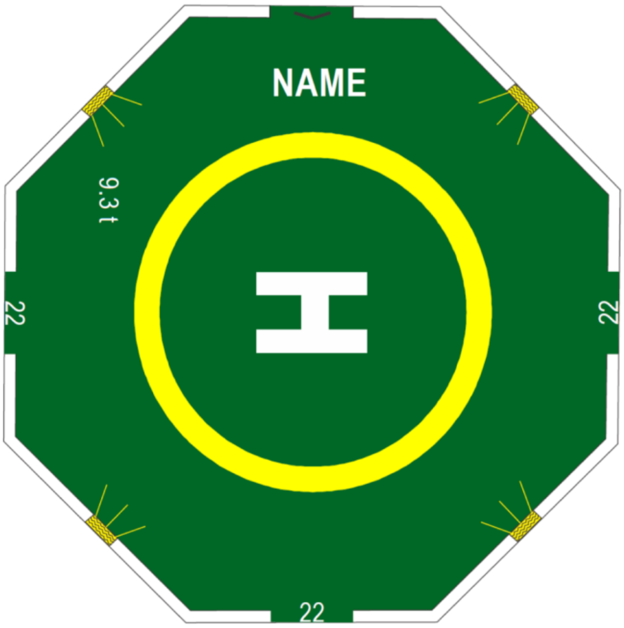


Figure 12-1 Typical floodlighting arrangement for an octagonal helideck

The following can be considered as guidance:

a) As an effective alternative to providing illumination of the touchdown markings by the use of deck-mounted floodlighting, operators may wish to consider a scheme for a lit touchdown/ positioning marking and a lit helideck identification marking.

b) The lit touchdown/positioning marking and the lit helideck identification marking scheme has been developed by the UK CAA to be compatible with helicopters having wheeled undercarriages. Although the design specification ensures segments and sub-sections are compliant with the maximum height for obstacles on the TLOF surface (2.5 cm), and are likely to be able to withstand the point loading presented by typically lighter skidded helicopters, due to the potential for raised fittings to induce dynamic rollover, it is important to establish compatibility with skid-fitted helicopter operations before lighting is installed on helidecks and shipboard helidecks used by skid-fitted helicopters.

c) If used, the lit Helideck Identification Marking ('H') should be superimposed on the 4m x 3m white painted 'H' (limb width 0.75m). The lit 'H' should be 3.9 to 4.1m high, 2.9 to 3.1m wide and have a stroke width of 0.7 to 0.8m. The lit 'H' may be offset in any direction by up to 10cm in order to facilitate installation (e.g. avoid a weld line on the helideck surface). The limbs should be lit in outline form as shown in Figure 12-2. An outline lit 'H' should comprise sub-sections of between 80mm and 100mm wide around the outer edge of the painted 'H'. There are no restrictions on the length of the sub-sections, but the gaps between them should not be greater than 10cm. The mechanical housing should be coloured white.

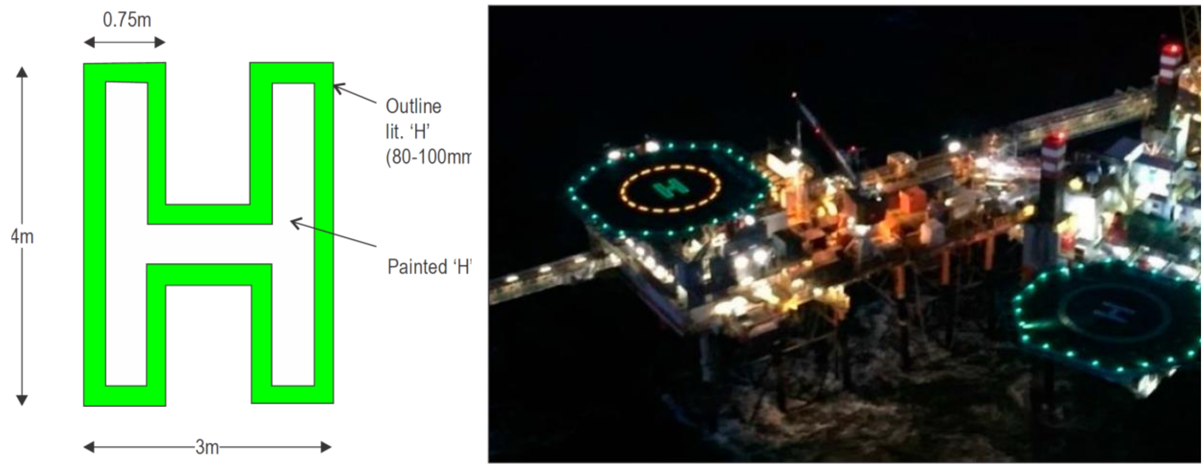


Figure 12-2 Configuration and example of a normal dimension helideck identification marking "H"

12.3 Helideck Status Light System

Application

12.3.1 If it is deemed that a hazard or potential hazardous condition exists 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 following can be considered as guidance:

a) The aeronautical meaning of a flashing red light is either "do not land, aerodrome no available for landing" or "move clear of landing area". The necessity for the installation of a Status Light systems should be the results of a safety assessment, accepted by the accountable organisation.

12.3.2 The system should be automatically initiated at the appropriate hazard level (e.g. gas release) 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.

12.3.3 The following specification should be applied:

a) 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. 360^0 in azimuth.
b) The effective intensity should be a minimum of 700 cd between 2^0 and 10^0 above the horizontal and at least 176 cd at all other angles of elevation.
c) 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.
d) 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 b) above.
e) The colour of the status light(s) should be red as defined in CAR Part IX (Aerodromes), colours for aeronautical ground lights.
f) 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 maximum duty cycle should be no greater than 50%.

g) The light system should be integrated with platform safety systems such that it is activated automatically in the event of a process upset.

h) Facilities should be provided for the HLO to manually switch on the system and/or override automatic activation of the system.

i) The light system should have a response time to the full intensity specified not exceeding three seconds at all times.

j) Facilities should be provided for resetting the system which, in the case of NUIs, do not require a helicopter to land on the helideck.

k) 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.

l) The system and its constituent components should comply with all regulations relevant to the installation.

m) Where the system and its constituent components are mounted in the 210^0 OFS or in the first segment of the LOS, the height of the installed system should not exceed 25 cm above deck level (or exceed 5 cm for any helideck where the D-value is 16.00 m or less).

n) Where supplementary 'repeater' lights are employed for the purposes of achieving the 'on deck' 360^0 coverage in azimuth, these should have a minimum intensity of 16 cd and a maximum intensity of 60 cd for all angles of azimuth and elevation.

12.3.4 All components of the status light system should be tested by an independent test house to ensure verification with the specification. The photometrical and colour measurements performed in the optical department of the test house should be accredited.

The following can be considered as guidance:

a) Manufacturers are reminded that the minimum intensity specification stated above is considered acceptable to meet the current operational requirements, which specify a minimum meteorological visibility of 1400 m (0.75 NM). Development of offshore approach aids which permit lower minima (e.g. differential GPS) will require a higher intensity.

12.3.5 Where helideck status light systems installed on normally unattended installations (NUIs) malfunction, whether the outcome is light(s) permanently flashing or disabled/depowered, in these cases, in order to allow them to be manually reset at the platform, a duty-holder may present a case-specific risk assessment to the accountable organisation, who if satisfied with the risk assessment, may provide acceptance to permit flights against operating status lights or black platforms to occur.

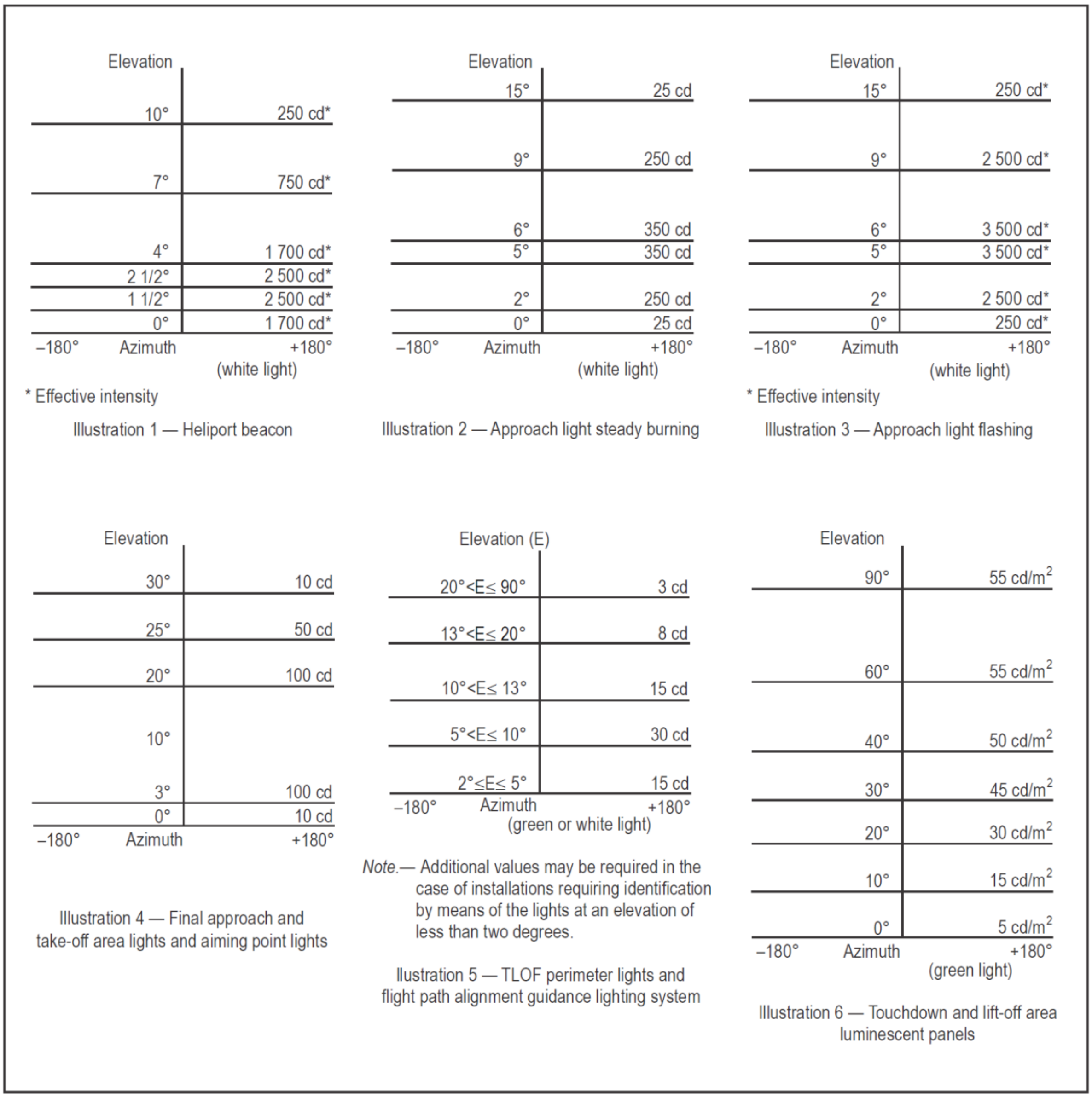


Figure 12-3 – Isocandela diagrams of lights meant for visual heliports

12.4 Floodlighting of Obstacles

Application

12.4.1 At a helideck intended for use at night, obstacles shall be floodlighted if it is not possible to display obstacle lights on them.

Location

12.4.2 Obstacle floodlights shall be arranged so as to illuminate the entire obstacle and as far as practicable in a manner so as not to dazzle the helicopter pilots.

Characteristics

12.4.3 Obstacle floodlighting should be such as to produce a luminance of at least 10cd/m2

The following can be considered as guidance:

a) Omni-directional low intensity steady red obstruction lights having a minimum intensity of 10 candelas for angles of elevation between 0 degrees and 30 degrees 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 an off-shore facility or vessel. Objects which are more than 15 metres higher than the landing area should be fitted with intermediate low intensity steady red obstruction 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 intermediate steady red lights, provided that the lights are arranged such that they will illuminate the whole of the structure and not dazzle a helicopter pilot. Facilities may, where appropriate, consider alternative equivalent technologies to highlight dominant obstacles in the vicinity of the helideck.

b) An omni-directional low intensity steady red obstruction light should be fitted to the highest point of the installation. The light should have a minimum intensity of 50 candelas for angles of elevation between 0 and 15 degrees, and a minimum intensity of 200 candelas between 5 and 8 degrees. Where it is not practicable to fit a light to the highest point of the installation (e.g. on top of flare towers) the light should be fitted as near to the extremity as possible.

c) In the particular case of jack-up units, it is recommended that when the tops of the legs are the highest points on the facility, they should be fitted with omni-directional low intensity steady red lights of the same intensity and characteristics as described in paragraph b). In addition, the leg (or legs) adjacent to the helideck should be fitted with intermediate low intensity steady red lights of the same intensity and characteristics as described in paragraph a) at 10 metre intervals down to the level of the landing area. As an alternative the legs may be floodlit providing the helicopter pilot is not dazzled.

d) Any ancillary structure within one kilometre of the helideck, and which is significantly higher than it, should be similarly fitted with red lights.

e) Red lights should be arranged so that the locations of the objects which they delineate are visible from all directions of approach above the landing area.

f) Facility/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 a UPS system.

g) For some helidecks, especially those that are on not permanently attended installations (NPAI), it may be beneficial to improve depth perception by deploying floodlighting to illuminate the main structure (or legs) of the platform. This can help to address the visual illusion that a helideck appears to be 'floating in space'.

12.5 Special Considerations for Non-Purpose-Built Shipboard Helidecks

12.5.1 At a helideck intended for use at night, obstacles shall be floodlighted if it is not possible to display obstacle lights on them.

12.5.2 Given the possible presence of obstructions within the landing area night operations should not take place unless a risk assessment has been undertaken to demonstrate it is safe to do so. Where night operations are conducted, specific lighting schemes for non-purpose-built shipboard helidecks may utilise an area floodlighting solution to illuminate the TLOF and markings as illustrated in Figure 12-4 below.

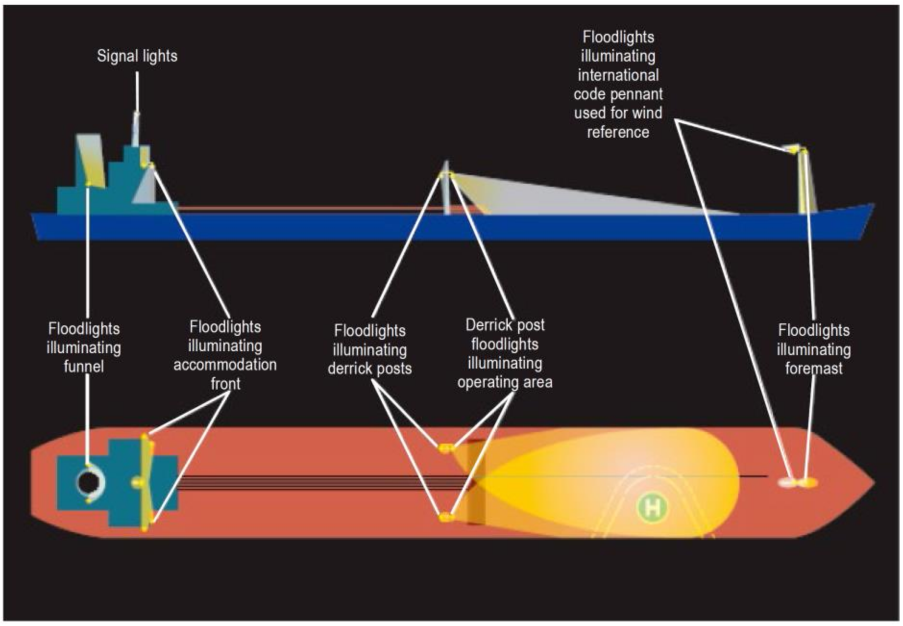


Figure 12-4 Special considerations for lighting non-purpose-built shipboard helidecks

Chapter II-13 – Parking Areas and Push-In Areas

13.1 Parking Area (PA)

14.1.1 Where provided, parking areas shall be located within the 150-degree limited obstacle sector (LOS) equipped with markings to provide effective visual cues for flight crews needing to use the parking area.

The following can be considered as guidance:

a) Markings should be incorporated on the parking area surface to provide visual cues to the flight crew to enhance safe operations.

b) It is necessary for a parking area to be clearly distinguishable from the landing area (the TLOF). By day this is achieved by ensuring a good contrast between the surface markings of the landing area and the surface markings of the parking area. For a standard dark green helideck, as described in Chapter II-11, a parking area which is painted a light grey colour utilising a high friction coating, will provide suitable contrast (an aluminium surface may be left untreated). For an untreated aluminium landing area, it may be necessary to select a different colour finish for the parking area (preferably a darker colour than the landing area but avoiding dark green) to achieve a good contrast. (The Figures in this chapter II-13assume that a dark green minimum 1D FATO is provided. When an untreated aluminium landing area is selected the underlying colour of the parking area will need to be varied to achieve good contrast).

13.1.2 The dimensions of the parking area shall be able to accommodate a circle with a minimum diameter of 1 x the D-value of the design helicopter.

13.1.3 Where space (the physical surface) is limited for the parking area it is permissible to reduce the parking area 'footprint' to be no less than the rotor diameter (RD) of the design helicopter. In this case the touchdown/positioning marking (TD/PM) circle is offset away from the landing area to ensure a parked helicopter is a safe distance away from the landing area and is contained in the parking area within an imaginary circle of dimension D. With a reduction in the load bearing surface of the parking area from D to RD, it is accepted that parts of the helicopter e.g. the tail rotor or main rotor, may overhang the physical parking area (inboard). The general arrangement for a helideck parking area with offset TD/PM circle is shown at Figure 13-2.

13.1.4 For some offshore facilities it may not be practical to accommodate a full helideck parking area adjacent to the landing area. In this case consideration may be given to providing an extension to the landing area, known as a limited parking area (LPA) or push-in area (PIA), separated from the landing area by a Parking Transition Area (PTA) (see 13.1.3) and designed to accommodate only a fully shutdown helicopter. In this case it is intended helicopters should be shut down on the landing area and ground handled to and from the LPA/ PIA. The arrangement for an LPA/PIA is shown at Figure 13-3. Similar to a parking area, the LPA/PIA is bounded by a solid white edge buffer line, and should be painted in a colour that contrasts effectively with the landing area (and the PTA).

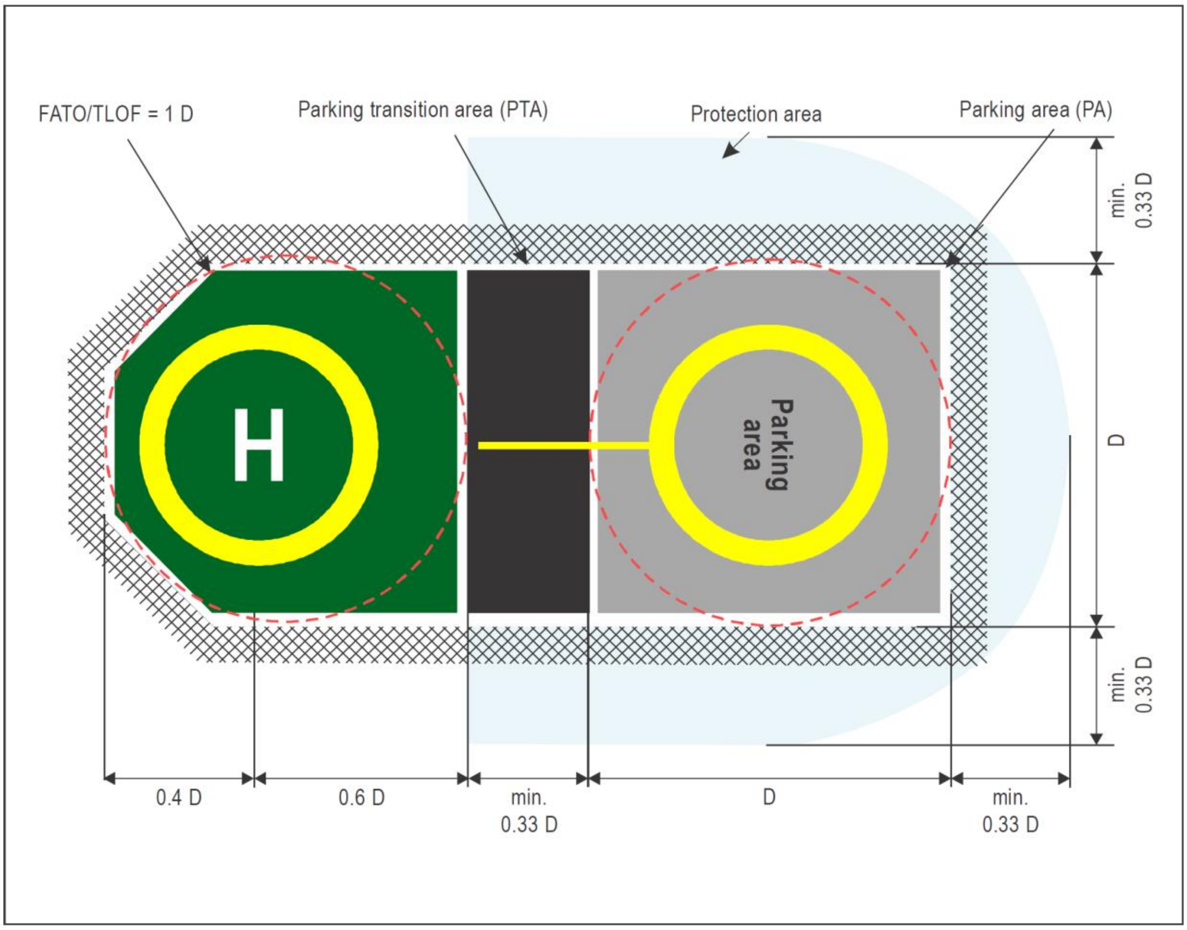


Figure 13-1 1D FATO/TLOF with associated 1D parking area (separated by a parking transition area

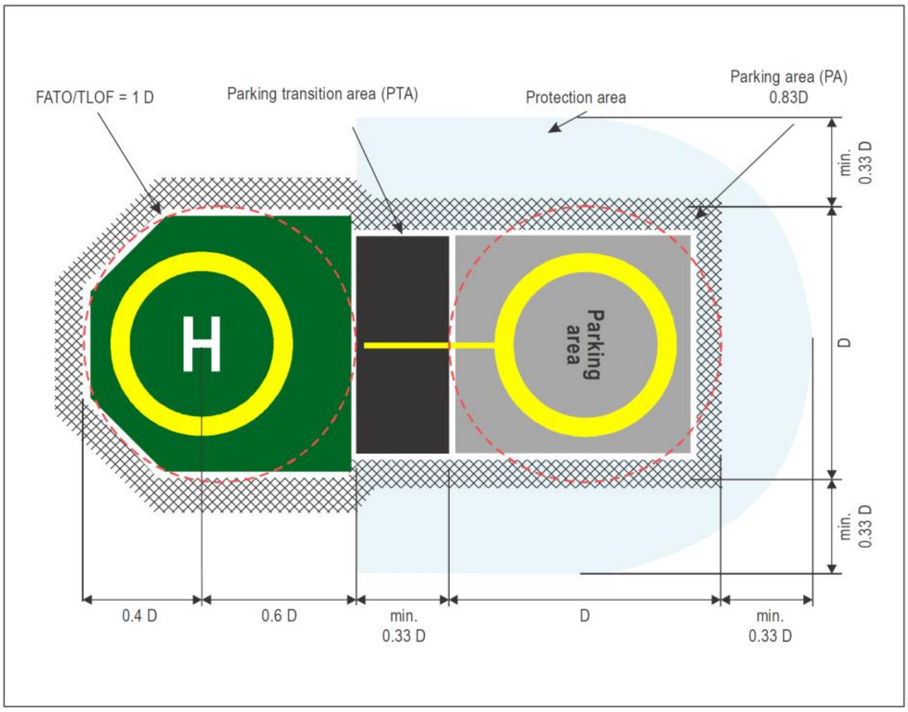


Figure 13-2 Helideck parking area with off-set TD/TM circle

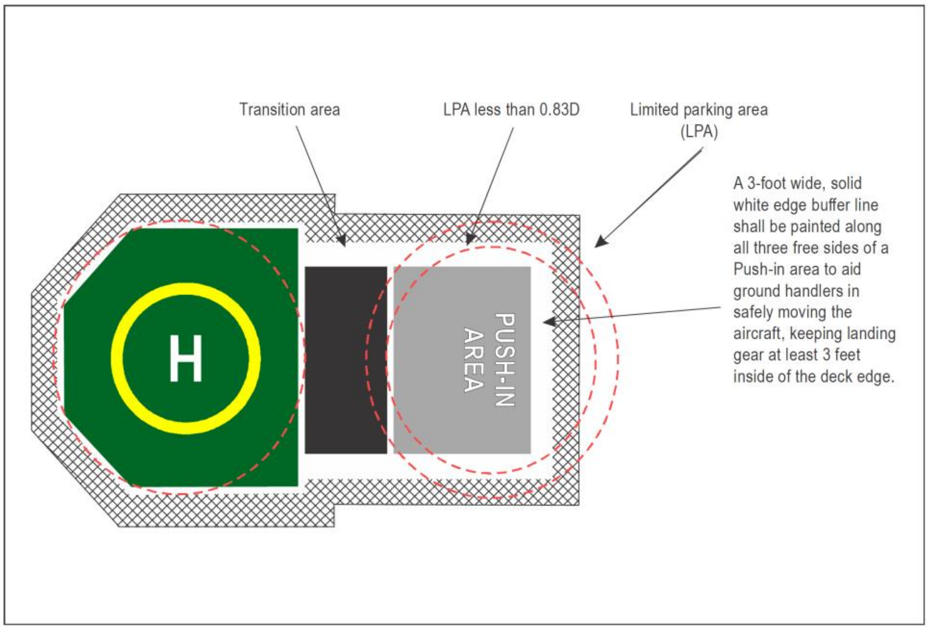


Figure 13-3 A helideck with limited parking area (LPA) / push-in area (PIA)

13.2 Parking Transition Area (PTA)

13.2.1 A minimum clearance between the edge of the parking area and the edge of the landing area of 1/3 (0.33D) based on the design helicopter shall be provided and shall be kept free of obstacles when a helicopter is located in the parking area. (Refer to Figure 13-4)

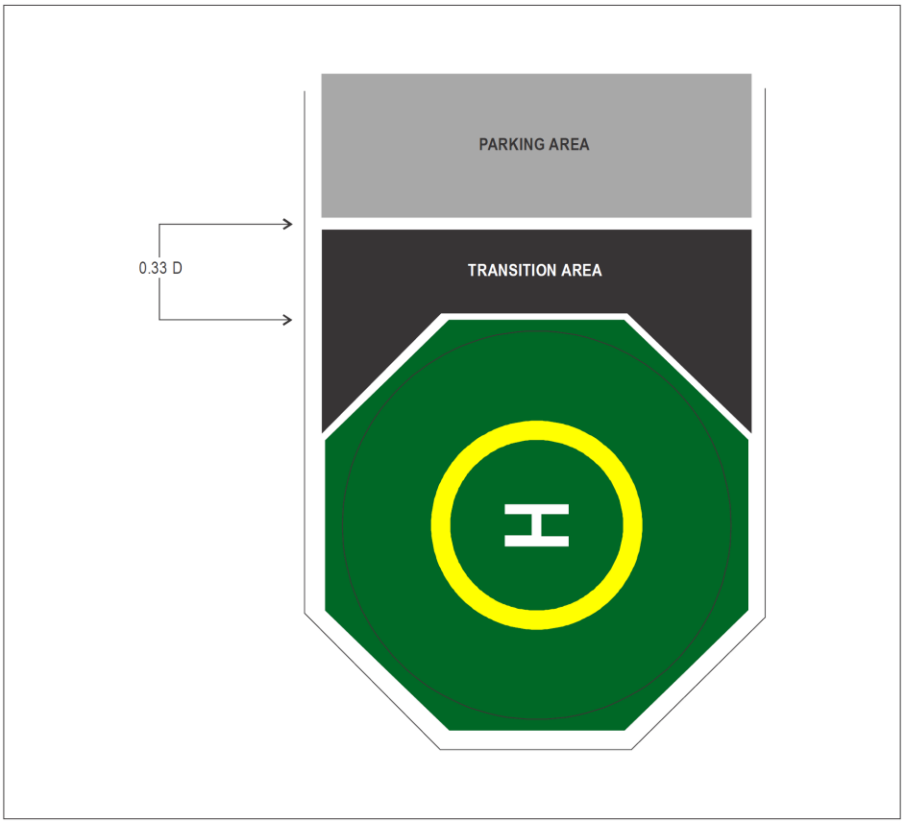


Figure 13-4 Parking transition area (PTA)

The following can be considered as guidance:

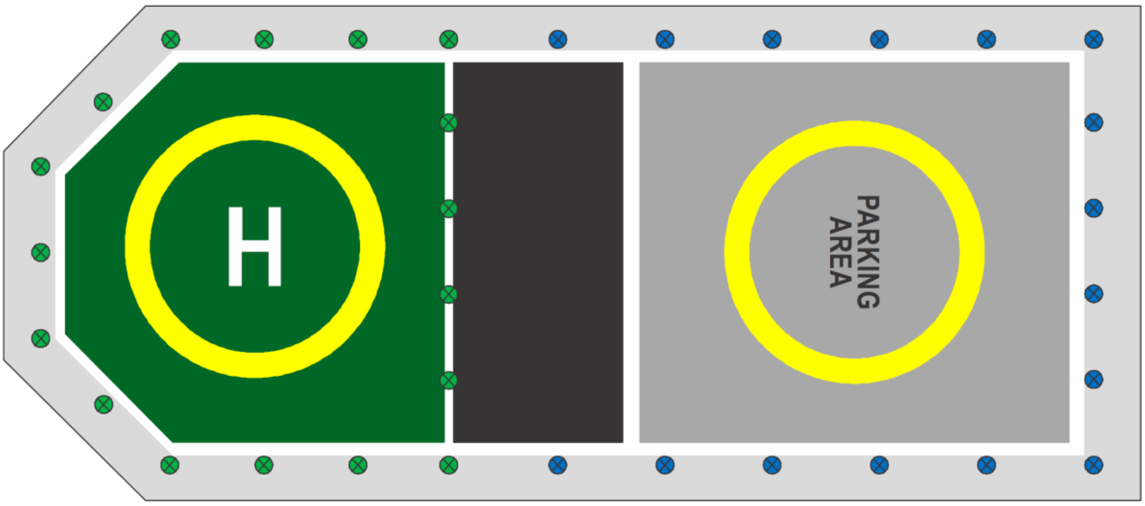
a) In all cases the parking transition area (PTA) provides a sterile area between the edge of the landing area (the TLOF) and the edge of the parking area or LPA/PIA, and is used to transition the helicopter to and from the parking or LPA/push-in area, whether performing an air taxi-ing or ground taxi-ing manoeuvre to the parking or push-in area or, in the case of a disabled helicopter, towing or pushing the helicopter clear of the landing area (for an LPA/PIA the helicopter will always be pushed-in). No part of either helicopter, whether parked in the parking or LPA/push-in area, or operating into the landing area, should intrude into the PTA.

The following can be considered as guidance:

a) The PTA should be painted in black for the area between the TLOF perimeter marking and the inboard perimeter of the parking (or push-in) area (both defined with 30cm white lines).

The following can be considered as guidance:

a) To provide illumination to a parking area at night, and to ensure a pilot is able to differentiate between the parking area and the landing area, it is recommended that deck-mounted floodlights, with louvres, be arranged along either side of the parking area (for guidance on the number and use of floodlighting see Chapter II-12). Alternatively, where point source (coloured) lights are preferred, or are utilised in addition to floodlights, then the colour green should be avoided for the parking area and the associated PTA — instead blue lights are preferred. The perimeter lights on the parking area do not need to be viewed at range, as do the TLOF perimeter lights and therefore parking area perimeter lights should be a blue low intensity light — no greater than 5 candelas at any angle of elevation.



Note.— For parking areas and limited parking areas (LPA) where hover taxi and/or ground taxi is authorized, blue lights shall extend along the transition area and the (L)PA.

Figure 13-5 Landing and parking area lighting scheme

Note — For Parking Areas and Limited Parking Areas where Hover Taxi and/or Ground Taxi is authorized, blue lights shall extend along the Transition Area and the (L)PA.

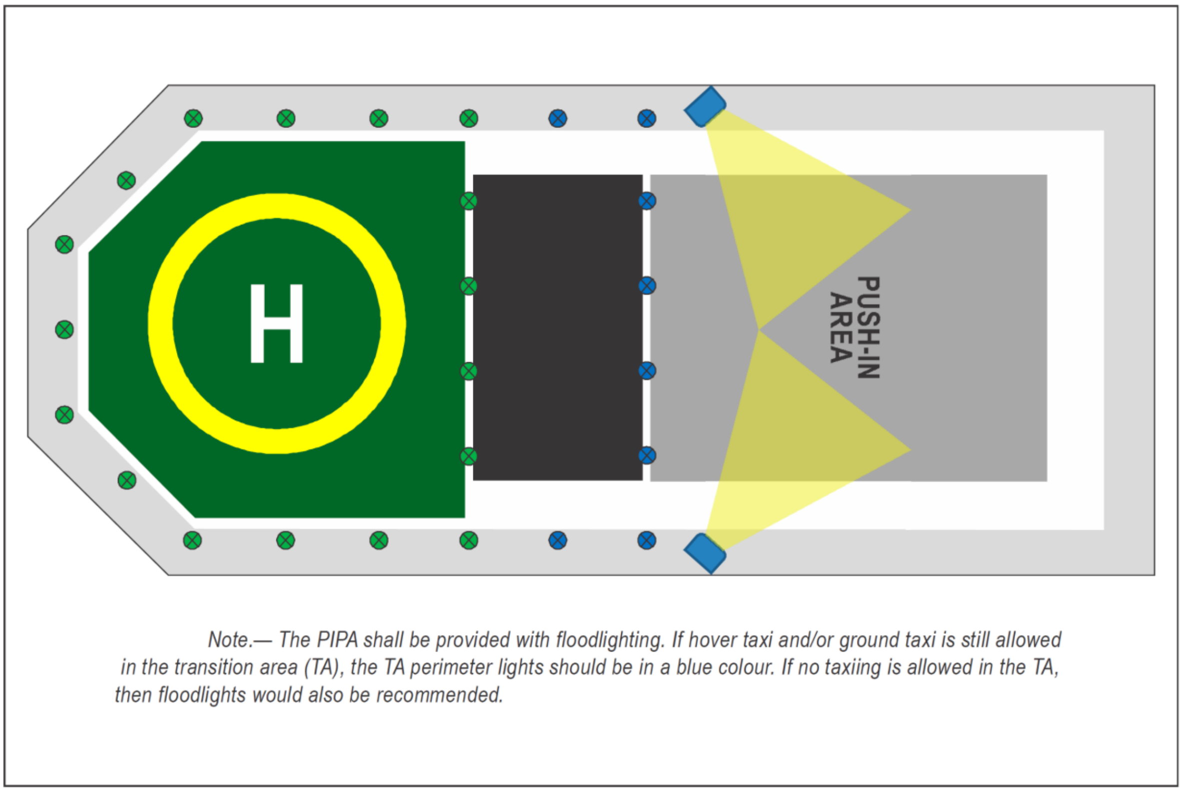


Figure 13-6 Floodlighting scheme for a push-in area (PIA) connected via a PTA to a 0.83D TLOF

Note — The Push-in Area shall be provided with flood lighting. If hover taxi and/or ground taxi is still allowed in the Transition Area, the TA perimeter lights should be in a blue colour. If no taxi-ing is allowed in the TA, then flood lights would also be recommended

The following can be considered as guidance:

a) A helicopter may be taxied from the landing area to the parking area, by reference to the 15cm yellow taxiway alignment line (see Figures 13-7 and 13-8) and then shut down on a heading which keeps the tail clear of any obstructions that may be present in the vicinity of the parking area. Where an obstacle is in close proximity to, or infringes the parking protection area, a no nose marking may be necessary to prevent the helicopter tail rotor from coming into line with an object as illustrated by Figure 13-8.

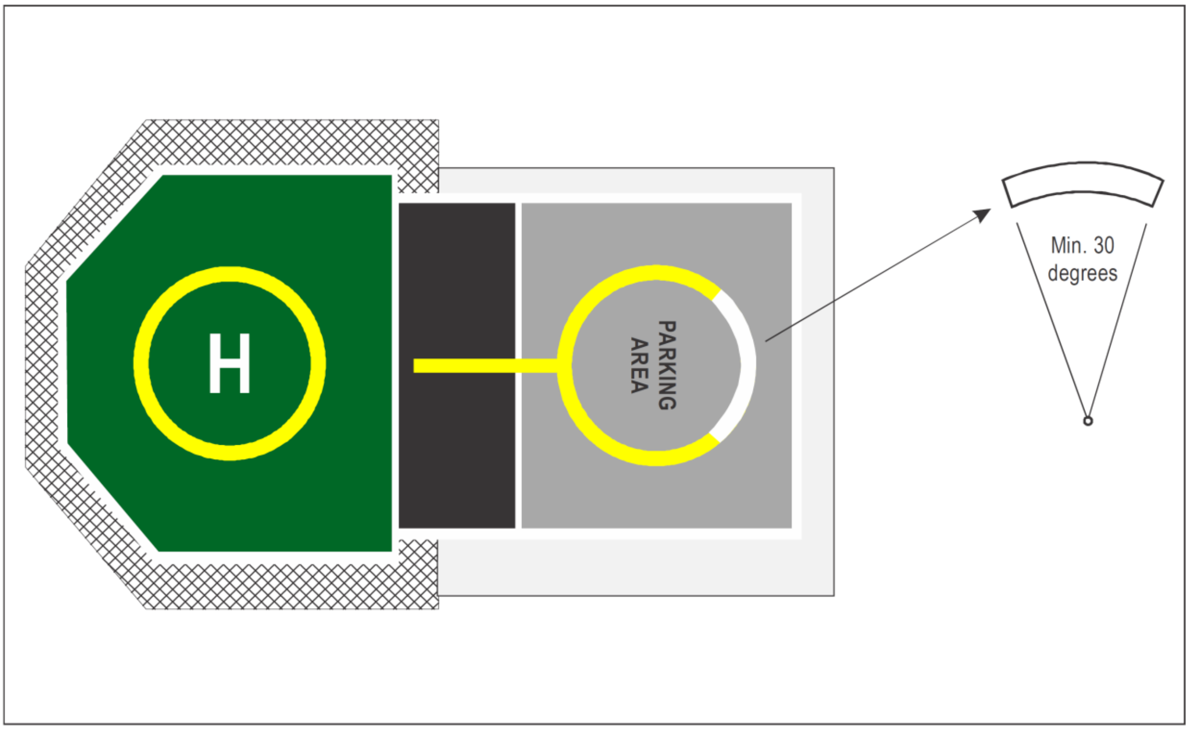


Figure 13-7 Touchdown Parking Circle and Parking Circle Orientation Marking (PCOM)

b) Manoeuvring (360 degrees) in the PA as a hover or ground taxi operation is acceptable. The nose of the helicopter should be located over the yellow portion of the parking circle orientation marking (PCOM) when shutdown i.e. the nose of the helicopter should not be located over the white portion of the PCOM circle during or while shutdown (refer to Figure 13-7.

c) A "PCOM" marking can be used to avoid the tail rotor being positioned in the vicinity of an exit or emergency exit. The coverage of the white portion of the PCOM will depend on the size of the obstacle to be avoided but, when used, it is recommended the minimum (angular) size should be no less than 30 degrees (refer to Figure 14-8).

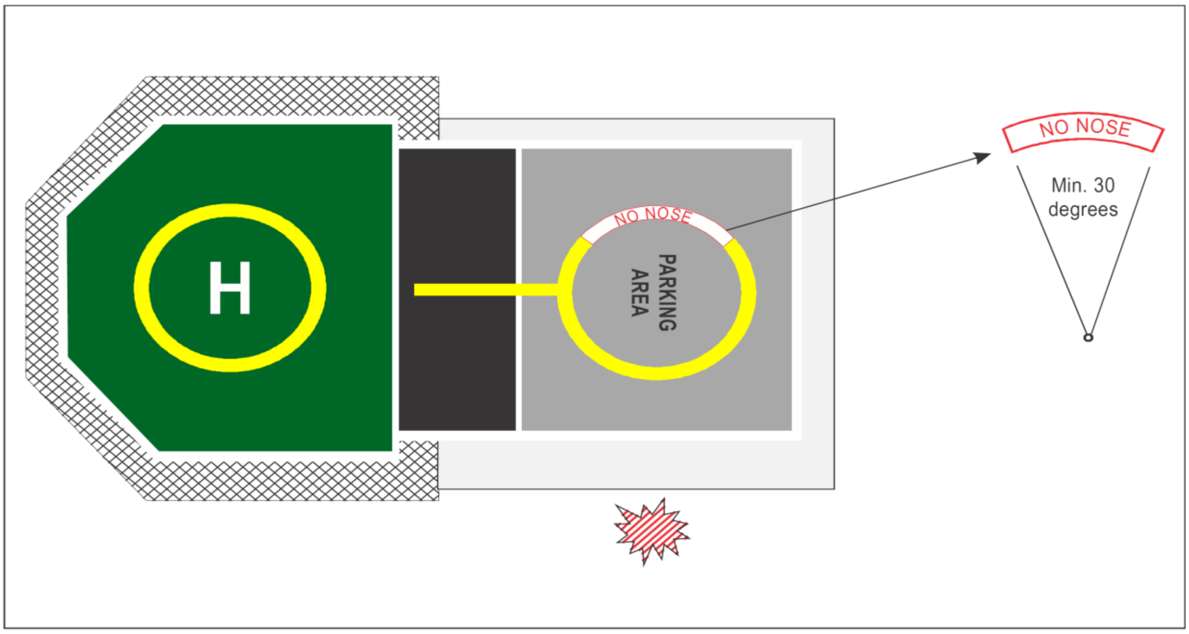


Figure 13-8 Illustration of a "No Nose" marking

d) A 'NO NOSE' marking should be used to avoid the tail rotor being positioned in the vicinity of an obstacle that is very near to, or infringes the 0.33 D parking protection area.

e) A 'NO NOSE' marking provides visual cues for aircrew indicating that the 'helicopters nose' should not be manoeuvred or parked in a particular direction. (Figure 13-8) shows a helicopter manoeuvring and parking orientation restriction, to avoid infringement of a tail rotor hazard.

f) A "No Nose Marking" should be on a white background with a red border and the words 'NO NOSE' located on the Touchdown Parking Circle (TDPC) as shown in (Figure 13-8). The "NO NOSE" marking size will depend on the size of the area or obstacle to be avoided by the tail rotor/tail boom. It is recommended the minimum (angular) size should be not less than 30 degrees. One or multiple obstacles may be covered by this sector.

Note — Consistent with the arrangements for the landing area provisions should be put in place for parking or limited parking/ push-in areas/parking transition areas to ensure adequate surface drainage arrangements and a skid-resistant surface for helicopters and persons operating on the parking or limited parking /push-in areas/parking transition areas. When tying down helicopters in the parking area it is prudent to ensure sufficient tie-down points are located about the touchdown/positioning marking circle. A method to secure a helicopter in the push-in area should also be considered. Where necessary a safety device, whether netting or shelving, should be located around the perimeter of the parking area or limited parking/push-in area (and the parking transition area). Parking areas may be provided with one or more access points to allow personnel to move to and from the parking area without having to pass through the PTA to the landing area.

Chapter II-14 – Not Permanently Attended Installations (NPAI)

14.2 Rescue and Firefighting Facilities

14.2.1 In the case of NPAI's, where RFF equipment will be unattended during certain helicopter movements, the application of foam through a manually operated fixed monitor system is not recommended. Serious consideration shall be given to the selection and provision of Fixed Foam Application System (FFAS) integrated into helideck.

14.2.2 For installations which are at times unattended the effective delivery of foam to the whole of the landing area should be best achieved by means of a fully-automated DIFF System.

14.2.3 For NPAIs, other 'combination solutions' where these can be demonstrated to be effective in dealing with a running fuel fire should be considered. This may permit, for example, the selection of a sea water-only DIFFS used in tandem with a passive fire-retarding system demonstrated to be capable of removing significant quantities of unburned fuel from the surface of the helideck in the event of a fuel spill from a ruptured helicopter tank. In this case the minimum discharge duration should meet the appropriate requirements specified in Chapter II-16, paragraph 16.5.2.3.

14.2.4 DIFFS on NPAI's shall be integrated with platform safety systems so that pop-up nozzles are activated automatically in the event of an impact of a helicopter on the helideck where a Post-Crash Fire is a probable outcome.

14.2.5 The overall design of a DIFFS shall incorporate a method of fire detection and be configured to avoid false activation/alarms. It should be capable of manual over-ride by the HLO and from the main installation or control room.

14.2.6 Similar to a DIFFS provided for a Permanently Attended Installation or vessel, a DIFFS provided on an NPAI needs to consider the eventuality that one or more nozzles may be rendered ineffective by, for example, a crash. The basic performance assumptions stated in Chapter II-16, paragraph 16.5 should also apply for a DIFFS located on a NPAI.

14.3 Rescue and Firefighting Facilities (Without DIFFS)

14.3.1 Where no automatic fire detection/protection system is provided then the operator shall conduct a Risk Assessment and detail the equipment and method of fire-fighting for the arrival of the first helicopter and the departing of the last helicopter.

14.3.2 Where DIFFS are not part of the installation, then the following minimum rescue and firefighting equipment shall be supplied:

a) 90 kg of dry powder – is suitable extinguishers.
b) 36 kg of CO2 with extendable applicator for high engine access
c) Rescue equipment (refer to Chapter II-16 – section 6 table 16-1)
d) 2 x full sets of fire-fighting PPE (refer to Chapter II-16 – section 7)
e) 2 breathing apparatus sets with spare cylinders

14.3.3 Helideck operators should consider the use of a cameras in order that an assessment of the conditions of the helideck can be monitored before a flight takes place.

14.3.4 A procedure should be implemented and consist of:

a) On board the first arriving helicopter is a Helicopter Landing Officer (HLO).
b) The HLO is to comprehensively brief his team before take-off of the actions required upon landing at the NPAI and of the emergency actions in the event of a helicopter crash/fire situation on landing.
c) The HLO is to analyse the weather, checked the state of the deck, and coordinate the deck arrival in terms of safety.
d) On landing the HLO is to secure the chocks, check the deck, call the on-shore base to confirm safe arrival if applicable and manage the disembarkation – fire-fighter first.
e) There should be at least one additional fully trained fire person on board.
f) On landing, the crew should undertake a visual inspection, test the safety equipment and check the deck surface for any obstructions and maintenance issues. These inspections and tests shall be recorded.

g) For embarkation the luggage/equipment; always goes on first. The HLO is to allow one passenger to board the helicopter at a time, holding back the next person in line.

h) Once the passenger is seated and strapped the passenger should provide the "thumbs-up" sign and the HLO then allows the next passenger to board.

i) Once all the passengers and luggage/equipment is on board the HLO should indicate to the pilot all is loaded and ready.

j) The HLO should conduct a final visual inspection of the flight direction and surrounding area give the "thumbs up" to the pilot and board the helicopter.

Chapter II-15 – Helidecks and Vessels – Personnel Requirements

15.1 General

15.1.1 The organisation's Safety Management System (SMS) is one of the keys to assuring safe and efficient off-shore helideck operations. Supervision of helicopter operations should be fully integrated into the SMS.

15.1.2 The responsibilities and authority assigned to individuals for controlling all activities related to helideck operations (in all weather conditions) should be set down in a clearly defined structure and hierarchy. They should be widely promulgated, on-shore and off-shore, to ensure full and proper understanding by all. The interfaces with other disciplines and those activities that may impact safe and efficient helideck operations should be identified and built into operating procedures.

15.1.3 Irrespective of the volume of helicopter traffic, the level of preparedness and effectiveness of both personnel and equipment involved in helicopter operations requires to be of a single satisfactory standard.

15.1.4 On facilities with infrequent helicopter operations, this may involve a significant commitment to ensure there are enough adequately trained personnel available for helideck duties. Such operations will require routine monitoring and testing to ensure proper standards are maintained.

15.2 Dangerous Goods

15.2.1 Personnel involved with dangerous goods shall hold a certificate of training, appropriate to the role and responsibility of the individual. This shall be provided from a GCAA approved training provider. Further information can be obtained from the GCAA, Aviation Security Affairs Sector for details regarding authorisation of the carriage of dangerous goods, with reference to GCAA CAR Part VI, Chapter 2: Transport of Dangerous Goods by Air.

15.3 Helideck Preparation

15.3.1 Prior to helicopter landings taking place on an installation or vessel, all support facilities shall be properly prepared for use. Preparation should be carried out in a systematic manner; following set procedures/checklists this is to ensure all equipment is serviceable, in the correct position and ready for immediate use. Completion of helideck and support equipment preparation should be formally documented by the Helicopter Landing Officer (HLO) and all records retained for auditing purposes.

15.4 Installation Manager / Vessel Master

15.4.1 With respect to helicopter operations, the Installation Manager or Master of a vessel is responsible for:

a) appointing a competent person to be responsible for the control of helicopter operations in relation to the installations, to be known as the Helideck Landing Officer (HLO)

b) ensuring that all persons engaged on helideck operations, or who are in or near any helicopter landing area, are under the immediate and effective control of the HLO

c) ensuring that all helideck personnel are appropriately trained for normal and emergency helicopter operations

d) ensuring that the helideck and associated operational and emergency equipment is provided and maintained in good working condition

e) ensuring that all helideck personnel are provided with appropriate personal protective equipment (PPE)

f) ensuring that the appointed Helideck Landing Officer carries out his duties as described by the Safety Management System.

The following can be considered as guidance:

a) All helideck personnel including contractors should wear hi-visibility clothing, safety shoes, hearing protection muffs and eye protecting glasses.

15.5 Helideck Personnel Composition

15.5.1 Helideck operators shall appoint a competent person to establish and effectively manage all aspects of fire-fighting and rescue, staffing, equipment and response.

15.5.2 Sufficient competent personnel shall be readily available to respond and operate the helideck equipment and emergency facilitates at maximum capacity. These personnel shall be deployed in a way that ensures that response objectives shall be achieved and that continuous agent application at the appropriate rate(s) shall be fully maintained.

15.5.3 An organisation shall appoint a trained and certified Helideck Landing Officer (HLO) and sufficient emergency personnel when undertaking helicopter operations on an off-shore Installation or vessels.

The following can be considered as guidance:

a) The precise composition of helideck crews required for off-shore helideck operations is a matter for the installation/vessel owner/operator to decide. The primary objective is to ensure the safety of the helicopter passengers and crew.

15.5.4 To establish the optimum number of helideck personnel for a particular off-shore operation, the installation owner/operator should carry out a thorough assessment (Task and Resource Analysis).

15.5.5 When conducting this assessment, the following should be taken into account:

a) The types and size of helicopters using the helideck;

b) Type, design, capacity and discharge rate of a fire-fighting equipment;

c) Need for the rescue of helicopter occupants;

d) Need to operate ladders, breathing apparatus, fire extinguishers, hand-lines, and rescue equipment;

e) Availability of additional emergency support personnel; and

f) Training and Competency levels of helideck personnel.

15.5.6 The helideck owner / operator shall formulate a selection and recruitment process that identifies the ideal candidate to undertaken such duties.

15.5.7 As a minimum, the GCAA would expect a helideck team comprising of an HLO to supervise the helideck operations plus a minimum of three (3) Helideck Assistants (HDA) (in effect a fire-fighting monitor/hand-line operator plus one person to affect any rescue/evacuation operation).

15.5.8 Members of the flight crew shall not be considered as part of the helideck crew.

15.5.9 In addition, the helideck operator should conduct an assessment for the need of a Radio Operator, with an acceptable level of English to confirm the helideck is available and ready accept the helicopter and to monitor and respond to any emergency calls.

Table 15-1 Example of Minimum Staffing Levels

Role	Installation (complexes)	Rigs and Barges
HLO	1	1
HDA (Fire-fighting team)	3	3
Radio Operator (RO)	1	1
Refueller (if required)	1	1

15.5.10 If they are to effectively utilise the equipment provided, all personnel assigned to fire-fighting duties on the helideck shall be comprehensively trained to carry out their duties to ensure competence in role and task. The GCAA will only accept personnel who have attended a SLP accepted by the GCAA for helideck operations.

15.5.11 In addition, regular training in the use of all fire and support equipment, helicopter familiarisation and rescue tactics and techniques shall be carried out. All such training shall be formally recorded and retained for at least 5-years.

15.6 Responsibilities of The Helideck Landing Officer (HLO)

15.6.1 The Helideck Landing Officer (HLO) is responsible for the day-to-day management of the helideck, associated helideck operations and supervision of the Helideck Assistants and support staff.

15.6.2 The HLO shall exercise immediate and effective control of all persons who are engaged in helicopter operations, or who are on or near the helicopter landing area.

15.6.3 The HLO shall immediately report any form of deviation on the helicopter deck to his immediate superior/installation manager, so that the helicopter operator may be informed of the situation.

15.6.4 The HLO shall be positioned to be able to observe as best as possible, and closely monitor, landing and take-off. The HLO shall immediately inform the pilot via radio or visually if any abnormal situation occurs.

15.6.5 The HLO’s responsibilities should include, but are not necessarily limited to:

a) Overall charge (e.g. supervision) of the helideck and helideck crew.

b) Ensuring pre-operational and post-operational helideck checks are carried out.

c) Ensuring that on receipt of radio information regarding helicopter arrivals, helideck facilities are ready to receive the aircraft.

d) Ensuring the safe movement of passengers, baggage, freight and correct loading of the aircraft.

e) Ensuring correct manifest procedures are used.

f) Initiating fire-fighting and rescue procedures on the helideck, and ensuring that members of the helideck crew carry out their duties as described in the SMS.

Note - The HLO may also be responsible for leading the initial response to a helicopter emergency on an off-shore fixed, mobile, floating installation or vessel and leading the HDA helideck emergency response team during any emergency.

g) Liaison with the installation/vessel fire teams and ensuring that backup fire-fighting and rescue procedures are implemented to assist after the initial stage of an emergency.

h) Briefing the helideck crew on helideck handling and other relevant tasks.

i) Ensuring the installation/vessel management, are kept aware of aircraft movements and that cranes in particular have ceased movement whilst aircraft operations are in progress.

j) Ensuring that the 210° OFS is clear of obstructions before giving a helicopter clearance to land.

k) Ensuring that the floodlighting controls (and Status Lights if installed) are accessible to and controlled by the HLO (or Radio Operator).

l) Ensuring that the refuelling procedures are implemented.

m) Carrying out on-the-job training for trainee Helideck Assistants in accordance with their SMS.

15.6.6 The HLO shall also ensure that:

a) Necessary steps are taken to deny unauthorised persons access to the helicopter deck prior to take-off and landing.

b) The deck is cleared of loose objects, inflammable substances etc.

c) Necessary personnel are present and at a state of readiness.

d) All equipment and instruments are in place and in full working order.

e) Passengers are held in the safe zone during landing/take off and that they are given guidance during disembarkation and embarkation.

15.6.7 HLO Identification on PPE Clothing

a) The HLO should wear identification on his outer PPE clothing to clearly show he is the responsible person during helideck operations. Either purpose made reflective markings wearing of a tabard will achieve this.

b) The tabard should be marked on the front and back with the letters HLO in a reflective material, and should be clearly visible from a distance. Because of the potential for static electricity hazards during helideck operations, clothing made from nylon should not be worn by helideck crew members.

15.7 Responsibilities of The Helideck Assistant (HDA)

15.7.1 As the HLO is required to be present on the helideck during helicopter arrivals and departures, the helideck operator shall appoint a 'Helideck Assistant ' (HDA) to assist the HLO with administration of passengers and freight.

15.7.2 The responsibilities of the HDA should include but not be limited to:

a) Assisting the HLO in the operation of the helideck.

b) Directing passengers to and from the aircraft.

c) Loading and unloading freight and baggage from the aircraft.

d) Operation of fire-fighting and rescue equipment under the direction of the HLO and assisting the HLO in checking fire-fighting and rescue equipment.

e) Undertaking other duties around the helideck area as required by the HLO.

f) Passenger and freight control before departure and on arrival.

g) Production of complete and accurate passenger and cargo manifests.

h) Preparation of Dangerous Goods manifests.

i) Liaison with the HLO, Radio Operator on helicopter movements and requirements.

15.8 Responsibilities of the Helideck Radio Operator (HRO)

15.8.1 Organisations providing a flight information/alerting service to pilots operating within oil field complexes shall obtain an Aerodrome Flight Information Service Certificate from the GCAA, as required in Civil Aviation regulations CAR Part VIII Subpart 9.

Note. – Helideck Radio Operators on individual platforms, although organisations have a duty to ensure their training, experience and competence, are not subject to these regulations provided they supply advice to pilots concerning only the status of that platform.

15.8.2 Continuous two-way radio communications shall be available between the helicopter pilot and the helideck operator or an appropriate agent. While not always possible, it is highly desirable to have a three-way communications link between the helicopter pilot, the off-shore facility, and a land-based facility.

15.8.3 Helideck Radio Operators shall be aware of helicopter operations within the vicinity of the helideck and should be prepared to pass on relevant information to the pilots.

15.8.4 Although these will vary amongst operations, the following should be a guide to Helideck Radio Operator procedures:

a) The provision of information and advice for the purpose of assisting the safe and efficient operation of aircraft. This should include:

1) information when available on other known traffic,

2) weather information,

3) information regarding radio and navigational aids,

4) landing area conditions and associated facilities,

5) alerting service, and

6) any other information likely to affect safety.

b) Coordination is required with other agencies as required, including:

1) other ATS and AFIS units,

2) meteorological services providers,

3) operators of aircraft and landing platforms,

4) rescue and fire-fighting emergency services,

5) search and rescue authorities, and

6) UAE armed forces.

c) Local processes may include passing Weather Status Reports to the helicopter operator, estimated times of arrival, and revisions, to the HLO, confirmation that the deck is ready for arriving helicopters, sending arrival messages, and obtaining flight plan and load details, et cetera.

d) All procedures require to be documented.

15.8.5 Each HRO should have an Emergency Procedures Checklist which clearly displays Alerting Service actions involving overdue or missing aircraft.

The following can be considered as guidance:

a) Further information regarding the regulations and certification for the provision of flight information services can be found in CAR Part VIII (Air Navigation Regulations), Subpart 9 (Aerodrome Flight Information Services).

b) On most facilities, fixed and floating, the helideck radio operator (HRO) is the initial and final point of contact between flight crew and the facility. However, as final approach to the landing area is established, personnel (e.g. HLOs and HDAs) with portable aeronautical headsets, may be available for guidance to the pilot as to the status of the landing area. When such personnel are utilised, the use of this equipment requires that they should be suitably trained.

c) A major advantage of having a radio-equipped person on the helideck is that they can maintain visual as well as radio communication during the circuit, final approach and landing, so assisting the helicopter crew with further positive identification of the facility and thereby reducing the incidence for a landing on an incorrect deck. A radio-equipped person is also in a good position to warn of any developing issues while the helicopter is ‘on deck’.

d) In order to avoid misunderstandings, hand-over and general R/T procedures employed should consist of standard R/T phrases and vocabulary only. Transmissions should be restricted to aviation-related matters only, and radio discipline strictly maintained. Communications should be kept brief, avoiding any unnecessary ‘chatter’ on the selected aeronautical frequency and should be confined to essential dialogue.

e) Off-shore fixed and floating facilities which have aeronautical radio equipment and/or aeronautical Non-Directional Beacons (NDBs) on them, should ensure the systems are maintained by competent people. All Aeronautical Frequencies employed shall be allocated and authorised by the Telecommunications Regulatory Authority.

Chapter II-16 – Rescue and Firefighting

16.1 General

16.1.1 The provision contained in this chapter II-16 should be read in conjunction with the appropriate detailed guidance on rescue and firefighting options given in the Heliport Manual (Doc 9261).

16.1.2 Provisions described in this chapter II-16 are intended to address incidents or accidents within the heliport response area only.

16.1.3 No dedicated firefighting provisions should be included for helicopter accidents or incidents that may occur outside the response area, such as on an adjacent structure near a helideck.

16.1.4 Complementary agents should be dispensed from one or two extinguishers (although more extinguishers may be permitted where high volumes of an agent are specified, e.g. H3 operations). The discharge rate of complementary agents should be selected for optimum effectiveness of the agent used. When selecting dry chemical powders for use with foam, care should be exercised to ensure compatibility. Complementary agents should comply with the appropriate specifications of the International Organization for Standardization (ISO).

16.1.5 Where a fixed monitor system (FMS) is installed, trained monitor operators, where provided, should be positioned on at least the upwind location to ensure primary media is directed to the seat of the fire. For a ring-main system (RMS), practical testing has indicated that these solutions are only guaranteed to be fully effective for TLOFs up to 20 m diameter. If the TLOF is greater than 20 m, an RMS should not be considered unless supplemented by other means to distribute primary media (e.g. additional pop-up nozzles installed in the centre of the TLOF).

16.1.6 The International Convention for the Safety of Life at Sea (SOLAS) sets forth provisions on rescue and firefighting (RFF) arrangements for purpose-built and non-purpose-built shipboard heliports in SOLAS regulations II 2/18, II-2-Helicopter Facilities, and the SOLAS Fire Safety Systems Code.

16.1.7 It should therefore be assumed that this chapter II-16 does not include RFF arrangements for purpose built or non-purpose-built shipboard heliports or for winching areas.

16.2 Definitions

16.2.1 Refer to Chapter I-08, 8.2 for specific definitions relating to rescue and firefighting provisions.

16.3 Applicability

16.3.1 Rescue and firefighting equipment and services shall be provided at offshore helidecks.

16.4 Level of Protection

16.4.1 For the application of primary media, the discharge rate (in litres/minute) applied over the assumed practical critical area (in m²) shall be predicated on a requirement to bring any fire which may occur on the helideck under control within one minute, measured from activation of the system at the appropriate discharge rate.

16.4.2 For offshore helidecks, the practical critical area should be based on the largest circle capable of being accommodated within the TLOF perimeter.

Note. — Paragraph 16.*4.2 is applied for the practical critical area calculation for helidecks regardless of how primary media is being delivered (either as a solid stream or dispersed pattern).*

16.5 Extinguishing Agents

Note 1. — The primary objective of an extinguishing agent is to extinguish or suppress a helicopter fire on which it is applied. Principal agents are provided for permanent control, i.e. for a period of several minutes or longer. Complementary agents may provide rapid-fire suppression but generally only offer a transient control, which is available during application.

Note 2. — Throughout this section, the discharge rate of a performance level B foam is based on an application rate of 5.5 L/min/m2, and for a performance level C foam and for water, is based on an application rate of 3.75 L/min/m2. These rates may be reduced if, through practical testing, a helideck operator demonstrates that the objectives of 16.*3.1 can be achieved for a specific foam use at a lower discharge rate (L/min).*

Note 3. — Information on the required physical properties and fire extinguishing performance criteria needed for a foam to achieve an acceptable performance level B or C rating is given in the ICAO Airport Services Manual (Doc 9137), Part 1 – Rescue and Firefighting.

Note 4. — While foam is the principal extinguishing agent for dealing with fires involving fuel spillages, the wide variety of fire incidents likely to be encountered during helicopter operations — e.g. engine, avionic bays, transmission areas, hydraulics — may require the provision of more than one type of complementary agent. Dry powder and gaseous agents (e.g CO2, etc) are acceptable for this task. The complementary agents selected must comply with the appropriate specifications of the International Organization for Standardization (ISO). Systems should be capable of delivering the agents through equipment to ensure its effective application. When selecting complementary agents for use with foam, care needs to be exercised to ensure compatibility.

*Note 5. — Where new and/or alternative helideck firefighting technologies are available, providing they are demonstrated by rigorous practical testing to be at least equal to or more effective than the firefighting solutions described in this chapter II-*16*, with the approval of the GCAA, may be considered determined by a safety risk assessment. Any alternative firefighting technologies or media must comply with standards and specifications specified by ICAO Airport Services Manual (Doc 9137), Part 1 – Rescue and Firefighting.*

16.5.1 Both principal and complementary extinguishing agents shall be provided at offshore helidecks.

16.5.2. Complementary extinguishing agents should be dispensed from one or two extinguishers (although more extinguishers may be permitted where high volumes of an agent are specified, e.g. H3 operations). The discharge rate of complementary agents should be selected for optimum effectiveness of the agent used.

16.5.3. Delivery of firefighting agents to the helideck landing area at the appropriate application rate should be achieved in the quickest possible time. The method for delivery of the primary agent is best achieved through a fixed foam application system (FFAS). A FFAS can either be an automatic or semi-automatic method for the distribution of extinguishing agent to knock down and bring a helicopter fire under control in the shortest possible time, while protecting the means of escape for helicopter occupants to evacuate to a place of safety. An FFAS should include, but is not limited to a fixed monitor system (FMS), a deck integrated firefighting system (DIFFS) and for a TLOF of 20 m or less, a ring main system (RMS).

16.5.4. A FFAS should be regarded as different methods by which the uniform distribution of foam, at the required application rate based on foam performance level B or C and for the required duration, are efficiently applied to the whole of the helideck landing area.

a) For an FMS, where, due to its location around the periphery of the helideck, a good range of application is essential, foam should be initially applied in a solid stream (jet) application.

b) A dispersed pattern should be applied through a DIFFS or an RMS where the requirement is to deliver media at shorter ranges to combine greater coverage and a more effective surface application of primary media.

c) Where a solid plate deck is provided, i.e. a helideck having a solid plate surface design set to a fall or camber which allows fuel to drain across the solid surface into a suitable drainage collection system, primary media should be foam.

d) Where the option is taken to install a passive fire-retarding helideck surface constructed in the form of a perforated surface or grating, which contains numerous holes that allow burning fuel to rapidly drain through the surface of the helideck, the use of sea water in lieu of foam is accepted. In this case, the critical area calculation based on application rate for a foam meeting performance level C should be selected.

16.5.5 For purpose-built helidecks with primary media applied in a solid stream or a dispersed pattern through a fixed foam application system (FFAS) on a solid-plate deck surface:

a) the amount of water required for foam media production should be predicated on the practical critical area (m^2) multiplied by the application rate ($L/min/m^2$) giving a discharge rate for foam solution (in L/min);

b) the discharge rate should be multiplied by the discharge duration to calculate the amount of water needed for foam production; and

c) the discharge duration should be at least five minutes.

16.5.6 For purpose-built helidecks with primary media applied in a dispersed pattern through an FAS on a passive fire-retarding deck surface with water-only DIFFS:

a) the amount of water required should be predicated on the practical critical area (m^2) multiplied by the application rate ($3.75\ L/min/m^2$) giving a discharge rate for water (in L/min);

b) the discharge rate should be multiplied by the discharge duration to calculate the amount of water needed; and

Note. — Sea-water may be used.

c) the discharge duration should be at least three minutes.

16.5.7 Minimum amounts of complementary media to be provided at offshore helidecks should be in accordance with Table 16-1

Table 16-1 - Minimum amounts of complementary media at offshore helidecks

Helideck Size	Complementary agents (both)	
	Dry chemical powder (kg)	Gaseous Media (kg)
Up to 16 m	23	9
16 – 24 m	45	18
Greater than 24 m	90	36

16.5.7 Minimum 200% reserve stocks of extinguishing agents to allow for replenishment, as a result of operation of the FFAS during an incident or following training or testing, shall be available at offshore helidecks.

Note. —Where a significant delay in replenishing the extinguishing agents is anticipated, the amounts of reserve stocks are increased accordingly.

16.5.8. Where a Fixed Monitor System (FMS) is installed, at least two fire monitors are provided, each monitor shall be capable of producing foam at the required discharge rate. The actual number provided and their locations around the helideck should be such as to ensure the application of foam to any part of the helideck area under any weather condition and to minimize the possibility of one or more monitors being impaired by a helicopter accident.

16.5.9 Fire monitors should be strategically located so as to ensure the uniform application of foam to any part of the helideck landing area irrespective of wind strength/direction or accident location. In this respect, contingency 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 landing area at or above the minimum application rate.

Note. — Where 2 fire monitors are provided, they are located, at least, directly opposite of each other to ensure maximum coverage of helideck landing area. Where 3 or more monitors are provided, the angle between them is at least 120° or less.

16.5.10 Where an FMS is operated by trained monitor operators, they should be positioned on at least the upwind location to ensure primary media is directed to the seat of the fire. For a ring-main system (RMS), practical testing has indicated that these solutions are fully effective for TLOFs up to 20 m diameter. If the TLOF is greater than 20 m, an RMS should not be considered unless supplemented by other means to distribute primary media (e.g. additional pop-up nozzles installed in the centre of the TLOF).

16.5.11 A solid stream should be considered for firefighting when range of application is essential. Delivering foam solution for initial attack from a fixed monitor system (FMS) located on the periphery of the helideck (see Figure 16-1), or from a hose-line, in a jet configuration, are examples of typical solid stream applications. Once the fire has been brought under control during the initial attack, there is usually a facility to adjust the nozzle, changing the throughput of equipment from a solid stream application to a dispersed pattern, i.e. the nozzle is adjusted from a jet to a spray (fog) pattern. Where applicable, this should provide a safer environment for RFF personnel to approach the accident/ incident location to rescue any trapped crew and/or occupants.

Figure 16-1 - Solid stream application utilising a fixed monitor system (FMS)

16.5.12 A deck integrated firefighting system (DIFFS) should be considered at helidecks when it is necessary to deliver foam and/or water at shorter ranges, combining greater coverage with a more effective surface application of the primary extinguishing agent (see Figure 16-2).

Note. — Due to the greater coverage of primary extinguishing agent applied in a dispersed spray pattern, the practical critical area is much larger than in a case where primary extinguishing agent is applied in a solid stream (jet).

Figure 16-2 Example of a dispersed pattern application on a solid plate deck surface

16.5.13 Where purpose-built helidecks are either be constructed of aluminium or steel with aluminium or steel support structures, a solid plate deck surface should be set to an appropriate fall or camber (typically 1:100), which allows burning fuel to drain across the solid surface into a suitable drainage collection system, whether the fall or camber emanates from the centre of the TLOF or at the perimeter edge. An example of a DIFFS installed on a solid plate deck surface is shown in Figure 16-3.

Note. — While solid plate deck surface is most commonly met by a purpose-built arrangement, it can be used on a non-purpose-built structure, typically made of concrete. The important distinction, from a firefighting perspective, is that in all cases, whether purpose built or non-purpose built, a solid plate deck surface is by definition non-porous, i.e. impervious to liquids – therefore there is no reasonable expectation that fluids, i.e. aviation fuel discharging from ruptured tanks in a crash and burn, will rapidly drain away, other than through dissipation due to a mild slope on the solid plate deck surface.

Figure 16-3: A foam DIFFS on a solid plate deck surface

16.5.14 As an alternative to the solid-plate deck surface, consideration should be given to install a passive fire retarding surface at a purpose-built helideck, which is constructed in the form of a perforated surface or grating, containing numerous holes that allow burning fuel to rapidly drain through the surface of the helideck. An example of passive fire retarding deck surface is shown in Figure 16-4.

Note. — In some cases, to an intermediate safety screen and that functions to extinguish the fire (by starving it of oxygen) permitting, now un-ignited, fuel to drain away to a safe collection area. Other systems have no safety screen inside the deck chambers but function by removing the heat from a fire via novel hole sizes and patterns.

Figure 16-4: A fire test conducted on a passive fire-retarding surface using 200 L of burning fuel

Note 1. — The good thermal conductivity of aluminium, coupled with the fuel flow profile, facilitates a rapid cooling effect on the burning fuel, extinguishing any fire that flows into the decking. These systems, when used in combination with a water-only DIFFS, have been demonstrated to show that any residual fire burning over the surface of the heliport remains insignificant given that the fuel source is constantly draining away to a safe area. Figure 16-4 *illustrates on a passive fire-retarding surface how burning fuel rapidly drains away to collection troughs (approximately 22 seconds after the start of the fire).*

Note 2. — Practical testing (see Figures 16-4 *and* 16-5*) has consistently demonstrated that even without the addition of water for cooling, a passive fire-retarding surface is proven to be effective in suppressing running fuel fires by channelling liquids away via the holes on the surface, through the decking sub surface into the perimeter gutters and onwards into the drainage system.*

Figure 16-5: A fire test on a passive fire-retarding surface (180 L of fuel is collected)

16.5.15 Where a passive fire-retarding surface is selected in lieu of a solid plate deck surface, the requirement to use foam as the primary extinguishing agent should be re-considered since most of the fuel is directed immediately away from the surface restricting the intensity of the subsequent fire and what residual fire does remain above the surface is insignificant and can be extinguished with the use of water (see Figure 16-6 which shows an elevated heliport with a water-only DIFFS coupled with a passive fire-retarding surface). One of the issues with most passive systems is the year-round tendency to collect debris or contaminants which could result in a reduction of efficacy. The heliport maintenance program should include the regular inspection and clearing of such debris and contaminants when using passive system.

Figure 16-6: A water-only DIFFS on a heliport with a passive fire-retarding surface

Installation and Maintenance of Foam Application System

16.5.16 All portable and fixed foam application systems including foam components and fittings shall not penetrate the safety area or approach and take-off surfaces at the helideck.

16.5.17 All portable and fixed foam application systems should be subject to testing and inspection by a competent person and containers pressure tested in accordance with manufacturer's recommendations.

16.5.18 Foam concentrates should not be mixed and helideck operators should verify requirements with the material safety data sheet (MSDS). It is important to ensure that foam containers and tanks are correctly labelled and records of compliance are held. When selecting type of foam concentrates for used at helidecks, considerations should be given to its environmental impact. Where environmental-friendly foam is selected, a safety risk assessment should be conducted to assess its firefighting performance in meeting the standards specified by ICAO.

Note 1. — An environmental-friendly or ecological-friendly firefighting foams are considered as biodegradable and considered as eco-products. They have very little impact on the environment during their life cycle compared to traditional fluorinated firefighting foams. When selecting such foams, a *full assessment of its firefighting performance must be conducted to ensure compliance with these regulations.*

16.5.19 Foam induction equipment should ensure that water and foam concentrates is mixed in the correct proportions. Settings of adjustable inductors, if installed, should correspond with the strength of concentration used.

16.5.20 All portable and fixed foam application systems including all components, fittings and 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 while ensuring compliance with any relevant pollution regulations.

16.5.21 Consideration should be given to the effects of the weather on static firefighting equipment. All equipment forming part of the RFF response 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. The effects of condensation on stored equipment should also be considered.

16.5.22 The minimum capacity of the FFAS should depend on the helideck design, the required foam application rate at the helideck, the discharge rates of installed equipment (i.e. capacity of main fire pump) 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, application rate and for the minimum duration to the whole of the landing area, when all monitors are being discharged simultaneously.

16.5.23 The application rate is dependent on the types of foam concentrate in use and the types of foam application equipment selected. For fires involving aviation kerosene, ICAO has produced a performance test, which assesses and categorizes the foam concentrate. Foam concentrate manufacturers should be able to advice on the performance of their concentrates against these tests. A foam certificate of conformity should be provided. Table 16-2 provides examples of calculating the application rate and Table 16-3 for examples of calculating the minimum operational and reserve foam stocks.

Table 16-2 – Example of calculating the application rate

For the purpose of illustration assumed to be the helideck design with a D = 20 m:
For a foam meeting performance level B

Application rate = 5.5 x π x r2 (5.5 x 3.142 x 10 x 10) = 1 728 litres per minute
For a foam performance level C foam (or water) Application rate = 3.75 x π x r2 (3.75 x 3.142 x 10 x 10) = 1 178 litres per minute
For a foam performance level B using compressed air foam system (B-CAFS): Application rate = 3.00 x π x r2 (3.00 x 3.142 x 10 x 10) = 943 litres per minute

Table 16-3 - Calculation of minimum operational and reserve foam stocks

Using the 20 m example as shown Table 16-2 above:
A 5 per cent performance level ‘B’ foam solution discharged over five minutes at the minimum application rate will require: 1 728 (litres/min) x 0.05 x 5 mins = 432 litres of operational foam concentrate. A reserve 200% foam stocks = 470 x 2 = 864 litres
A 3 per cent performance level ‘C’ foam solution discharged over five minutes at the minimum application rate will require 1 178 (litres/min) x 0.03 x 5 mins = 177 litres of operational foam concentrate. A reserve 200% foam stocks = 193 x 2 = 354 litres

16.5.24 At offshore helidecks, the overall capacity of the foam system should exceed that which is necessary for the initial suppression and extinction of the fire. Five minutes of foam application capability for a solid plate helideck should be acceptable. In the case of a passive fire-retarding surface with a water-only DIFFS, the discharge duration may be reduced to three minutes.

Management of Extinguishing Media Stocks

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

16.5.26 The mixing of different types of foam concentrate may cause serious density issues and result in the possible malfunctioning of foam production systems. Unless evidence is given to the contrary, it should be assumed that different types are incompatible. In the event of mixing, it is essential that the tank(s), pipe work and pump (if fitted) should be thoroughly cleaned and flushed prior to the new concentrate being introduced.

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

Additional hand-controlled foam branches for the application of aspirated foam

16.5.28 It is an important consideration that not all helicopter fires are capable of being accessed by FFAS. In addition to FFAS, at least two hose lines with hand-controlled foam branch pipes should be deployed for the application of aspirated foam at a minimum rate of 225-250 litres/minute through each hose line.

Note - In certain helicopter fire scenarios, the use of FFAS may endanger helicopter occupants who are seeking to escape from the fire.

16.5.29 Hose lines, capable of delivering aspirated foam at a minimum application rate of 225-250 litres/minute, should be provided. Hose line should be of sufficient length, and the hydrant system of sufficient operating pressure for the effective distribution of foam to any part of the practical critical area, regardless of wind strength or direction.

16.5.30 Taking account of the open-air environment in which firefighting equipment is expected to perform, a low expansion foam should be used. An inline foam inductor is provided to induct the foam concentrate into the water stream to supply a proportioned solution of concentrate and water to foam producing equipment (see Figure 16-7). The inline inductor should be set to the appropriate rate corresponding to the strength of the foam concentrate used e.g. 3 or 6 per cent.

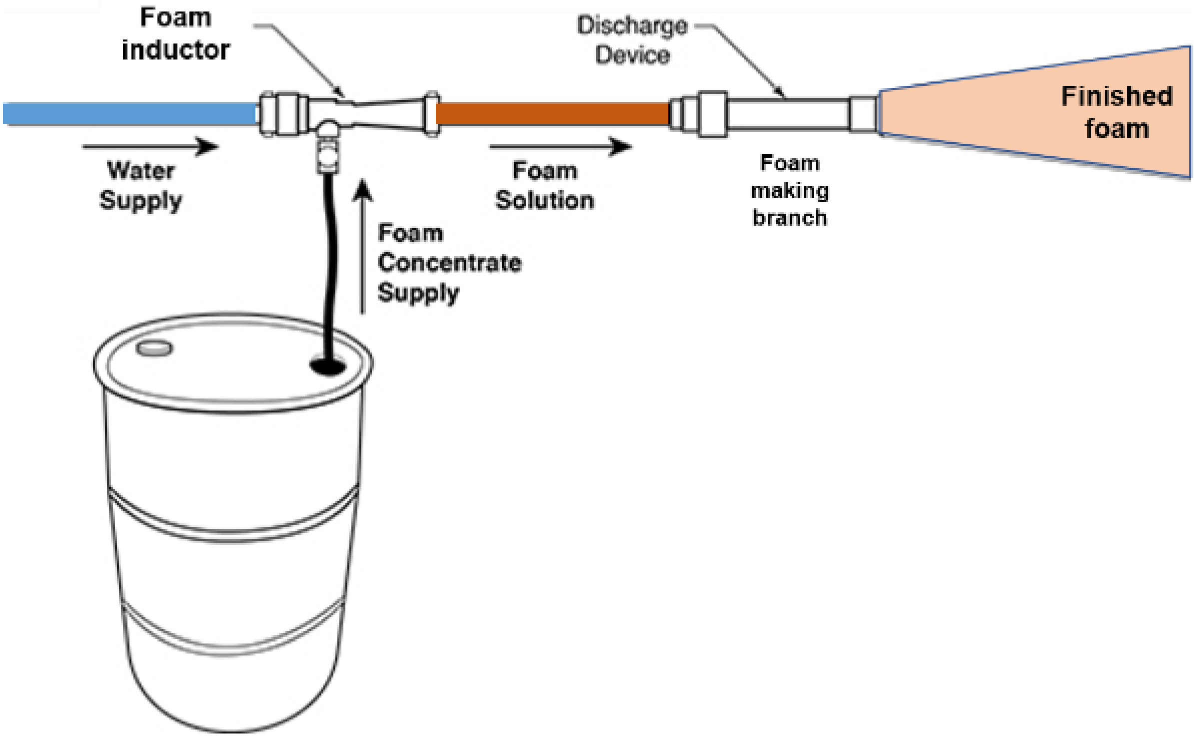


Figure 16-7: Example of an Inline Foam Inductor

16.5.31 The hose line(s) provided should be capable of being fitted with a foam making branch/nozzle able to apply water in the form of a jet or spray pattern for cooling, or for specific firefighting tactics (see Figure 16-8).

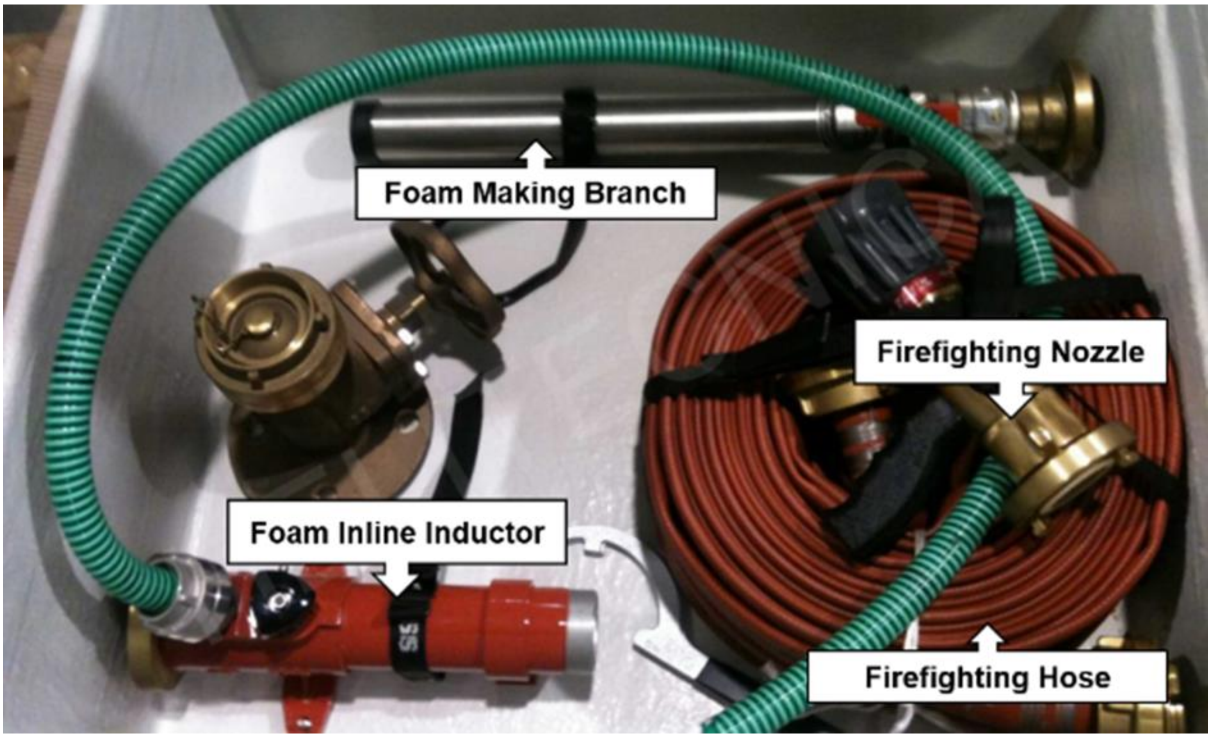


Figure 16-8: Examples of Hose lines with Foam Making Branch /Nozzle

Summary of Different Heliport Firefighting Solutions

16.5.32 The appropriate heliport firefighting solutions should be selected based on heliport design and physical characteristics. Table 16-4 provides a summary of different heliport firefighting options.

Table 16-4 Summary of Helideck Firefighting Options

FFAS Application method / Surface-Type	Critical area assumptions	Discharge duration	Primary extinguishing agent	Response time objective
Solid stream / Solid plate deck surface	Practical Critical Area / TLOF	5 minutes	Level B / C foam	15 seconds

Dispersed pattern / Solid plate deck surface	Practical Critical Area / TLOF	5 minutes	Level B / C foam	15 seconds
Dispersed pattern / Passive fire retardant deck surface	Practical Critical Area / TLOF	3 minutes	Level C foam / Water only	15 seconds

16.6 Fire and Life Safety Protection

16.6.1 At offshore helidecks, fire and life safety protection shall be provided:

a) main structural support beams that could be exposed to a fuel spill have a fire-resistance rating acceptable to UAE Fire Code and/or Building Control Authorities.

b) FATO/TLOF is pitched to provide drainage that flows away from passenger holding areas, access points, stairways, elevator shafts, ramps, hatches, and other openings not designed to collect drainage;

c) FATO/TLOF surface is constructed of non-combustible, non-porous materials;

d) at least two means of egress from the FATO/TLOF, including sufficient illumination at night, are provided;

e) at least two access points from the FATO/TLOF, including sufficient illumination at night, are provided for rapid access by firefighting personnel;

f) where buildings or occupied structure are provided with a fire alarm system, a manual pull station is provided near each designated means of egress from the roof;

g) no smoking signs are erected at access and egress points of the heliport; and

h) flammable liquids, compressed gas and liquefied gas are not be permitted within the FATO/TLOF and safety area.

16.7 Response Time

16.7.1 At offshore helidecks, the response time for the discharge of primary media at the required application rate should be 15 seconds measured from system activation.

Note1 - This is to ensure that the an FFAS is able to bring under control a helideck fire associated with a crashed helicopter within 1 minute measured from the time the system is activated and producing foam/water at the required application rate for the range of weather conditions prevalent for the helicopter operating environment.

Note2 - A fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent.

Note3 - For an FFAS located at an offshore helideck, the initial response should be comparatively quick because primary extinguishing agent-dispensing equipment will already be located adjacent to the scene of the incident (or accident) and 100 per cent discharge capability can be achieved in a relatively short space of time (up to 15 seconds after activation of the system).

16.7.2 Where rescue and firefighting personnel are provided at offshore helidecks, they should be immediately available in full PPE on or in the safe vicinity of the heliport while helicopter movements are taking place.

16.8 Rescue Arrangements

16.8.1 Rescue arrangements commensurate with the overall risk of the helicopter operation shall be provided at offshore helidecks.

Note - Guidance on the rescue arrangements, e.g. options for rescue and for personal protective equipment to be provided at a heliport, is given in ICAO Heliport Manual (Doc 9261).

16.8.2. Rescue arrangements should include, but are not limited to, an assisted-rescue or self-rescue model predicated on the results of a risk assessment. Where a self-rescue model is promoted, it is especially important to establish the respective roles and interfaces between agencies on and off the helideck. This should form part of the helideck emergency plan and be periodically tested.

16.8.3. Minimum rescue equipment should be provided to ensure effective rescue arrangements are in place at offshore helideck in accordance with Table 16-5. Rescue equipment should be fit for purpose and only be used by personnel who have received adequate information, instruction and training.

Table 17-5 - Minimum list of rescue equipment at offshore helidecks

Equipment type	Quantity

Adjustable wrench	1
Rescue axe, large (non-wedge or aircraft type)	1
Cutters, bolt	1
Crowbar, large	1
Hook, grab or salving	1
Hacksaw (heavy duty) and six spare blades	1
Blanket, fire resistant	1
Ladder (two-piece) *	1
Lifeline (5 mm circumference x 15 m in length) plus rescue harness	1
Pliers, side cutting (tin snips)	1
Set of assorted screwdrivers	1
Harness knife and sheath or harness cutters	**
Man-Made Mineral Fibre (MMMF) Filter masks	**
Gloves, fire resistant	**
Power cutting tool***	1
* For access to casualties in an aircraft that may be on its side, the ladder should be of appropriate type and length. ** This equipment is required for each helideck crew member. *** Requires additional approved training by competent personnel. Equipment only specified for helicopters with a D-value above 24m.	

16.8.4. Rescue equipment should be located within the safe vicinity of the helideck for rapid access by rescue and firefighting personnel but should not penetrate the safety areas of the FATO/TLOF area. A responsible person should be appointed to ensure that the rescue equipment is checked and maintained before the start of flight operations. Rescue equipment should be stored in clearly marked and secure watertight cabinets or chests.

An inventory checklist of equipment should be held inside each equipment cabinet/chest. See Figure 16-9 for examples of rescue equipment storage.

Figure 16-9 – Examples of rescue equipment storage

16.8.5. Rescue equipment should be regular inspected and tested and records maintained throughout the life of equipment. Refer to GCAA AMC 35 – Testing and Inspection of Rescue Equipment for further guidance.

16.8.6. Minimum quantities of medical equipment resources appropriate to the sizes and types of helicopter should be provided in accordance with Table 16-6. Where there is an increased in helicopter movements, an assessment of the medical equipment to be provided should be undertaken to determine additional quantity.

Table 16-6 – Minimum list of medical equipment

Contents of the First Aid Box	Numbers
Large Emergency Wound Dressings	3
Extra Large Emergency Wound Dressings	3
Triangular Bandages	3
Scissors – suitable for cutting clothing	1
Eye Dressings	1

Sterile Eyewash (bottle 500 ml)	1
Blankets	Each helicopter occupant

16.9 Communication and Alerting System

16.9.1 A suitable alerting and/or communication system shall be provided in accordance with the helideck emergency plan.

16.9.2. A discrete communication system should be provided linking the helideck central control and RFF personnel. The mobilization of all parties and agencies required to respond to an helicopter emergency will require the provision and management of a complex communications system.

Note - Guidance on the communication system requirement is given in ICAO Airport Services Manual, Part 7 – Airport Emergency Planning, Chapter 12 (Doc 9137).

16.9.3. An alerting system for RFF personnel should be provided at their base facility and be capable of being operated from that location, at any other areas where RFF personnel congregate, and in the control room. Examples include:

a) direct telephone line to the helideck control room;

b) alarm button for direct alarm of the RFF personnel;

c) heat sensor for alarm and/or automatic switching of the FFAS; or

d) monitored video surveillance.

Note - Detailed guidance on communication and alarm requirements is detailed in the ICAO Airport Services Manual, Part 1 – Rescue and Fire Fighting, Chapter 4 (Doc 9137).

16.10 Rescue and Firefighting Personnel

16.10.1 Where provided, the number of helideck rescue and firefighting personnel shall be sufficient for the required task.

16.10.2 The sufficient number of rescue and firefighting personnel to be provided at the helideck should be determined by a task resource analysis depending on size and complexity of helideck operations. Appendix I-I provides an example of task resource analysis

16.10.3 Rescue and firefighting personnel shall be provided with protective equipment.

16.10.4. Rescue and firefighting personnel should be fit to perform their assigned duties effectively during a helicopter accident/incident. Medical and physical fitness assessments should be established for rescue and firefighting personnel.

Note - It is important that rescue and firefighting personnel are assessed for aerobic, anaerobic and flexibility fitness. Guidance in determining the fitness assessment for rescue and firefighting personnel is given in CAR Part XI.

16.10.5 Rescue and firefighting personnel shall be trained to perform their duties with initial competence achieved through a Structured Learning Programme (SLP) and maintained their competence through a Maintenance of Competence plan (MOC).

16.10.6 The minimum training syllabus covering the necessary subject areas for initial and continued competency trainings for rescue and firefighting personnel should be in accordance with training requirements detailed in Chapter II-18. The objective to prepare the rescue and firefighting personnel with the necessary competencies in the safe and effective use of rescue and firefighting equipment and to apply defined actions to save persons or assist in the removal of persons in a helicopter accident.

16.10.7 Rescue and firefighting personnel should be fit to participate in practical trainings. The responsibility for declaring any known current or pre-existing medical conditions that could have adverse effects to the individual's state of health while undertaking the training and/or assessment activities lies with the individual and/or company sponsoring the individual.

16.10.8 Where rescue and firefighting personnel are required to wear respiratory protective equipment (breathing apparatus), they should be trained and competent in its operations, maintain the area of the seal free from hair (facial or head). Failure to do so could impair the efficiency of the seal and avoidable safety hazard to the BA wearer.

Note - Guidance on respiratory protective equipment (breathing apparatus) can refer to AMC 45 – Breathing Apparatus Operational Guidance.

Chapter II-17 – Emergency Planning

17.1 General

Note.1 — Helideck emergency planning is the process of preparing a helideck to cope with an emergency that takes place at the helideck or in its vicinity. Examples of emergencies include crashes on or off the helideck, medical emergencies, dangerous goods occurrences, fires and natural disasters.

Note.2 — The purpose of helideck emergency planning is to minimise the impact of an emergency by saving lives and maintaining helicopter operations.

Note.3 — The Helideck Emergency Plan sets out the procedures for coordinating the response of helideck agencies or services (i.e. air traffic services unit, firefighting services, helideck administration, Helicopter Emergency Medical Services (HEMS), Search and Rescue (SAR), helicopter operators, security services and police), that could be of assistance in responding to the emergency.

17.1.1 A Helideck Emergency Plan shall be established commensurate with the helicopter operations and other activities conducted at offshore helidecks.

17.1.2 The Helideck Emergency Plan should set out the emergency orders and instructions for the management of the helideck and rescue & firefighting personnel; the requirements for emergency drills and exercises, and the training and assessment of personnel.

17.1.3 The Helideck Emergency Plan shall identify agencies which could be of assistance in responding to an emergency at the offshore helideck or in its vicinity.

17.1.4 The Helideck Emergency Plan should provide for the coordination of the actions to be taken in the event of an emergency occurring at a helideck or in its vicinity.

17.1.5 The Helideck Emergency Plan should include, as a minimum, the following information:

a) the types of emergencies planned for;

b) how to initiate the plan for each emergency specified;

c) the name of agencies on and off the helideck to contact for each type of emergency with telephone numbers or other contact information;

d) the role of each agency for each type of emergency;

e) a list of pertinent on-helideck services available with telephone numbers or other contact information;

f) copies of any written agreements with other agencies for mutual aid and the provision of emergency services; and

g) location and references to installation(s).

The following can be considered as guidance:

a) The Helideck Emergency Plan should contain procedures for all emergency scenarios where helicopters may be involved. Procedures can range from dealing with major accident events and precautionary situations that occur on the installation and vessel to providing helicopter support for emergencies arising elsewhere.

b) Scenarios to consider are:

1) The following events that may occur on the installation or vessel:

2) Helicopter crash on the helideck (with or without fire and fuel spillage).

3) Engine fire on helicopter.

4) Fire in the helicopter cabin.

5) Off-shore Installation or vessel on fire.

6) Fire during helicopter refuelling operations.

7) Aviation refuelling fire.

8) An emergency or precautionary landing.

9) An attempted wheels-up landing.

10) Evacuation and emergency movement (e.g. Medevac) by helicopters.

11) Helicopter use for man over-board.

c) The following events that may occur near the installation or vessel:

1) Helicopter ditching near to off-shore Installation or vessel.

2) Inter-installation/vessel emergency support.

3) Search and Rescue (SAR) duties and contingencies.

d) In addition, the following events should also be considered for inclusion in the Helideck Emergency Plan, in so far as they may severely impact flight safety or the use of helicopters in the event of an emergency response (e.g. an evacuation):

1) Obstructed helideck.

2) Wrong deck landing.

3) Installation, MODU or vessel status changes with helicopter on deck.

17.1.6 Personnel assigned to off-shore helideck activities and the related emergency duties should receive appropriate training and their competence assessed regularly.

17.1.7 Procedures shall be developed for a variety of helideck fire-fighting, evacuation and rescue scenarios, and shall be included in the Helideck Emergency Plan.

The following can be considered as guidance:

a) The procedures should be written to encourage the full use of available fire-fighting appliances, rescue equipment and resources to best advantage. The Helideck Emergency Plan should include all elements for both on and off-shore co-ordination and support.

Crash on Helideck

b) In the event a crash on the helideck, the HLO should:

1) Raise the alarm.

2) Direct first response helideck fire-fighting and rescue activities. On some installations and vessels, the arrival on scene of an appointed emergency coordinator may signal handover of responsibilities after the initial response.

3) Contact the installation/vessel operator at the earliest opportunity.

4) Establish and maintain contact with the radio room, Central Control Room (CCR) or incident room throughout any subsequent fire-fighting and rescue operations.

5) Report incident to the GCAA.

Crash on Helideck, Major Spillage with No Fire

c) In the event of a crash on helideck with a major spillage but no fire, the HLO should:

1) Raise the alarm.

2) Direct helideck rescue and firefighting ~~Fire~~ team to lay a foam blanket around and under the helicopter.

3) Direct/manage the evacuation of the helicopter.

4) Establish and maintain contact with the radio room/CCR/incident room as required.

5) Contact the installation/vessel operator at the earliest opportunity.

6) Ensure helideck rescue and firefighting ~~Fire~~ team safety and support is provided.

7) Report incident to the GCAA.

Significant Fuel Spillage, Rotors Turning (Hot Fuelling)

d) In the event of a significant fuel spillage with rotors turning, the HLO should:

1) Immediately ensure that no further fuel is delivered to the aircraft.

2) Inform the pilot of the circumstances. The pilot will decide whether to shut down or take-off.

3) Once the aircraft has taken off or shut down, direct the hosing down of the helideck with water to wash away the fuel prior to any further operations. Such actions the HLO should consider the environmental impact. Conditions should be provided to contain all spilled fuel.

4) If the aircraft remains on deck, care must be taken not to spray the aircraft with foam/ sea water.

5) Report incident to the GCAA.

Emergency Evacuation by Helicopter

e) In the event of evacuation by helicopter, the HLO should:

1) Prepare the helideck to receive incoming aircraft.

2) Establish pay-loads as each aircraft approaches and inform administration of the number of passengers required on deck.

3) As each aircraft departs, report to administration the number of evacuees lifted off.

4) Report incident to the GCAA.

Man Over-board

f) In the event of a man overboard, the HLO should:

1) If there is a helicopter available on deck equipped for winching or required for search activities, be prepared for it to take off when requested.

2) If the helideck is not in use, prepare the helideck for operations and stand by to receive an incoming SAR aircraft if it is diverted to the installation, MODU or vessel.

3) Inform vessels standing by of anticipated helicopter movements.

4) Maintain communication with the radio room/CCR/incident room.

Emergency or Precautionary Landing

g) In the event of an emergency or precautionary landing, the HLO should:

1) Contact the installation operator at the earliest opportunity

2) Instruct any aircraft on deck to take off, and hold off any incoming aircraft.

3) Instruct cranes to lay down loads, and move jibs to a safe position.

4) Confirm that the approach and overshoot areas are clear and in the case of vessels, if possible, turn the vessel onto appropriate heading for an optimum approach by helicopter.

5) Ensure that rescue and fire-fighting (RFF) equipment is ready for instant use.

6) Ensure fire-fighting and rescue teams are standing by and are correctly dressed for fire-fighting/rescue response actions.

7) Ensure complementary fire-fighting media are also to hand.

8) Inform the radio room that the deck is clear and ready to receive the aircraft, maintain contact with the radio room.

9) Report incident to the GCAA.

Helicopter Incident on Landing

h) In the event of a helicopter incident on landing, the HLO should:

1) Hold the helicopter on deck and advise the pilot of his observations.

2) Inform the helicopter operator of the nature of the incident.

3) Contact and inform the installation/vessel operator at the earliest opportunity.

4) The helicopter operator and pilot will decide if the flight is to proceed.

5) Report incident to the GCAA.

Dangerous Goods Spill/Release

i) In the event a Dangerous Goods Spill/Release the HLO should:

1) Raise the alarm.

2) Direct first response helideck rescue and firefighting team to contain the spillage if possible – wearing appropriate PPE.

3) Evacuate the helideck and surrounding area, taking into account wind direction and surface slope.

4) Contact the installation/vessel operator at the earliest opportunity.

5) Establish and maintain contact with the radio room, CCR or incident room throughout.

6) Seek further information on the hazardous substance.

7) Ensure limited contamination.

8) Ensure area is fully cleaned once the spillage/release is contained.

9) Ensure all affected personnel are not contaminated, decontamination may be required.

10) Ensure all affected equipment remains/is fit for purpose.

11) Report the incident to the GCAA.

17.2. Coordinating Agencies

17.2.1. The helideck emergency plan shall identify all agencies, which could be of assistance in responding to an emergency at the heliport or in its vicinity.

17.2.2. All agencies should be consulted about their roles and responsibilities in the plan.

17.2.3. The helideck emergency plan should identify agencies that could assist or respond to an emergency at the heliport or in its vicinity. Names of agencies on and off the heliport, for each type of emergency, with telephone numbers or other contact information, should be included. The plan should also identify the role of each agency for each type of emergency, and a list of pertinent on-heliport services available with telephone numbers or other contact information.

17.2.4. The helideck emergency plan should set out the procedures for coordinating the response of heliport agencies or services (air traffic services unit, firefighting services, heliport administration, medical and ambulance services, aircraft operators, security services and police) and the response of agencies in the surrounding community (fire departments, police, medical and ambulance services, hospitals, military and harbour patrol and/or coastguard agencies). Copies of any written agreements with other agencies for mutual aid and the provision of emergency services should be contained within the emergency plan.

17.3. Review of Helideck Emergency Plan

17.3.1. The helideck emergency plan shall be reviewed and the information in it updated regularly.

17.3.2. The helideck emergency plan should be reviewed and its information updated at least yearly. After an actual emergency, a review of the helideck emergency plan should be conducted to identify any deficiencies arising as a result of the actual emergency.

17.4. Testing of Helideck Emergency Plan

17.4.1. The helideck emergency plan shall be tested periodically.

17.4.2. Testing of the helideck emergency plan should include:

a) an emergency drill conducted, at least, every 6-month covering different emergency scenarios mentioned in paragraph 17.1.5; and

b) a full-scale emergency exercise, at least, once every three years with the participation of those agencies identified in 17.2

c) observations/findings arising from drills and exercises are addressed and records maintained.

Chapter II-18 – Helideck Operations

18.1 Helideck Operations

18.1.1 The helideck operator should provide an initial assessment to establish the obstacle environment surrounding the heliport with reference to the Obstacle Limitation Surfaces (OLS) specified in Chapter II-10. This should be validated annually by a Validation Assessment carried out by an aeronautical survey service provider (ASSP) approved by the authority as stipulated in CAR - ASSP. Action should be taken to ensure that the Obstacle Limitation Surfaces remain clear of all permanent and semi-permanent obstructions.

18.1.2 For areas outside the helideck, safeguarding arrangements should be made with the appropriate authorities to aid the control of potential buildings or other structures which may affect helicopter operations.

18.1.3 The helideck Operator shall establish written policy, procedures and other relevant documentation as well as provide appropriate facilities and equipment to ensure that the helideck can be operated and maintained in a condition that does not impair the safety of helicopter operations.

18.1.4 The helideck operator shall ensure that this information is made available to all applicable personnel and is reviewed and amended so that it remains current.

18.1.5 The helideck operator shall ensure that there are sufficient trained and competent personnel for the planned tasks and activities to be performed in accordance with the helideck operator's policy and procedures.

18.1.6 A safety management system (SMS) including quality assurance should be established, that should maintain the requirements as per Chapter II-4.2.

18.1.7 Equipment and training records shall be maintained and retained for future reference.

18.2 Marshalling Signals

Note - For marshalling hand signals refer to Chapter I-10.2.

Chapter II-19 – Training and Development of Helideck Personnel

19.1 General

19.1.1 All personnel assigned to operational duties on a helideck shall be trained to carry out their duties to ensure competence in role and task.

19.1.2 Helideck personnel shall attend a Structured Learning Programme (SLP) as referred to in paragraph 19.2 for helideck operations and rescue & fire-fighting.

19.1.3 In addition to paragraph 19.1.2, heliport personnel assigned to perform rescue and firefighting duties shall attend regular training in the use of all RFF equipment, helicopter familiarisation and rescue tactics and techniques.

19.1.4 All helideck trainings shall be formally recorded, with records available to the GCAA and Primary Accountable Organisations.

19.2 Training Structure – Structured Learning Programme

19.2.1 All helideck personnel should commence the process of acquiring initial competence through a Structured Learning Programme (SLP) and continued competence through a Maintenance of Competence Plan (MOC).

19.2.2 SLPs will provide Helideck personnel with the initial acquisition of knowledge and skills in a controlled training/development environment. They should also have a MOC plan to refresh, enhance or attain additional skills to enable them to be fully competent in their current role.

19.2.3 The full list of helideck duties and the environment in which they are to be carried out should be considered in detail. To be acceptable, helideck personnel selected for a given operation should be able to clearly demonstrate safety in all operations.

19.2.4 The aim of Structured Learning Programme is to provide helideck personnel with the knowledge, skill and attitudes which will enable them to perform their tasks commensurate with their role within the organisation efficiently, safely and competently.

19.2.5 All helideck personnel shall commence the process of acquiring competence through a Structured Learning Programme (SLP), which shall meet the training specifications as detailed in Tables 19-1, 19-2 and 19-3.

19.2.5 Organisations / training providers delivering Structured Learning Programmes to helideck operations personnel shall develop competency-based training and assessment in accordance with Chapter I-2, paragraph 2.4.4 and demonstrate clearly the criteria and structure of their individual courses and the mapping against the training requirements contained in this chapter II-19.

19.2.6 The comprehensive list of helideck duties and the environment in which they are to be carried out by helideck personnel must be considered in detail. To be acceptable, helideck personnel selected for a given operation must be able to clearly demonstrate safety in all operations.

Table 19-1 Table of key information

Elements	
SLP Practical Elements = PE	Practical Elements where the candidate participates in practical elements as an individual or team member.
SLP Technical Elements = TE	Technical Elements the main focus is for the candidate to understand the technical elements of the function.
Safety Critical Functions = SCF	Individual tasks that collectively or individually contribute to safe operations. These critical tasks need to be formally assessed.
Assessment	
Assessment Method = AM	Formal methods and process of making judgments about performance. The means by which evidence of performance is collected and compared with the required competency standard and a judgment about performance is made and also fully recorded.
Practical Assessment = P	Practical Demonstration of operational skills and use of equipment including PPE.
Technically Assessment = T	Technical Written Examination Paper to assess fully the knowledge and understanding of training objectives
Oral Assessment = O	Oral Technical Spoken Word Assessment to support the technical assessment in the knowledge and understanding of training objectives
Personnel	
HLO	Helideck Landing Officer

HDA(L)	Helideck Assistant Team (Leader) - Rescue and Firefighting Team Member
HDAL	Helideck Assistant Team - Rescue and Firefighting Team Member

Table 19-2 Table of Application

Introduction to Regulatory Requirements	**A**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Role of GCAA	T/O		100%		√	√	√
GCAA Regulations framework	T/O		100%		√		
GCAA Off-shore Helideck Regulations	T/O		100%		√		
Management of Off-shore Helideck Operations	T/O						
GCAA dangerous goods regulations (*Note – a separate GCAA approval maybe required to deliver this training*)	T/O		100%		√	√	√
Off-shore helideck emergency response requirements	T/O		100%		√	√	√
GCAA Safety Management System (SMS)	T/O		100%		√	√	√
Helicopter Hazards	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Overview of Helicopter Design and Construction	T/O		100%		√	√	√
Overview of Helicopter Performance	T/O		100%		√	√	√
Overview Helicopter Fuels –Hydraulic Liquids and Additives	T/O		100%		√	√	√
Overview of Helicopter danger areas	T/O		100%	YES	√	√	√
Rotors running – personnel contact with main or tail-rotors	T/O		100%		√	√	√
Adverse weather effect on helicopter operations, to include: excessive wind turbulence	T/O		100%		√	√	√

Helicopter engine shut down procedures – battery isolation	T/O		100%	YES	√	√	√
Helicopter Emergency Actions	T/O		100%	YES	√	√	√
Helicopter Fire Situations	T/O		100%	YES	√	√	√
Helideck Hazards	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Helideck physical characteristics, to include: ‘D value’	T/O		100%	YES	√	√	√
Access and Escape routes	T/O		100%	YES	√	√	√
Helideck visual aids, marking and lights	T/O		100%	YES	√	√	√
Power supplies emergency power back-up systems	T/O		100%	YES	√	√	√
Obstacle-protected surfaces, to include	T/O		100%	YES	√	√	√
Helideck landing and perimeter safety nets	T/O		100%	YES	√	√	√
Landing areas and winching areas on vessels	T/O		100%	YES	√	√	√
Safety Working practices on Helidecks	T/O		100%	YES	√	√	√
Helideck Equipment and Systems	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Plant and equipment for routine and non-emergency response operations	T/O	20%	80%	YES	√	√	√
Fire Fighting Equipment – guidance on when and where to use various media	T/O	20%	80%	YES	√	√	√
Primary Media requirements: foam type, delivery and testing	T/O	20%	80%	YES	√	√	√
Complimentary media requirements	T/O	20%	80%	YES	√	√	√
Fixed Foam Application System – Foam Monitor System (FMS) / Deck Integrated Fire-Fighting System (DIFFS)	T/O	20%	80%	YES	√	√	√

Meteorological systems and minimum meteorological equipment requirement for region of operations.	T/P	20%	80%	YES	√	√	√
Testing and Inspecting helideck systems Daily – Monthly – Annual Checks	T/O	20%	80%	YES	√	√	√
Reporting helideck and systems defects	T/O	20%	80%	YES	√	√	√
Helideck Operational Hazards	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Poor visibility effect on helideck operations	T/O		100%	YES	√	√	√
Rotors running – personnel contact with main or tail rotors while on deck	T/O		100%	YES	√	√	√
Excessive wind turbulence	T/O		100%	YES	√	√	√
Obstacles on deck	T/O		100%	YES	√	√	√
Noise hazard	T/O		100%	YES	√	√	√
Loose items (baggage, freight, netting etc.) being sucked air intake	T/O		100%	YES	√	√	√
Passenger Transfer	T/O		100%	YES	√	√	√
Dangerous Goods Transfer	T/O		100%	YES	√	√	√
Crane operations: crane work to cease during helicopter operations	T/O		100%	YES	√	√	√
Responsibilities During Helicopter Landing and Departure	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
The role of the Off-shore Helicopter Landing Officer	T/O		100%		√	√	√
The key responsibilities of the HLO	T/O		100%		√	√	√
How the HLO is identifiable to the helicopter crew	T/O		100%		√	√	√
Helideck Procedures Prior to Landing	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**

Helicopter type identification	T/O		100%				
30 minutes before helicopter ETA	T/O		100%	YES	√	√	√
10 minutes before helicopter ETA	T/O		100%	YES	√	√	√
Immediately before landing	T/O		100%	YES	√	√	√
After landing - rotors running turnaround	T/O		100%	YES	√	√	√
After landing - engines shut down and rotors not running	T/O		100%	YES	√	√	√
Helicopter tie-down	T/O		100%	YES	√	√	√
Helicopter start-up	T/O		100%	YES	√	√	√
Communications with all relevant personnel: heli-admin. personnel, pilot, crane operator, standby vessel, fire crews, HAs, loaders and passengers (simulated)	T/O		100%		√	√	√
HLO and flight crew radio transmissions restricted to essential dialogue	T/O		100%		√	√	√
How to ensure that the correct and agreed protocol for “clear to lift” signal to the pilot is understood on the specific fixed or mobile installation the HLO is operating on	T/O		100%	YES	√	√	√
HLO-to-pilot coms protocols are conducted correctly, to include ‘deck available’ or ‘do not land’ call to pilot	T/O		100%	YES	√	√	√
Limitation of radio coms and correct use of hand signals (Marshalling)	T/O		100%	YES	√	√	√
Monitoring of environmental conditions and change in conditions	T/O		100%	YES	√	√	√
Checking helideck equipment availability	P/O	80%	20%	YES	√	√	√
Checking and testing radio equipment	P/O	80%	20%	YES	√	√	√

HLO to ensure that the helideck surface is free from any contamination, debris or damage after take-off	P/O	80%	20%	YES	√	√	√
Supervisor HDAs ensuring HDA duties and responsibilities are clearly understood during helicopter landing and departure	P/O	80%	20%	YES	√	√	√
Briefing the HAs prior to helideck operations, to include a 'tool-box-talk'	P/O	80%	20%	YES	√	√	√
Ensuring HAs are in the correct location	P/O	80%	20%	YES	√	√	√
Ensuring the HAs are prepared for helicopter emergencies	P/O	80%	20%	YES	√	√	√
Ensuring HLO and HAs are equipped with appropriate PPE	P/O	80%	20%	YES	√	√	√
Helideck Protocols	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Safe-to-approach, helicopter agreed with operating company	P/O	80%	20%	YES	√	√	√
Supervision of Passenger and Cargo Handling	P/O	80%	20%	YES	√	√	√
Helicopter freight loading limitations and requirements and how these will vary for different types of helicopters	P/O	80%	20%	YES	√	√	√
Under-slung loads: hazards and typical procedures	P/O	80%	20%	YES	√	√	√
Checking freight manifests (inbound and outbound)	P/O	80%	20%	YES	√	√	√
Preparing for, and supervising, correct loading and unloading of freight and baggage. (HLOs should not become involved in manual activity, such as carrying bags, at the expense of their supervisory role)	P/O	80%	20%	YES	√	√	√
Supervising passenger baggage reclamation	P/O	80%	20%	YES	√	√	√

Dangerous goods identification	P/O	80%	20%	YES	√	√	√
Dangerous goods management and handling	P/O	80%	20%	YES	√	√	√
Notification to Captain of Dangerous Goods	P/O	80%	20%	YES	√	√	√
Supervise passenger handling	P/O	80%	20%	YES	√	√	√
Checking and interpreting information on passenger manifest and routing plans	T/O		100%	YES	√	√	√
Receiving incoming manifest from pilot and handing over outgoing manifest to pilot	T/O		100%	YES	√	√	√
Supervising passenger safe access and egress on helideck	P/O	80%	20%	YES	√	√	√
Supervising passenger entry into helicopter	P/O	80%	20%	YES	√	√	√
Supervising passenger exit from helicopter	P/O	80%	20%	YES	√	√	√
Conducting passenger checks, to include: checking that passengers are wearing required PPE for region of operations, ear protection and seat belt harnesses are secure	P/O	80%	20%	YES	√	√	√
First Aid	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Carryout primary and secondary surveys for life threatening injuries	P/O	80%	20%		√	√	√
Establish airway	P/O	80%	20%		√	√	√
Carry out cardiopulmonary resuscitation	P/O	80%	20%		√	√	√
Identify and treat internal/external bleeding	P/O	80%	20%		√	√	√
Identify and treat casualty suffering from shock	P/O	80%	20%		√	√	√
Identify injuries to skull, spine, chest and extremities	P/O	80%	20%		√	√	√
Identify internal injuries	P/O	80%	20%		√	√	√
Place casualties in recovery position	P/O	80%	20%		√	√	√

Move casualties	P/O	80%	20%		√	√	√
Treat burns	P/O	80%	20%		√	√	√
Fire-fighting Equipment and Fire-Fighting Actions	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
Fire Extinguisher Identification	P/O	80%	20%	YES	√	√	√
Fire Extinguisher Testing and Inspection	P/O	80%	20%		√	√	√
Fire Hose and Branches Identification	P/O	80%	20%	YES	√	√	√
Fire Hose Reels Identification	P/O	80%	20%	YES	√	√	√
Fire Monitors Identification	P/O	80%	20%	YES	√	√	√
Fire Blankets Identification	P/O	80%	20%	YES	√	√	√
Fixed Foam Application System – Fixed Monitor System / Deck Integrated Fire Fighting Systems - Identification	P/O	20%	80%	YES	√	√	√
Fire – Emergency Call Points	P/O	80%	20%	YES	√	√	√
Rescue Equipment Requirements	P/O	80%	20%		√	√	√
Rescue Equipment Testing and Inspection	P/O	80%	20%	YES	√	√	√
Rescue Equipment use	P/O	80%	20%	YES	√	√	√
Water Fire Extinguisher	P/O	80%	20%	YES	√	√	√
Foam Fire Extinguisher	P/O	80%	20%	YES	√	√	√
Dry Powder Fire Extinguisher	P/O	80%	20%	YES	√	√	√
CO2 Fire Extinguisher	P/O	80%	20%	YES	√	√	√
Fire-Fighting Practical Exercise 1	P/O	100%		YES	√	√	√
Fire-Fighting Practical Exercise 2	P/O	100%		YES	√	√	√
Fire-Fighting Practical Exercise 2	P/O	100%		YES	√	√	√
Breathing Apparatus (BA)	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**

The requirements for BA	T/O		100%	YES	√	√	√
BA set and its equipment	T/O	80%	20%	YES		√	√
General Check and records	P/T/O	80%	20%	YES		√	√
Donning, Start and doffing Procedures	P/T/O	80%	20%	YES		√	√
Wearing Procedures	P/T/O	80%	20%	YES		√	√
Search Procedures	P/T/O	80%	20%	YES		√	√
Entrapped Procedures	P/T/O	80%	20%	YES		√	√
BA Wearer responsibilities	P/T/O	80%	20%	YES		√	√
Smoke Wearing Procedures	P/T/O	80%	20%	YES		√	√
Confined Space Procedures	P/T/O	80%	20%	YES		√	√
Incident Procedures Dangerous Goods	P/T/O	80%	20%	YES		√	√
BA set Incident Servicing procedures	P/T/O	80%	20%	YES		√	√
BA Entry Control Procedures	P/T/O	80%	20%	YES		√	√
BA Incident Procedures.	P/O	80%	20%	YES		√	√
BA Practical Exercise 1	P/O	100%		YES	√	√	√
BA Practical Exercise 2	P/O	100%		YES	√	√	√
Helideck Emergency Planning	**AM**	**SLP PE**	**SLP TE**	**SCF**	**HLO**	**HDA**	**HDAL**
What is helideck emergency planning?	T/O		100%		√	√	√
Elements of a helideck emergency plan	T/O		100%		√	√	√
Roles and Responsibilities	T/O		100%		√	√	√
Coordination with Agencies	T/O		100%		√	√	√
Types of Emergencies	T/O		100%		√	√	√
Emergency Orders/Instructions	T/O		100%		√	√	√
Planning and conducting emergency drills and exercises	T/O		100%		√	√	√

Emergency Exercise Day	P/O	100%			√	√	√
Emergency Exercise Night	P/O	100%			√	√	√

Table 19-3 Duration and Frequency of Training

Discipline	Initial Training	Refresher Training	Frequency
Helideck Landing Officer (HLO)	5 Days SLP	3 days SLP	2-years
	1 Day Company Induction		
	1 Day HSE Safety	1 day	Annual
	Company On-Job Training	Ongoing Competency Assessment	
	Work place Exercises and Drills	Ongoing records to be maintained	
	Competency Assessment (SCF)	Ongoing Competency Assessment (SCF)	
Helideck Assistant - Leader (HDAL) (RFF Team member)	5 Days	3 days SLP	2-years
	1 Day Company Induction		
	1 Day HSE Safety Training	1 day	Annual
	Company On-Job Training	Ongoing records to be maintained	
	Work place Exercises and Drills	Ongoing records to be maintained	
	Competency Assessment (SCF)	Ongoing Competency Assessment (SCF)	
Helideck Assistant (HDA)	4 Days	3 days SLP	2-years
	1 Day Company Induction		
	1 Day HSE Safety Training	1 day	Annual
	Company On-Job Training	Ongoing records to be maintained	

(RFF Team member)	Work place Exercises and Drills	Ongoing records to be maintained	
	Competency Assessment (SCF)	Ongoing Competency Assessment (SCF)	
Helideck Radio Operator	Flight Information Service course	As required	2-years
	Company Induction Training		
	1 Day HSE Safety Training	1 day	Annual
	Minimum 40 hours initial Company On-Job Training	Ongoing records to be maintained	
	Comms. Exercises and Drills	Ongoing records to be maintained	
	Competency Assessment (SCF)	Ongoing Competency Assessment (SCF)	
	Standard telephony, R/T phraseology	Ongoing Competency Assessment (SCF)	
	Proficiency in English language	Ongoing Competency Assessment (SCF)	
	Appropriate training in required knowledge, skills and experience	Ongoing Competency Assessment (SCF)	

Note.1 - When developing structured learning programmes, the above course duration is the minimum expected and has not taken into account Meals and Prayer breaks.

Note.2 - If any candidate fails complete any course (fully), they should be not be deemed competent in acquisition; they shall complete the course in full before a certificate can be issued. The GCAA may request to sample course attendance records as part of the SLP oversight process.

Note.3 - All courses may be of modular format, however, for a certificate of competency to be issued, the complete course content must be completed.

Chapter II-20 – Meteorological Equipment Provision

20.1 General

20.1.1 Accurate, timely and complete meteorological observations are necessary to support safe and efficient helicopter operations. The manned fixed and floating facilities and vessels shall be provided with an automated means of ascertaining the following meteorological information at all times:

a) wind speed and direction (including variations in direction);
b) air temperature and dew point temperature;
c) atmospheric pressure (QNH and, where applicable, QFE);
d) cloud amount and height of cloud base (above mean sea level (AMSL));
e) visibility and;
f) present weather
g) the sea-surface temperature
h) the state of the sea
i) the significant wave height
j) data covering the cloud layers from sea level to flight level 100.

20.1.2 Where a fixed manned facility is in close proximity to another fixed manned facility, 'close' as determined by the competent authority, it may not be deemed necessary for every facility to provide the above equipment, providing that those facilities which are so equipped make their information routinely available to the others. For these 'other' facilities, a manual means of verifying and updating the reported elements of an observation, i.e. cloud amount and height of base, visibility and present weather, may be used. For not permanently attended installations (NPAI) and for those fixed and floating facilities and vessels deemed to have a low movement rate, as determined by the competent authority, it may be acceptable just to provide the basic elements of wind, pressure, air temperature and dew point temperature information.

20.1.3 Contingency meteorological observing equipment providing manual measurements of air and dew point temperatures, wind speed direction and pressure shall be provided in case of the failure or unavailability of the automated sensors. It is recommended that personnel who carry out meteorological observations undergo appropriate training for the role and complete periodic refresher training to maintain competency.

20.1.4 Where required, for example for those helicopters which have remained overnight, access to meteorological forecasts, special observations, weather warnings and SIGMETS should be available.

20.1.5 Equipment sensors used to provide the data listed in paragraph 1.1. a) to f) should be periodically inspected, tested and calibrated in accordance with manufacturers' recommendations in order to demonstrate continuing adequacy for purpose.

20.1.6 For additional information relating to the provision of meteorological information reference should be made to GCAA CAR CAR-MET (Air Navigations Regulations), Subpart 7 (Meteorological Services).

Chapter II-21 – Deck Motion Reporting and Recording

21.1 Floating facilities and vessels experiencing dynamic motions due to wave action which represent a potential hazard to helicopter operations shall ensure these motions to be recorded by the use of an electronic Helideck Motion System (HMS) and reported as part of the overall off-shore weather report (refer to Chapter II-20), prior to landing and during helicopter movements. An HMS should be equipped with a colour-coded display which allows a trained operative to easily determine whether the landing area is ‘in-limits’, or is ‘out of limits’; or is moving towards a condition where it may soon be ‘out-of-limits’. Motions at the helideck should be reported to the helicopter operator to an accuracy of one decimal place. The helicopter pilot, in order to make vital safety decisions, is concerned with the amount of ‘slope’ on and the rate of movement of the helideck surface. It is therefore important that reported values are only related to the true vertical and do not relate to any false datum created, for example, by a ‘list’ created by anchor patterns or displacement.

21.2 A Helideck Motion System should incorporate additional software which allows for ‘on-deck’ Motion Severity and Wind Severity Index limits to be recorded and communicated to aircrew; in a similar way that pre-landing limits are disseminated to a pilot.

21.3 To provide air crew with a visual indication of the current status of a helideck/shipboard helideck should employ a traffic light system consisting of three lights mounted at three to four locations around the edge of a helideck. These lights should avoid the use of the colour green (green is used for TLOF perimeter lights), but could consist of blue/amber and red — where blue is ‘safe within limits’, amber is ‘moving out of limits towards an unsafe condition’ and red is ‘out of limits — unsafe condition’.

Chapter II-22 – Helicopter Refuelling Operations

22.1 General

22.1.1 It is essential to ensure at all times that aviation fuel delivered to helicopters from off-shore facilities and vessels is of the highest quality. A major contributor towards ensuring that fuel quality is maintained, and contamination prevented, is to provide clear unambiguous product identification on all system components and pipelines denoting the fuel type (e.g. Jet A-1) following the standard aviation convention for markings and colour code. Markings should be applied initially during systems manufacture and routinely checked for clarity during subsequent maintenance inspections.

22.1.2 It should be noted that an off-shore fuelling system may vary according to the particular application for which it was designed. Nevertheless, the elements of all off-shore fuelling systems are basically the same and will include:

a) storage tanks;
b) static storage facilities, and if installed, a sample reclaim tank;
c) a pumping system and;
d) a delivery system

22.1.3 When preparing a lay-out design for aviation fuelling systems on off-shore facilities and vessels it is important to make provisions for suitable segregation and bunding of the areas set aside for the tankage and delivery system. Facilities for containing possible fuel leakage and providing fire control should be given full and proper consideration, along with adequate protection from potential dropped objects. The design of the elements of an off-shore fuelling system is not addressed in detail in the Heliport Design and Services Manual.

22.1.4 For detailed guidance refer to the Air Transport Association Specification 103 (Standard for Jet Fuel Quality Control at Airports).

22.1.5 Fuel storage, handling and quality control are key elements for ensuring, at all times, the safety of aircraft in flight. For this reason personnel assigned refuelling responsibilities should be certified as properly trained and competent to undertake systems maintenance, inspection and fuelling of helicopters.

22.1.6 Throughout the critical processes of aviation fuel system maintenance and fuelling operations, routine fuel sampling is required to ensure delivered fuel is scrupulously clean and free from contamination that may otherwise enter helicopter fuel tanks and could ultimately result in engine malfunctions.

22.1.7 Fuel samples drawn from transit/static storage tanks and the fuel delivery system should be retained in appropriate containers for a specified period. The containers should be kept in a secure light-excluding store and kept away from sunlight until they are disposed of.

22.1.8 Guidance on the design of containers is provided by the International Air Transport Association (IATA). The IATA fuel guidelines provide an essential set of standards designed to ensure safe and efficient aircraft fuel handling and contribute to training of fuelling operatives for oil companies or into-plane service providers.

Appendix II-A –Guidance Material - Helidecks: Types of Facilities

Note1. —The types of facilities illustrated in within this Appendix II-A, and described throughout this document, are typically used in the process of mineral extraction; for the exploration and/or exploitation of oil and/or gas in the off-shore environment.

Note2. —Off-shore landing facilities range in types from helidecks on fixed platforms, on mobile off-shore drilling units, on crane barges (not illustrated) and on Floating Production Storage and Off-loading (FPSO) units, through to purpose-built shipboard helidecks located on large tankers or on smaller vessels such diving support vessels, seismic survey vessels, ice-breakers and research vessels.

Note3. —For vessels, in particular, helicopter landing areas may be purpose built above the bow or stern, purpose-built in an amidships location or purpose-built overhanging the ship's side.

Note4. —This document also provides information for non-purpose built shipboard helidecks, whether located on the side of a ship (ship's side) or landing on other areas not specifically designed to receive helicopters; such as on hatch covers.

Note5. —Finally, the Appendix II-A addresses shipboard winching areas, where a Helicopter Hoist Operation (HHO) is completed in lieu of landing-on. The operation of non-purpose built shipboard helidecks and shipboard winching areas is described in detail in the International Chamber of Shipping (ICS) Helicopter/Ship Guide which is referenced in the glossary.

A.1 Helidecks - Types of Facilities

A.1.1 Fixed Platforms: Permanently Attended (PAI)

A.1.1.1 Fixed platforms sit directly on the sea floor and are thus stable. They can be single units or can consist of two or more separate modules for production, processing and accommodation. Where there are separate modules these are generally linked by bridges and can be served by more than one helideck and are occupied for 365 days a year.

Figure A-1 Fixed platforms with helidecks above accommodation

A.1.2 Fixed Platforms: Not Permanently Attended (NPAI)

A.1.2.1 Facilities that do not subscribe to a permanent attendance model are referred to as not permanently attended installations (NPAIs).

Figure A-2 Not Permanently Attended (NPAI) helideck

Bird Control

A.1.2.2 Bird guano infestations may be routinely encountered, particularly at not permanently attended installations, and especially at certain times of the year for facilities located in proximity to bird migratory routes. The effects of bird guano infestation are many and include threats to safe flight operations (e.g. potential for a bird strike during an approach), the obliteration of essential markings (so making touchdown/positioning inaccuracies more likely), a reduction in the friction qualities of the surface (leading to a helicopter sliding over the deck surface) and effects on personnel health and safety due to the highly toxic and slippery-when-wet nature of guano (e.g. effect on the lungs due to inhalation of dried guano 'dust', slips and trips on wet-guano surfaces). Also, to consider are the additional costs incurred through a requirement for more regular maintenance of static equipment on a facility, of damage caused to the interior of the helicopter (guano is trodden into floor surfaces) and the need to perform high-pressure cleaning on a regular basis to restore the integrity of markings, etc.

A.1.2.3 Problems caused by the presence of sea birds and guano infestation on or around the landing area should be noted and reported by flight crews. Significant surface contamination is likely to incur flight restrictions where, for example, the build-up of guano has a detrimental effect on the interpretation of surface markings and an inability to maintain an adequate friction surface. Routinely, for affected facilities, flight crew should be encouraged to complete and file helideck condition reports that indicate the current condition of the surface, of helideck lighting (including any outages) and of the wind direction indicator (including illumination).

A.1.2.4 Experience over time in various sectors would suggest that finding permanent solutions to the guano/bird problem can be challenging, such are the forces of nature. Consequently, determining an optimum solution to the problem has proven elusive. In the past active measures taken to discourage sea birds from roosting on helidecks has included visual deterrents, different audio deterrents (e.g. distress calls) and even combined audio/visual deterrents that build-in random changes such as to the distress call. However, over a passage of time, birds have tended to habituate to any 'solutions' that involve audio and/or visual deterrents, even where these incorporate random changes.

A.1.2.5 One 'solution' that has been found to be more effective than most of the aforementioned is the application of pressurised water-spray systems, to which birds do not appear to readily habituate (pressurized water could be delivered from a Fixed Foam Application System (FFAS) where bird activities are being monitored, at the beach or on a normally attended platform, via a remotely operated TV system (ROTS). When water combined with an effective bird scaring device is activated automatically as birds are detected around the landing area, these combinations have proven to be relatively effective in dispersing birds that may have encroached onto the helideck. However, in general, it is fair to conclude that current bird-exclusion methods have, at best, been only partially successful; so there would seem to be room for more innovative approaches to bird control measures at helidecks.

A.1.3 Mobile Off-Shore Drilling Units: Semi-Submersible

A.1.3.1 Semi-submersible units have the hull design of a catamaran and are either towed or self-propelled. A semi-submersible has good stability and sea-keeping characteristics and can be positioned dynamically with thrusters or by the use of anchors. Semi-submersible units are heavy duty specialised rigs with their hull structure submerged at a deep draft (ballasted down fifty feet or so to give it stability) so that a semi-submersible, being less affected by wave loadings than a normal ship, is able to operate in adverse weather conditions. They are used in a number of specific off-shore roles such as off-shore drilling rigs and heavy lift cranes. In the latter case a semi-submersible is able to transform from a deep to a shallow draft rig by de-ballasting (removing ballast water from the hull), and thereby becoming a surface vessel. Semi-submersibles are classified as Mobile Off-shore Drilling Units (MODUs) with standards for helidecks addressed in the International Maritime Organisation (IMO) MODU Code.

Figure A-3 Deep ballasted semi-submersible mobile off-shore drilling unit

A.1.4 Mobile Off-Shore Drilling Units: Self-Elevating Unit (Jack-Up)

A.1.4.1 A jack-up rig, or a self-elevating unit, is a type of mobile platform that consists of a buoyant hull fitted with a number of moveable legs (typically three or four). These rigs are towed to and from locations or may be self-propelled. When on site the legs (which can be up to 450 feet or more) are 'jacked' down until they penetrate the seabed or sit on the sea floor with the main body of the rig about 50 feet above sea level. The height of the legs when on station is dependent upon the depth of the water. When on tow, the legs are jacked up (and specific limitations are applied for helicopter operations to moving decks. When in the jacked-down position helidecks are not subject to significant movement and so behave more like fixed platforms. Jack-up rigs are classified as Mobile Off-shore Drilling Units (MODUs) with standards for helidecks also addressed in the IMO MODU Code.

Figure A-4 Jack-up mobile off-shore drilling unit

A.1.5 Floating Production Storage and Off-Loading (FPSO) and Tankers

A.1.5.1 An FPSO unit is a floating vessel used for the production and processing of hydrocarbons and for the storage of oil, until it can be off-loaded onto a tanker or, less frequently, transported through a pipeline. The FPSO extracts and stores the oil while the tanker hooks up to the FPSO before it shuttles the oil ashore. FPSOs are either purpose-built or can result from the conversion of an oil tanker. They are really effective when used in remote or deep-water locations, where seabed pipelines are not a commercially viable option. Variations on the FPSO concept may include a floating storage and off-loading unit (FSO) or a Liquefied Natural Gas (LNG) floating storage and re-gasification unit.

A.2 Shipboard Helidecks - Types of Facilities

A.2.1 Drill Ships

A.2.1.1 A drill ship is a merchant vessel designed for use in exploratory off-shore drilling for new oil and gas wells. They can be either purpose built or a converted older vessel and are kept on station by standard anchoring systems or by a dynamic positioning system (DPS). In recent years they have increasingly been used to drill in deep-water or in ultra-deep water and, in this operating environment, require the most advanced dynamic positioning systems.

Figure A-5 High mounted bow helideck on a drill ship

A.2.2 Small Vessels

A.2.2.1 Support and survey vessels are amongst the most challenging ships to fly too, especially at night. Vessels can be quite small and the helideck can be high up above the bow, over the stern or even amidships.

A.2.3 Non-Purpose Built Landing Area on Ship's Side –Tanker Port and Starboard

A.2.3.1 Some helicopter landing areas, located on tankers, consist in a non-purpose built ships side arrangement usually on one or other side of the vessel. For non-purpose facilities the control of ground based, and usually immoveable, obstacles become an issue. In this case care needs to be taken to ensure that deck-mounted obstacles, which may form part of the vessel superstructure, do not impinge on the safety of helicopter operations.

Figure A-6 High mounted stern helideck

Appendix II-B – Designation of Helidecks Class of Use

Compliance with GCAA Regulation

In order to aid the prioritisation process for compliance with GCAA regulations, Primary Accountable Organisations, helideck operating companies and helideck operators shall undertake a safety assessment of the facilities for which they are responsible for. An action plan aimed at achieving compliance should be produced relevant to the risks identified.

The safety assessment should be based on a safety risk management model, which should include hazard identification, safety risk assessment and mitigation processes. Table B-1 Helidecks: Class of Use), provides a classification of facilities, against which reference should be made.

Table B-1 Helidecks: Class of Use

Helideck Class	Day / Night / Closed	Manned / Unmanned	Fixed / Movable	Regulatory Focus	Applicability
F1	Day and night	manned	fixed	Full compliance – Including lighting	For designated CASEVAC helidecks on major accommodation installations
F2	Day only	manned	fixed	Full compliance – Lighting optional	For designated 'DAY ONLY' helidecks on major and minor platforms
F3	Day only	unmanned	fixed	Compliance – Mandatory markings Lighting not required Limited fire-fighting / crash equipment	For designated 'DAY ONLY' helidecks on minor platforms
F4	Closed	-	fixed	Helideck markings removed.	Closed / not to be used

M5	Day and night	manned	movable	Full compliance – Including lighting	For movable helidecks to which CASEVAC flights off-shore may be required at night
M6	Day only	manned	movable	Full compliance – Lighting optional	For movable helidecks to which night CASEVAC flights are not required

Appendix II-C: Helideck Compliance Checklist

INSPECTOR:	**DATE:**	
NAME OF OPERATING COMPANY:	**AUDIT REFERENCE NUMBER:**	
NAME OF OPERATOR REPRESENTATIVE:	**HELIDECK ID:**	
INSTALLATION / VESSEL NAME:	**HELIDECK D-VALUE:**	**t –VALUE:**
POSITION (LAT & LONG) Deg/Min & Decimals of Mins:	**HELIDECK ELEVATION (feet AMSL):**	
DATE OF LAST INSPECTION:	**LAST INSPECTION REPORT:**	
HELICOPTER LANDING AREA TEMPLATE:	**HELIDECK OPERATIONS MANUAL:**	

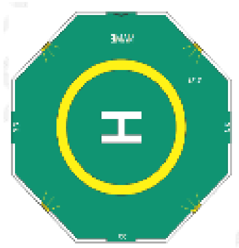
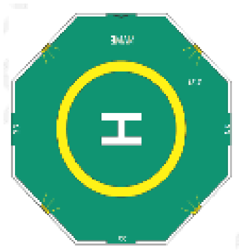
INSTALLATION TYPE:

LQ ☐	BARGE ☐	RIG ☐	VESSEL ☐	NPAI ☐	DPV/DSV ☐
Class F1 ☐	Class F2 ☐	Class F3 ☐	Class F4 ☐	Class M5 ☐	Class M6 ☐

OIM / BARGE MASTER:	NAME:	TEL:
INSTALLATION SAFETY OFFICER:	NAME:	TEL:
INSPECTION CARRIED OUT BY: (Internal)	NAME:	TEL:

TYPE	**'D' VALUE**	**0.33 'D'**	**0.12 'D'**	**0.05 'D'**	**Minimum 't' value**
AW 139	16.66 M	5.50	2.0	0.83	6,400 kg / 6,800 kg
BELL 412/212	17.10 M	5.64	2.05	0.86	5,400 kg

1	DOCUMENTS TO BE AVAILABLE	YES	NO	NOTES	PART II
1	Helideck Operations Manual Helideck Landing Area Template Helideck Plans Foam test certificate Friction Test Report and certificate (if no net) Perimeter safety net testing records Landing safety net documentation (if applicable) Digital equipment calibration certificates (weather and HMS) Passenger scales calibration records Fire Monitor flow rates Training records and certificates RFFS certificates & tests records Emergency Response Manual (ERM) Fuel inspection records Dangerous goods certificates Previous Inspection reports Additional evidence of compliance as required below				Ch 4.4 Ch 4, Table 4-2 Ch 6 Ch 8.5 Ch 9.3 Ch 8.5 Ch 8.3 Ch 20.1
2	**HELIDECK DESIGN, ENVIRONMENTAL EFFECTS, PHYSICAL CHARATERISTICS**	**YES**	**NO**	**NOTES**	PART II
1	**Final Approach and Take-Off Area (FATO)** Measured FATO = ___________m Is the FATO 1D? *Note: FATO: circle 1D TLOF: >3175kg = 1D; 3175kg or less = 0.83D*				Ch 7. 1
2	**Touchdown Lift and Off-Area (TLOF)** Measured TLOF = ___________m				Ch 7.1

	Is the TLOF 1D? Is the TLOF dynamic load bearing? *Note: TLOF: >3175kg = 1D; 3175kg or less = 0.83D*				
3	What is the helideck constructed of? Steel:___________ Aluminium:___________ Other:____________				Ch 5.1
4	Have the ultimate limit states (ULS) and the serviceability limit states (SLS) been assessed? *Note: For deck plate and stiffeners and for helicopter landing area supporting structure.*				Ch 5.1
5	Is the helideck area free from flares & hot exhausts? Indicate on drawing all sources for: Hot and cold vented gas emissions Turbine or other exhaust emissions Raised platforms and vents for hydrocarbon release H2S environment/possible release Other emissions *Note the potential of turbulence on T/O or Landing; in addition for a rig on location, note exhaust flow changes with prevailing winds.*				Ch 5.2
6	**Access Points** How many access / egress points are there on the Helideck? Is there an Emergency Exit on the far side? Number:___________ (Include Emergency Exits) *Note: All frangible railings are to be hatch painted (Yellow & Black)* *(Hatch-painted red and white & Marked 'EMERGENCY EXIT')*			a = access point e = emergency exist 	Ch 5.8

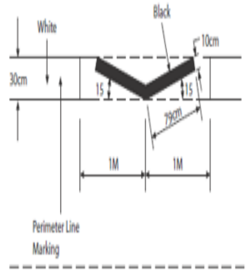
7	**Load Bearing Analysis** Maximum Weight: ______________ Method of Determination: ______________ Evidence Provided?				Ch 6.1
8	**Air Gap** Is there an air-gap - encompassing full dimensions of FATO? Is the air gap between 3m-6m? Is the air gap kept free from objects? *(Note tall accommodation blocks require 5m-6m)*				Ch 5.2
9	Do the helideck plans accurately show detail required? If not, state omissions:_________________________				Ch 4
3	**HELIDECK SURFACE ARRANGEMENTS**	**YES**	**NO**	**NOTES**	PART II
1a	**Objects** Is the helideck surface flush (level)? *(TLOF – not more than 2.5cm/if TLOF for use by helicopters less than 16m D value or TLOF having dimensions less than 1D – not more than 5 cm)*				Ch 9.1
1b	What is the condition of the helideck surface? Acceptable:______________ Not acceptable:_______________				Ch 9.1
1c	Is the Helideck covered with a helideck surface netting? *(If used by wheeled helicopters)* What type/material?				Ch 9.1 Ch 9.3
1d	Is the net (if fitted) in good condition and properly tensioned (2225N = Able to lift centre of net to approximately 25cm above deck level)?				Ch 9.3
1e	Does the net cover the TDPM but not obscure name and t value?				Ch 9.3

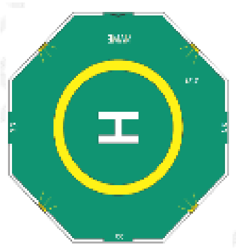
1f	Are the tie down points regularly spaced (recommended every 1.5m) and secure, with webbing strap ends properly secured/fastened?				Ch 9.3
1g	Is the net when fitted less than 25mm above deck level?				Ch 9.3
2a	**Slopes / Drainage** Is there a suitable drainage system and how many downpipes are used?				Ch 9.2
2b	Is fuel spillage kit available?				Ch 9.2
2c	Has the helideck been provided with a slope / camber (1:100)? *(Designed to prevent liquid accumulating on landing area).*				Ch 9.2
2d	Is there a full peripheral gutter or raised curb?				Ch 9.2
2e	Is the deck sealed so that spillages drain only via the drainage system?				Ch 9.2
2f	Does the design of the drainage system preclude blockage by use of debris filters or similar?				Ch 9.2
3a	**Friction** Is the surface skid-resistant to both helicopters and personnel using the TLOF?				Ch 9.3
3b	Are markings of a non-slip material?				Ch 9.3
3c	Has a friction test been performed to confirm a minimum friction coefficient greater than 0.65mu?				Ch 9.3
4a	**Tie-Down Points** Are the tie-down points suitable for helicopter type? *(Example: B412/212 & AW 139)*				Ch 9.4
4b	Are the tie-down points flush fitting? If not, are they of a design (and height above deck level) to limit the likelihood of ground resonance?				Ch 9.4

4c	Are the tie-down strop attachments/hooks compatible with the tie down points?				Ch 9.4
5a	**Perimeter Safety Nets** Is a perimeter safety net installed? If no, state why:_________________				Ch 9.5
5b	Does it exceed the height of the outboard edge of the TLOF? (For helidecks completed on or after 01/01/2012 it must not exceed)				Ch 9.5
5c	Has the load bearing capability been assessed and what measures/systems are in place to monitor deterioration?				Ch 9.5
5d	Does it protect all drop down areas (e.g. at exit stairway decks etc.)?				Ch 9.5
5e	Does it: Extend to a distance of 1.5m? Arranged with an upward slope of 10^0?				Ch 9.5
5f	What is the condition / security of the perimeter safety net? Acceptable:______________ Not acceptable:_______________				Ch 9.5
4	**OBSTACLES ENVIRONMENT**	**YES**	**NO**	**NOTES**	PART II
1	Is there an Obstacle-Free Sector (OFS) of 210^0? *(List all infringements: items, location, height - with drawing)*				Ch 10.1
2	Is there a 180^0 sector with an obstacle free falling gradient 0f 5:1? *(List all infringements: items, location, height - with drawing)*				Ch 10.1
3	Is the Limited Obstacle Sector (LOS) no greater than 150^0?				Ch 10.2
4	Within the 150^0 Limited Obstacle Sector are there objects above allowed height?				Ch 10.3
5	Control of cranes: Are controls and procedures in place to protect the OFS?				Ch 10.8
6	Are cranes infringing the OFS even when stowed?				Ch 10, 8

5	VISUAL AIDS	YES	NO	NOTES	PART II
1	Are the markings suitable for operations? Acceptable:_______________ Not acceptable:________________				Ch 12
2a	**Wind Direction Indicator** Is there at least one wind direction indicator? Is there at least one spare wind direction indicator?				Ch 12.1
2b	Is it located free from the effects of airflow disturbances?				Ch 12.1
2c	Colour: is the wind direction indicator conspicuous?				Ch 12.1
2d	Is it illuminated for night operations?				Ch 12.1
2e	Are the dimensions a minimum of: Length 1.2m; diameter (large end) 0.3m; diameter (small end) 0.15m?				Ch 12.1
3	Are the following markings correctly applied? (If not, state details)				Ch 12.1
4a	**Helideck Identification Marking "H"** Is it in the centre of the FATO? State details if off-set:___________________ *(Must be offset by no more than 0.1D)*				Ch 12.2
4b	Is the cross-arm on or parallel to the bisector of the obstacle-free sector? *(Note for a non-purpose-built shipboard helidecks located on a ship's side, the cross arm shall be parallel with the side of the ship)*.				Ch 12.2
4c	Is the H white; height 4m, width 3m, thickness 0.75m?				Ch 12.2
5a	**Maximum Allowable Mass Marking** Is it located within the TLOF or FATO and arranged to be readable from the preferred final approach direction i.e. towards the OFS origin?				Ch 12.3

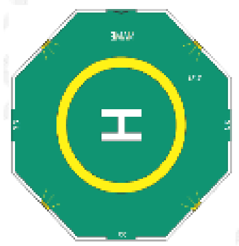
5b	Does it agree with the heaviest helicopter and structural limitations?				Ch 12.3
5c	Is the size compliant? *(90 cm (or 60cm if FATO < 15m) high, with proportional width).*				Ch 12.3
5d	Is it a contrasting colour?				Ch 12.3
6a	**D-Value Marking** Is the stated value correct?				Ch 12.4
6b	Is there at least one D-value marking? *(Should have D-Value marking for each final approach direction)*				Ch 12.4
6c	Is it readable from the final approach direction? (Note, for a non-purpose-built helideck located on a ship's side, D-value markings should be provided on the perimeter of the D circle at the 2 o'clock, 10 o'clock and 12 o'clock positions when viewed from the side of the ship facing towards the centre line).				Ch 12.4
6d	Is the D-value white?				Ch 12.4
6e	Is the size compliant? *(90 cm (or 60cm if FATO < 15m) high, with proportional width).*				Ch 12.4
7a	**Touchdown and Lift-Off Perimeter (TLOF) Marking** Is the marking located on the edge of the TLOF?				Ch 12.5
7b	Is the marking white, width 30cm?				Ch 12.5
8a	**Touchdown / Positioning (TD/PM) Circle Marking** Is the marking at the centre of the FATO? State if off-set:________________ *(Must be offset by no more than 0.1D)*				Ch 12.6
8b	Is the marking yellow; line width 1m?				Ch 12, 6
8c	Is the inner diameter0.5D of the largest helicopter?				Ch 12, 6
9a	**Helideck Name Marking**				Ch 12, 7

	Is a marking provided? If not, then justify:_________________				
9b	Does it consist of the name or the alphanumeric designator of the helideck as used in the radio (R/T) communications?				Ch 12, 7
9c	It is a contrasting colour?				Ch 12, 7
9d	Is the marking not less than 1.2m?				Ch 12, 7
10a	**Obstacle-Free Sector (Chevron) Marking** Is the marking correctly located with reference to the obstacle-free sector and the directions of the limits of the sector?				Ch 12, 8
10b	Is it located at a distance from the centre of the TLOF equal to the radius of the largest circle that can be drawn in the TLOF or 0.5 D, whichever is greater?			 	
11	**Helideck Surface Marking** Is the surface bounded by the TLOF perimeter marking dark green (high friction coating)? If not, state colour:____________________				Ch 12, 9
12a	**Prohibited Landing Sector (or “no nose”) Marking** Location: Is a marking within the relevant headings?				Ch 12, 10
12b	Colour and design in accordance with PART II?				Ch 12, 10
13	**Obstacles** Are fixed obstacles marked and conspicuous?				Ch 12, 11
14	**Installation Closed Marking** When required, is a procedure available for temporary closures?				Ch 12, 12
6	**AERONAUTICAL LIGHTING**	**YES**	**NO**	**NOTES**	**PART II**

1	Is Perimeter Lighting correctly installed around the helideck? *(Equally-spaced, not more than 3 m apart; height less than 25cm visible omni-directionally)* *Note: in order to avoid trip hazards, blocking foam dispensing nozzles etc. the TLOF perimeter lights may be relocated by up to +/- 0.5m – a maximum/minimum spacing of 3.5m/2.5m)*			Indicate: 	Ch 13, 2
2	What colour are the lights? (All Green lights of at least 25 candelas)				Ch 13, 2
3	Are the lights coincidental with the TLOF area as defined by the white perimeter line?				Ch 13, 2
4	Are they compliant with PART II chromaticity?				Ch 13 T13-1
5	Are the Floodlights correctly installed for the Helideck? *(At least four required adequate illumination; min 10 lux)*			Indicate: 	Ch 13, 2,3
6	Status Lights (if available)?				Ch 13, 3
7	Lit helideck marking (H) (if available)?				Ch 13, 3
8	Are they adjustable and can be operated by the Radio Operator or HLO?				Ch 13, 3
9	Is there a 28V DC Ground power supply to the helideck?				Ch 13, 3
10	Is the helideck lighting rigged to the UPS?				Ch 13, 3
11	Obstacle floodlighting: Obstacles higher than the Helideck – nearby or in 150^0 Sector Jack-up Legs				Ch 13, 3

	Highest point of the Installation Obstacles higher than the Helideck out to 1000 meters				
12	Are daily checks conducted to correct misaligned lights? *(i.e. floodlighting)*				Ch 13, 2. 3
7	**PARKING AREAS AND PUSH-IN AREAS**	**YES**	**NO**	**NOTES**	PART II
1	Are parking areas provided?				Ch 14, 1
2	Are the dimensions of the parking area able to accommodate a circle with a minimum diameter of 1 x the D-value of the design helicopter?				Ch 14, 1
3	Is a minimum clearance between the edge of the parking area and the edge of the landing area of 1/3 (0.33D) based on the design helicopter provided? (Parking transition area) Is it free of obstacles when a helicopter is located in the parking area?				Ch 14, 2
	Is the lighting scheme compliant?				Ch 14, 2
8	**NOT PERNAMENTLY ATTENDED INSTALLATIONS (NPAI)**	**YES**	**NO**	**NOTES**	PART II
1	Are procedures in place to take action with regard to bird guano and bird activity?				Ch 15, 1
2	Are condition reports submitted to indicate the current condition of the surface, of helideck lighting (including any outages) and of the wind direction indicator (including illumination)?				Ch 15, 2
3a	**Rescue and Fire-Fighting Facilities** Has consideration been given on the selection and provision of foam as the principle agent?				Ch 15, 2
3b	Has a DIFF system been installed?				Ch 15, 2
3c	Has an assessment taken place for the provision of RFFS without DIFFS?				Ch 15, 2
9	**PERSONNEL REQUIREMENTS**	**YES**	**NO**	**NOTES**	PART II

1	Dangerous goods: do personnel involved in dangerous good hold a certificate of training appropriate to the role and responsibility?				Ch 16, 2
2	Has an assessment (Task Analysis) be conducted to establish the number of personnel required? Date:____________				Ch 16, 5
	Has appropriate training been provided for each:				Ch 16, 5
3a	Helideck Landing Officer (HLO)				
3b	Helideck Assistances (HDA)				
3c	Radio Operator				
3d	Fire-fighter				
3e	Re-fueller				
4	Has the appropriate PPE been provided to each personnel?				Ch 16, 6
10	**HELIDECK RESCUE AND FIRE-FIGHTING**	**YES**	**NO**	**NOTES**	PART II
1a	Has an assessment been undertaken and exercises conducted demonstrating a response time to any helicopter incident on the helideck within 1-minute?				Ch 16, 7
1b	Last Response Time test , date:____________ (15 secs, Completion < 30 secs)				Ch 16, 7
2	Is the objective, less than 15 seconds, measured from the time the system is activated to actual production at the required application rate achieved? (Exercise).				Ch 16, 7
3	Can the operational objective to ensure that the system is able to bring under control a helideck fire associated with a crashed helicopter within 30 seconds measured from the time the system is producing foam at the required application rate in all weather conditions be achieved?				Ch 16, 7
4	Where Fixed Monitor System is used, what are the angles between monitors? Angle(s):___________________			Indicate positions & angles:	Ch 16, 5

	Number of monitors:________________				
5a	**Principal Fire-Fighting Agent (Foam)** Is there a Certificate of conformity for each batch of foam? *(Available for audit)*				Ch 16, 2
5b	What is the foam application rate measured against the D-value: Rate:________________ litres per min (Example for a D-value 22.2 metre helideck). Application rate = 6.0 x ∏r2 (6.0 x 3.142 x 11.1 x 11.1) = 2322 litres per minute).				Ch 16, 2
5c	Can the Application rate be met? Can the “5-min” discharge capability be met?				Ch 16, 2
5d	Is there sufficient minimum operational stock				Ch 16, 2
5e	Is there 200% reserve foam stocks				Ch 16, 2
5f	Are hand-controlled foam branches available?				Ch 16, 2
5g	Type of Foam: _________________% Discharge Rate: _______ Ltrs / min				Ch 16, 2
5h	Volume Available:________ Ltrs				Ch 16, 2
5i	Are they remotely operable from the Helideck?				Ch 16, 2
5j	Are the Helideck RFFS crew familiar with the procedures?				Ch 16, 2
5k	Last Test Certificate, date:___________ Last Functional Check carried out, date:__________				Ch 16, 2

5l	Last Inspection Report, date:_____________				Ch 16, 2
5m	Is a hand-held hose line reel monitor available? (At least 1 required) (Discharge rate 250Litres / min)				Ch 16, 2
5n	How many water hoses and hydrants? (At least 1 required)				Ch 16, 2
6a	**Complementary Media** Are Dry Chemical Powder units available? (Minimum 45 kgs) (Should be of "foam compatible" type) Number of Units : _________ Sizes :__________				Ch 16, 2
	Check Accessibility to Helideck Last Inspection Date :_____________				Ch 16, 2
6b	Are Gaseous Agent (Carbon Dioxide: CO2 or equivalent) units available? (Minimum 22 kgs)				Ch 16, 2
	Check Accessibility to Helideck Number of Units :_________ Sizes :__________				Ch 16, 2
	Last Inspection Date :_____________				Ch 16, 2
6c	Portable Foam Unit (NUI's Only)				Ch 16, 2
	Minimum requirement for MEDIUM H2 RFFS Standard Intensity NUI's Capacity:__________				Ch 16, 2
	Capacity: 1200lts Discharge Rate: 600lts Duration: 2 Minutes Last Inspection Date :____________				Ch 16, 2
	Is 200% reserve stocks of complementary media available?				Ch 16, 2
7	**Use and Maintenance of Foam Equipment** Have the following tests and inspection been conducted? Foam system installation test:____________ Date:____________				Ch 16, 2

	Periodic testing: :_____________ Date:____________				Ch 16, 2
	Testing procedures for foam systems:__________ Date:_________				Ch 16, 2
	In-service test NFPA foam test procedures:_____________ Date:____________				Ch 16, 2
8a	**Rescue equipment** Is a cabinet available and sited next to the Helideck? *(Should be easily accessible in event of Emergency)*				Ch 16, 8
8b	Is it secure and watertight?				Ch 16, 8
8c	Does it contain the following minimum required items? (Mark each item as appropriate)				Ch 16, 8
	Adjustable Wrench				Ch 16, 8
	Rescue axe, large (non-wedge or aircraft type)				
	Bolt Cutters				
	Crow Bar (Large)				
	Hook, grab or salving				
	Hacksaw (heavy duty) and six spare blades				
	Blanket, fire resistant				
	Ladder (two-piece) (For access to casualties in an aircraft on its side)				
	Life line (5 cm circumference x 15 m in length) plus rescue				
	Pliers, side cutting (tin snips)				
	Set of assorted screwdrivers				
	Harness knife and sheath (for each helideck crew member)				
	Gloves, fire resistant				

	(for each helideck crew member)				
	Power cutting tool				
	Screw Drivers				
	Harness Knife x 2				
9	**Personal Protective Equipment (PPE)** Is the following provided for each fire-fighter?				Ch 16, 10
	Helmet with Visor				
	Gloves				
	Boots (footwear)				
	Tunic and Trousers				
	Flash-hoods				
	Ear protection				
10	**Respiratory Protective Equipment (RPE)** Are the following provided?				Ch 16, 10
	Positive Pressure SCBA. Sets x2				
	Full Back-up SCBA Cylinders x2				
	Ear protection for deck crew: all				
11	**HELIDECK EMERGENCY PLAN (HEP**	**YES**	**NO**	**NOTES**	PART II
1	Does the ERM sets out the following procedures?				Ch 17
	emergency duties and responses for the management				
	of the Helideck Landing Officer				
	helideck rescue and fire-fighting personnel				
	requirements for emergency drills and exercises				
	training and assessment of personnel				
2	Does it contain procedures for all emergency scenarios where helicopters may be involved ranging from dealing with major				Ch 17, 1

	accident events and precautionary situations that occur on the installation and vessel to providing helicopter support for emergencies arising elsewhere?				
3	Does the ERM encourage full use of available fire-fighting appliances, rescue equipment and resources to best advantage including all elements for both on and off-shore co-ordination and support?				Ch 17, 2
4	Are procedures in place for the following?				Ch 17, 1
	Crash on Helideck, Major Spillage with no fire				
	Significant fuel spillage, rotors turning (hot fueling)				
	Emergency evacuation by Helicopter				
	Man over-board				
	Emergency or precautionary landing				
	Helicopter incident on landing				
	Dangerous goods spill/release				
12	**TRAINNG AND DEVELOPMENT**	**YES**	**NO**	**NOTES**	PART II
1	Is a Structured Learning Programme (SLP) provided?				Ch 19, 2
2	Are training records available for all personnel? *(To be available for audit)*				Ch 19, 3
3	Has the duration and frequency of training been maintained? *(Provide details)*				Ch 19, 4
13	**METEOROLOGICAL EQUIPMENT PROVISION**	**YES**	**NO**	**NOTES**	PART II
1	What MET Equipment is available? List: ___________				Ch 20, 1
2	Fixed Anemometer KTS or MPH:___________ Calibration Dates:___________				Ch 20, 1
3	Hand Held Anemometer				Ch 20, 1

	KTS or MPH:__________ Calibration Dates:__________				
4	Barometer Hpa or IN Hg:__________ Calibration Dates:__________				Ch 20, 1
14	**DECK MOTION REPORTING AND RECORDING**	**YES**	**NO**	**NOTES**	PART II
1	Can helideck movement be measured? Pitch:_____________ Roll:______________ Heave:____________				Ch 21, 1
2	Is an electronic Helideck Motion System (HMS) used?				Ch 21, 1
3	Is the HMS operator trained? *(Certificate to be available)*				Ch 21, 1
15	**REFUELLING OPERATIONS (IF PROVIDED)**	**YES**	**NO**	**NOTES**	PART II
1	When was the System Inspected by an Authorised Fuel Inspector? *(Copy of last fuel Audit/Report required)* Name:______________ Company:___________ Date : _______________				Ch 22, 1
2	When was the system last used? Date:_______________ *(A System static for 3 months should be flushed & inspection)*				Ch 22, 1
3	What is the capacity and dispensing units of the Fuel System? LTR:_________ US GAL:________ IMP GAL:________ (Current Quantity) *(Circle unit of measurement)*				Ch 22, 1
4	Is a Fuel Quality Check done prior to aircraft refuelling?				Ch 22, 1
5	Are current (in-date) Water Detector Kits available?				Ch 22, 1
6	Was a Company QA Inspection carried out, if not due when will it be required?				Ch 22, 1

7	Are all required records maintained as per Refuelling Manual?				Ch 22, 1
8	Are fuel sample retained in appropriate containers?				Ch 22, 1
9	Are the procedures aligned to the IATA fuel guidelines?				Ch 22, 1
16	**OPERATIONS INSPECTION (ON-SITE)**	**YES**	**NO**	**NOTES**	PART II
1	Are the Deck Crew familiar with the required aircraft types? Date of last type-specific training: ______________________ Orientation Required:____________________				Ch 18
2	Briefing Room – complete with TV and Video?				
3	Can you see the Helideck from the Radio Room?				
4	Is there a fixed multi-channel aeronautical VHF Radio installed? Allocated Frequency:_________________				
5	HLO Radios & Headsets *(Minimum 2)*				
6	What other Communications Equipment is available? VHF FM: ___________ Telefax:__________ Sat Phone:__________ Email:____________				
7	Is an operating NDB Installed? Freq and Ident:__________				
8	Is there a heavy duty Weighing Scale on board? Calibration Date : _______ Capacity : ____________ (*Domestic scale not acceptable. Minimum capacity 300 kg)*				
9	Passenger Control: Have appropriate Passenger Safety Boards been provided?				
10	Does the Radio Operator maintain a Flight Log?				
11	Does the Radio Operator have an R/T Certificate and is he fluent in English?				

12	Did Radio Operator receive Helicopter Operator Briefing Pack? *(Briefing Video, Manifest, etc.) FAS/ADA/AGS/____________*				
13	Are wheel chocks available? *(3 sets)* Type: _______ Quantity: : _______				
14	A/C Tie Down Strops (3000kg Rated) X 4				
15	Condition of Baggage Trolley Acceptable:____________ Unacceptable:__________				
16	Record of the number of helicopter movements Last month: ____________ Last year: ____________				
17	**HELIDECK OPERATOR – REGULATORY COMPLIANCE WITH SMS**	**YES**	**No**	**NOTES**	PART II
1	Is there a PART II compliance matrix? *(Documented evidence of compliance with* PART II*)*				Ch 4, 1
2	Is there an established SMS (PART II)?				Ch 4, 2
3	Does the Helideck Operations Manual meet the requirements of PART II? *(Sample of operational procedures)*				Ch 4, 3
4	Are the helideck operating procedures comprehensively documented?				Ch 4, 2
5	Does the SMS include: a description of the overall philosophies, objectives and principles (Safety policy), signed by the Accountable Manager; clearly defined lines of responsibility & accountability;				Ch 4, 2

	statement of accountabilities with named responsible persons, (Accountable Manager, Helideck Safety and Quality Assurance; Operations; Maintenance; Rescue and Fire-Fighting Service (RFFS); a policy and procedure for a systematic approach to hazard identification and risk management; a safety assessment: reference to Chapter II-4, 2.2 d) and Chapter II-2, 2.1.4); a policy and procedure for notification of safety critical issues / findings to stakeholders; Primary Accountable Organisation; a policy and procedure for ensuring that accidents, serious incidents, unlawful interferences as well as safety events identified as mandatorily reportable in CAR Part IX (Aerodromes) are reported to the GCAA through the Reporting of Safety Incidents (ROSI); a policy and procedure to educate their personnel of how to report an actual or potential safety deficiency through the Voluntary Reporting (VORSY) System; a policy and procedure for the acceptance and transfer of contracted vessels to assure compliance with GCAA regulations; a policy and procedure to ensure sub-contractor compliance with GCAA regulations; a policy and procedure for an internal safety oversight and auditing system; the means to verify the safety performance of the organisation with reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls; a process to review the safety management system, identify the causes of substandard performance of the safety management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes; a safety training programme that ensures personnel involved in the operation, rescue and fire-fighting, maintenance and management of the helideck are trained and competent to perform their duties safely;				

	a formal means for safety communication that ensures that personnel are fully aware of the safety management system, conveys safety critical information, and explains why particular safety actions are taken and why safety procedures are introduced or changed; a coordination of the safety management system with the helideck emergency response plan; and coordination of the helideck emergency response plan with the emergency response plans of those organizations it must interface with during the provision of helideck services; a policy and procedure for the maintenance of compliance against PART II for contracted helidecks; and a policy and procedure for recording the number of helicopter movements.				
6	Does the helideck operator engage, employ or contract sufficient and qualified personnel for the planned tasks and activities to be performed related to the operation, maintenance and management of the helideck in accordance with PART II (Training and Development of Personnel)?				Ch 19
7	Does the helideck operator ensure that personnel have demonstrated their capabilities in the performance of their assigned duties through proficiency check at adequate intervals to ensure continued competence?				Ch 19
8	Does the helideck operator ensure that unescorted persons operating on the helideck are adequately trained?				Ch 4
ADDITIONAL OBSERVATIONS, COMMENTS, DIAGRAMS					

Appendix II-D: GCAA Approval Assessment Checklist - Primary Accountable Organisation

GCAA Approval Assessment Checklist – Primary Accountable Organisation

Aim: To confirm that the Primary Accountable Organisation meets the requirement to have a safety management structure in place, enabling effective safety oversight of helideck operating companies or specific helideck operators for which the Organisation is responsible for.

Present:

GCAA Team: Inspector(s)

Organisation: Accountable Manager

Organisation: Responsible persons for Safety and Quality Assurance; Operations; Maintenance; Rescue and Fire-Fighting Service (RFFS).

Documents / evidence required to be available to the GCAA at the commencement of the GCAA Approval Assessment:

A	Safety Management Structure - Documentary Evidence		Yes	No
	Organisational structure	Line of responsibility and accountability.		
		Statement of accountabilities – with named responsible persons: Accountable Manager Safety and Quality Assurance Operations Maintenance Rescue and Fire-Fighting Service (RFFS)		

	Safety Assessment	A safety assessment. *Reference: Chapter II-2: Safety risk management model (2.1.4).*		
	Policies	Safety Policy signed by the Accountable Manager.		
		Statement and agreement between the Primary Accountable Organisation and named helideck operating companies or specific helideck operators for the system of safety oversight.		
		A policy stating the audit team are sufficiently trained and qualified for the planned tasks and activities to be performed.		
	Performance processes	The means to verify the safety performance of the organisation in reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls.		
		A process to review the management system, identify the causes of substandard performance of the management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes.		
B	**Safety Oversight of Helidecks - Documentary Evidence**		Yes	No
	List of facilities	List of helideck operating companies.		
		Data for each facility: Location Owner (helideck operator or subsidiary company) D-value Unique identification name/number Class of Use		
	Policies and procedures	A policy and procedure for the audit process and content. (i.e. audit scope, audit periodicity; audit plan; audit programme; definition of findings).		
		A policy and procedure for the follow-up process on audit findings.		

		(i.e. actions to be taken for safety critical issues; identifying causal factors and corrective actions; agreement on action plans; agreement on timescales).		
		A policy and procedure for notification of safety critical issues / findings to stakeholders and the GCAA.		
		A policy and procedure for document control of audits, reports and records.		
		A policy and procedure for investigations (safety incidents and accidents; ROSI).		
		A policy and procedure for communicating with the GCAA.		
	Audit documents	The Audit Programme (periodicity).		
		The Audit Plan (i.e. scope).		
	Audit reports	Reports since 1 January 2015 – compliance required for new facilities. *(Reference DG Directive: 01/2015)* Reports sampled (list): __________		
		Reports before 1 January 2015 Reports sampled (list): __________		
		Actions / closed actions / findings Mitigations / controls for actions / findings still open Reports sampled (list): __________findings from reports		
		Reporting safety critical findings Findings sampled (list): __________		
	Audit team	Auditor / audit team: Training records Training programme		

C	Example of a GCAA Approval Assessment Plan

Day 1	In-brief: Opening meeting by GCAA	Present: GCAA team Primary Accountable Organisation (Accountable Manager, responsible persons as required by Chapter II-3)
	Briefing by Primary Accountable Organisation	Overview of: Organisation Operation
	Requirement for a safety management structure	Organisational structure (i.e. accountabilities, responsibilities, agreements) Safety assessment *Reference: Chapter II-2: Safety risk management model (2.1.4).* Policies (i.e. safety policy, agreements; audit team) Performance processes (i.e. SPI, SPT, review processes)
	Requirement for safety oversight of helidecks	List of each facility Policy and procedure for audit process (i.e. audit scope, periodicity, plan, programme, definition of finding) Policy and procedure for audit findings (i.e. action plans, actions for safety critical issues) Policy and procedure for notification of safety critical issues / findings Policy and procedure document control

		Policy and procedure for investigations (i.e. safety incidents and accidents, ROSI,) Policy and procedure for communicating with GCAA Audit Programme Audit Plan Audit reports Audit team training records
Day 2	Requirement for safety oversight of helidecks	Continuation
	Out-brief: Closing meeting by GCAA	Present: GCAA team Primary Accountable Organisation (Accountable Manager, responsible persons as required by Chapter II-3)

PART III – VERTIPORTS

Chapter III-1 – General Requirements

1.1 Applicability

1.1.1 The provisions contained in CAR-HVD Part III are applicable to all operators of onshore vertiports.

1.1.2 An operator of an on-shore vertiport shall hold either a Vertiport Certificate or a Landing Area Acceptance as described in Appendix A.

1.2 General

1.2.1 The purpose of this CAR-HVD – Part III is to establish the regulatory requirements for operators of all onshore vertiports within the UAE.

1.2.2 By following the requirements in this regulation and on successful completion of the process listed in Chapter III-2 as applicable, vertiport operators will be provided with a ***Vertiport Certificate*** or a ***Landing Area Acceptance***.

1.3 Purpose

1.3.1 This part will ensure compliance with the UAE Civil Aviation Law, and Civil Aviation Regulations and conformance with international standards of ICAO Annex 14, Volume II.

1.3.2 Civil Aviation Regulation, Part III (General Regulations), Chapter 5 states that “An aircraft shall not land at, or take-off from, any place unless; the place is authorized by the GCAA and the place is suitable for use as an aerodrome for the purposes of the landing and taking-off of aircraft in safety, having regard to all circumstances, including the prevailing weather conditions”.

1.4 References

a) Decree (26) 2022 - UAE Law on the civilian use of unmanned aircrafts and its associated activities

b) CAR DEF
c) CAR UAM
d) CAR ADR (Aerodromes)
e) CAR Part X (Safety Management Requirements)
f) CAR Part XI (Aerodrome Emergency Services, Facilities & Equipment)
g) ICAO Annex 14 Volume II (Aerodromes – Heliports)
h) ICAO heliport Manual Doc 9261
i) ICAO Doc 9137 Airport Services Manual Part 1 Rescue and Fire-Fighting
j) ICAO Annex 2 (Rules of the Air)
k) National Fire Protection Association (NFPA) 418 Standards for Heliports
l) AMC 22 (Safety Incident Reporting)
m) AMC 35 (Inspecting and Testing of Rescue and Fire-Fighting Equipment)
n) AMC 36 (Runway and Movement Area Inspections)
o) AMC 43 (Foreign Object Debris – FOD)
p) AMC 45 (Breathing Apparatus Operational Guidance)
q) AMC 57 (Voluntary Occurrence Reporting System)
r) ICAO Annex 15 (Aeronautical Information Services)
s) FAA Engineering Briefing 105 (EB-105) - Vertiports
t) EASA (PTS-VPT-DSN) March 2022
u) EUROCAE (ED-299) – Guidance for Vertiport Operators and Operations
v) Australian Government Civil Aviation Safety Authority Part 139 (Aerodromes) Manual of Standards 2019.

1.5 Policy

1.5.1 The GCAA will approve the certification of vertiports or provide a Landing Area Acceptance (as the case), once satisfied with the level of compliance with this Part; however, the responsibility for the maintenance and condition of the vertiport, the facilities, and for obstacle control, remains with the Certificate/Acceptance Holder.

1.6 Definitions

1.6.1 The term ‘’**shall**’’ is used in the GCAA regulation to impose a requirement or a prohibition.

1.6.2 The term ''should'' is used to indicate any specification which is recognized as necessary in the interest of safety unless an alternative is accepted by the GCAA.

1.6.3 for the purposes of this CAR, the terms described below shall have the following meaning:

Accepted Landing Area.	An aerodrome or vertiport whose operator has been granted a Landing Area Acceptance.
Accuracy.	A degree of conformance between the estimated or measured value and the true value. Note: For measured positional data, the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.
Assessor	A designated examiner for assessment of the theoretical and practical competencies of a trainee for the issuance of a certificate of competency after successful completion of a given structured learning program in accordance with the training standards defined in this regulation
Certificated Vertiport	A vertiport whose operator has been granted a Vertiport Certificate by the GCAA under this regulation.
Charging facility	A charging station that supplies alternating current (AC) and/or direct current (DC) to an electric aircraft for recharging its batteries, including, if needed, the connection between charging station and electric aircraft (refer to the International Electrotechnical Commission (IEC)).
Continued safe flight and landing (CSFL)	In relation to a Vertical Take-off and Landing (VTOL)-Capable Aircraft (VCA), that the aircraft is capable of continued controlled flight and landing at a vertiport, possibly using emergency procedures, without requiring exceptional piloting skill or strength.
Declared Distances - Vertiports	**Landing distance available (LDAV)**. The length of the FATO plus any additional area declared available and suitable for VCAs to complete the landing manoeuvre from a defined height.

	Landing distance required (LDRV) for VCA, means the horizontal distance that is required for landing and coming to a full stop from a point that is 15 m (50 ft) above the landing surface. **Rejected take-off distance (RTODV)**, for VCA, means the length of the final approach and take-off area (FATO) that is declared available and suitable for VCA to complete a rejected take-off. **Rejected take-off distance available (RTODAV)**. for VCA, means the length of the FATO that is declared available and suitable for VCA to complete a rejected take-off. **Rejected take-off distance required (RTODRV)**, for VCA, means the horizontal distance that is required from the start of the take-off to the point where the aircraft comes to a full stop, following a critical failure for performance (CFP) that is recognised at the take-off decision point (TDP). **Take-off decision point (TDP)**, for VCA, means the first point that is defined by a combination of speed and height from which continued take-off can be made meeting the certified minimum performance (CMP) following a critical failure for performance (CFP), and is the last point in the take-off path from which a rejected take-off (RTO) is ensured. **Take-off distance available (TODAV)**, for VCA, means the length of the final- approach and take-off area (FATO) plus the length of any clearway (if provided) that is declared available and suitable for VCA to complete the take-off. **Take-off distance required (TODRV)**, for VCA, means the projected horizontal distance from the start of the take-off to the point at which safe obstacle clearance and a positive climb gradient are achieved, following a critical failure for performance (CFP) recognised at the take- off decision point (TDP).
D.	‘D’, for VCA, means the diameter of the smallest circle enclosing the VCA projection on a horizontal plane, while the aircraft is in the take-off or landing configuration, with rotor(s) turning, if applicable.

	Note: If the VCA changes dimensions during taxiing or parking (e.g. folding wings), a corresponding $D_{taxiing}$ or $D_{parking}$ should also be provided.
Design D.	The D of the design VCA.
D-value	A limiting dimension, in terms of 'D', for a vertiport, or shipboard vertiport, or for a defined area within.
Design VCA	means the VCA type that the vertiport is intended to serve, which has the largest set of dimensions, the greatest maximum take-off mass (MTOM), and the most critical obstacle avoidance criteria. Those attributes may not reside in the same VCA capability.
Elevated vertiport	A vertiport located on a raised structure on land or on a rooftop or other elevated structure where the TLOF and FATO are at least 0.8m above the surrounding surface.
Elevated VCA clearway	A clearway raised to a level that provides obstacle clearance.
Elongated.	When used with TLOF or FATO, elongated means an area which has a length more than twice its width.
Emergency Evacuation Vertipad	An emergency landing area on top of a building, solely for the purpose of emergency evacuation of the building.
Essential objects permitted	'Essential objects permitted' includes, but may not be limited to, around the touchdown and lift-off area (TLOF), perimeter lights and floodlights, guttering and raised kerb, principal agent monitors or ring-main system, handrails and associated signage, other lights.
Final approach and take-off area (FATO)	A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by VCAs operated, the defined area includes the rejected take-off area available.
GCAA Inspector	An Inspector from any discipline within the GCAA, dependent upon the discipline being inspected or audited.

Hospital Vertiport	A vertiport located at a hospital or medical facility intended to serve VCAs engaged in HEMS or other hospital related functions.
Instructor	a training specialist who possesses the relevant qualifications, competencies and has the responsibility to deliver a given structured learning program to trainees in accordance with the training standards defined in this regulation.
Landing Area Acceptance	An acceptance issued by the GCAA for the operation of a vertiport limited to private use.
Limited-sized vertiport	a vertiport where the firefighting capacity is concentrated at the FATO/TLOF and there is no requirement to move foam and/or water dispensing equipment.
Shipboard vertiport.	A vertiport located on a ship that may be purpose or non-purpose-built. A purpose-built shipboard vertiport is one designed specifically for VCA operations. A non-purpose-built shipboard vertiport is one that utilizes an area of the ship that is capable of supporting a VCA but not designed specifically for that task.
Surface-level vertiport	A vertiport located on the ground or on the water.
Task resource analysis	A risk-based approach to establish the minimum number of competent personnel or equipment required to deliver an effective RFF service to deal with a worst-case credible accident at the vertiport
Technical Inspection	An inspection of a vertiport conducted by the GCAA to confirm compliance with the physical characteristics' requirements of these regulations.
Touchdown positioning circle (TDPC).	A touchdown positioning marking (TDPM) in the form of a circle used for omnidirectional positioning in a TLOF.
Touchdown positioning marking (TDPM).	A marking or set of markings providing visual cues for the positioning of VCAs.
Verification Audit	An audit of the vertiport facilities, equipment and services and audit of the relevant manuals and Compliance Statements conducted

	prior to the issue of a Vertiport Certificate or Landing Area Acceptance.
Vertipad	Any portion of land, building or structure or part thereof which has been demarcated and approved by the Authority for the purposes of landing or taking off of VCA;
Vertiport	Means an area of land, water, or structure that is used or intended to be used for the landing, take-off, and movement of VCA.
Vertiport Certificate	A Certificate issued by the GCAA under this regulation (CAR-HVD) for the operation of a vertiport.
Vertiport elevation	The elevation of the highest point of the FATO for elevated vertiport.
Vertiport facilities and equipment	Facilities and equipment, inside or outside the boundaries of the vertiport, that are constructed or installed, operated and maintained for the arrival, departure and surface movement of aircraft.
Vertiport Operations Manual	The Manual that forms part of the application for an operational approval for a Certificated Vertiport, including any amendments thereto accepted by the GCAA.
Vertiport Operator	In relation to a Certificated Vertiport, the Vertiport Certificate holder or in relation to an accepted landing area, the VCA Landing Area Acceptance holder, or any legal or natural person that is operating or proposing to operate one or more vertiports.
Vertical procedures	A take-off and landing procedures that include an initial vertical/steep climb and a final vertical/steep descent profile. The profile may or may not include a lateral component.
Vertiport reference point (VRP).	The designated geographical location of a vertiport.
VTOL-capable aircraft (VCA)	A heavier-than-air aircraft, other than aeroplane or helicopter, capable of performing vertical take-off and landing by means of

	more than two lift/thrust units that are used to provide lift during the take-off and landing.
VCA clearway	A defined area on the ground or water, selected and/or prepared as a suitable area over which a VCA that is certified to achieve a specified set of flight conditions.
VCA stand	A defined area intended to accommodate a VCA for purposes of: loading or unloading passengers, mail or cargo; fuelling, parking or maintenance; and, where air taxiing operations are contemplated, the TLOF.
VCA taxi-route	A defined path established for the movement of VCAs from one part of a vertiport to another. c) An air taxi-route. A marked taxi-route intended for air taxiing. d) b) A ground taxi-route. A taxi-route centred on a taxiway.
VCA taxiway	A defined path on a vertiport intended for the ground movement of VCAs and that may be combined with an air taxi-route to permit both ground and air taxiing.

1.8 Abbreviations

AFM	aircraft flight manual (a VCA AFM also refers to a aircraft flight manual)
APAPI	abbreviated precision approach path indicator
ASPSL	arrays of segmented point source lighting
AIP	Aeronautical Information Publication
ASPSL	Arrays of Segmented Point Source Lighting
VCA	VTOL-Capable Aircraft
CAT	Commercial Air Transport
cd	candelas

CFP	critical failure for performance
C/L	Centre line
cm	centimetre
DP	Decision Point
DR	horizontal distance that the VCA has travelled from the end of the take-off distance available
DCP	Dry Chemical Powder
DIFFS	Deck Integrated Fire Fighting System
EASA	European Union Aviation Safety Agency
FATO	Final approach and take-off area
FAS	Fixed application system
FFAS	Fixed foam application system (FMS/DIFFS/RMS)
PAS	Portable foam application system
FMS	Fixed monitor system
FOD	Foreign Object Debris
ft	feet
GCAA	General Civil Aviation Authority
GNSS	Global navigation satellite system
HAPI	Helicopter Approach Path Indicator
HEMS	Helicopter Emergency Medical Services
VLO	Vertiport Landing Officer
VPA	Vertiport Assistant
Hz	Hertz
ICAO	International Civil Aviation Organisation

IFR	Instrument Flight Rules
kg	Kilograms
Km/h	Kilometres per hour
Kt	knots
LDAV	Landing Distance Available (for VCA)
LDRV	Landing Distance Required (for VCA)
LDP	landing decision point
LED	Light Emitting Diodes
LP	Luminescent Panel
Lpm	Litre per minutes
lx	lux
M	metres
MAPt	Missed approach point
MTOM	Maximum take-off mass
NVIS	Night Vision Imaging System
OFS	Obstacle-free sector
OLS	Obstacle Limitation Surfaces
PAPI	Precision approach path indicator
PC	Performance Class
R/T	radiotelephony or radio communications
PinS	Point-in-space
RFFS	Rescue and firefighting service
RMS	Ring-main system

RTO	Rejected Take-off
RTODV	Rejected Take-off Distance (for VCA)
RTODAV	Rejected Take-off Distance Available (for VCA)
RTODRV	Rejected Take-off Distance Required (for VCA)
s	Seconds
SARPs	Standards and Recommended Practices (ICAO)
SMS	Safety Management System
t	Tonne (1 000 kg)
TDP	take-off decision point
TODAV	take-off distance available (for VCA)
TODRV	take-off distance required (for VCA)
TDPC	touchdown positioning circle
TDPM	touchdown positioning marking
TLOF	Touchdown and Lift-Off Area
UCW	Width of undercarriage
VCA	VTOL-Capable Aircraft
VEMS	VCA Emergency Medical Services
VFR	Visual Flight Rules
VPT	Vertiport
VRP	Vertiport Reference Point
VSS	Visual-segment surface
VTOL	Vertical Take-off and Landing
eVTOL	electrical Vertical Take-off and Landing

VTOSS	Vertical Take-off Safety Speed (for helicopters certified in category A)

Symbols

µ	the coefficient of friction (µ=Mu) is the ratio between the friction force and the vertical load
°	degrees
=	equals
%	per cent

Chapter III-2 – Vertiport Certificate and Landing Area Acceptance

2.1 General

2.1.1 For new vertiports, the operator shall apply for a Design Acceptance prior to commencing construction of the vertiport. For details refer to Appendix III-E.

2.1.2 The applicant shall initiate a meeting with the GCAA to discuss the application and the contents of the submission including the anticipated scope of operations for the vertiport.

2.1.3 All applicants must have secure access to the ANA e-Services to apply for a Vertiport Certificate or Landing Area Acceptance, available on the GCAA website: *www.gcaa.gov.ae*.

2.1.4 Organisation applicants shall provide a copy of their Trade License or equivalent.

2.1.5 Individual applicants shall provide a copy of their Emirates ID.

2.1.6 After receiving access to ANA e-Services, the applicant shall complete the details required in the on-line form for the issue of a Vertiport Certificate or a Landing Area Acceptance.

2.2 Application

2.2.1 The initial information required for the completion of the on-line application form includes the following:

a) a point of contact for the application;
b) particulars of the vertiport including name, location, intended scope of operations etc.;
c) for a Vertiport Certificate the nomination of Responsible Persons (Post Holders); (refer to 2.4.2 and Chapter III-11)
d) for a Landing Area Acceptance, the nomination of a Person Responsible for Operations;
e) if applicable, evidence that all security, emergency planning and any requirements relating to the provision of Air Navigation and Airspace have been satisfied; and
f) evidence of payment of any applicable GCAA Service Fees. (refer to 2.3.2)

2.3 Service Fees

2.3.1 Applicants undertake to pay GCAA Service Fees in respect of an initial issue of Vertiport Certificate or a Landing Area Acceptance.

2.3.2 Payment of the GCAA Service Fee does not guarantee the grant or continuation of a Vertiport Certificate or a Landing Area Acceptance.

2.4 Vertiport Certification Process

2.4.1 Initial Certification Process:

2.4.1.1 The following documents shall be provided to GCAA for review:

a) Written policy, procedures and other information as required by Chapter III-10.
b) Any other documents or evidence as requested by the GCAA.

2.4.1.2 For a Vertiport Certificate, applications are provided through ANA e-Services. Each Applicant will be required to hold a GCAA ANA e-Service account and complete an initial on-line form. Applications will be assessed and processed by Air Navigation and Aerodrome Department through assessing visual aids (markings, lights, signs and markers); Heliport Manual and AES (RFFS and Emergency Response) in relation to CAR Part IX Aerodromes, CAR Part X and CAR Part XI, any Air Navigation Services in relation to the relevant requirements in CAR-ANS (which includes Air Traffic Services (ATS), Communication Navigation & Surveillance Services (CNS), Aeronautical Information Services (AIS), Aeronautical Meteorological Services (MET)), Airspace in relation to the direction of flight; the assessment of the obstacle environment on the basis of the intended use of a Vertiport.

2.4.1.3 Applicants may be, prior to the issue of a Certificate or Landing Area Acceptance, required to obtain a security clearance through the GCAA website e-Services under security. Further guidance shall be sought directly to Aviation Security Affairs Sector (ITA@gcaa.ae).

2.4.1.4 The GCAA will conduct a Verification Audit of the facilities, equipment, policies and procedures and other related safety activities.

2.4.1.5 The aim of the Verification Audit is:

a) to verify compliance with the applicable requirements through a technical inspection, the examination of documentation, and demonstration of compliance. It should be noted that the GCAA audit, inspection, testing or sampling processes do not absolve the applicant from the responsibility to provide accurate information and documentary evidence.

b) assess the certificate holder's management of safety as well as the competence of those responsible for safety at the vertiport.

2.4.1.6 The GCAA will produce an audit report identifying any shortfalls in compliance.

2.4.1.7 If shortfalls in compliance are identified during the Verification Audit, the applicant will be required to provide confirmation of the audit report together with an action plan with timescales to rectify or mitigate all findings to a level acceptable to the GCAA.

2.4.1.6 The GCAA will only issue a Vertiport Certificate when satisfied that all regulatory and critical safety elements have been mitigated. This may require a further audit/inspection follow-up visit and/or special additional operating approvals, conditions or restrictions.

2.4.2 Personnel Requirements

2.4.2.1 Vertiport staffing requirement:

RESERVED

2.4.2.2 Each vertiport operator prior to the grant of a Vertiport Certificate and thereafter on an on-going basis shall engage, employ or contract:

a) Sufficient, qualified and trained personnel for the planned tasks and activities to be performed related to the operation, maintenance, emergency response and management of the vertiport in accordance with the applicable requirements and the vertiport operator's training programme; and
b) sufficient number of managerial, supervisory and operational personnel with defined duties and responsibilities.

2.4.2.3 The vertiport operator shall nominate:

a) An Accountable Manager - a person who has direct access to funds, final authority over operations under the certificate/approval of the organisation and ultimate responsibility and accountability for the resolution of all safety issues; and
b) Vertiport Operations Post Holder – a person who is responsible for ensuring that the vertiport and its operations comply with the requirements of this CAR-HVD PART III.

2.4.2.3 The vertiport operator shall consider the size and complexity of the organization, recognizing that the roles of the Vertiport Accountable Manager and Vertiport Operations Post Holder may be combined.

2.4.2.4 The nomination of a single person should depend upon the individual's competence and capacity to meet the responsibilities of holding both positions.

2.4.2.5 The vertiport operator shall ensure that any changes to the personnel mentioned in 2.4.2.2 are notified to the GCAA immediately.

2.4.2.6 Vertiport Operations Post Holder should be responsible for all aspects of the vertiport operations and maintenance, where necessary and for the coordination with AIS provider. The post holder is also responsible for the development, implementation of and conformance with the vertiport:

a) emergency response;
b) manoeuvring area access and control procedures;
c) apron management;
d) disabled aircraft removal plan;
e) other environmental, security and safety programs as required; and
f) oversight to ensure compliance with certification regulatory obligations.

2.4.2.7 No operation shall be conducted in the vertiport unless one or more Vertiport Landing Officers (VLO) are present. A VLO should be responsible for ensuring that the physical and operational aspect of the vertiport is safe for VCA operations including:

a) All necessary steps are taken to limit access of vehicles and persons to the vertiport landing area prior to take-off and landing;
b) the vertiport is clear of FOD, etc.;
c) assessing the risk of wildlife on and in the vicinity of the vertiport, and establishing a means and procedures to minimise the risk of collision between wildlife and VCA at the vertiport
d) all necessary personnel are present and at a state of readiness; and
e) passengers are held in a safe zone during the landing or take off of VCAs and are under supervision while on the vertiport movement area.

2.4.2.8 The VLO should wear identification clearly showing he/she is the responsible person during vertiport operations. A vest should be marked on the front and back with the letters VLO in a reflective material.

2.4.2.9 The VLO is required to be present on the vertiport during VCA landing and take-off, the vertiport operator should appoint ‘Vertiport Assistant(s) ' to assist the VLO with the administration of passengers and freight.

2.4.2.10 The vertiport operator should ensure sufficient number of personnel is provided.

Note. – Vertiport operator may refer to the task resource analysis available in Appendix I-I.

2.4.2.12 No operation shall be conducted in the vertiport unless one or more VertiPort Assistant (VPA) are present. The responsibilities of VPAs should include but not be limited to:

a) Assisting the VLO in the operation of the vertiport;
b) Directing passengers to and from the VCA;
c) Loading and unloading freight and baggage from the VCA; and

d) Operation of firefighting and equipment under the direction of the VLO and assisting the VLO with checking the performance and operational readiness of ground operations, firefighting and rescue equipment'

2.4.2.13 During VCA operations both the VLO and VPA(s) should be standing by in the immediate location of the VCA landing area. The VPAs should be dressed in fire-fighting protective clothing to enable them to respond to any incident as quickly as possible.

2.5 Landing Area Acceptance Process

2.5.1 For new vertiports, the operator shall apply for a Design Acceptance prior to commencing construction of the vertiport. For details refer to Appendix III-E.

2.5.2 For a Landing Area Acceptance, applications are provided through ANA e-Services. Each Applicant will be required to hold a GCAA ANA e-Service account and complete an initial on-line form.

2.5.2 Landing Area Acceptance Requirements:

2.5.2.1 The GCAA will conduct an on-site inspection to determine the level of compliance with this CAR HVD Part III.

2.5.2.2 The Landing Area Acceptance will only be granted by the GCAA when it is satisfied that:

a) Level of compliance with CAR HVD Part – III is acceptable and
b) Corrective action plan proposed by the operator is acceptable

2.6 Vertiport collocated on aerodrome

2.6.1 Aerodrome Certificate Holders planning to operate VCA from either dedicated new vertiport infrastructure within the aerodrome boundary or by adapting existing infrastructure (i.e. FATO); shall comply with CAR ADR.

2.7 Oversight

2.7.1 Following the issue of a Vertiport Certification and/or Landing Area Acceptance, the vertiport operator will be subject to a continuous oversight process.

2.7.2 The GCAA retains also the right to inspect the vertiport at any time.

2.7.3 If conditions or operations are found to be unsafe, the GCAA also retains the right to place restrictions on the use of the vertiport or withdraw or suspend the Vertiport Certification and/or Landing Area Acceptance.

2.8 Movement Data

2.8.1 The vertiport operator shall establish a system of records keeping which includes mechanism to record number of movements of each type of VCA, number of passengers. When requested by the GCAA, the Vertiport Certificate holder and/or Landing Area Acceptance holder shall provide required details.

Note - A movement is either a take-off or a landing

Chapter III-3 – Vertiport Data

3.1 Notifying and Reporting Information to the Aeronautical Information Service

3.1.1 A vertiport operator holding a Vertiport Certificate shall publish the relevant information on its vertiport within the Aeronautical Information Publication (AIP) and ensure that its activities are coordinated with other nearby civil and military aviation activity.

Note1. - Commercial VCA activities include, but not limited to ferrying passengers, transporting cargo, hospitality, tourism, photography, filming, etc.

Note2. - Information on all vertiports is published in GCAA UAE Heliport Dashboard. UAE Heliport Dashboard subscription request is available through GCAA website ***(www.gcaa.gov.ae)****.*

3.1.2 Certificated vertiports published in the AIP shall comply with the relevant documents reference in Table 3-1. Reference should also be made to CAR ADR – Aerodromes, Chapter 4, Section 4.10 Notifying and Reporting Information to the Aeronautical Information Service.

Table 3-1 – Document References

Aeronautical Information Service	Reference documents
ICAO	Annex 4 – Aeronautical Charts Annex 15 – Aeronautical Information Services DOC 8126 - Aeronautical Information Services Manual
GCAA	CAR ADR – Aerodromes, Chapter 4, Section 4.10 AMC 56: Electronic Data Provision in AIM

3.2 Naming of Vertiports

3.2.1 Vertiport name shall not have the potential to be confused with another aerodrome/heliport or vertiport.

3.3 Common Reference System

3.3.1 Please refer to CAR ADR - Aerodromes, Chapter 1, Section 1.4.

3.4 Aeronautical Data

3.4.1 Vertiport Operators shall comply with aeronautical data accuracy and integrity requirements stipulated in CAR ADR – Aerodromes, Chapter 4, Section 4.10.

3.5 Vertiport Reference Point

3.5.1 A vertiport reference point (VRP) shall be established for a vertiport not co-located with an aerodrome.

3.5.2 The VRP should be located at the geometric centre of the vertiport.

3.5.3 The position of the VRP shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

Note. - When the vertiport is co-located with an aerodrome, the established aerodrome reference point serves both aerodrome and vertiport.

3.6 Vertiport Elevation

3.6.1 The elevation of the VRP and geoid undulation at the VRP elevation position shall be measured and reported to the aeronautical information services authority to the accuracy of half a metre.

3.6.2 The elevation of the TLOF and/or the elevation and geoid undulation of each the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority to the accuracy of half a metre.

Note. - Geoid undulation must be measured in accordance with the appropriate system of coordinates.

3.7 Vertiport Dimensions and Related Information

3.7.1 The following data shall be measured or described, as appropriate, for each facility provided on a vertiport:

a) Vertiport type — surface-level or elevated;
b) TLOF — dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1000 kg);
c) FATO — type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length and width to the nearest metre, slope, surface type;
d) safety area — length, width and surface type;

e) VCA taxiway and VCA taxi route — designation, width, surface type;
f) apron — surface type, VCA stands;
g) clearway — length, ground profile;
h) visual aids for approach procedures, marking and lighting of FATO, TLOF, VCA ground taxiways, VCA air taxiway and VCA stands.

3.7.2 The geographical coordinates of the geometric centres of the TLOF(s) and/or of each threshold of the FATO(s) (where appropriate) should be measured and reported to the authority, if required, in degrees, minutes, seconds, and hundredths of seconds.

3.7.3 The geographical coordinates of appropriate centre line points of VCA taxiways should be measured and reported to the authority, if required, in degrees, minutes, seconds, and hundredths of seconds.

3.7.4 The geographical coordinates of each VCA stand should be measured and reported to the authority, if required, in degrees, minutes, seconds, and hundredths of seconds.

3.8 Declared Distances

3.8.1 The following distances to the nearest metre shall be declared, where relevant, for a vertiport for VCA:

(a) landing distance available (LDAV),

(b) landing distance required (LDRV),

(c) rejected take-off distance available (RTODAV),

(d) rejected take-off distance required (RTODRV),

(e) rejected take-off distance (RTODV),

(f) take-off distance available (TODAV), and

(g) take-off distance required (TODRV).

3.9 Vertiport Emergency Response

3.9.1 Vertiport operator shall establish an emergency plan, rescue and firefighting services.

Note. – For further information, refer to Chapter III-8 for emergency planning and Chapter III-9 for rescue and firefighting.

3.10 Coordination between Aeronautical Information Services and Vertiport Operator

3.10.1 To ensure that aeronautical information services (AIS) providers obtain information that allows them to provide up-to-date pre-flight information and in-flight information, arrangements should be made in due time between AIS providers and the vertiport operator, to report to the responsible AIS unit:

(1) information on vertiport conditions;

(2) the operational status of associated facilities, services, and navigation aids within their area of responsibility; and

(3) any other information that is considered to be of operational significance.

3.10.2 Before introducing changes to the air navigation system, the services responsible for such changes should take due account of the time needed by the AIS providers to prepare, produce, and distribute the relevant material for promulgation. To ensure timely provision of the information to the AIS providers, close coordination between the services concerned is therefore required.

3.10.3 Of particular importance are changes to aeronautical information affecting charts and/or computer-based navigation systems that qualify to be notified by the aeronautical information regulation and control (AIRAC) system, as specified in ICAO Annex 15, Chapter 6. The responsible vertiport services should consider the predetermined, internationally agreed AIRAC effective dates when submitting raw information/data to the AIS providers.

Note: Detailed specifications on the AIRAC system are contained in ICAO Doc 10066, PANS-AIM, Chapter-6.

3.10.4 The vertiport services responsible for the provision of raw aeronautical information/data to the AIS providers should do so taking into account accuracy and integrity requirements that are necessary to meet the needs of the end user of aeronautical information/data.

Note 1: Specifications on the accuracy and integrity classification of heliport (vertiport)-related aeronautical data are contained in ICAO Document 10066, 'PANS-AIM', Appendix 1.

Note 2: Specifications for issuing a Notice to Airmen (NOTAM) and NOTAM on snow conditions (SNOWTAM) are contained in ICAO Annex 15, Chapter 6, and ICAO Document 10066, 'PANSAIM', Appendices 3 and 4 respectively.

Note 3: The AIRAC information is distributed at least 42 days in advance of the AIRAC effective dates to reach recipients at least 28 days in advance of the effective date.

Note 4: The schedule of the predetermined, internationally agreed, and common AIRAC effective dates at intervals of 28 days, as well as guidance on the AIRAC use, are contained in ICAO Document 8126, 'AIS Manual', Chapter 2, Section 2.6.

3.11 Safeguarding of vertiports

3.11.1 Obstacle limitation surfaces (OLSs) and obstacle-free volume (OFV) (see Chapter III-5) describe the airspace around vertiports that allow safe VCA operations and prevent vertiports from becoming unusable due to obstacles growing around them.

3.11.2 Vertiport safeguarding is the process by which vertiport operators can, in consultation with the appropriate authorities and within their capability, protect the environment surrounding the vertiport from developments that may affect the vertiport's operation and/or business.

3.11.3 Vertiport safeguarding assesses the implications of any development being proposed in the vicinity of an established vertiport to ensure, as far as practicable, that the vertiport and its surrounding airspace are not adversely affected by those proposals, thus ensuring the continued safety of VCA operating at the location.

3.11.4 Vertiport safeguarding covers several aspects. Its purpose is to protect:

(a) the airspace around a vertiport to ensure no buildings or structures cause danger to aircraft either in the air or on the ground, through the provision of OLSs or OFV;

(b) all the elements of vertiport lighting by ensuring that they are not obscured by any proposed development and that any proposed lighting, either temporary or permanent, is not confused with aeronautical ground lighting;

(c) the vertiport from any increased risk of wildlife strike, in particular bird strikes, which pose a serious threat to flight safety (e.g. the proximity of a garbage and waste disposal site);

(d) vertiport operations from interference by any construction processes that produce dust and smoke, by temporary lighting or by construction that affects navigational aids; and

(e) VCA from the risk of collision with obstacles, through appropriate lighting.

Note: The vertiport operator should consider all the above when assessing the vertiport development proposals.

3.11.5 For the purposes of safeguarding, the vertiport operator should provide a layout plan that shows the following key dimensions:

— vertiport elevation,

— TLOF size,

— FATO size,

— safety area size,

— clearway,

— distance from the safety area or clearway perimeter, where applicable, to the vertiport edges, and

— approach/departure paths showing locations of buildings, trees, fences, power lines, obstructions (including elevations), schools, places of worship, hospitals, residential areas, and other significant features.

— OLSs, OFV, and virtual clearways, where applicable, with the altitude of their origins.

Note: Further guidance on safeguarding is provided in ICAO Document 9261, 'Heliport Manual'.

Chapter III-4 – Physical Characteristics: Onshore Vertiports

Note1. - The provisions given in this section are based on the design assumption that no more than one VCA will be in the FATO at the same time.

Note2. - A vertiport consists of various essential components or defined areas that are the basic building blocks of the design process. Each defined area has an objective, which is described in terms of usage, limitations, and attributes, as well as necessary subsidiary areas associated with it. The vertiport design follows the principle of encapsulation, which means that each defined area can be positioned in isolation or in combination with other defined or subsidiary areas without the need for tables specifying the separation distance. Encapsulation provides flexibility in design, as an area can be present within the boundaries of any defined or subsidiary area. The defined areas are: FATO, TLOF, stand, taxiway, ground taxi-route, and air taxi-route. The subsidiary areas are safety area, clearway, and protection area.

Note3. - The design provisions given in this section assume when conducting operations to a FATO in proximity to another FATO, those operations will not be simultaneous. If simultaneous VCA operations are required, appropriate separation distances between FATOs need to be determined, giving due regard to such issues as downwash, take-off and landing performance, and airspace requirements, and ensuring the flight paths for each FATO do not overlap.

Note4. - The provisions given in this section are common for surface-level vertiports and elevated vertiports unless otherwise specified.

Note5. - When designing VCA stands, the location and dimensions of the charging facility should be taken into consideration.

4.1 Final approach and take-off areas (FATO)

4.1.1 A FATO shall

a) provide:

1) an area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of every part of the design VCA in the final phase of approach and commencement of take-off-in accordance with the intended procedures;

Note. - Essential objects are visual aids (e.g. lighting) or others (e.g. firefighting systems) necessary for safety purposes. For further requirements regarding penetration of a FATO by essential objects, see 4.1.4.

2) when solid, a surface which is resistant to the effects of rotor downwash; and

i) when co-located with a TLOF, is contiguous and flush with the TLOF; has bearing strength capable of withstanding the intended loads; and ensures effective drainage; or

ii) when not co-located with a TLOF, is free of hazards should a forced landing be required; and

Note. – 'Resistant' implies that downwash effects neither cause a degradation of the surface nor result in flying debris.

b) be associated with a safety area.

4.1.2 A vertiport shall be provided with at least one FATO, which need not be solid.

Note. - A FATO may be located on or near a runway strip or taxiway strip.

4.1.3 The minimum dimensions of an FATO should be:

a) the length of the RTODV for the required take-off procedure that is prescribed in the aircraft flight manual (AFM) of the VCA for which the FATO is intended, or 1.5 Design D, whichever is greater; and
b) the width for the required procedure that is prescribed in the AFM of the VCA for which the FATO is intended, or 1.5 Design D, whichever is greater.

Note.: Local conditions, such as elevation, temperature, and permitted manoeuvring may have to be considered when determining the size of an FATO in accordance with EASA SC-VTOL.2105.

4.1.4 Essential objects located in a FATO shall not penetrate a horizontal plane at the FATO elevation by more than 5 cm.

Note: At vertiports that are elevated, roll-over protection may be provided.

4.1.5 When the FATO is solid, its overall slope should not exceed 2 per cent (to horizontal) in any direction. Higher slopes are possible, according to the AFM.

4.1.6 The FATO should be located so as to minimize the influence of the surrounding environment, including turbulence, which could have an adverse impact on VCA operations.

4.1.7 A FATO shall be surrounded by a safety area which need not be solid.

4.2 Safety Areas

Note.: The objective of the safety area is to provide a free-obstacles area that extends beyond the FATO, to compensate for manoeuvring errors under challenging environmental conditions.

4.2.1 A safety area shall provide:

a) An area free of obstacles, except for essential objects which because of their function are located on it, to compensate for manoeuvring errors; and

b) When solid, a surface which: is contiguous and flush with the FATO; is resistant to the downwash effects of, and ensures effective drainage.

4.2.2 The safety area surrounding a FATO shall extend outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 Design D, whichever is greater.

4.2.3 No mobile object shall be permitted in a safety area during VCA operations.

4.2.4 Essential objects located in the safety area shall not penetrate a surface originating at the edge of the FATO at a height of 25 cm above the plane of the FATO sloping upwards and outwards at a gradient of 5 per cent.

4.2.5 When solid, the slope of the safety area shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

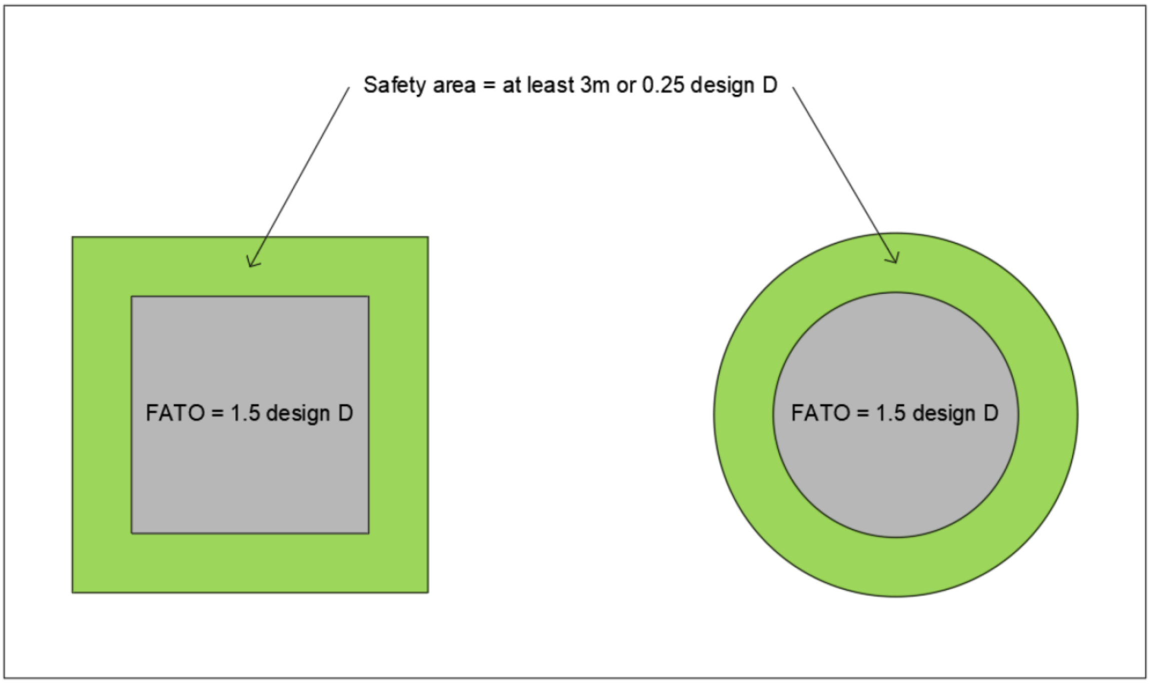


Figure 4-1 – FATO and associated safety area

Protected Side Slope

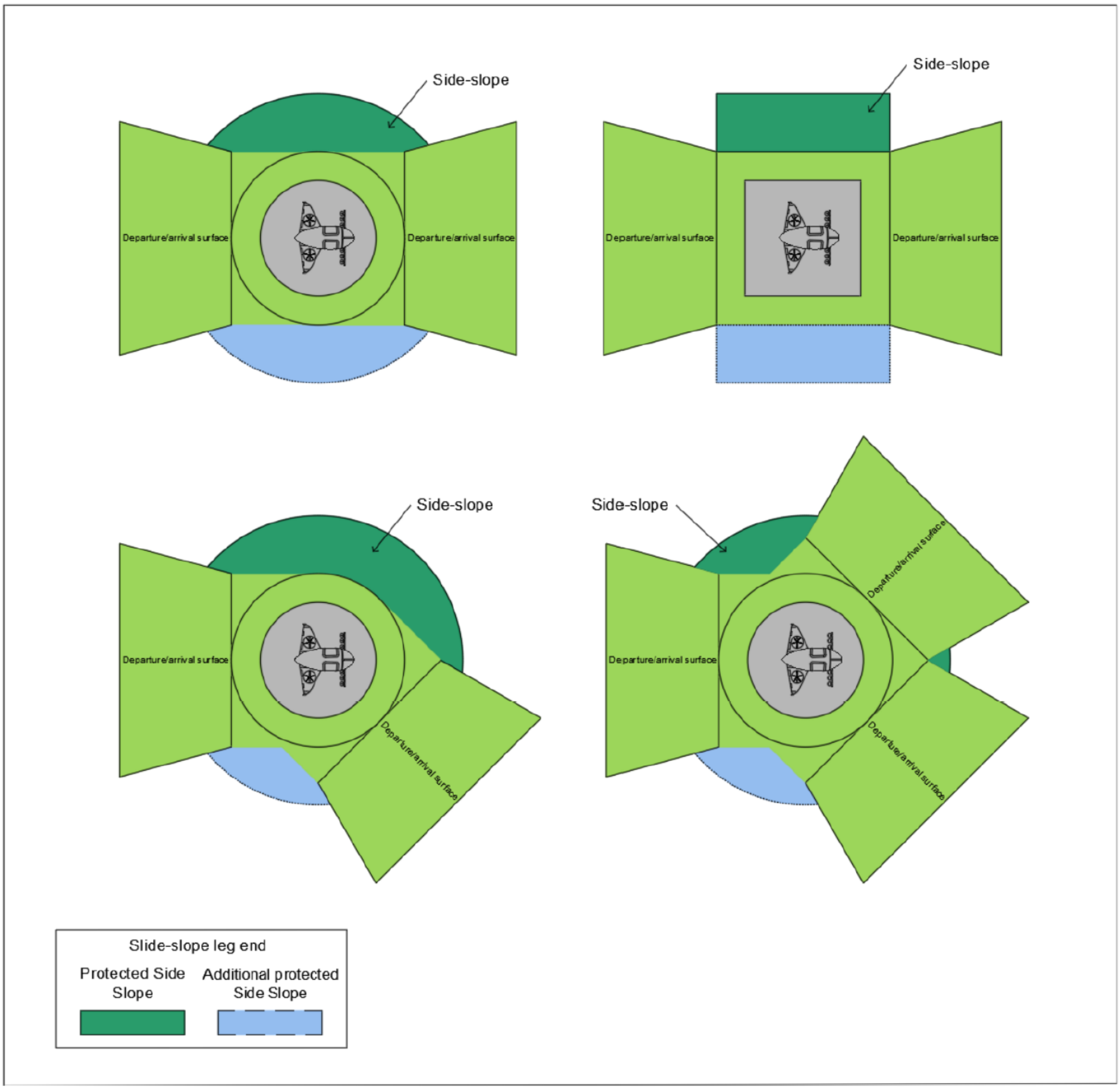


Figure 4-2 – FATO simple/complex safety area and side slope protection

4.2.6 A vertiport should be provided with at least one protected side slope, rising at 45 degrees outward from the edge of the safety area and extending to a distance of 10 m (see Figure 4-2).

4.2.7 The surface of a protected side slope shall not be penetrated by obstacles.

Note. - These diagrams show a number of configurations of FATO/Safety Areas/Side slopes. For a more *complex arrival/departure arrangement which consists of two surfaces that are not diametrically opposed; more than two surfaces; it can be seen that appropriate provisions are necessary to ensure that there are not obstacles between the FATO and/or safety area and the arrival/departure surfaces.*

4.3 Downwash protection

4.3.1 The AFM for VCA provides the value of the downwash that is measured on a 2 D circle while the aircraft is in a 1-m hover in no-wind conditions.

4.3.2 This value can be used to evaluate the adequacy of the SAFETY AREA to protect from downwash. An initial evaluation can be carried out using the values of Table 4-1. However, the evaluation should be complemented by a study taking into account the specific local conditions and relevant wind comfort criteria of the affected population (e.g. bicycle path, vegetation, light structures, etc.).

Table 4-1. Initial guidelines for the maximum downwash velocity per type of area

Maximum downwash velocity	Type of area
60 km/h	for areas of a vertiport traversed by flight crew, or passengers, boarding or leaving an aircraft
60 km/h	for public areas, within or outside the vertiport boundary, where passengers or members of the public are likely to walk or congregate
80 km/h	for public areas where passengers or others are not likely to congregate
50 km/h	for public roads where the vehicle speed is likely to be 80 km/h or more
60 km/h	for public roads where the vehicle speed is likely to be less than 80 km/h
80 km/h	for any personnel working near an aircraft
80 km/h	for equipment on an apron
100 km/h	for buildings and other structures

Adapted from the Australian Government Civil Aviation Safety Authority Part 139 (Aerodromes) Manual of Standards 2019. (Based on content from the Federal Register of Legislation at 09/03/2021. For the latest information on Australian Government law, please go to https://www.legislation.gov.au.)

4.3.3 If the AFM value of the downwash on the 2 D circle is above the recommended maximum downwash velocity, an additional downwash protection area should be created so that the downwash at the boundaries is lower than the recommended maximum. Jet blast fences that are positioned respecting 4.2.6 and 4.2.7 and applicable OLSs and /or OFV can also be used. An extension beyond the 2 D circle may also be warranted to take into account significant mean winds.

4.3.4 If a downwash protection area is established, it may coincide with the placement and size of the safety area when the safety area is not solid.

4.3.5 It should be noted that the AFM value is measured in a 1-m hover radially and a particularly dynamic take-off or landing procedure, or a hover at a different height (e.g. out-of-ground effect), may generate a stronger downwash. A downwash will also be generated on the arrival or departure paths and may affect other areas of the vertiport and nearby environment. A safety assessment and an operational evaluation of individual aircraft type to be approved for a given vertiport is thus also recommended.

4.3.6 For vertiports that are elevated, the downwash protection area may need to be extended below the level of the FATO as illustrated in Figure 4-3. A safety assessment should be conducted to determine whether such an extension is necessary.

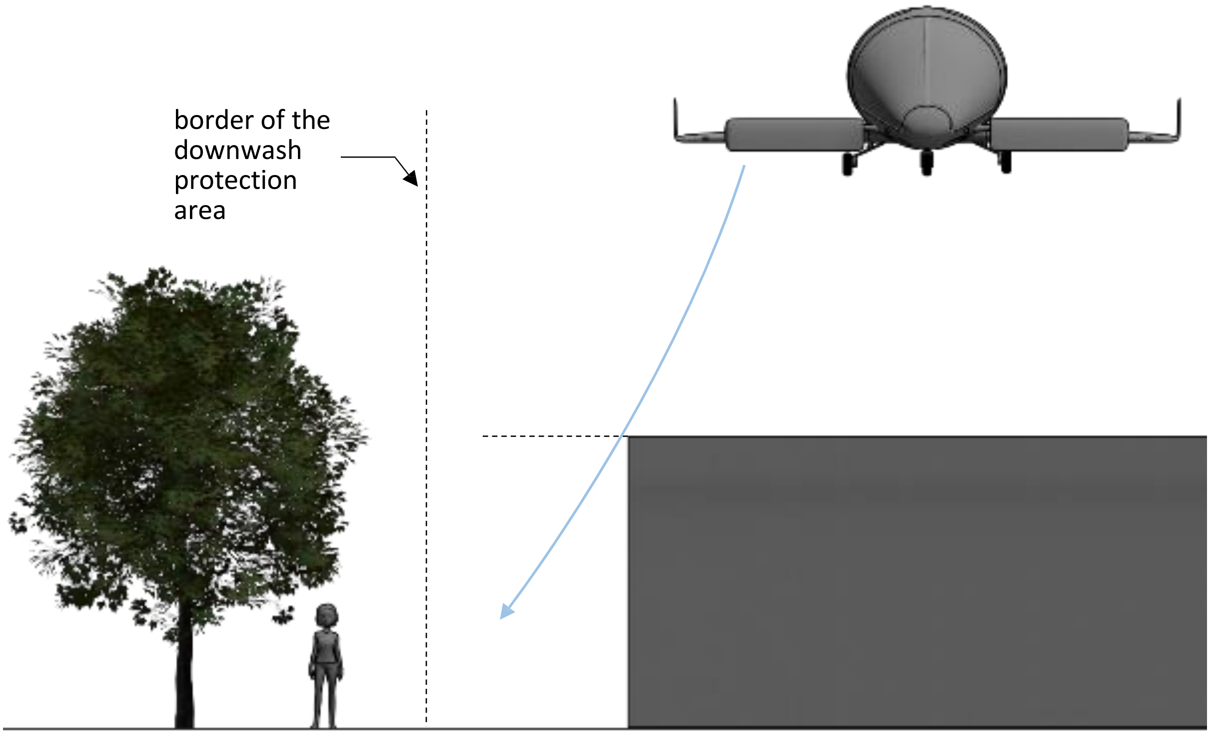


Figure 4-3. Downwash protection area extended below the vertiport that is elevated

4.4 VCA Clearway

Note. - The inclusion of detailed specifications for VCA clearways in this section is not intended to imply that a clearway has to be provided.

4.4.1 A VCA clearway shall provide:

a) An area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of the design VCA when it is accelerating in level flight, and close to the surface, to achieve its take-off safety speed; and

b) When solid, a surface which: is contiguous and flush with the FATO and safety area; is resistant to the downwash effects; and is free of hazards if a forced landing is required; or

c) when elevated, clearance above all obstacles.

4.4.2 When a VCA clearway is provided, the inner edge should be located:

a) at the outer edge of the safety area; or

b) when elevated, directly above, or directly below, the outer edge of the safety area.

4.4.3 The width of a VCA clearway should not be less than that of the FATO and associated safety area. (See Figure 4-1).

4.4.4 When solid, the ground in a VCA clearway should not project above a plane having an upward slope of 3 per cent, or having a local upward slope exceeding 5 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

4.4.5 An object situated in a VCA clearway which may endanger VCAs in the air should be regarded as an obstacle and should be removed.

4.5 Touchdown and Lift-Off Areas

4.5.1 A TLOF shall:

a) provide:

1) An area free of obstacles and of sufficient size and shape to ensure containment of the undercarriage of the most demanding VCA the TLOF is intended to serve in accordance with the intended orientation;

2) a surface which:

a. has sufficient bearing strength to accommodate the dynamic loads associated with the anticipated type of arrival of the VCA at the designated TLOF;

b. is free of irregularities that would adversely affect the touchdown or lift-off of VCAs;

c. has sufficient friction to avoid skidding of VCAs or slipping of persons;

d. is resistant to the downwash effects; and

e. ensures effective drainage while having no adverse effect on the control or stability of a VCA during touchdown and lift-off, or when stationary; and

b) be associated with a FATO or a stand.

4.5.2 A vertiport shall be provided with at least one TLOF.

4.5.3 A TLOF shall be provided whenever it is intended that the undercarriage of the VCA will touch down within a FATO or stand, or lift off from a FATO or stand.

4.5.4 The minimum dimensions of a TLOF should be 0.83 D or the dimensions for the required procedure prescribed in the AFM of the VCA for which the TLOF is intended, whichever is greater.

4.5.5 For an elevated vertiport, the minimum dimensions of a TLOF, when in a FATO, shall be of sufficient size to contain a circle of diameter of at least 1 Design-D. For a non-solid FATO, TLOF should be of sufficient size to permit servicing of the aircraft.

4.5.6 Slopes on a TLOF shall not exceed 2 per cent in any direction.

4.5.7 When a TLOF is within a FATO, it should be:

a) centred on the FATO; or

b) for an elongated FATO, centred on the longitudinal axis of the FATO.

4.5.8 When a TLOF is within a VCA stand, it shall be centred on the stand.

4.5.9 A TLOF shall be provided with markings which clearly indicate the touchdown position and, by their form, any limitations on manoeuvring.

Note. - When a TLOF in a FATO is larger than the minimum dimensions, the TDPM may be offset while ensuring containment of the undercarriage within the TLOF and the VCA within the FATO.

4.5.10 Where more than one TDPMs are provided they shall be placed to ensure containment of the undercarriage within the TLOF and the VCA within the FATO.

Note. - The efficacy of the rejected take-off or landing distance will be dependent upon the VCA being correctly positioned for take-off, or landing.

4.5.11 Safety devices such as safety nets or safety shelves shall be located around the edge of an elevated vertiport but shall not exceed the height of the TLOF.

4.5.12 Where provided, a safety net support assembly and its fixings to the vertiport primary structure should be designed to withstand the static load of the whole support structure, the netting system, and any attached appendages plus at least 125 kg load imposed on any section of the netting system. Where the safety shelving is provided, rather than netting, the construction and layout of the shelving should not promote any adverse wind flow issues over the FATO, while providing equivalent personnel safety benefits, and should be installed to the same minimum dimensions as the netting system, beyond the edge of the TLOF/FATO. It may also be further covered with netting to improve grab capabilities.

4.6 VCA Taxiways and Taxi-Routes

Note.1 - The specifications for ground taxi-routes and air taxi-routes are intended for the safety of simultaneous operations during the manoeuvring of VCAs. The effect of wind velocity/turbulence induced by the rotor downwash would need to be considered.

Note2. - The defined areas addressed in this section are taxiways and ground/air taxi-routes:

a) Taxiways may be associated either with air taxi-routes or ground taxi-routes.

b) Ground taxi-routes are meant for use by ground taxiing of VCAs under their own power or by means of ground movement equipment.

c) Air taxi-routes are meant for use by air taxiing only.

VCA taxiways

Note.1 - A VCA taxiway is intended to permit the surface movement of a VCA either under its own power or by means of ground movement equipment.

Note2. - A VCA taxiway should be designed to accommodate the undercarriage width (UCW) of the most demanding aircraft that it is intended to serve, as well as the width of the required ground movement equipment, whichever is greater.

Note 3: A VCA taxiway can be used by a VCA for air taxi if associated with a VCA air taxi-route.

Note4. - When a taxiway is intended for use by aeroplanes, helicopters, and VCAs, the provisions for aeroplane taxiways; taxiway strips; helicopter taxiway, taxi-routes; and VCA taxiways and taxi-routes will be taken into consideration and the more stringent requirements will be applied.

4.6.1 A VCA taxiway shall:

a) provide:

1) an area free of obstacles and of sufficient width to ensure containment, including taxiing deviations, of the undercarriage of the most demanding VCA the taxiway is intended to serve;

2) a surface which:

a. has bearing strength to accommodate the taxiing loads of the VCAs the taxiway is intended to serve;

b. is free of irregularities that would adversely affect the ground taxiing or movement of VCAs;

c. where relevant, is resistant to the downwash effects; and

d. ensures effective drainage while having no adverse effect on the control or stability of a VCA when being manoeuvred under its own power, or by means of ground movement equipment, or when stationary;

and

b) be associated with a taxi-route.

4.6.2 The minimum width of a VCA taxiway shall be the lesser of:

a) two times the undercarriage width (UCW) of the most demanding VCA the taxiway is intended to serve; or

b) a width meeting the requirements of 4.6.1 a)1).

4.6.3 The transverse slope of a taxiway shall not exceed 2 per cent and the longitudinal shall not exceed 3 per cent.

4.6.4 When defining the minimum distance between a ground taxiway and another ground taxiway, fixed or movable object, the following should be considered:

a) 0.75 maximum width of the aircraft intending to use the ground taxiway when defining the distance between the ground taxiway centre line and a fixed or movable object; and

b) 1.25 maximum width of the aircraft intending to use the ground taxiway when defining the separation between parallel ground taxiway centre lines.

4.6.5 When defining the distance between ground taxiways used by large wingspan VCA, the separation distance between the centre line of a ground taxiway and the centre line of a parallel ground taxiway or an object should take into consideration a minimum wingtip clearance of at least 0.25 D.

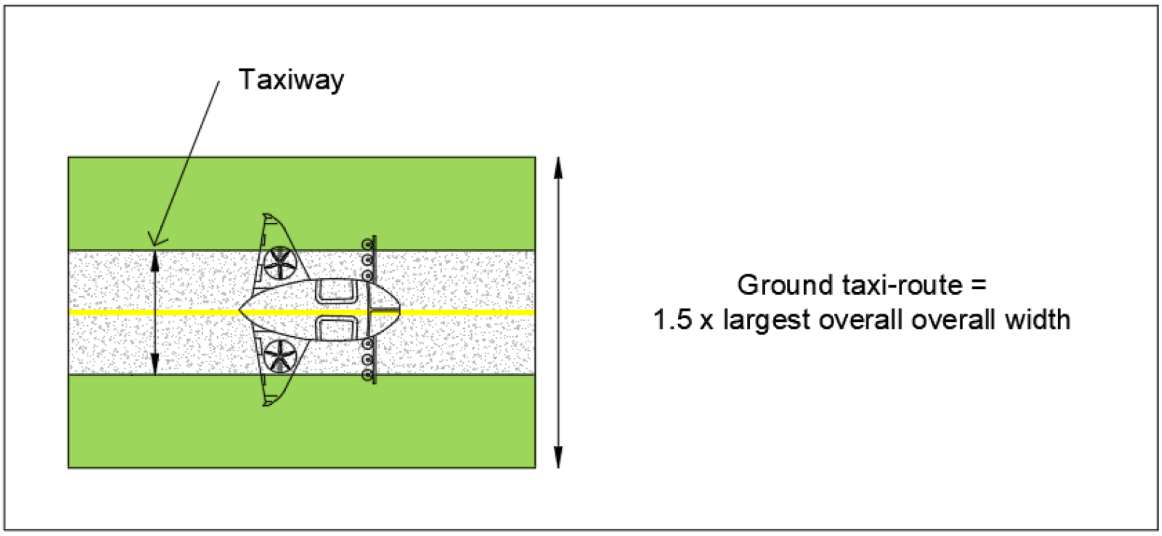


Figure 4-4 – VCA taxiway/ground taxi route

VCA taxi-routes

4.6.6 A VCA taxi-route shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it, established for the movement of VCAs; with sufficient width to ensure containment of the largest VCA the taxi-route is intended to serve;

b) when solid, a surface which is resistant to the downwash effects; and

c) when co-located with a taxiway:

1) is contiguous and flush with the taxiway;

2) does not present a hazard to operations; and

3) ensures effective drainage; and

d) when not co-located with a taxiway, it is free of hazards if a forced landing is required

4.6.7 No mobile object shall be permitted on a taxi-route during VCA operations.

4.6.8 When solid and co-located with a taxiway, the taxi-route shall not exceed an upward transverse slope of 4 per cent outwards from the edge of the taxiway.

VCA ground taxi-routes

4.6.9 A VCA ground taxi-route shall have a minimum width of 1.5 times the overall width of the largest VCA it is intended to serve, and be centred on a taxiway.

4.6.10 Essential objects located in a VCA ground taxi-route shall not:

a) be located at a distance of less than 50 cm outwards from the edge of the VCA ground taxiway; and

b) penetrate a plane originating 50 cm outwards of the edge of the VCA taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

VCA air taxi-routes

Note. — A VCA air taxi-route is intended to permit the movement of a VCA above the surface at a height normally associated with ground effect and at ground speed less than 37 km/h (20 kts).

4.6.11 A VCA air taxi-route shall have a minimum width of twice the overall width of the largest VCA it is intended to serve.

Note: If the VCA designs allow for width changes (e.g. folding wings), a corresponding overall width should be considered for defining the taxi-route width.

4.6.12 If co-located with a taxiway for the purpose of permitting both ground and air taxi operations (see Figure 4-5):

a) the VCA air taxi-route shall be centred on the taxiway; and

b) essential objects located in the VCA air taxi-route shall not:

1) be located at a distance of less than 50 cm outwards from the edge of the VCA taxiway; and

2) penetrate a surface originating 50 cm outwards of the edge of the VCA taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

4.6.13 When not co-located with a taxiway, the slopes of the surface of an air taxi-route should not exceed the slope landing limitations of the VCAs the air taxi-route is intended to serve. In any event the transverse slope should not exceed 10 per cent and the longitudinal slope should not exceed 7 per cent.

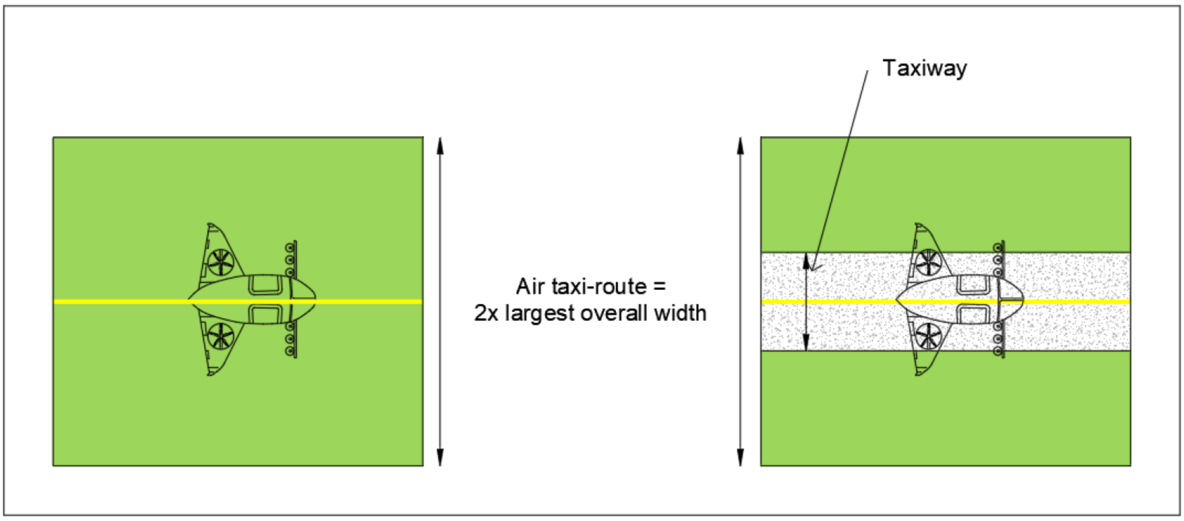


Figure 4-5 – VCA air taxi-route and combined air taxi-route/ taxiway

4.7 VCA stands

4.7.1 Where provided, a VCA stands and aprons shall permit the safe loading and unloading of passengers and/or cargo, as well as the servicing of VCA without interfering with the apron traffic.

Note: A space for safe ground handling should be considered by planning the VCA stand design. In the case of a geometry-based stand, where appropriate, a tail clearance should be also provided (see Figure 4-7).

4.7.2 A VCA stand shall:

a) provide:

1) an area free of obstacles and of sufficient size and shape to ensure containment of every part of the largest VCA the stand is intended to serve when it is being positioned within the stand;

2) a surface which:

a. is resistant to the effects of rotor downwash;

b. is free of irregularities that would adversely affect the manoeuvring of VCAs;

c. has bearing strength capable of withstanding the intended loads;

d. has sufficient friction to avoid skidding of VCAs or slipping of persons; and

b) ensures effective drainage while having no adverse effect on the control or stability of a wheeled VCA when being manoeuvred under its own power, or when stationary; and

c) be associated with a protection area.

Note1. - For a VCA stand intended to be used for taxi-through only, a width less than 1.2 D but which provides containment and still permits all required functions of a stand to be performed, might be used (in accordance with 4.7.1)

Note2. - For a VCA stand intended to be used for turning on the ground, the minimum dimensions may be influenced by the turning circle data provided by the manufacturer and are likely to exceed 1.2 D. See the Heliport Manual (Doc 9261) for further guidance.

Note. - The provisions of this section do not specify the location for VCA stands but allow a high degree of flexibility in the overall design of the vertiport. However, it is not considered good practice to locate VCA stands under a flight path, due to possible downwash and depending on the local conditions, obstacle environment, etc. The extended flight path could go along the vertiport; see the following example in Figure 4-6.

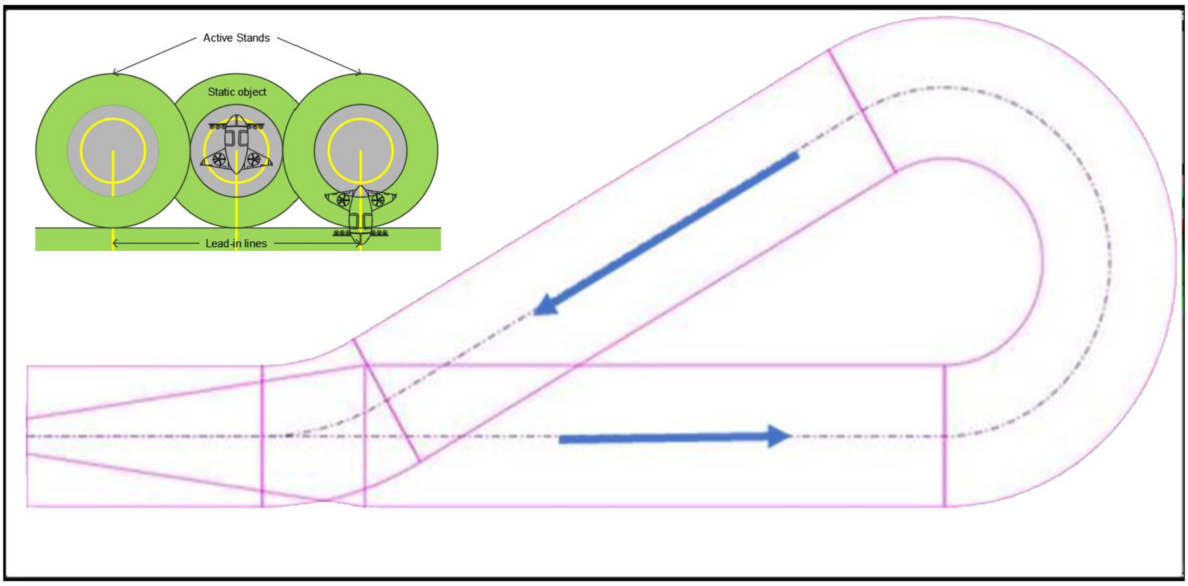


Figure 4-6. Example of not providing parking stands under a flight path

4.7.3 The mean slope of a VCA stand in any direction shall not exceed 2 per cent.

Note: When determining the VCA stand and apron layout, the vertiport designer and/or operator should take into consideration various designs of the aircraft that the vertiport intends to serve. The configurations of VCA vary significantly (e.g. a multi-copter, a winged aircraft, etc.). As a result, it proved to be challenging to introduce a single, unified design of a VCA stand, based on the D-value, as it is commonly done in today's helicopter world.

Furthermore, certain VCA can execute a power-in/push-back type manoeuvre under their own power or using a tug avoiding the need for hover turns, which resembles an aeroplane operation at an aerodrome.

*Hence, a concept of a 'vertiport apron' and a 'geometry-based stand' are introduced in addition to conventional stands, originating from aerodrome design rules (namely, CAR-ADR 8.6.2 **Size of Aprons**).*

4.7.4 Each VCA stand shall be provided with positioning markings to clearly indicate where the VCA is to be positioned and, by their form, any limitation on manoeuvring.

4.7.5 VCA stands and the vertiport apron layout should be designed based on the geometry, ground movement and servicing requirements of a VCA intended to be served, taking into consideration the following factors:

a) the size and manoeuvrability characteristics of the aircraft intending to use the VCA stand;
b) clearance requirements;
c) type of ingress and egress to the VCA stand;
d) vertiport layout;
e) VCA ground equipment and servicing requirements;
f) taxiway access;
g) intended use of the VCA stand (such a turning or taxi-through).

Note: Stands designed for turning or associated with a TLOF should be defined and sized based on the D-value considerations.

D-value-based VCA stand

4.7.6 When the VCA stand design is based on D-value, the minimum dimensions should be:

a) a circle of diameter of 1.2 D of the largest VCA the stand is intended to serve; or

b) when there is a limitation on manoeuvring and positioning, of sufficient width to meet the requirement of 4.8.2 (a)(1) above, but not less than 1.2 times overall width of largest VCA the stand is intended to serve.

4.7.7 A D-value-based VCA stand should be surrounded by a protection area which need not be solid.

Note 1: For a VCA stand intended to be used for taxi-through only, a width less than 1.2 D but which provides containment and still permits all required functions of a stand to be performed, might be used in accordance with 4.8.1, above.

Note 2: Each stand should be provided with positioning markings to clearly indicate where the VCA is to be positioned and, by their form, any limitations on manoeuvring.

Geometry-based VCA stands

4.7.8 For a VCA that enters/exits the stand with surface movement either under its own power or by means of ground movement equipment, where practical, stands may be designed in accordance with the geometry of the aircraft, following the aerodrome apron concept.

4.7.9 The minimum dimension of a single geometry-based stand should rely on the geometry and performance of the VCA intending to use the geometry-based stand and provide the following minimum clearances between an aircraft entering or exiting the stand and any adjacent building and aircraft of another stand:

VCA width	**Clearance** (see Figure 4-7)
Up to but not including 24 m	3 m
24 m up to but not including 36 m	4.5 m
36 m up to but not including 80 m	7.5 m

4.7.10 The minimum nose (VCA front point) to buildings clearance on geometry- based stands and/or the minimum side clearance between a VCA entering or exiting the stand and any adjacent building may be reduced to 2 m, if a safety assessment indicates that it would not adversely affect the safety of operations of a VCA (e.g. by demonstrating the accuracy of ground movement equipment used).

Note 1: The wingtip clearance to objects and neighbouring aircraft should be at least 3 m; however, the wingtip clearances of neighbouring aircraft may fully overlap, in case one is stationary.

Note 2: The minimum wingtip clearance of 3 m assumes that there are no moving parts that extend beyond the wingtip (e.g. open rotors at the tip of the wing) while entering or exiting the stand.

Note 3: With the minimum clearance ensured as per the table above, the geometry-based stand does not require an additional protection area surrounding it.

VCA Protection Areas

4.7.11 A stand shall be surrounded by a protection area which need not be solid.

4.7.12 A protection area should be provided when the VCA stand is designed in accordance with the D-value-based VCA stand principles described above.

4.7.13 A protection area shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it; and

b) when solid, a surface which is contiguous and flush with the stand; is resistant to the effects of rotor downwash; and ensures effective drainage.

4.7.14 When associated with a stand designed for turning, the protection area shall extend outwards from the periphery of the stand for a distance of 0.4D or rely on turning circle data provided in the AFM of VCA intending to use the stand (See Figure 4-9).

4.7.15 When associated with a stand designed for taxi-through, the minimum width of the stand and protection area shall not be less than the width of the associated taxi-route (see Figures 4-10 and 4-11).

4.7.16 When associated with a stand designed for non-simultaneous use (see Figures 4-12 and 4-13):

a) the protection area of adjacent stands may overlap but shall not be less than the required protection area for the larger of the adjacent stands; and

b) the adjacent non-active stand may contain a static object but it shall be wholly within the boundary of the stand.

Note - To ensure that only one of the adjacent stands is active at a time, instruction to pilots in the AIP make clear that a limitation on the use of the stands is in force.

4.7.17 No mobile object shall be permitted in a protection area during VCA operations, unless the object is used to support the movement of the VCA (e.g. a towing vehicle).

4.7.18 Essential objects located in the protection area shall not:

a) if located at a distance of less than 1 D from the centre of the VCA stand, penetrate a plane at a height of 5 cm above the plane of the central zone; and

b) if located at distance of 1 D or more from the centre of the VCA stand, penetrate a plane at a height of 25 cm above the plane of the central zone and sloping upwards and outwards at a gradient of 5 per cent.

4.7.19 When solid, the slope of a protection area shall not exceed an upward slope of 4 per cent outwards from the edge of the stand.

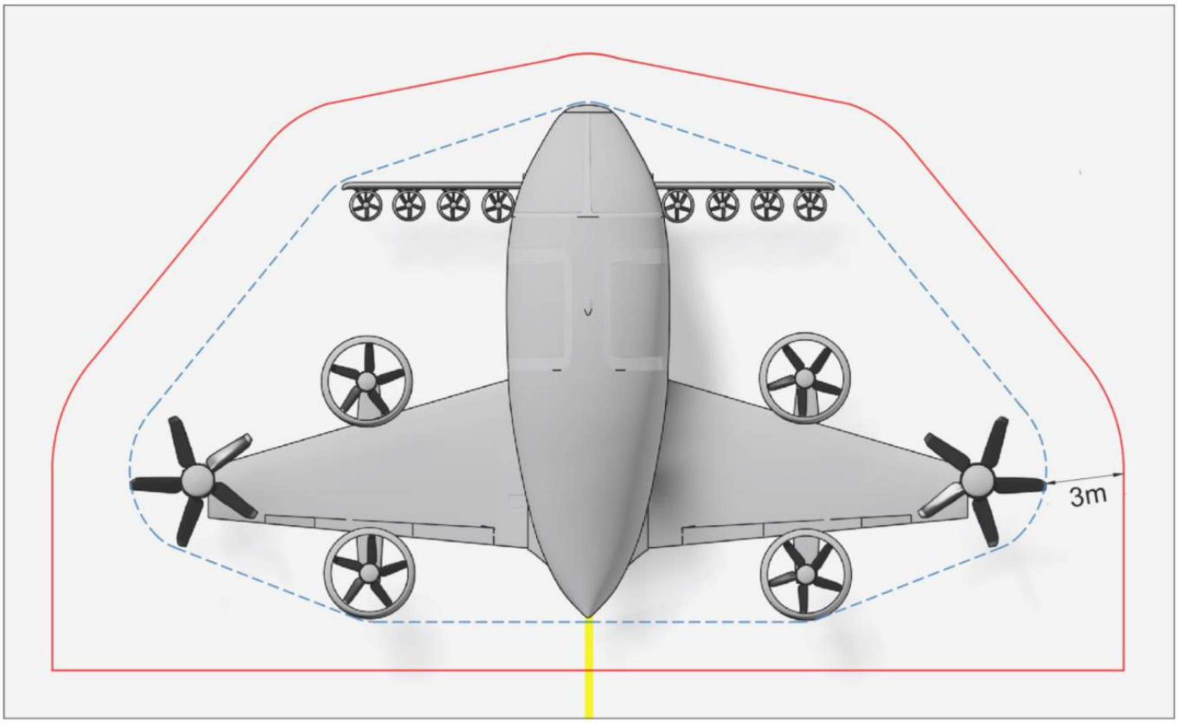


Figure 4-7. VCA stand with a minimum clearance based on VCA geometry showing unshrouded rotors not turning

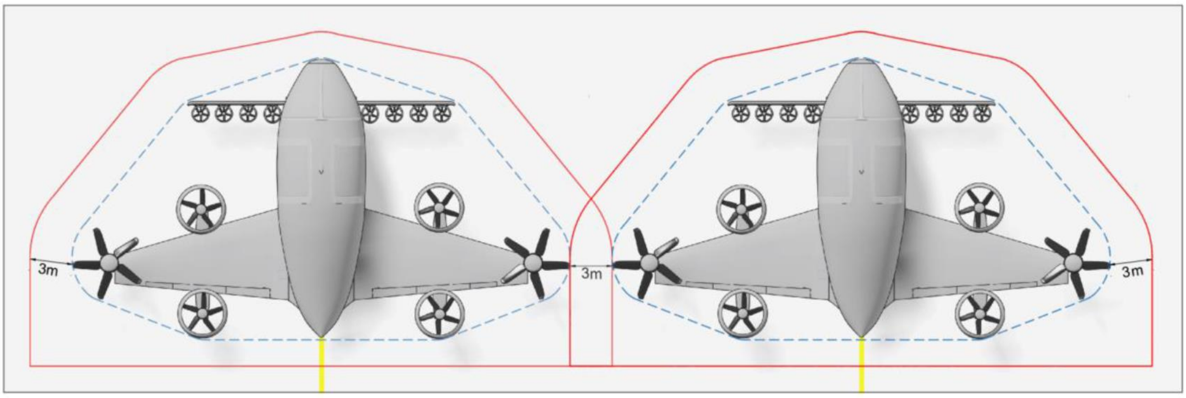


Figure 4-8. VCA stands with a minimum clearance between an aircraft entering or exiting the stand and any adjacent building and aircraft of another stand

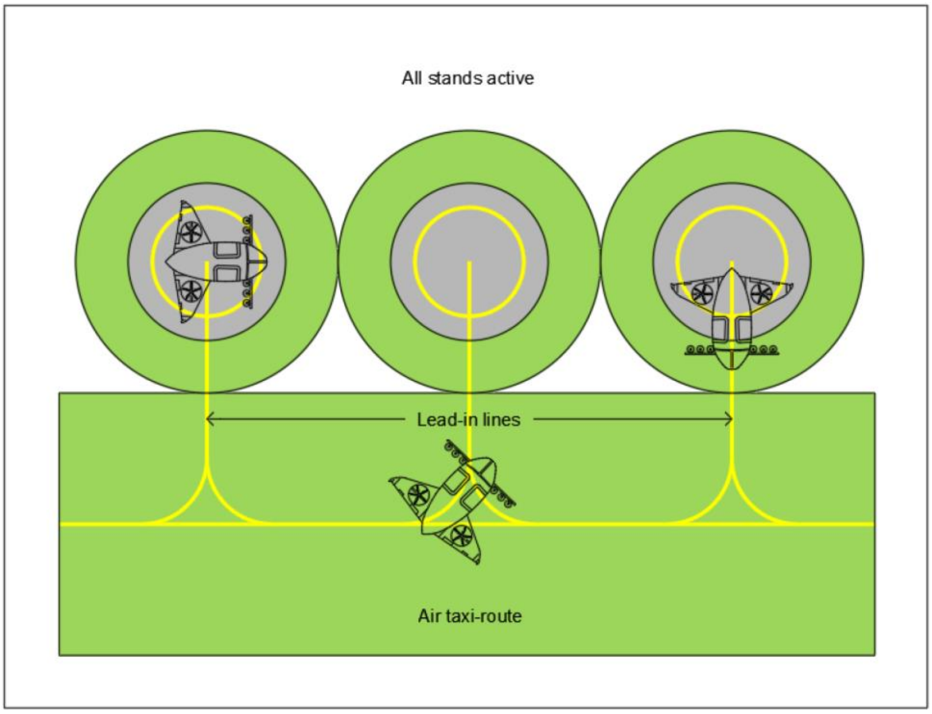


Figure 4-9. Turning VCA stands (with air taxi-routes) — simultaneous use

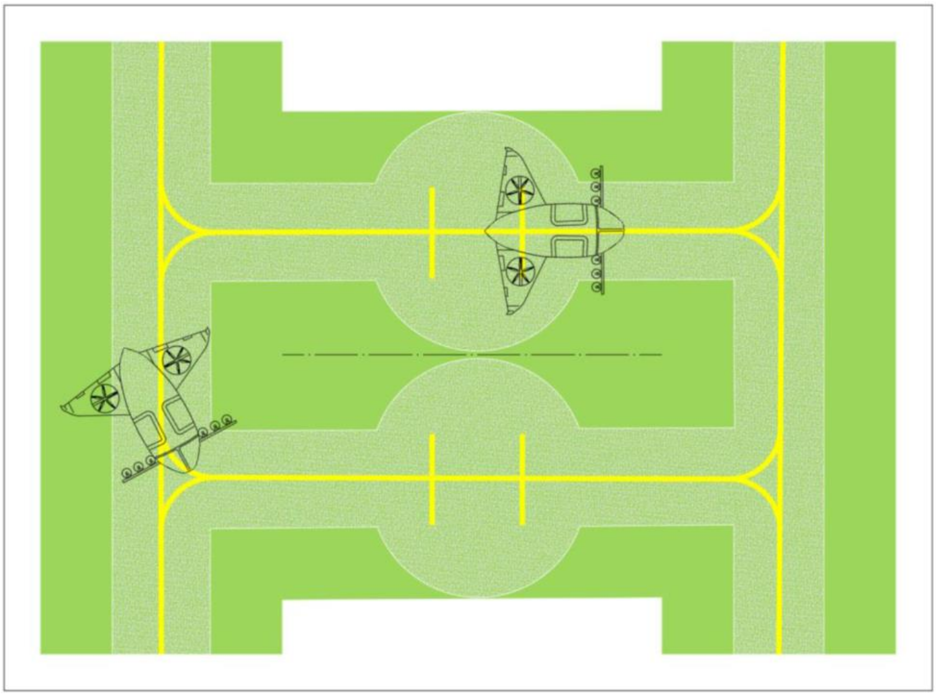


Figure 4-10. Ground taxi-through stands (with taxiway/ground taxi-route) — simultaneous use

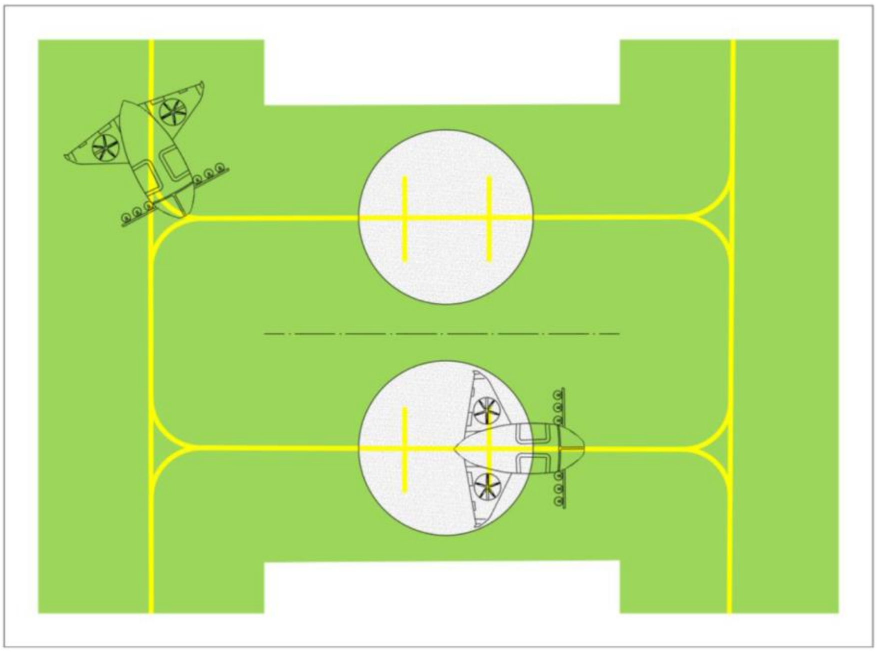


Figure 4-11. Air taxi-through stands (with air taxi-route) — simultaneous use

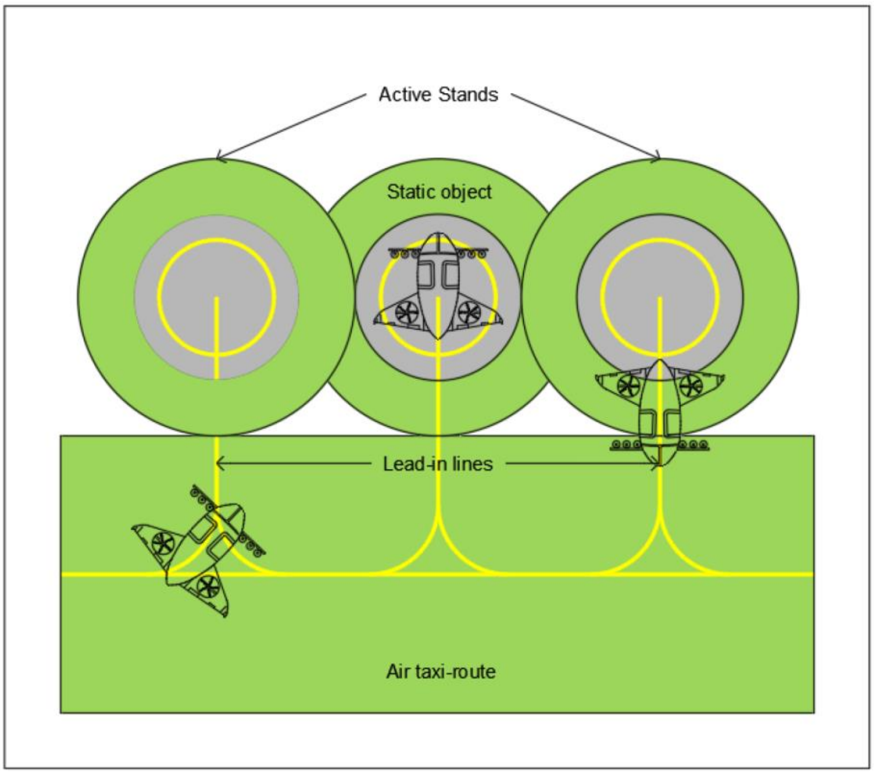


Figure 4-12. Turning stands (with air taxi-routes) — non-simultaneous use — outer stands active

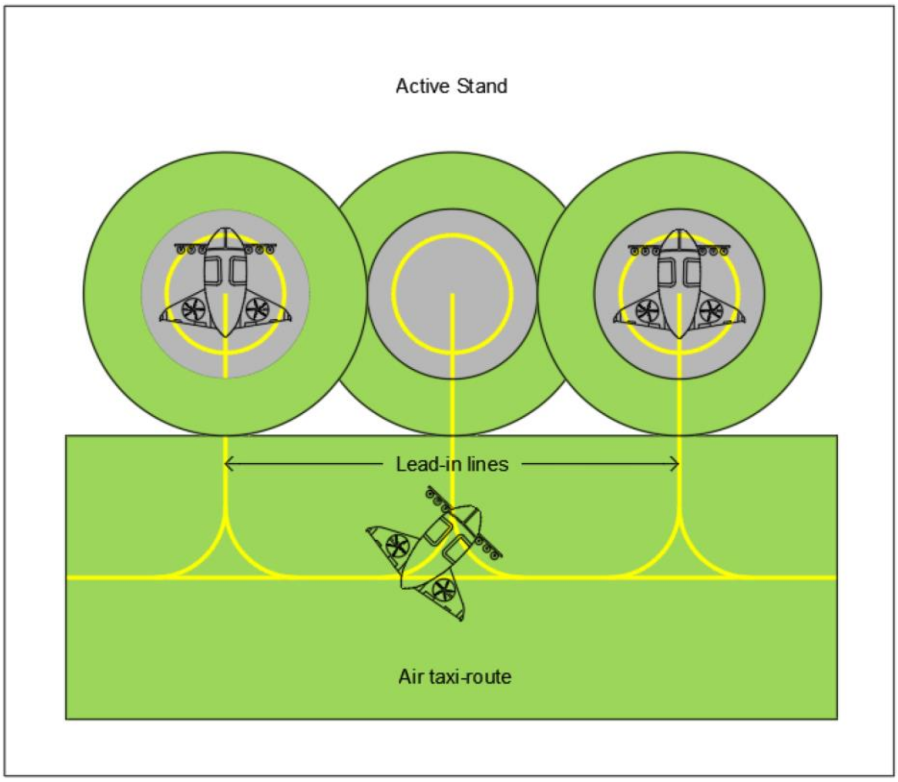


Figure 4-13. Turning stands (with air taxi-route) — non-simultaneous use — inner stand active

4.8 Location of a FATO in Relation to another FATO

4.8.1 When determining the distance between two FATOs, a safety assessment should indicate that this would not adversely affect the safety of operations of a VCA.

4.8.2 The safety assessment should take into consideration, at least the following aspects:

a) type of operation;

b) orientation of departure and approach flight path;

c) balked landing procedure;

d) the downwash data (provided in AFM);

e) ensuring that safety areas do not overlap.

Note 1: A 60-m separation distance between two FATOs has been recognised as a reference for simultaneous VCA landings and take-offs where the courses to be flown do not conflict and where the

MTOW of the VCA does not exceed 3 175 kg. This distance can be used as a reference for conducting a safety assessment to determine whether the distance for VCA should be adapted.

Note 2: When there is a need to adapt a rectangular area, such as already existing runway type FATO or the runway at aerodrome, for simultaneous or quasi-simultaneous and close in space operations of VCA, following the assumption that no more than one VCA will be in the FATO at the same time, the principle of building blocks and encapsulation should be applied. The existing rectangular area has to be replaced by several FATOs in close proximity. Whether the operations can be simultaneous or not will depend on the separation of the FATOs in close proximity according to 4.9.2.

4.9 Location of a FATO in Relation to a Runway or Taxiway

4.9.1 Where a FATO is located near a runway or taxiway, and where simultaneous operations are planned, the separation distance between the edge of a runway or taxiway and the edge of a FATO shall not be less than the appropriate dimension in Table 4-2.

4.9.2 A FATO shall not be located:

a) near taxiway intersections or holding points where jet engine efflux is likely to cause high turbulence; or

b) near areas where aeroplane vortex wake generation is likely to exist.

Table 4-2 – FATO Minimum Separation Distances for simultaneous operations

If aeroplane mass and/or VCA mass are:	Distance between FATO edge and runway edge or taxiway edge (m)
up to but not including 3 175 kg	60
3 175 kg up to but not including 5 760 kg	120
5 760 kg up to but not including 100 000 kg	180
100 000 kg and over	250

4.10 Safety Devices Around an Elevated Vertiport

4.10.1 Personnel protection safety devices such as perimeter safety nets or safety shelves should be installed around the edge of the elevated vertiport, or a surface level vertiport where there is a risk of persons falling, except where structural protection already exists. They should not exceed the height of the outboard edge of the TLOF/FATO to avoid presenting a hazard to VCA operations. The load bearing capability of the safety device should be assessed fit for purpose by reference to the shape and size of the personnel that it is intended to protect (see 4.11.5).

4.10.2 Where the safety device consists of perimeter netting, this should be of a flexible nature and be manufactured from a non-flammable material, with the inboard edge fastened just below the edge of the TLOF/FATO. The net itself should:

a) extend in the horizontal plane beyond the edge of the TLOF/FATO to the distance shall comply with UAE regulation on fall protection system and safety net and in any case to at least 1.5 m;

b) be arranged with an upward slope of approximately 10°; and

c) not act as a trampoline but exhibit properties that provide a hammock effect to securely contain a person falling or rolling into it, without serious injury.

Note: To achieve such a slope, the net should be connected to the TLOF/FATO below the plane of the surface to ensure it does not protrude above.

4.10.3 When considering the securing of the net to the structure and the materials used, each element should meet adequacy of purpose requirements, particularly that the netting should not deteriorate over time due to prolonged exposure to the elements, including ultraviolet light.

4.10.4 Perimeter nets may incorporate a hinge arrangement to facilitate the removal of sacrificial panels to allow for periodic testing.

4.10.5 A safety net support assembly and its fixings to the vertiport primary structure should be designed to withstand the static load of the whole support structure, the netting system and any attached appendages plus at least 125 kg load imposed on any section of the netting system (equivalent to a body falling onto the net from vertiport level).

4.10.6 Where the safety device consists of safety shelving rather than netting, the construction and layout of the shelving should not promote any adverse wind flow issues over the FATO, while providing equivalent personnel safety benefits, and should be installed to the same minimum dimensions as the netting system, beyond the edge of the TLOF/FATO. It may also be further covered with netting to improve grab capabilities. Where there is a sheer drop from the edges of the vertiport and the free movement of passengers and vertiport personnel cannot be made without some risk, a safety net should be installed.

4.10.7 Safety devices around elevated vertiport should be tested annually.

4.11 Elevated Vertiports - Structural Design

4.11.1 Elevated vertiports may be designed for a specific VCA type though greater operational flexibility will be obtained from a classification system of design. The FAT0 should be designed for the largest or heaviest type of VCA that it is anticipated will use the vertiport, and account taken of other types of loading such as personnel, freight, refuelling equipment, etc.

4.12 Elevated Vertiports - Means of Escape

4.12.1 Access and escape routes shall be of a suitable design to enable quick and efficient movement of the maximum number of personnel who may require to use them, and to facilitate easy manoeuvring of rescue and firefighting equipment and at hospital, the use of stretchers.

4.12.2 Access and escape routes should have a minimum width of 1.2 metres for main route and 0.7 m for secondary route. Dimensions should be increased accordingly to facilitate rapid transportation of rescue and firefighting equipment and at hospital, areas for manoeuvring a stretcher.

4.12.3 Means of escape should be hatch-painted red and white & Marked 'EMERGENCY EXIT').

4.12.4 Escape routes should be at least 90-degrees to each other and should not be sited close together.

Note1. - Preferred option is for routes to be positioned opposite each other.

4.12.5 Escape routes should not be positioned within direct range of a fixed principal agent application system and consider the likely effect of water blast impeding any passenger evacuation.

4.12.6 Escape routes should be designed and positioned so as not to impede rescue operations and to direct passengers immediately away from the VCA.

4.12.7 Escape routes should be sufficiently illuminated to aid rapid evacuation of passengers away from the vertiport to a safe area.

Note - The provision of an alternative means of escape is necessary for evacuation and for access by rescue and firefighting personnel. The size of an emergency access/egress route may require consideration of the number of passengers and of special operations like Helicopter Emergency Medical Services (HEMS) that require passengers to be carried on stretchers or trolleys.

4.13 Charging Facility and Electric Infrastructure.

Note1: Electrification of aviation propulsion systems is an evolving area with few industry-specific standards. In addition to relevant national, state, and local building codes, the following sections provide a partial list of relevant standards that may assist when specifying charging systems and *facility layout for this emerging industry. Current charging standards for light duty vehicle charging (up to 350kw) align with multiple light electric aircraft currently applying for certification. However, for meeting operational characteristics of higher capacity batteries and novel systems, manufacturers and operators may implement, along with fixed-charger equipment, alternate charging methods including mobile charging systems, fixed battery storage, cable and/or on-board battery cooling, battery swapping, or other concepts.*

Note2: charging or connection standards could vary based on the aircraft duty cycle, charging speed, battery chemistry, charging system, and battery cooling system, etc. Charging infrastructure design for vertiports should consider adapting to multiple aircraft specific systems.

Note3: The grid impact of high wattage charging stations needs to be considered when designing and adopting charging stations.

Note4: When designing VCA stands, the location and dimensions of the charging facility should be taken into consideration due to possible impact of battery charging/swapping procedures on taxiway and parking position and availability of minimum handling-area requirements around the VCA, including passenger handling and areas anticipated for the VCA services.

4.13.1 Sufficient power generation, energy storage, and distribution for any system, as applicable, shall be designed and installed to supply the power required for operation of connected loads during all intended operating conditions;

4.13.2 Vertiport operator should comply with the relevant UAE Fire Code requirements established for design, installation, and maintenance of a stationary energy storage system including battery storage systems.

4.13.3 Any aircraft batteries stored on site shall be stored safely away from TLOF, FATO, and Safety Areas to ensure battery charging in a safe and secure manner.

4.13.4 To ensure the continuity of electric aircraft operations, uninterrupted power supply shall be available thus ensuring alternative energy vectors for general precautions, emergency planning and preparedness, and storage of hazardous materials.

Chapter III-5 – Obstacle Environment

Note1. – This chapter compose of two main subparts; the OLSs, and the OFV. The limitation surface should be such that the population of VCA can achieve conformance in the case of a failure or failures that have a severity of less than catastrophic. There are two main issues: the maximum slope that can be achieved for the population of vehicles; and the type of take-off and landing profiles that are envisaged.

Note2. - The Chapter is providing a minimum requirement to be set in the design of vertiport.

Note3. - The surfaces require a clear area surrounding the vertiport. Because the majority of vertiports will be sited in urban areas and the environment will be rich in obstacles, it is likely that the take-off and landing profiles will have to perform a vertical element and the clearways (if necessary and provided) and take-off, climb and landing surfaces will be elevated. The vertical transit, from/to the vertiport surface, will be conditioned by the type of operation that is envisaged. The ascent/descent path for operations with a pilot should be pilot's field of view (FOV) to conduct a take-off/landing/reject — this is likely to require a sideways or backwards element, with the associated human error margins.

Note4. - More guidance on the separation between the ascent/descent path and transitional surface is provided in ICAO Document 9261, Heliport Manual, Appendix A to Chapter 4 — tailored to the error margins associated with the type of operation.

Note5. - Note. This Chapter contains two separate Subparts. Subpart 1 refers to the conventional Obstacle limitation surfaces (OLS), provided in Annex 14, Volume II, Heliports, Chapter 4 and in ICAO Document 9261, Heliport Manual. Subpart 2 refers to the concept of the 'obstacle-free volume' established at the vertiport.

Note6. — The objectives of the specifications in this chapter are to describe the airspace around vertiports so as to permit intended VCA operations to be conducted safely and to prevent, vertiports from becoming unusable by the growth of obstacles around them. This is achieved by establishing a series of obstacle limitation surfaces or obstacle-free volume that define the limits to which objects may project into the airspace.

5.1 Obstacle Limitation Surfaces and Sectors

General

Note. - In order to safeguard a VCA during its approach to the FATO and in its climb after take-off, an approach surface and a take-off climb surface through which no obstacle is permitted to project is established for each approach and take-off climb path designated as serving the FATO.

Note. - The minimum dimensions required for such surfaces will vary considerably and depend on the:

(1) VCA size, its climb gradient, particularly for critical failure for performance (CFP), its approach speed and rate of descent on the final approach, and its controllability at such speeds; and

(2) conditions under which the approaches/departures are made.

Note. - In many instances, the presence of permanent, high obstacles such as radio masts, buildings or areas of high ground may preclude the provision of the required take-off climb/approach surfaces for a straight take-off climb or approach, whereas the criteria required for the surfaces would be feasible if:

(1) a curved flight path avoiding the obstacles is established; or

(2) the origin of the approach or take-off climb surfaces is elevated with or without a turn.

Note: The slope design categories depicted in Table 5-1 represent minimum design slope angles and not operational slopes. Consultation with VCA operators will help to determine the appropriate slope category according to the vertiport environment and the VCA the vertiport is intended to serve.

5.1.1 The obstacle limitation requirements for vertiports at surface level and vertiports that are elevated will be the same. For vertiports that are elevated, the specified surfaces should be defined relative to the horizontal plane at the elevation of the FATO.

5.1.2 The following OLSs should be established for a FATO at a vertiport:

(a) take-off climb surface;

(b) approach surface; and

(c) where provided (see 5.1.19 to 5.1.22, below), transitional surface.

5.1.3 The dimensions of the take-off climb/approach surfaces should be considered in two parts.

(a) In the first part, the lateral edges of the surface diverge from the direction of the centre line by 10 per cent on each side for daylight operations and 15 per cent on each side for night operations (see Figures 5-7). The divergence should extend until the overall width of the surface has reached, for daylight operations 7 times D-value, and for night operations 10 times D-value. The increase in divergence and width at night is to allow for lack of visual references.

(b) In the second part, the width of the surface should remain constant at the 7 D or 10 D-values, as appropriate. The surface ends where the surface slope reaches 152 m (500 ft) above FATO elevation.

Note. - Further guidance for heliports (vertiports) with elevated origin of an approach and take-off climb surfaces is provided in ICAO Document 9261, Heliport Manual, and in the AFM.

Note. - Further guidance on how to protect airspace and surrounding during the backup procedure of VCA is provided in the CAR AIR OPS Regulation, in ICAO Heliport Manual (Document 9261), and in the AFM.

5.1.4 In the case of an approach or take-off climb surface involving a turn:

(1) when selecting a curved flight path, the performance and handling characteristics of the VCA, eluding undue discomfort to the passengers and minimising noise nuisance by avoiding the overflying of populated areas, should be considered (see Figure 5-1);

(2) the lateral and vertical surfaces should be the same as those for a straight approach surface;

(3) more than one curved portion, separated by a straight section of more than 150 m, are permitted;

(4) The sum of the radius of arc defining the centre line of the approach surface and the length of the straight portion originating at the inner edge should not be less than 575 m. Any combination of curve and straight portion may be established using the following formula:

$$S+R \geq 575 \text{ m and } R \geq 270 \text{ m where } S = 305 \text{ m}$$

where S is the length of the straight portion and R is the radius of turn.

Note: Because VCA take-off performance is reduced in a turn, a straight portion along the take-off climb surface prior to the start of the curve should be considered. This will permit an acceleration with CFP to achieve a stable climb attitude and speed before a turn is initiated. Limits on bank angle and degradation of turns on performance in accordance with the AFM should be noted and applied to the design VCA.

(1) In the case of an approach and departure surface involving turns, the surface should be a complex surface containing the horizontal normals to its centre line and the slope of the centre line should be the same as that for a straight approach surface.

(2) When a VCA is capable of performing turns with smaller radius and straight portions, the minimum radius of turns and the length of the straight portion may be reduced, if the safety assessment determines that it would not adversely affect the safety or significantly affect the regularity of operations of VCA at vertiport. The safety assessment should consider the

turn values and limitations on bank angles and CFP degradation provided in the AFM of the most demanding VCA that the vertiport is intended to serve.

Note. - Further guidance is given in EASA SC-VTOL.2115.

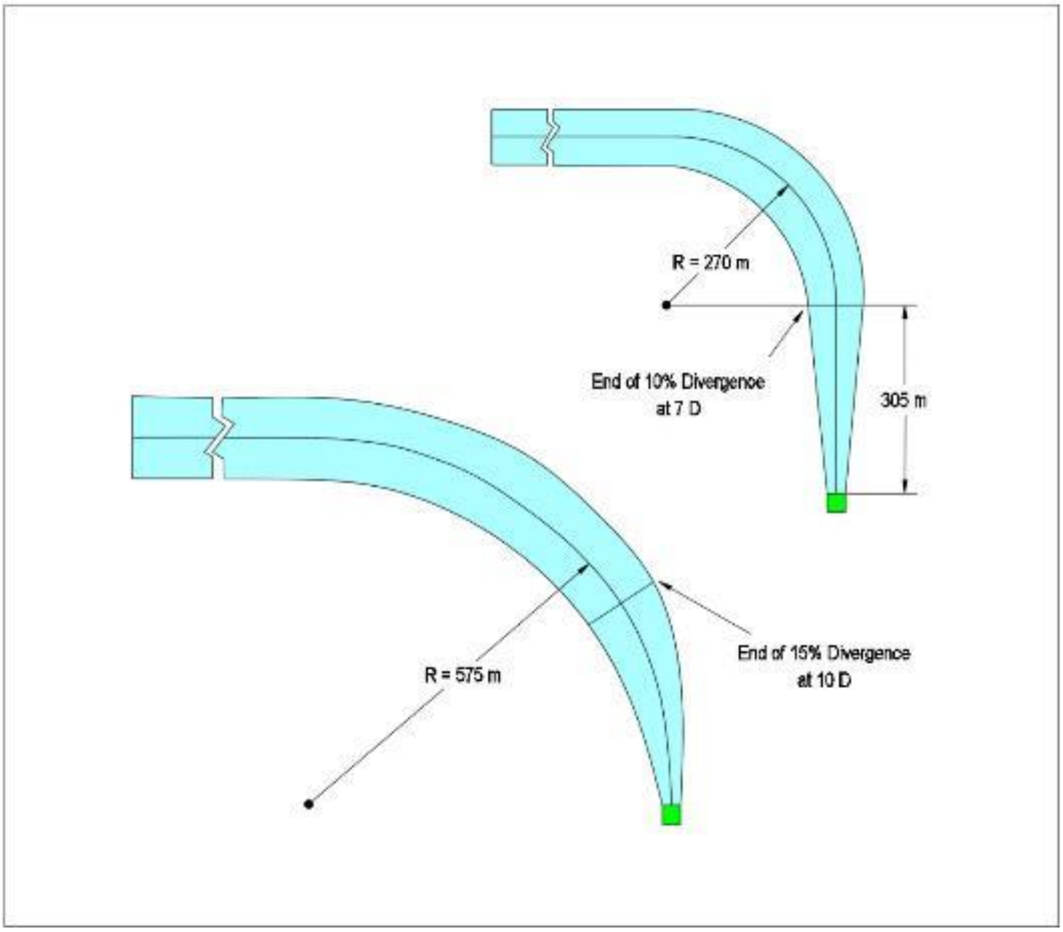


Figure 5-1. Curved approach and take-off climb surface for all FATOs

Blending the spaces between the approach or take-off climb surface and safety area

Note. - The reference circle is an inscribed circle inside the FATO/safety area that is used for orienting the approach/take-off and climb surface, transition area and VCA clearway.

5.1.5 Areas between the inner edge of the approach or take-off climb surface and the safety area, if any, should have the same characteristics as the safety area, since it would be unacceptable for such areas to have characteristics that were below the standards of either of the adjoining surfaces.

Note: Figure 5-2 to Figure 5-5 illustrate such areas by shading the relevant portions, but these are, of necessity, shown only for the basic configurations of FATO and safety area and are not drawn to scale. However, the planned direction of the approach surface may not be located in line with, or at a convenient 45° to, the centre line of the FATO. Furthermore, the FATO, and thus the safety area, may be of irregular shape or be much larger than one which can only just accommodate a circle of the minimum specified dimensions.

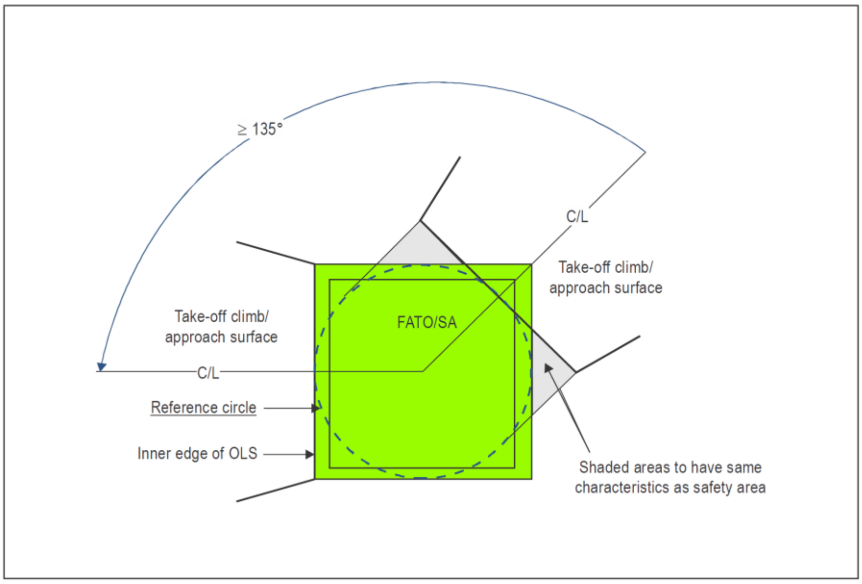


Figure 5-2. Square FATO with reference circle and surfaces separated by 135°

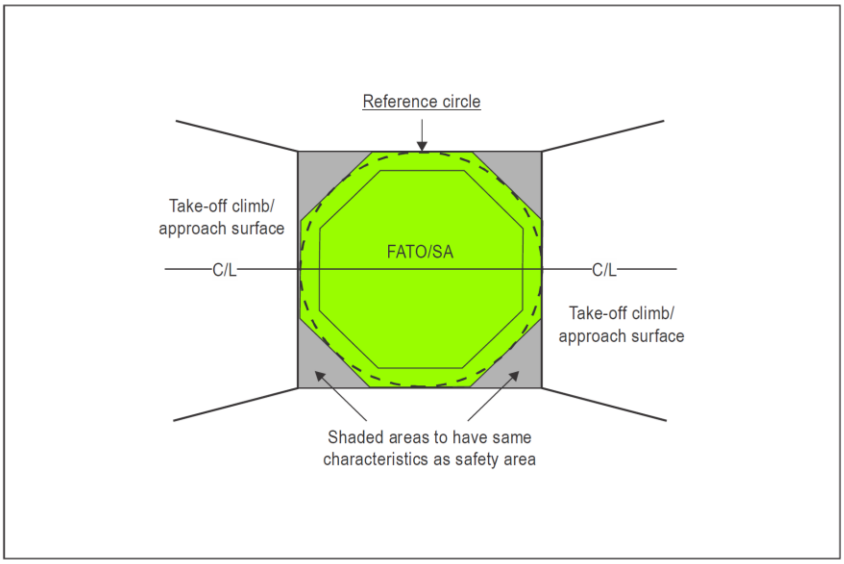


Figure 5-3. Octagonal FATO with reference circle and diametrically opposed surfaces

Note. - The issues involved with such deviations from the basic configurations are:

(1) where the inner edge should be located; and

(2) the shapes and sizes of the shaded areas may vary considerably.

Note. - To identify the shaded areas, if any, it is necessary to consider their side edges as extending from the ends of the inner edge to points where they meet the tangent of the reference circle at right angles to the centre line of the surface. The shaded areas will then be bounded by these side edges, the inner edge and the edges of the safety area.

5.1.6 Where the FATO is elongated, there should be two reference circles within the safety area, each located at the appropriate approach end of the safety area (see Figure 5-4).

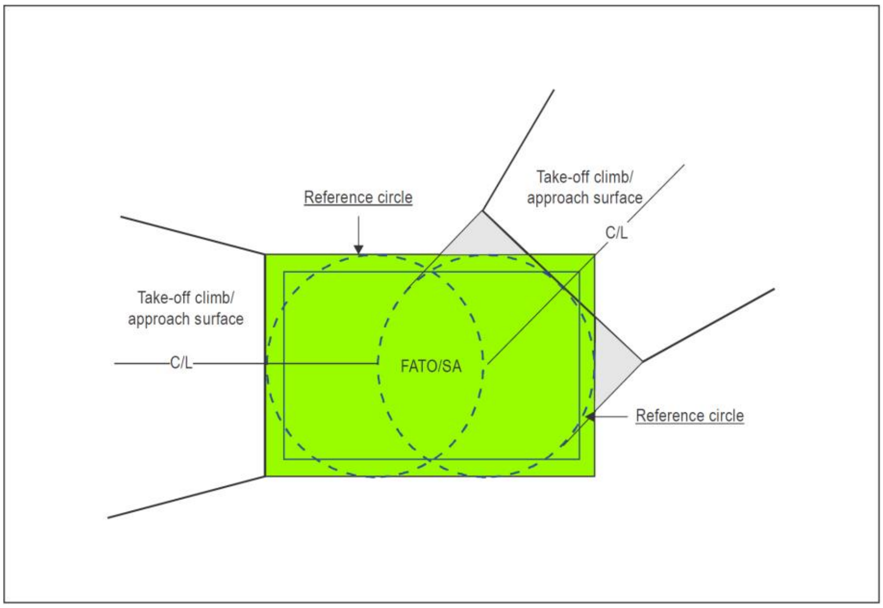


Figure 5-4. Rectangular FATO with two reference circles and surfaces separated by 135°

5.1.7 Where a clearway has been established, the shaded area should be between the FATO/safety area and clearway (see Figure 5-5); the inner edge of the approach or take-off climb surface will abut the clearway.

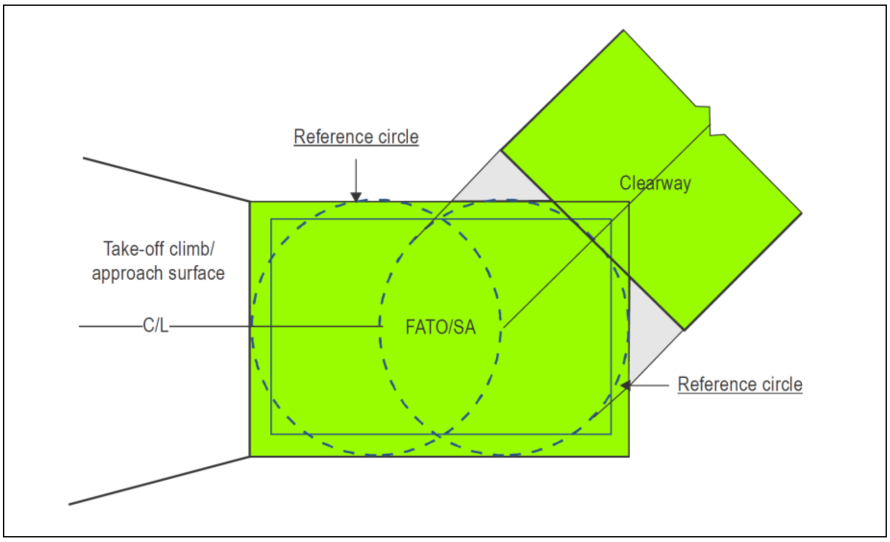


Figure 5-5. Rectangular FATO with two reference circles and helicopter clearway

Number and separation of take-off and climb and approach surfaces

5.1.8 Vertiport design and location should be such that downwind operations are avoided, crosswind operations are kept to a minimum, and balked landings can be carried out with the minimum change of direction.

5.1.9 The vertiport should have at least two take-off and climb and approach surfaces with a recommend separation of at least 135^o (see Figure 5-2) but ideally separated by 180^o. Additional approach surfaces may be provided, the total number and orientation ensuring that the vertiport usability factor will be at least 95 per cent for the VCA the vertiport is intended to serve. These criteria should apply equally to vertiports at surface level or vertiports that are elevated.

Note. - Where 5.1.8 and 5.1.9 above cannot be met, the separation may be decreased or the number of take-off and climb and approach surfaces reduced to one, if the safety assessment determines that it would not adversely affect the safety or significantly affect the regularity of operations of VCA at vertiport.

5.1.10 When only a single approach and take-off climb surface is provided, a safety assessment should be undertaken considering, as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;

b) the obstacle environment surrounding the vertiport; and the availability of at least one protected side slope;

c) the performance and operating limitations of VCA intending to use the vertiport; and

d) the local meteorological conditions including the prevailing winds.

Table 5-1. Dimensions and slopes of OLSs for all visual FATOs

	SLOPE DESIGN CATEGORIES		
SURFACE AND DIMENSIONS	A	B	C
APPROACH AND TAKE-OFF CLIMB SURFACE:			
Length of inner edge	Width of safety area	Width of safety area	Width of safety area
Location of inner edge	safety area boundary (Clearway boundary if provided)	safety area boundary	safety area boundary
Divergence: (1st and 2nd section)			
Day use only	10 %	10 %	10 %
Night use	15 %	15 %	15 %
First section:			

Length	3 386 m	245 m	1 220 m
Slope	4.5 % (1:22.2)	8 % (1:12.5)	12.5 % (1:8)
Outer width	(b)	N/A	(b)
Second section:			
Length	N/A	830 m	N/A
Slope	N/A	16 % (1:6.25)	N/A

	SLOPE DESIGN CATEGORIES		
SURFACE AND DIMENSIONS	A	B	C
Outer width	N/A	(b)	N/A
Total length from inner edge (a)	3 386 m[c]	1 075 m[c]	1 220 m[c]
TRANSITIONAL SURFACE[d]:			
Slope:	50% (1:2)	50% (1:2)	50% (1:2)
Height:	45 m	45 m	45 m

(a) The approach and take-off climb surface lengths of 3 386 m, 1 075 m and 1 220 m associated with the respective slopes, bring the VCA to 152 m (500 ft) above FATO elevation.

(b) Seven D-values overall width for day operations or ten D-values overall width for night operations.

(c) This length may be reduced if vertical procedures are in place.

(d) When the VCA procedure includes the lateral element, the transitional surface may be provided.

Note.

The slope design categories depicted above represent minimum design slope angles and not operational slopes. Consultation with VCA operators is needed to determine the appropriate slope category according to the vertiport environment and the VCA the vertiport is intended to serve.

Approach Surface

Applicability

5.1.11 The purpose of the approach surface is to protect a VCA during the final approach to the FATO by defining the area that should be kept free from obstacles to protect a VCA in the final phase of the approach-to-land manoeuvre.

Description

5.1.12 An inclined plane or a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note. — See Figure 5-1, 5-2, 5-3 and 5-4 for depiction of surfaces. See Table 5-1 for dimensions and slopes of surfaces.

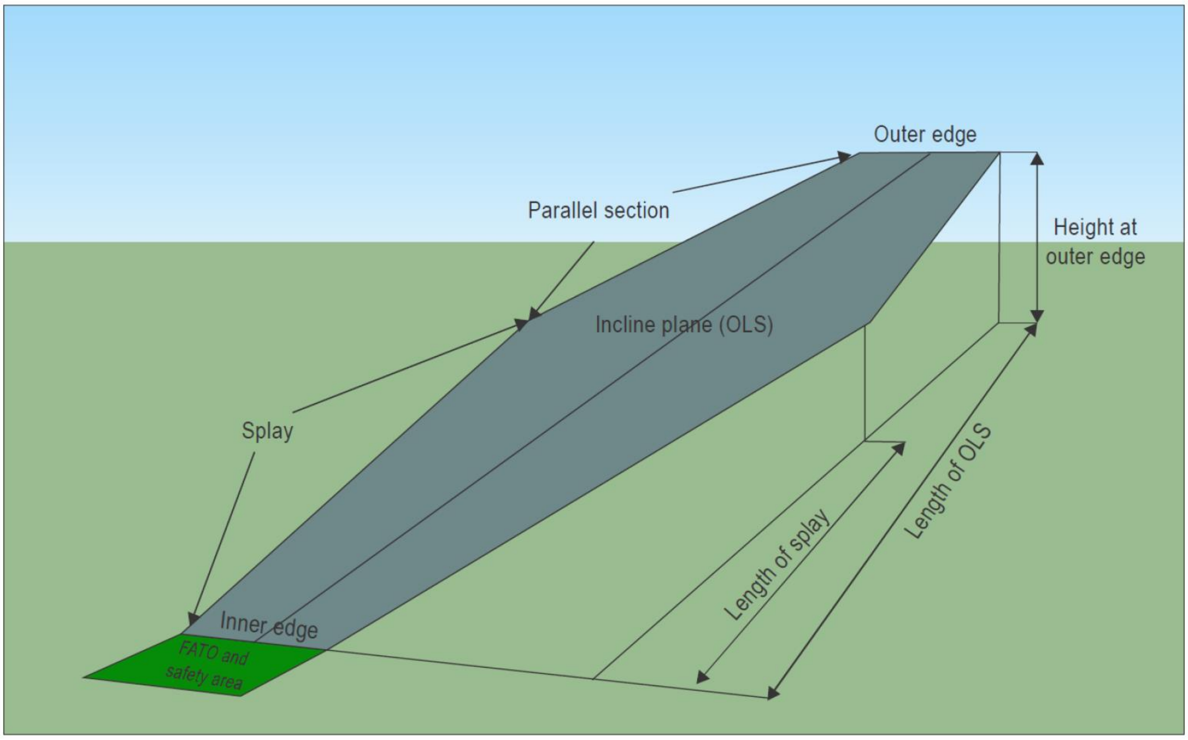


Figure 5-6. Generic approach/take-off climb surface

Characteristics

5.1.13 The limits of an approach surface shall comprise:

a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the approach surface and located at the outer edge of the safety area;

b) two side edges originating at the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and:

c) an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height of 152 m (500 feet) above the elevation of the FATO.

5.1.14 The elevation of the inner edge shall be the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the approach surface. When safety assessment determines that it would not adversely affect the safety or significantly affect the regularity of operations of VCA at vertiport, the origin of the inclined plane may be raised directly above the FATO.

5.1.15 The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the surface.

5.1.16 In the case of an approach surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope of the centre line shall be the same as that for a straight approach surface.

Note. — See Figure 5-5

5.1.17 Where a curved portion of an approach surface is provided the sum of the radius of arc defining the centre line of the approach surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

5.1.18 Any variation in the direction of the centre line of an approach surface shall be designed so as not to necessitate a turn radius less than 270 m.

Note: Further guidance on elevating approach surface is provided in ICAO Document 9261, Heliport Manual.

Transitional surface

Note. - The objective of the transitional surface is to provide a protected airspace when vertical procedures include lateral transit. The transitional surface defines the limit of the area where obstacles are, or may be, located (i.e. buildings, structures or natural obstructions such as trees).

Note. – For a FATO at a vertiport without a PinS approach incorporating a visual segment surface (VSS) there is no requirement to provide transitional surfaces.

Description.

5.1.19 A complex surface bounded by a lower and upper edge and sloping upwards and outwards from one to the other (see Figure 5-8, Figure 5-9 and Figure 5-10).

Application.

Note. - Where appropriate, a transitional surface may be provided at VFR vertiports for the safety of VCA when vertical procedures with lateral transit are planned.

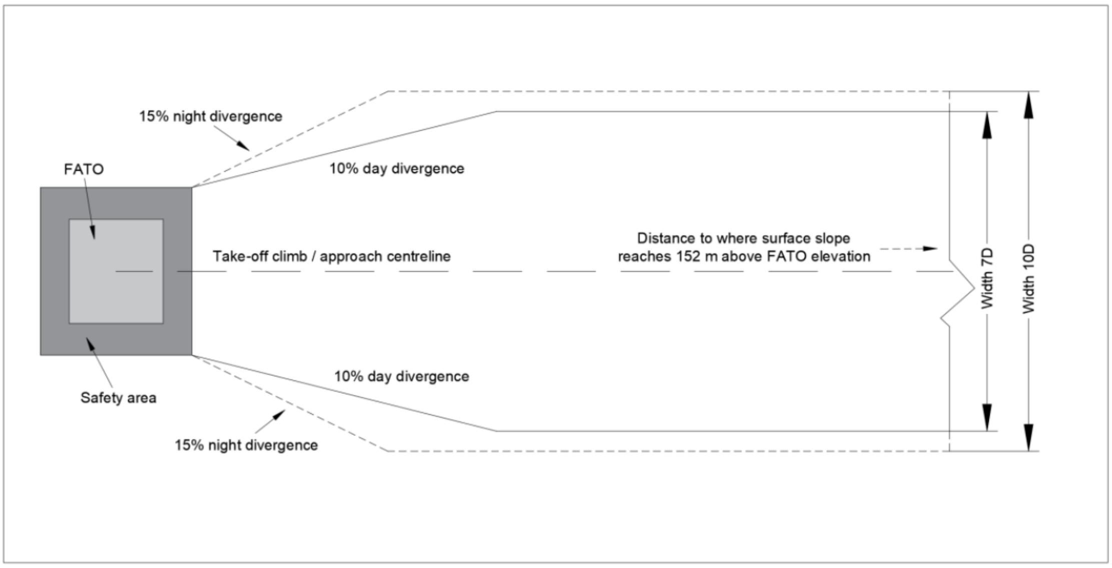


Figure 5-7. Take-off climb/approach widths (schematic)

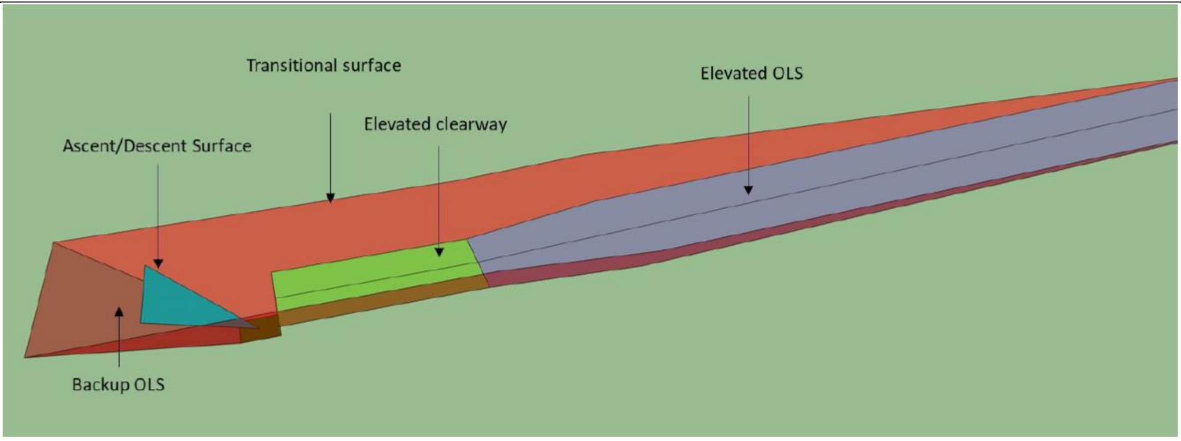


Figure 5-8. Transitional, backup and take-off climb surface

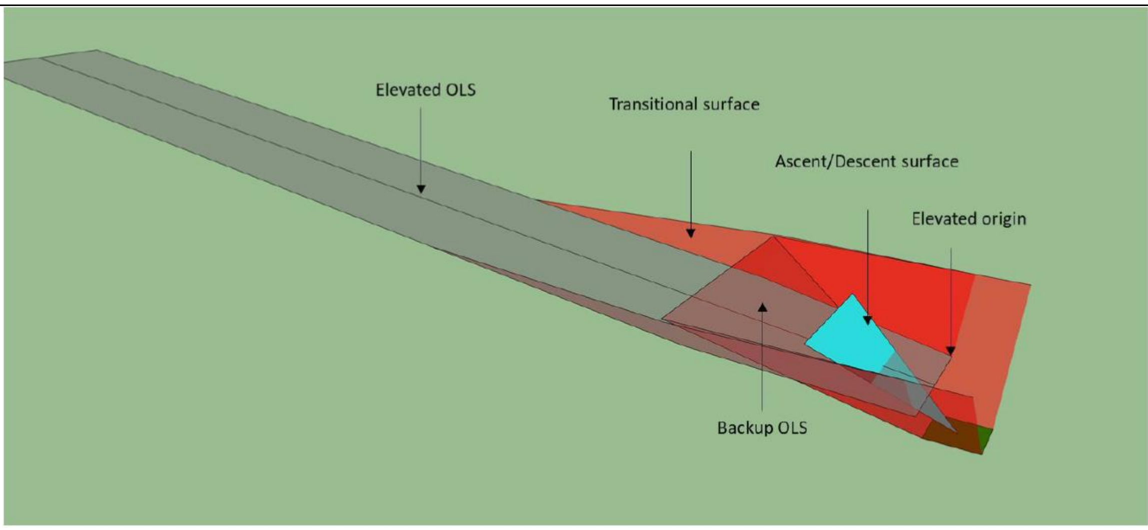


Figure 5-9. Transitional, backup and approach surface

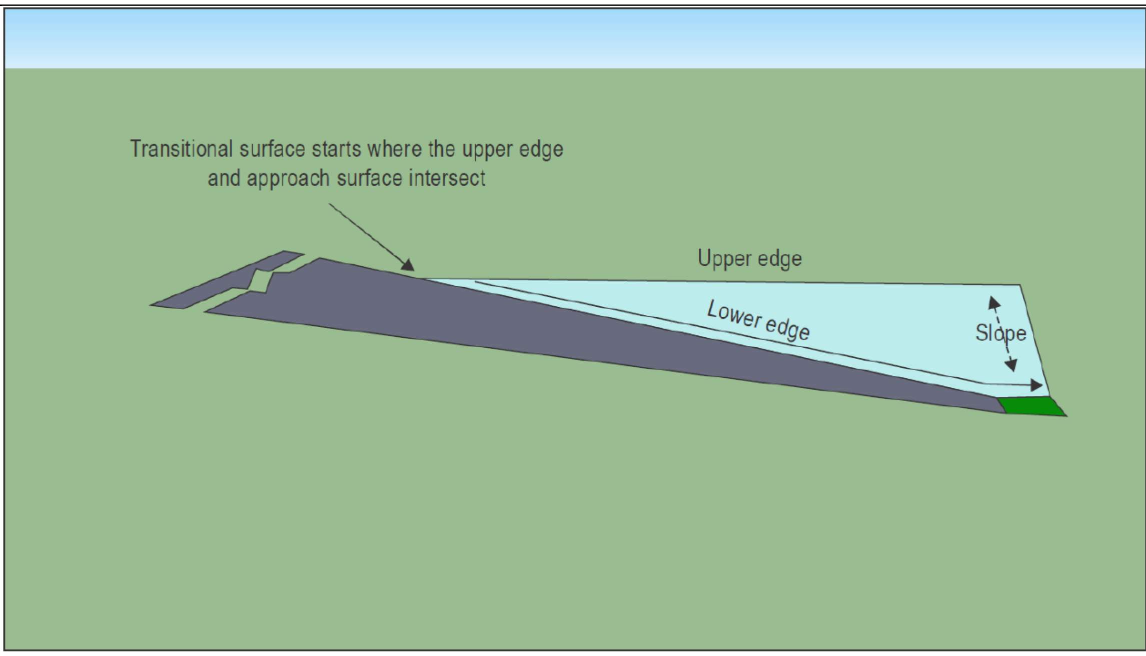


Figure 5-10. Transitional surface

Characteristics.

5.1.20 The limits of a transitional surface shall comprise:

a) a lower edge beginning at a point on the side of the approach/take-off climb surface at a specified height above the lower edge extending down the side of the approach/take-off climb surface to the inner edge and from there:

(1) where provided, along the side of the clearway; then

(2) for a runway-type FATO, along the length of the side of the safety area parallel to the centre line of the FATO; or

(3) for other than a runway-type FATO, along the tangent of the reference circle parallel, and equal in length, to its diameter; and

b) an upper edge located at 45 m above the FATO.

5.1.21 The extended transitional surface and modified extended transitional surface should comprise:

a) a lower edge beginning at the point where the approach surface, or take-off climb surface and upper edge of the transitional surface are at the same height, then extending downwards and along the side of the approach, or take-off climb, surface to the inner edge and from there:

(1) for the take-off climb along the length of the clearway to the inner edge; then

(2) directly down to, and connecting with, the outer edge of the safety area (see Figure 5-11);

(3) along the tangent of the reference circle until level with the back edge of the safety area; then

(4) up and along the outer edge of the backup obstacle surface until reaching the upper edge;

b) an upper edge located at 45 m (150 ft) plus the elevation of the OLS origin/clearway.

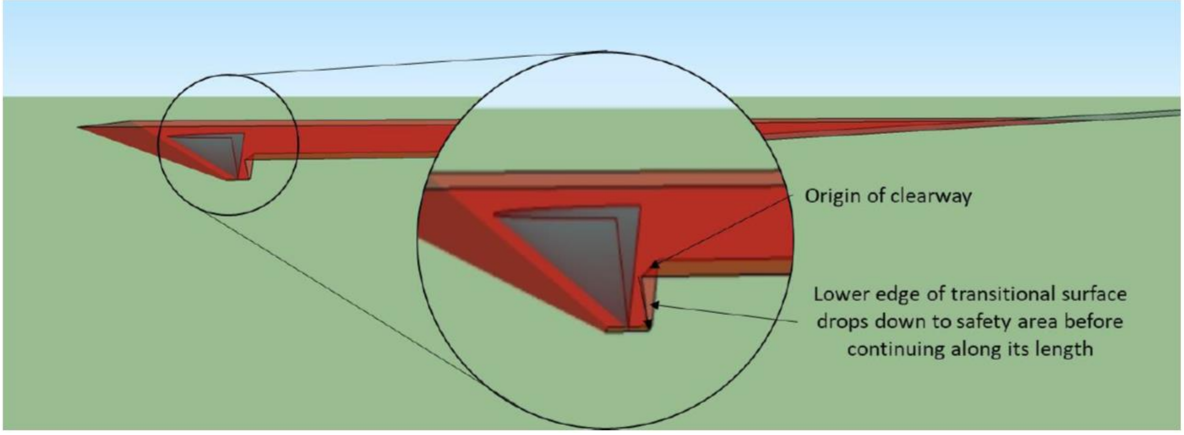


Figure 5-11. Transitional surface (showing the drop from clearway to safety area)

5.1.22 The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the FATO and should be:

(a) for a transitional surface and extended transitional surface 50 per cent (1:2) (see Table 5-1); or

(b) for a modified extended transitional surface 1:1 (45°).

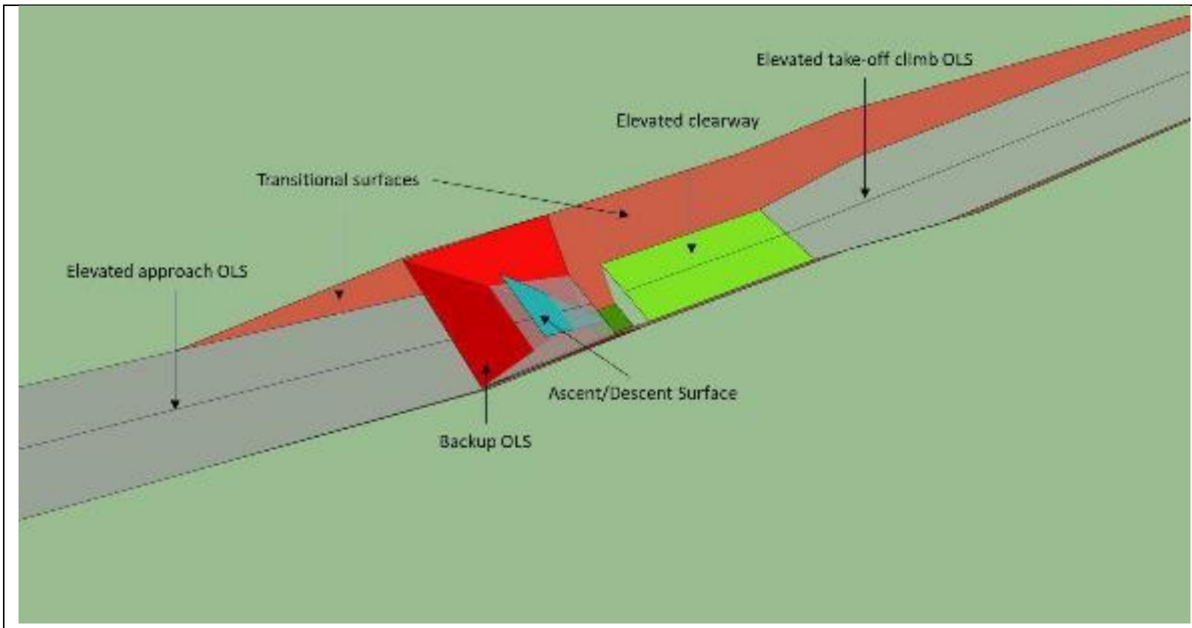


Figure 5-12. Elevated OLS and transitional surface

Note 1: The modified extended transitional surface can be regarded as an extension to the protected side slope (see 4.2.6 to 4.2.8).

Note 2: Further guidance on elevating an approach and take-off climb surface is provided in ICAO Document 9261, Heliport Manual.

Note 3. Further guidance on how to protect airspace during the backup procedure of VCA is provided in the CAR AIR OPS Regulation, in ICAO Heliport Manual (Document 9261), and in the AFM.

Note 4: Additional clarification on the transitional surface:

Principles of the basic transitional surface:

- *The upper edge is 45 m above the OLS origin.*
- *The upper and lower edges commence at a point adjacent to the back edge of the safety area.*
- *The lower edge and upper edge meet on the side of the OLS.*
- *The lower edge tracks along the tangent to the reference circle, parallel with the centre line of the FATO, to the inner edge of the OLS and then along the OLS until meeting the upper edge.*
- *The slope of the transitional surface is 1:2.*

Principles of the extended transitional surface (in addition to those of the basic transitional surface):

- *The upper edge is extended upwards by the elevation of the OLS origin.*
- *The rear of the extended surface is attached to the outer edge of the backup surface.*
- *The lower edge rises directly from the outer edge of the safety area to the inner edge of the clearway or OLS.*

Principles of the modified extended transitional surface (in addition to/modification of those of the extended):

- *The slope of the modified extended transitional surface is 1:1.*

The characteristics of the take-off climb surface are provided in 5.1.23 to 5.1.30 and in Table 5-1.

The characteristics of the extended clearway for the take-off climb:

— *The clearway is elevated to a level that permits clearance of obstacles in the take-off climb.*

— *The width of the clearway is extended on each side, by twice its elevation, to meet the surface of the extended transitional surface.*

The characteristics of the modified extended clearway for take-off climb (in addition to/modification of those of the basic clearway):

— *The width of the clearway is extended on each side, by its elevation, to meet the surface of the extended modified transitional surface.*

The origin of the extended the take-off climb surface:

— *The inner edge of the take-off climb surface is at the outer edge of the clearway.*

— *The width of the inner edge of the take-off climb surface is the width of the clearway.*

The characteristics of the approach surface are provided 5.1.1 to 5.1.18 and in Table 5-1:

— *The origin of the approach surface is elevated to a level that permits clearance of obstacles in the approach.*

— *The inner edge of the approach surface is extended on each side by:*

— *twice the amount of elevation, to meet the surface of the extended transitional surface; or*

— *the amount of elevation, to meet the surface of the extended modified transitional surface.*

The backup procedure may be of three types:

— *pure backup procedure: it does not need lateral protection;*

— *limited lateral procedure: the required lateral protection is ensured by a modified extended transitional surface; and*

— *full lateral procedure: the required lateral protection is ensured by an extended transitional surface.*

Take-Off Climb Surface

Note: The purpose of the take-off climb surface is to protect a VCA on take-off and during climb-out.

Description.

5.1.23 An inclined plane, a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note. - See Figure 5-1, 5-2, 5-3 and 5-4 for depiction of surfaces. See Table 5-1 for dimensions and slopes of surfaces.

Characteristics.

5.1.24 The limits of a take-off climb surface shall comprise (see Figure 5-6):

a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the take-off climb surface and located at:

1) for a runway-type FATO, the outer edge of the safety area;

2) for other than a runway-type FATO, the tangent of the outer edge of the reference circle; or

3) the outer edge of the clearway;

b) two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO to a specified final width and continuing thereafter at that width for the remaining length of the take-off climb surface; and; and

c) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface and at a specified height above the elevation of the FATO.

5.1.25 The elevation of the inner edge should be the elevation of the safety area at the point on the inner edge that is intersected by the centre line of the take-off climb surface except that when a helicopter clearway is provided, the elevation should be equal to the highest point on the ground on the centre line of the helicopter clearway (for a take-off climb surface with an elevated origin).

5.1.26 Where a clearway is provided the elevation of the inner edge of the take-off climb surface shall be located at the outer edge of the clearway at the highest point on the ground based on the centre line of the clearway.

5.1.27 In the case of a straight take-off climb surface, the slope shall be measured in the vertical plane containing the centre line of the surface.

5.1.28 In the case of a take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line, and the slope of the centre line shall be the same as that for a straight take-off climb surface. See Figure 5-6.

5.1.29 Where a curved portion of a take-off climb surface is provided the sum of the radius of arc defining the centre line of the take-off climb surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

5.1.30 Any variation in the direction of the centre line of a take-off climb surface shall be designed so as not to necessitate a turn of radius less than 270 m.

Note1. – VCA take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve allows for acceleration.

Note2. - Further guidance on elevating take-off approach surface is provided in ICAO Document 9261, Heliport Manual.

5.2 Obstacle Limitation Requirements

Note1. — The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a FATO, i.e. approach manoeuvre to hover or landing, or take-off manoeuvre and type of approach, and are intended to be applied when such use is made of the FATO. In cases where operations are conducted to or from both directions of a FATO, then the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.

Note2. – Guidance on obstacle protection surfaces, for when a visual approach slope indicator (VASI) is installed, is given in the onshore section of the Heliport Manual (Doc 9261)

5.2.1. Surface-Level Vertiports

5.2.1.1 The following obstacle limitation surfaces shall be established for a precision approach FATO:

a) take-off climb surface;

b) approach surface; and

c) transitional surfaces.

Note1. - See Figure 5-3 – Transitional Surfaces.

5.2.1.2 The following obstacle limitation surfaces shall be established for a FATO at vertiports, other than specified in 5.2.1.1, including vertiports with a PinS approach procedure where a visual segment surface is not provided:

a) take-off climb surface; and

b) approach surface.

5.2.1.3 The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than those specified in Table 5-1 and shall be located as shown in Figures 5-1 to Figure 5-12.

5.2.1.4 For vertiports that have an approach/take-off climb surface with a 4.5% slope design, objects can be permitted to penetrate the obstacle limitation surface, if the results of an aeronautical study approved by an appropriate authority have reviewed the associated risks and mitigation measures.

Note1. - The identified objects may limit the vertiport operation.

Note2. - Annex 6, Part 3 provides procedures that may be useful in determining the extent of obstacle penetration.

5.2.1.5 New objects or extensions of existing objects shall not be permitted above any of the surfaces in paragraphs 5.2.1.1 to 5.2.1.2 except when shielded by an existing immovable object supported by an aeronautical study and approved by an appropriate authority, determines that the object will not adversely affect the safety or significantly affect the regularity of operations of VCAs.

Note — Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual, Part 6 (Doc 9137).

5.2.1.6 Existing objects above any of the surfaces in 5.2.1.1 to 5.2.1.2 should, as far as practicable, be removed except when the object is shielded by an existing immovable object supported by an aeronautical study and approved by an appropriate authority, determines that the object will not adversely affect the safety or significantly affect the regularity of operations of VCAs.

Note — The application of curved approach or take-off climb surfaces as specified in 5.1.5 and 5.1.18 may alleviate the problems created by objects infringing these surfaces.

5.2.1.7 A surface-level vertiport shall have at least one approach and take-off climb surface. An aeronautical study conducted by approved ASSP shall be undertaken when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;

b) the obstacle environment surrounding the vertiport and the availability of at least one protected side slope;

c) the performance and operating limitations of VCAs intending to use the vertiport; and

d) the local meteorological conditions including the prevailing winds.

5.2.1.8 A surface level vertiport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.

5.2.2. Elevated Vertiports

5.2.2.1 The obstacle limitation surfaces for elevated vertiports shall conform to the requirements for surface-level vertiports specified in paragraphs 5.2.1.1. to 5.2.1.6.

5.2.2.2 An elevated vertiport shall have at least one approach and take-off climb surface. An aeronautical study conducted by approved ASSP shall be undertaken when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;

b) the obstacle environment surrounding the vertiport and the availability of at least one protected side slope;

c) the performance and operating limitations of VCAs intending to use the vertiport; and

d) the local meteorological conditions including the prevailing winds.

5.2.2.3 An elevated vertiport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.

5.3 Obstacle-free Volume

General

Note. - The objective of the obstacle-free volume (OFV) is to provide protection above vertiports to facilitate the introduction of vertiports in congested areas and an obstacle populated environment for VCA. The corresponding procedure is designated as 'vertical take-off and landing'. Due to the reduced footprint and vertical nature of the take-off and landing, synthetic cues may have to be used to guide the aircraft.

Characteristics

5.3.1 The obstacle-free volume is derived from the vertical take-off and landing procedure volume, provided in the AFM, expressed in terms of the parameters listed in Table 5-2 and depicted in Figure 5-13 and Figure 5-14:

Parameter	Short description
h_1	Low hover height
h_2	High hover height
TO_{width}	Width at h_2
TO_{front}	Front distance at h_2
TO_{back}	Back distance at h_2
$FATO_{width}$	Width of the FATO
$FATO_{front}$	Front distance on FATO
$FATO_{back}$	Back distance on FATO
θ_{app}	Slope of approach surface
θ_{dep}	Slope of departure surface

Table 5-2. Generic vertical take-off and landing procedure parameters

5.3.2 The FATO needed for the aircraft to perform an approved vertical take-off and landing procedure is characterised by the parameters $FATO_{back}$, $FATO_{front}$ and $FATO_{width}$. $FATO_{back}$ and $FATO_{front}$ are referenced to the centre of the smallest circle enclosing the aircraft, which is also used to define D (see EASA, MOC VTOL.2115). From the rectangular edges of the FATO, the procedure volume extends vertically to the low hover height h_1, from which it widens linearly up to the high hover height h_2. At that height, the volume has the width TO_{width}, while it extends to the back and to the front by the distances TO_{back} and TO_{front}. At the back and the front edges, approach and departure surfaces are angled with gradients θ_{app} and θ_{dep}. Some aircraft can perform a turn during the climb, in which case the corresponding turn and climb capability will be provided in the AFM.

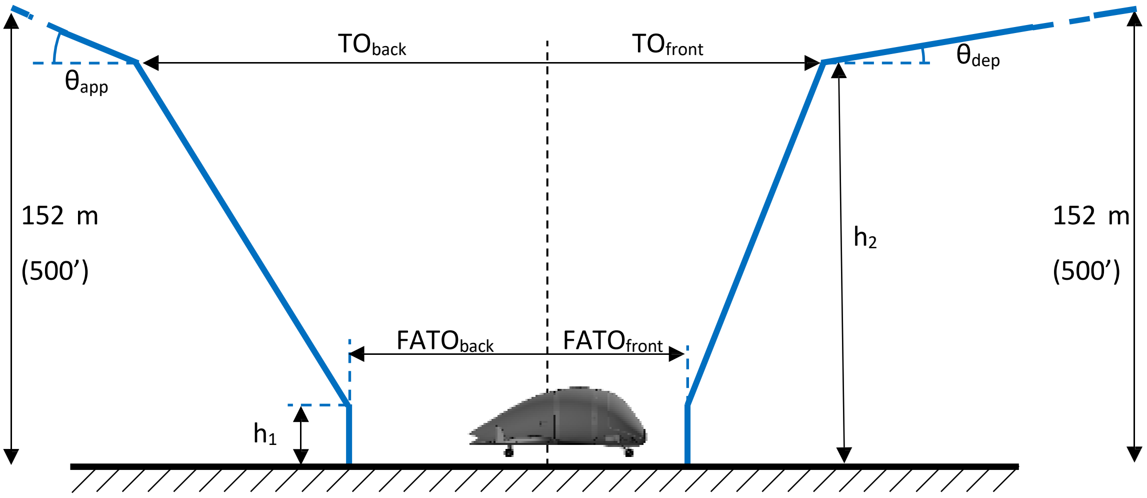


Figure 5-13. Generic vertical take-off and landing procedure parameters

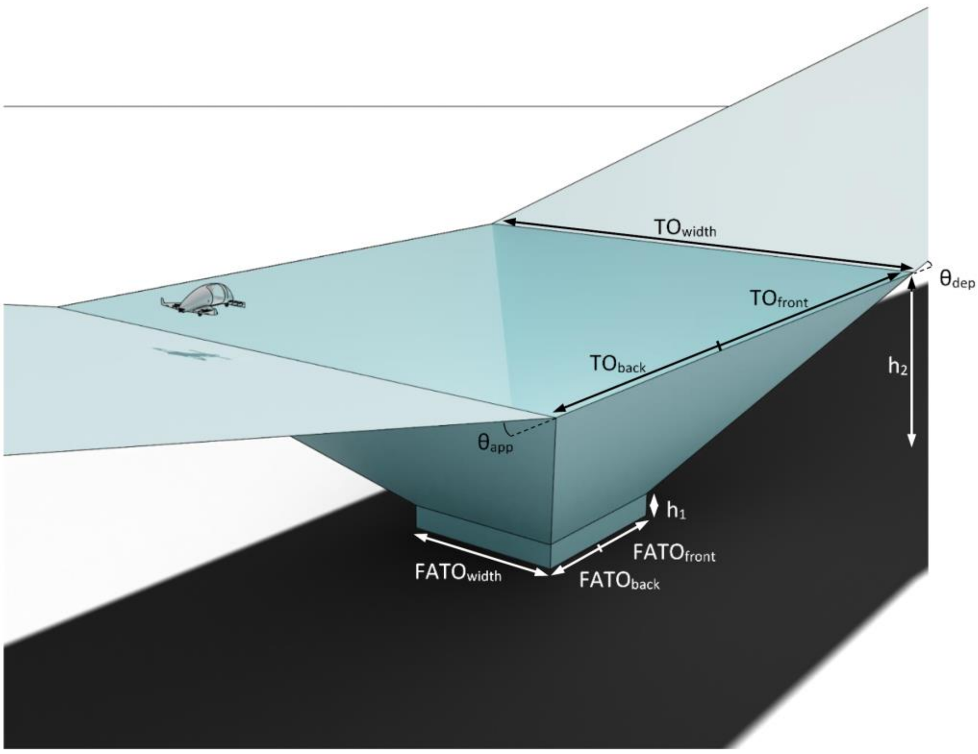


Figure 5-14. Vertical take-off and landing procedure volume

5.3.1c To qualify as a vertical take-off and landing procedure, the parameters defining the procedure must meet certain minima or maxima as provided in Table 5-3.

Parameter	Minimum/maximum
h_1	-
h_2	$\geq h_1$
TO_{width}	≤ 5 D
TO_{front}	≤ 5 D
TO_{back}	≤ 5 D
$FATO_{width}$	≥ 1.5 D
$FATO_{front}$	≥ 0.75 D
$FATO_{back}$	≥ 0.75 D
θ_{app}	$\geq 4.5\%$
θ_{dep}	$\geq 4.5\%$

Table 5-3. Vertical take-off and landing procedure parameters minima/maxima

5.3.2 A vertiport obstacle-free volume compatible with the aircraft vertical take-off and landing procedure can be established as described in the following paragraphs.

Final-approach and take-off area (FATO) and safety area

5.3.3 The minimum dimensions of the FATO should be:

a) the length $FATO_{back}$ behind the aircraft and the length $FATO_{front}$ in front of the aircraft, referenced to the VCA centre of the smallest enclosing circle; and
b) the width $FATO_{width}$.

5.3.4 All other characteristics should be as per 5.1.8 to 5.1.16.

5.3.5 The FATO should be surrounded by an safety area as per 5.1.22 to 5.1.29.

Note: A larger safety area may be warranted for specific local conditions, e.g. severe aerology.

Obstacle-free volume (OFV)

5.3.6 The obstacle-free volume, as depicted in Figure 5-15, is created by extending vertically upward the outside edges of the safety area up to height h_1. The edges at height h_1 are then extended upwards linearly up to height h_2 to provide a funnel-shaped volume. At height h_2, 0.5 D are added on each side of the VCA procedure volume so that the dimensions of the obstacle-free volume at height h_2 are:

a) the length (TO_{back}+0.5 D) behind the aircraft and the length (TO_{front}+0.5 D) in front of the VCA, referenced to the aircraft centre of the smallest enclosing circle when positioned on the FATO; and

b) The obstacle-free volume should not be penetrated by obstacles.

Note: A larger safety area may be warranted for specific local conditions, e.g. severe aerology.

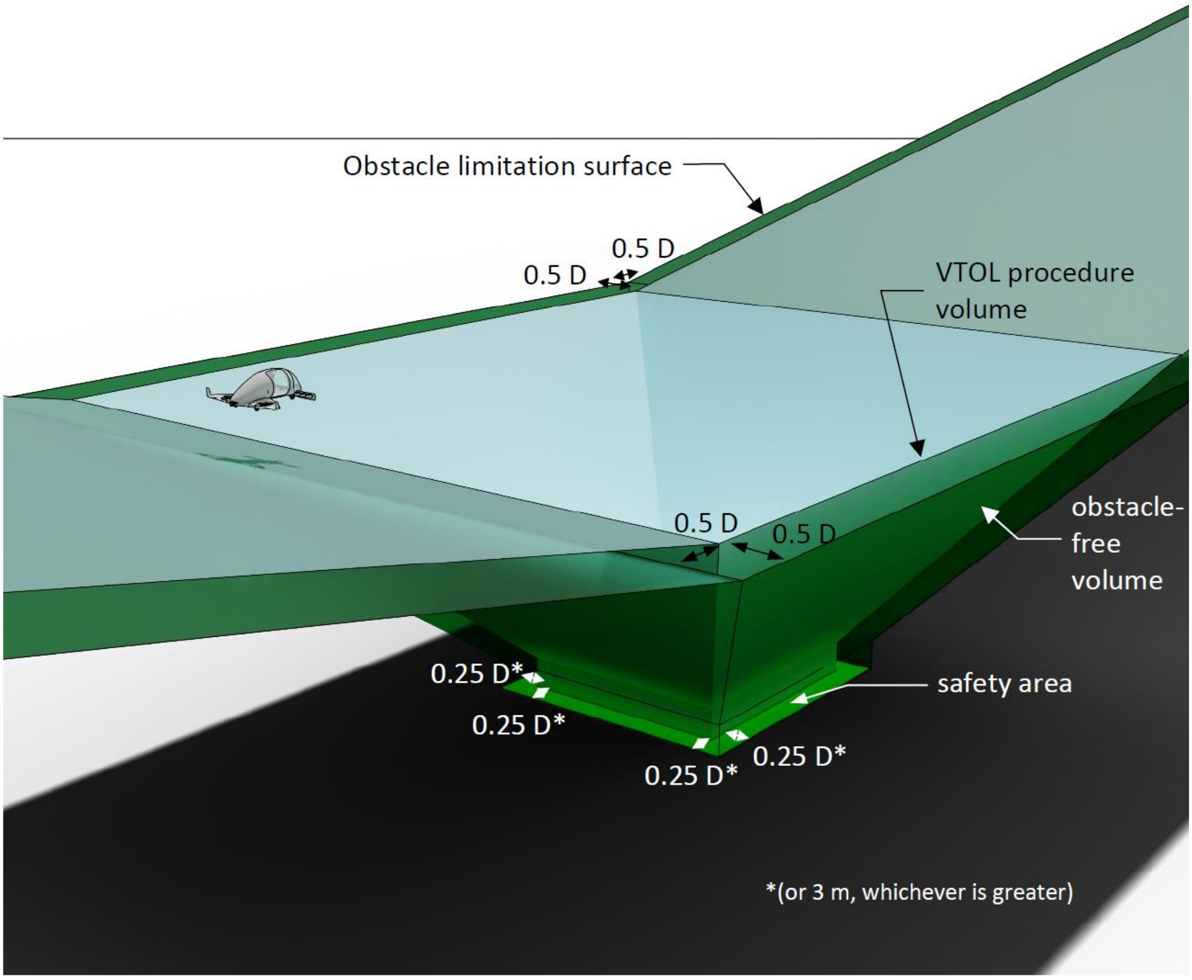


Figure 5-15. safety areas added to the vertical take-off and landing procedure parameters to

establish the vertiport obstacle-free volume.

Approach surface

5.3.7 The limits of the OLS approach surface comprise:

a) an inner edge, horizontal and equal in length to width (TO_{width} +1 D) located at the aft edge of the obstacle-free volume at height h_2;

b) two side edges originating at the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO to a specified width and continuing thereafter at that width for the remaining length of the approach surface;

c) an outer edge horizontal and perpendicular to the centre line of the approach surface at a height of 152 m (500 ft) above the elevation of the FATO, unless the en-route structure allows the OLS to stop at a lower altitude; and

d) The slope of the approach surface is θ_{app} and should be measured in the vertical plane containing the centre line of the surface.

5.3.8 All other characteristics should be as per 5.1.8 to 5.1.16.

Take-off climb surface

5.3.9 The limits of the OLS take-off climb surface comprise:

a) an inner edge, horizontal and equal in length to width (TO_{width} +1 D) located at the front edge of the obstacle-free volume at height h_2;

b) two side edges originating at the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO to a specified width and continuing thereafter at that width for the remaining length of the take-off climb surface; and

c) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface at a height of 152 m (500 ft) above the elevation of the FATO, unless the en-route structure allows the OLS to stop at a lower altitude.

d) The slope of the take-off climb surface is θ_{dep} and should be measured in the vertical plane containing the centre line of the surface.

5.3.10 All other characteristics should be as per 5.1.22 to 5.1.29.

5.3.11 All other characteristics (e.g. transitional surface) as per Chapter III-4 – Physical characteristics and Chapter III-5, 5.1 - Obstacle limitation surfaces.

Bidirectional volume

5.3.12 A bidirectional volume (where each OLS can be used for both take-off climb and approach) can be created by taking the largest values of the front and back parameters of the vertical take-off and landing procedure and the lowest of the gradients (see Table D-4). To this volume the safety areas should be added, and the obstacle-free volume derived as described in the preceding paragraphs.

Parameter	Bidirectional volume
$TO_{front\ bidirection} = TO_{back\ bidirection}$	max (TO_{front}, TO_{back})
$FATO_{front\ bidirection} = FATO_{back\ bidirection}$	max ($FATO_{front}$, $FATO_{back}$)
$\theta_{app\ bidirection} = \theta_{dep\ bidirection}$	min (θ_{app}, θ_{dep})

Table 5-4. Bidirectional VCA procedure volume derived from vertical take-off and landing procedure parameters (without an safety area)

Omnidirectional volume

5.3.13 An omnidirectional VCA procedure volume (where the final part of the approach or the initial part of the departure can be conducted from any direction) can be created by replacing the rectangular volumes with cylindrical volumes, and a conical OLS with the parameters given in Table 5-5 (see also Figure 5-16), centred on the centre of the smallest enclosing circle. From this procedure volume, the vertiport obstacle-free volume can be derived by adding 0.5 D or 6 m, whichever is greater, to the diameter at FATO level and 1 D at height h_2 as an safety area. The OLS starts at height h_2 on the circle with the added safety area and finishes at a height of 152 m (500 ft) above the elevation of the FATO, unless the en-route structure allows the OLS to stop at a lower altitude.

Parameter	omnidirectional volume
Ø $TO_{omnidirection}$	$\sqrt{(4 \times \max(\mathrm{TO}_{front}, \mathrm{TO}_{back})^2 + \mathrm{TO}^2{}_{width})}$

Ø $FATO_{omnidirection}$	$\sqrt{(4 \times \max(FATO_{front}, FATO_{back})^2 + FATO^2{}_{width})}$
$\theta_{omnidirection}$	min (θ_{app}, θ_{dep})

Table 5-5. Omnidirectional VCA procedure volume derived from vertical take-off and landing procedure parameters (without an safety area)

Note: If a VCA has been certified for a vertical procedure, it should be able to operate in the corresponding omnidirectional obstacle-free volume with conical OLS.

5.3.15 Instead of a conical OLS, discrete planar approach and take-off climb surfaces (see Figure 5-17 and Figure 5-18), as per 5.1.8 to 5.1.16 and 5.1.22 to 5.1.29, can be created as follows:

a) the inner edges are horizontal, equal in length to width ($TO_{omnidirection}$+1D), located at height h_2 and tangent at their centre to the circle of diameter ($TO_{omnidirection}$+1 D) centred on the centre of the smallest enclosing circle;

b) an additional horizontal surface bridges the space between the circle of diameter ($TO_{omnidirection}$+1 D) and the inner edges of the OLS.

5.3.16 It should be verified that a given VCA can operate in such a volume, e.g. can perform the turn between approach and take-off climb surfaces in case of a balked landing, without encroaching on the protection surfaces.

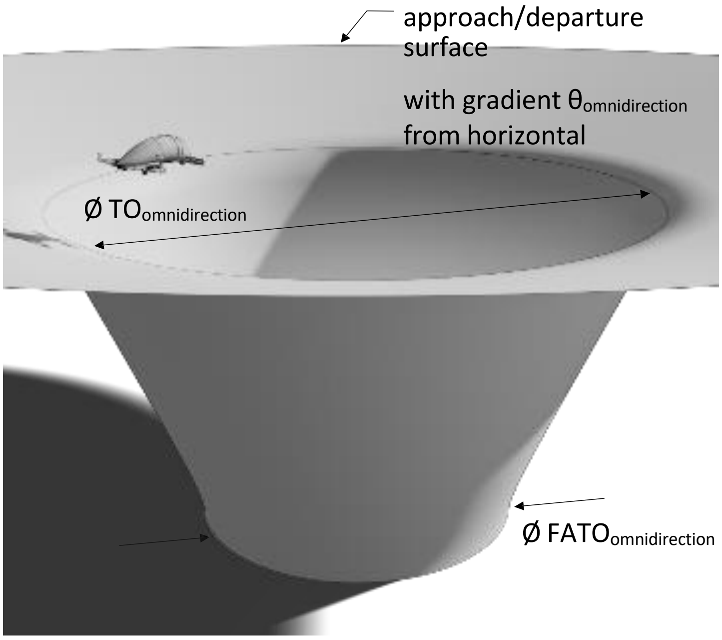


Figure 5-16. VCA procedure volume with omnidirectional approach and take-off climb surface (without safety areas)

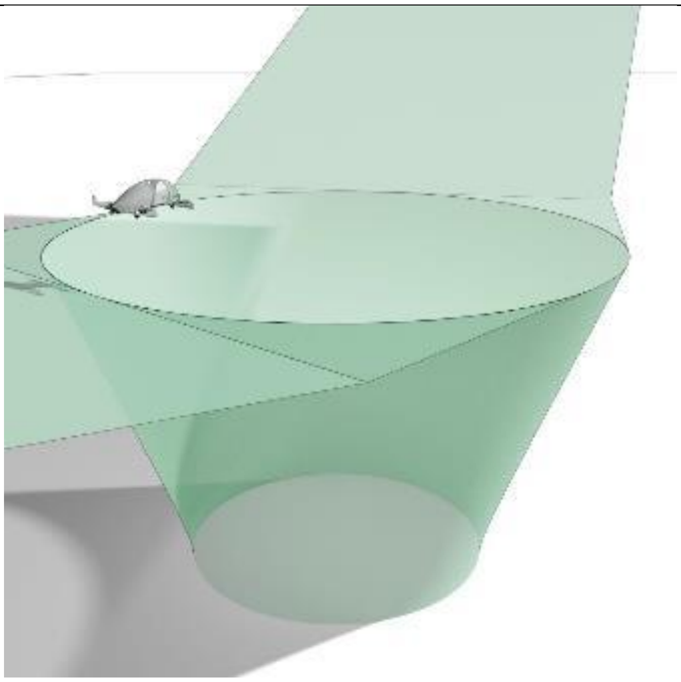


Figure 5-17. Vertiport omnidirectional obstacle-free volume with discrete planar approach and take-off climb surfaces — perspective view

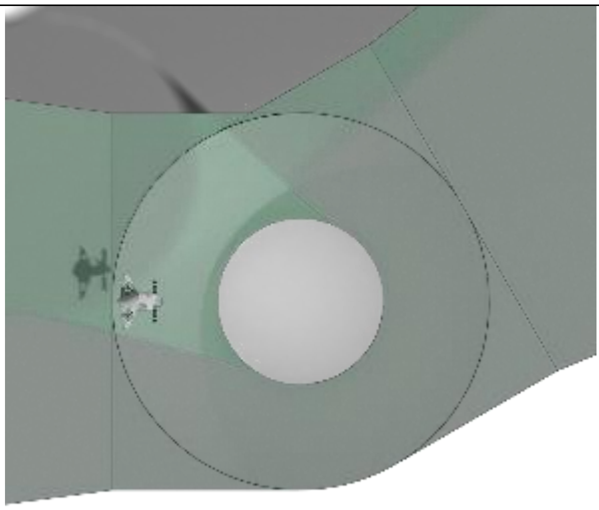


Figure 5-18. Vertiport omnidirectional obstacle-free volume with discrete planar

approach and take-off climb surfaces — top view

Omnidirectional obstacle-free volume with prohibited sector

5.3.17 A sector of the omnidirectional obstacle-free volume with conical OLS can be declared prohibited, e.g. to avoid an obstacle (see Figure 5-19 and Figure 5-20).

5.3.18 The prohibited sector is defined as follows:

a) an inner edge coinciding at the FATO with the circle of diameter $FATO_{omnidirection}$ centred on the centre of the smallest enclosing circle. The inner surface extends vertically upwards from this edge up to a height of 152 m (500 ft) above the elevation of the FATO, unless the en-route structure allows the OLS to stop at a lower altitude;

b) two side planes originating at the ends of the inner edge diverging radially;

c) an outer edge coinciding with the outer edge of the conical OLS. The outer surface extends vertically downwards down to the elevation of the FATO;

d) an upper surface to close the sector, horizontal at height 152 m (500 ft), unless the en-route structure allows the OLS to stop at a lower altitude.

5.3.19 It should be verified that a given VCA can operate in such a volume, e.g. can avoid the prohibited sector in case of a balked landing. Corresponding operational limitations should be set as necessary.

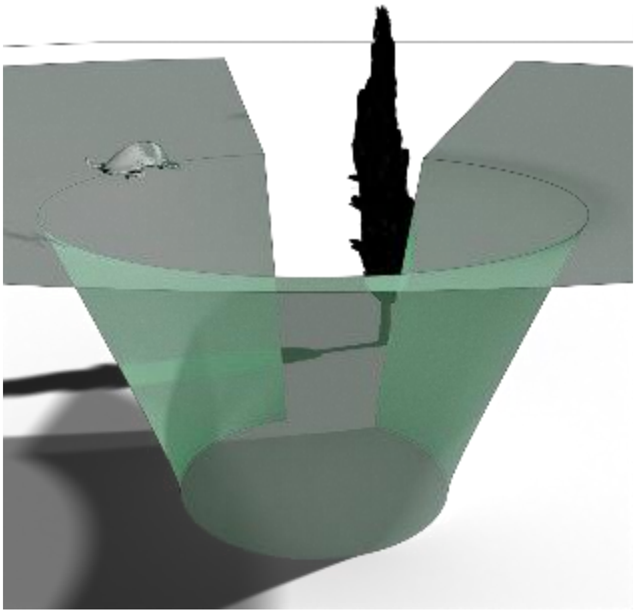


Figure 5-19. Vertiport obstacle-free volume with omnidirectional approach and take-off climb surface and prohibited sector — perspective view

Figure 5-20. Vertiport obstacle-free volume with omnidirectional approach and take-off climb surface and prohibited sector — top view

Reference volume Type 1

(a) The Reference volume Type 1 dimensions with the safety areas included are depicted on Table 5-6 and Figure 5-21:

Table 5-6. Reference volume Type 1 parameters (with the safety areas)

Parameter	Reference volume Type 1
h_1	3 m (10’)
h_2	30.5 m (100’)
TO_{width}	3 D
TO_{front}	2 D
TO_{back}	2 D
$FATO_{width}$	2 D
$FATO_{front}$	1 D
$FATO_{back}$	1 D
θ_{app}	12.5 %
θ_{dep}	12.5 %

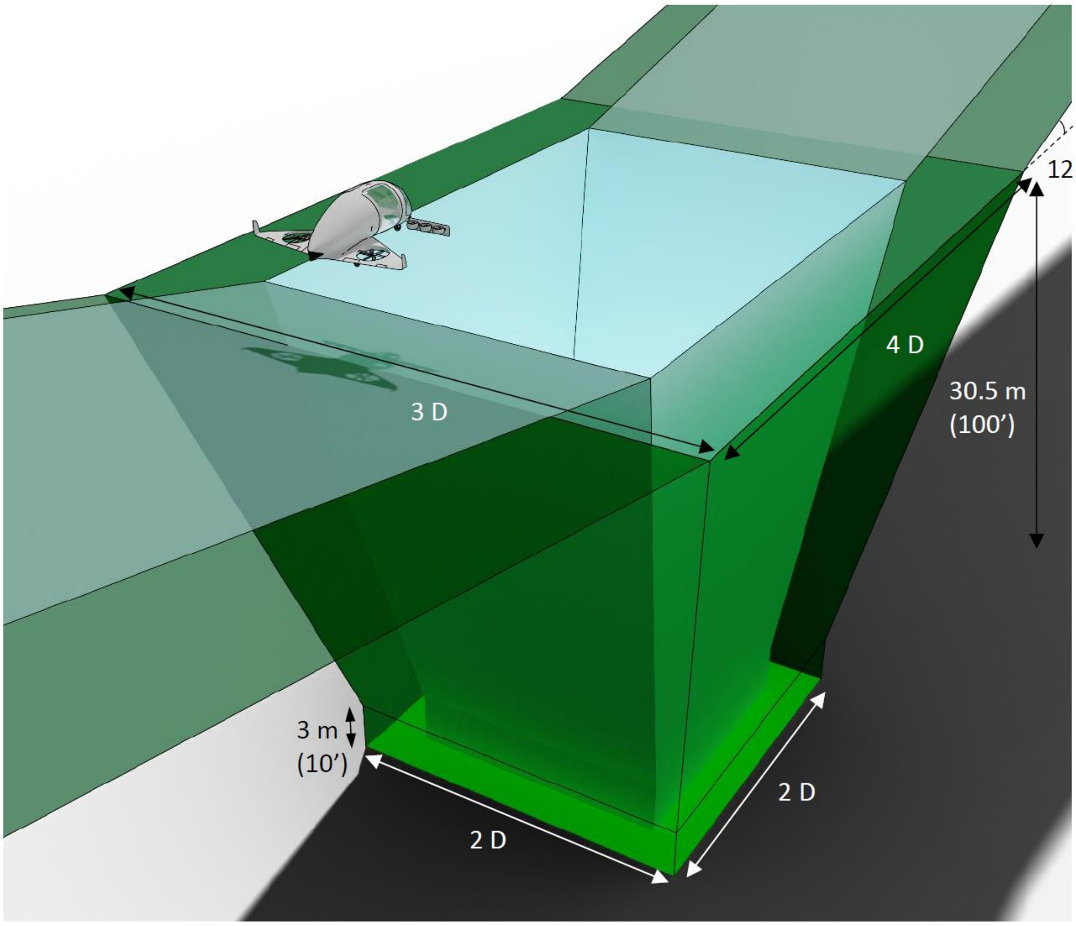


Figure 5-21. Reference volume Type 1 dimensions (with the safety areas)

(b) A Reference volume Type 1 is by design bidirectional.

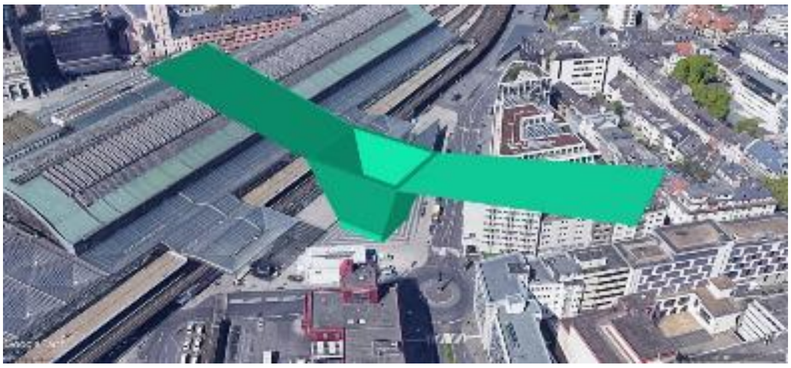
(c) An omnidirectional vertiport obstacle-free volume can be derived from the Reference volume Type 1 and has then the dimensions given in Table 5-7.

Parameter	omnidirectional volume
h_1	3 m (10')
h_2	30.5 m (100')
Ø $TO_{omnidirection}$	5 D
Ø $FATO_{omnidirection}$	2.83 D
$\theta_{omnidirection}$	12.5%

Table 5-7. Omnidirectional vertiport obstacle-free volume derived from the Reference volume

Type 1 (with the safety areas)

Examples of the potential vertiports with the Reference volume Type 1 established in congested urban areas (for illustration purposes only; the actual suitability has not been assessed) are presented in Figure 5-22.



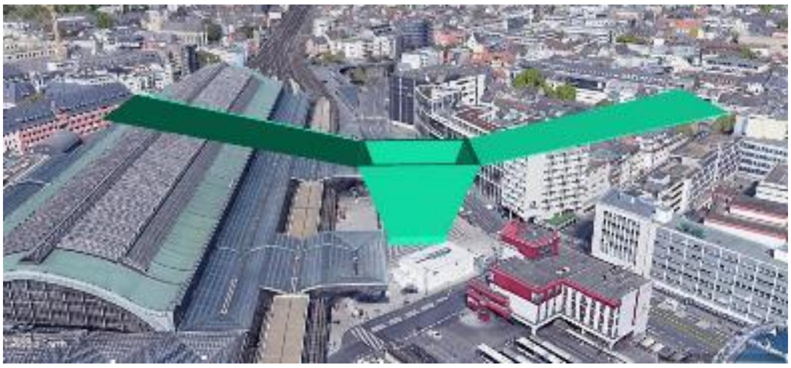


Figure 5-22. Examples of potential vertiports with Reference volume Type 1 (for illustration purposes only; the actual suitability has not been assessed)

Link to VCA requirements

Note: Requirements have been established for the aircraft designer to facilitate vertiport design; for example, to report certain characteristics of the aircraft in the AFM. Below are some of these requirements contained in EASA Special Condition VCA and its corresponding Means of Compliance. Some requirements are still under development and the different documents can be found at **https://www.easa.europa.eu/domains/rotorcraft-vtol/VTOL.**

Dimension 'D'

‘D’ means the diameter of the smallest circle enclosing the VCA projection on a horizontal plane, while the aircraft is in the take-off or landing configuration, with rotor(s) turning, if applicable (Figure 5-23). Publish D in metres, rounded up to the next tenth. If the VCA aircraft changes dimension during taxi or parking (e.g. folding wings), a corresponding D_{taxi} and $D_{parking}$ should also be provided.

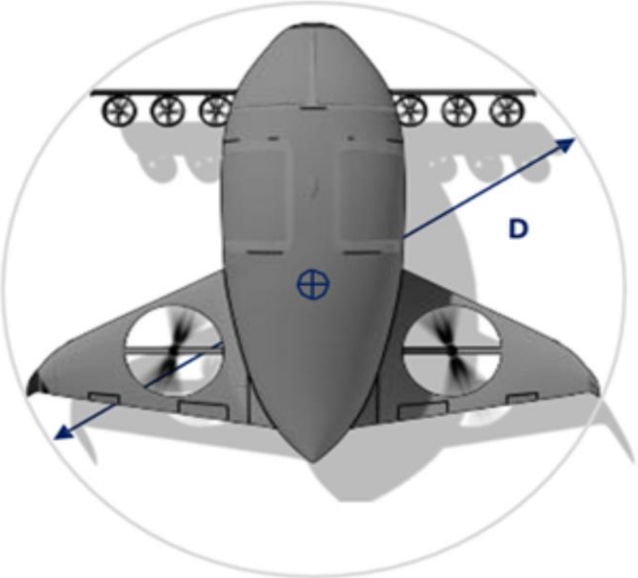


Figure 5-23. Dimension 'D' and centre of the smallest enclosing circle

Note: An example of difference between the largest overall dimension and the diameter of the smallest enclosing circle is provided in Figure 5-24. Appendix 1 provides clarification that if the largest overall dimension for obstacle protection is used, there could be a 15 % error in the unsafe direction. For VCA, the dimension D used for obstacle protection and vertiport design is thus defined based on the smallest enclosing circle, as stated above.

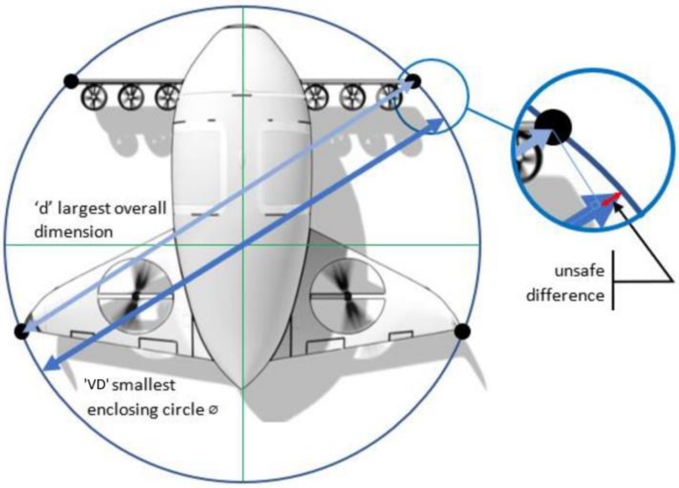


Figure 5-24. Example of unsafe difference between the largest overall dimension and the

diameter of the smallest enclosing circle

Undercarriage width (UCW)

'Undercarriage width' (UCW) means the maximum width of the undercarriage/landing gear projection on a horizontal plane (Figure 5-25). The UCW should be published in metres, rounded up to the next tenth.

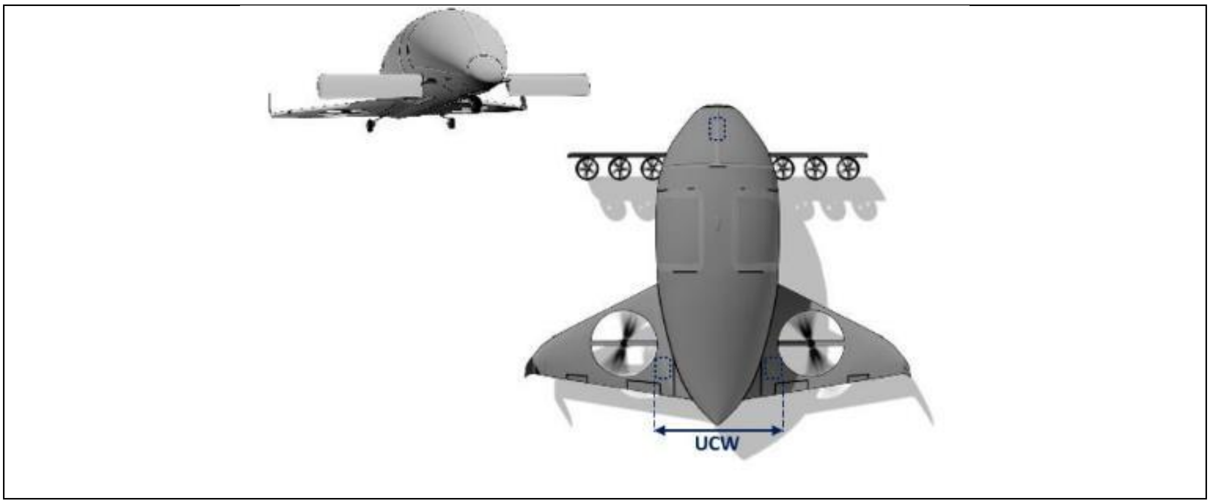


Figure 5-25. Undercarriage width

Undercarriage footprint

'Undercarriage' footprint means the diameter of the circle containing the landing gear contact area while the aircraft is in the take-off or landing configuration (Figure 5-26). The undercarriage footprint can be used for the determination of the undercarriage containment area and the TLOF. The undercarriage footprint should be published in metres, rounded up to the next tenth.

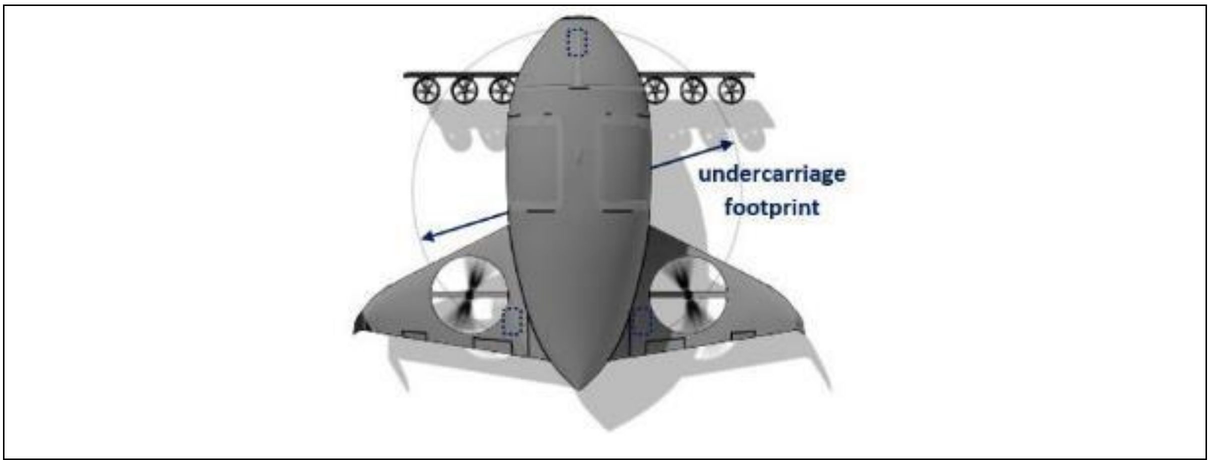


Figure 5-26. Undercarriage footprint

Take-off performance

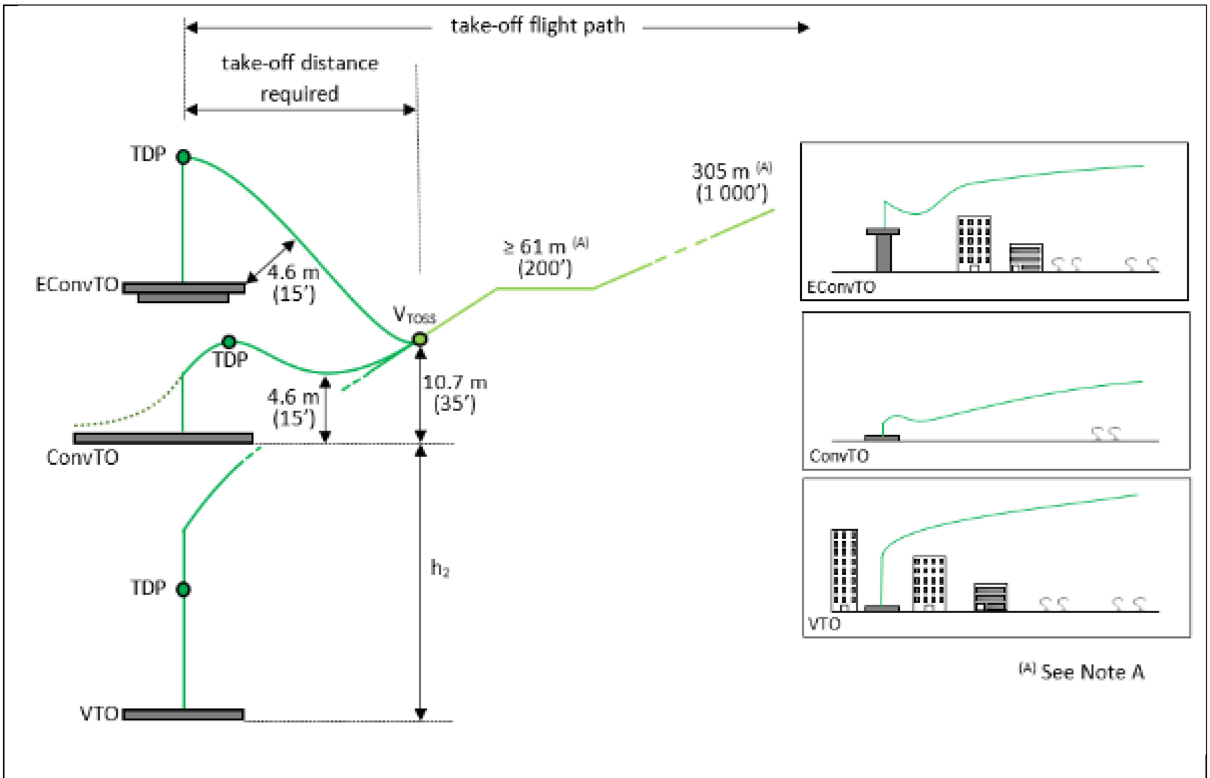


Figure 5-27. Possible take-off paths

Landing performance

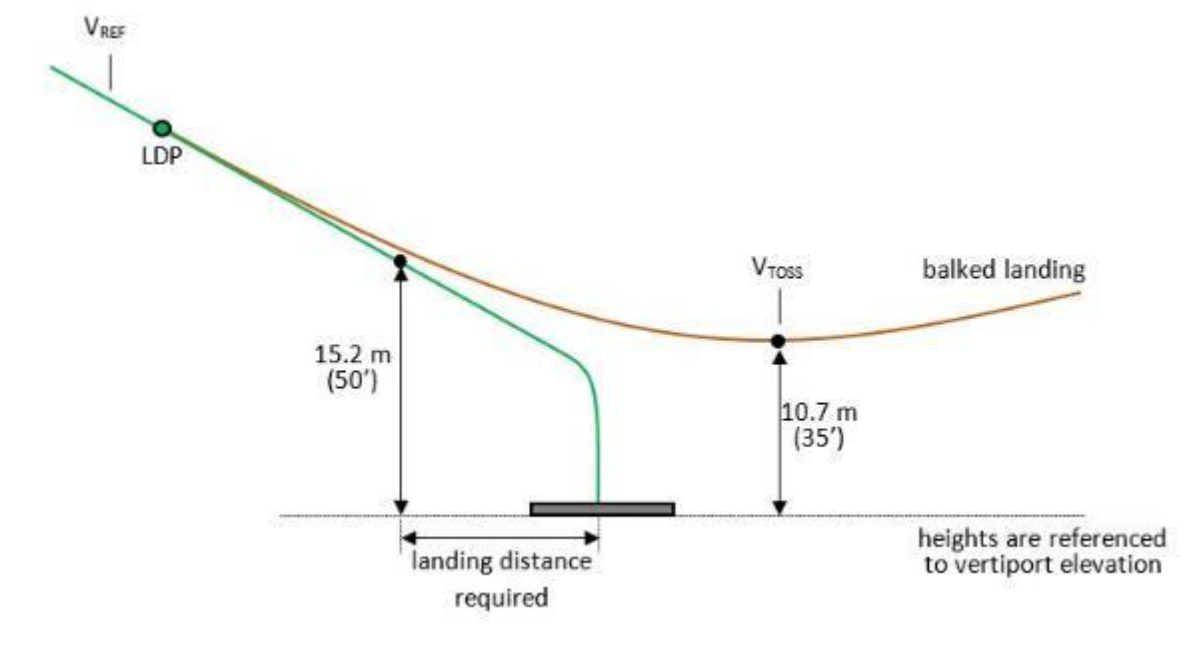


Figure 5-28. Landing path

Chapter III-6 – Visual Aids

Note 1 — The procedures used by some VCAs require that they utilise a FATO having characteristics similar in shape to a runway for fixed wing aircraft. For the purpose of this chapter a FATO having characteristics similar in shape to a runway is considered as satisfying the concept for a "runway-type FATO". For such arrangements it is sometimes necessary to provide specific markings to enable a pilot to distinguish a runway-type FATO during an approach. Appropriate markings are contained within sub-sections entitled "Runway-type FATOs". The requirements applicable to all other types of FATOs are given within sub-sections entitled "All FATOs except runway-type FATOs.

Note 2 — It has been found that, on surfaces of light colour, the conspicuousity of white and yellow markings can be improved by outlining them in black.

Note 3. - (c) The FATO may contain additional markings that support vertical approach or take-off subject to the specifications of Chapter III-5, 5.3, provided they do not interfere with other markings within or near the FATO and their meanings.

6.1 Wind Direction Indicator

Note - The objective of the wind direction indicator is to provide the pilot with a visual indication of the wind direction and give an indication of the wind speed in the vicinity of the FATO and TLOF.

Application

6.1.1 A vertiport shall be equipped with at least one wind direction indicator.

Location

6.1.2 A wind direction indicator shall be located so as to indicate the wind conditions over the FATO and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a VCA in flight, in a hover or on the movement area.

Note: At vertiports that are elevated or where an obstacle-free volume is provided, the wind direction indicator may be located at a nearby structure.

6.1.3 Where a TLOF and/or FATO may be subject to a disturbed airflow, then additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

6.1.4 The indicator should be sited to avoid the effects of turbulence and should be of sufficient size to be visible from VCA flying at a height of 200 m. Where a TLOF may be subjected to a disturbed air flow, then additional small lightweight wind vanes located close to the area may prove useful.

The following can be considered as guidance:

a) For FATOs located in environments where the airflow may be disturbed by nearby objects, such as in urban vertiports and congested areas, where more than one wind direction indicator may be needed, or when the wind direction indicators may be difficult to place near the FATO that is elevated, information on the wind direction and speed and other wind characteristics such as gusts or turbulence may be obtained from meteorological stations located near the FATO and be broadcasted/radio transmitted to the pilots.

Characteristics

6.1.5 A wind direction indicator shall be constructed so that it gives a clear indication of the direction of the wind and a general indication of the wind speed. See Figure 6-1 and 6-1A.

6.1.6 A wind direction indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:

	Surface-level Vertiports (m)	Elevated vertiports and Vertidecks (m)
Length	2.4	1.2
Diameter (large end)	0.6	0.3
Diameter (small end)	0.3	0.15

6.1.7 The colour of the wind direction indicator should be so selected as to make it clearly visible and understandable from a height of at least 200 m (650 ft) above the vertiport, having regard to background. Where practicable, a single colour, preferably white or orange, should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands the first and last band being the darker colour.

6.1.8 A wind direction indicator at a vertiport intended for use at night shall be illuminated. (See Figure 6-1A).

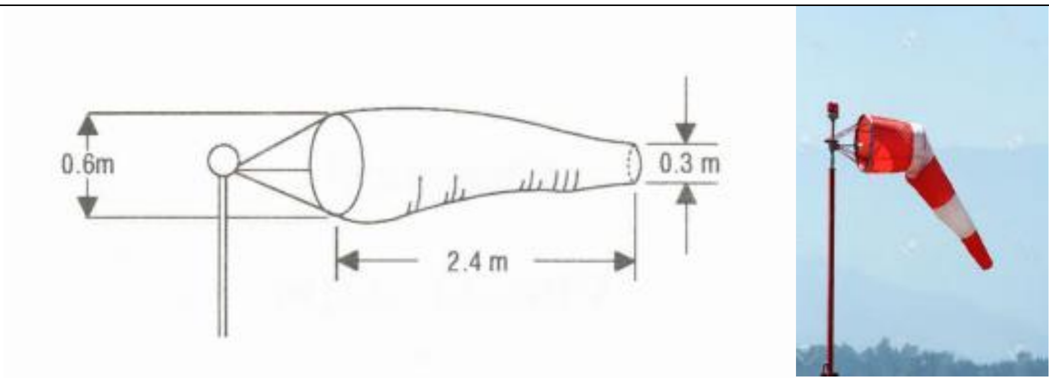


Figure 6-1 – Wind Direction Indicator – Surface Level

Figure 6-1A –Wind Direction Indicator – Illuminated

6.2 Vertiport Identification Marking

Note. - The objective of a vertiport identification marking is to provide the pilot with an indication of the presence of a vertiport; with its form, likely usage; and, the preferred direction(s) of approach.

Application

6.2.1 A vertiport identification marking shall be provided at a vertiport.

Location - All FATOs except runway-type FATOs

6.2.2 A vertiport identification marking shall be located at or near the centre of the FATO.

6.2.3 Where a vertiport that is elevated or an obstacle-free volume is provided, the vertiport identification marking should be located within the FATO or TLOF.

6.2.4 If the TDPM is offset, the vertiport identification marking should be established in the centre of the TDPM.

6.2.5 On a FATO, which does not contain a TLOF and which is marked with an aiming point marking, except for a vertiport at a hospital, the vertiport identification marking is established in the centre of the aiming point marking as shown in Figures 6-2 and 6-3.

Note 2 - For other than helidecks, the preferred direction(s) of approach corresponds to the median of the departure/arrival surface(s).

6.2.6 On a FATO which contains a TLOF, a vertiport identification marking shall be located in the FATO so the position of it coincides with the centre of the TLOF.

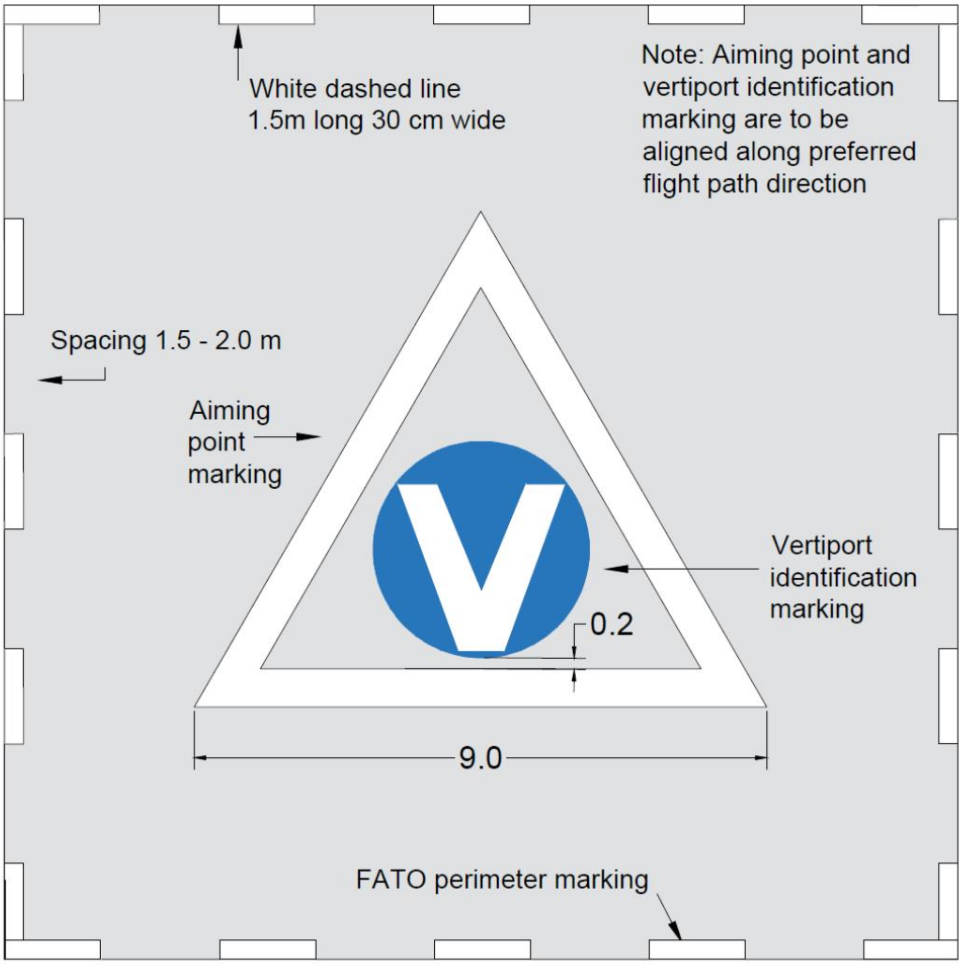
Location - Runway-type FATOs

6.2.7 A vertiport identification marking shall be located in the FATO and when used in conjunction with FATO designation markings, shall be displayed at each end of the FATO as shown in Figure 6-5.

Characteristics

6.2.8 A vertiport identification marking, except for a vertiport at a hospital, shall consist of a letter V shown as shown in Figure 6-2, white in colour. For a hospital vertiport the vertiport identification marking shall be red in colour on a white cross as shown in Figure 6-3.

6.2.9 The dimensions of the letter V marking and the white cross (where applicable) shall be no less than those shown in Figure 6-6 and where the marking is used for a runway-type FATO, its dimensions shall be as shown in Figure 6-5.



Note. – The aiming point, vertiport identification and FATO perimeter marking are white and may be edged with a 10 cm black border to improve contrast

Figure 6-2 –Vertiport identification, aiming point and FATO perimeter marking

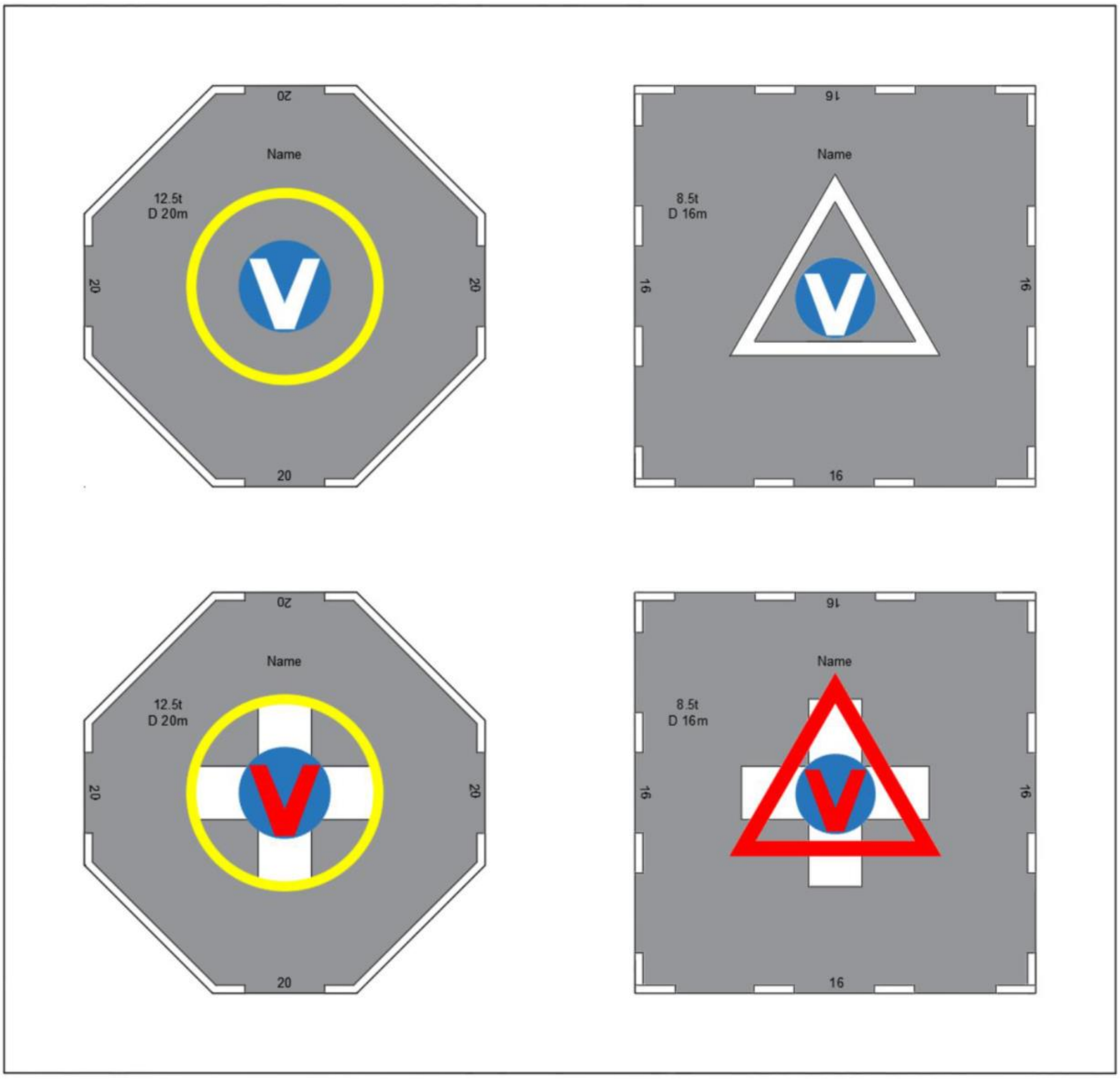


Figure 6-3 – Vertiport identification markings with TLOF and aiming markings for vertiport and hospital vertiport

6.3 FATO identification marking

Note. - The objective of the FATO identification markings is to provide the pilot with an identification of different FATOs at vertiport equipped with two or more FATOs.

Note. - FATO identification markings are not intended to be used in runway-type FATOs where the differentiation can be provided by the designation markings.

Application

6.3.1 Where appropriate for differentiation, FATO identification markings shall be provided.

Location

6.3.2 A FATO identification marking should be located within the FATO and so arranged as to be readable from the preferred final approach direction.

Characteristics

6.3.3 Each FATO identification marking should consist of an ordinal number, beginning with 1 and ending in the last of the numbered FATOs (see Figure 6-4).

6.3.4 The numbers code will have the size and proportions shown in Figure 6-7.

6.3.5 The FATO identification number will be inside a blue circle with diameter 175 cm as shown in Figure 6-4.

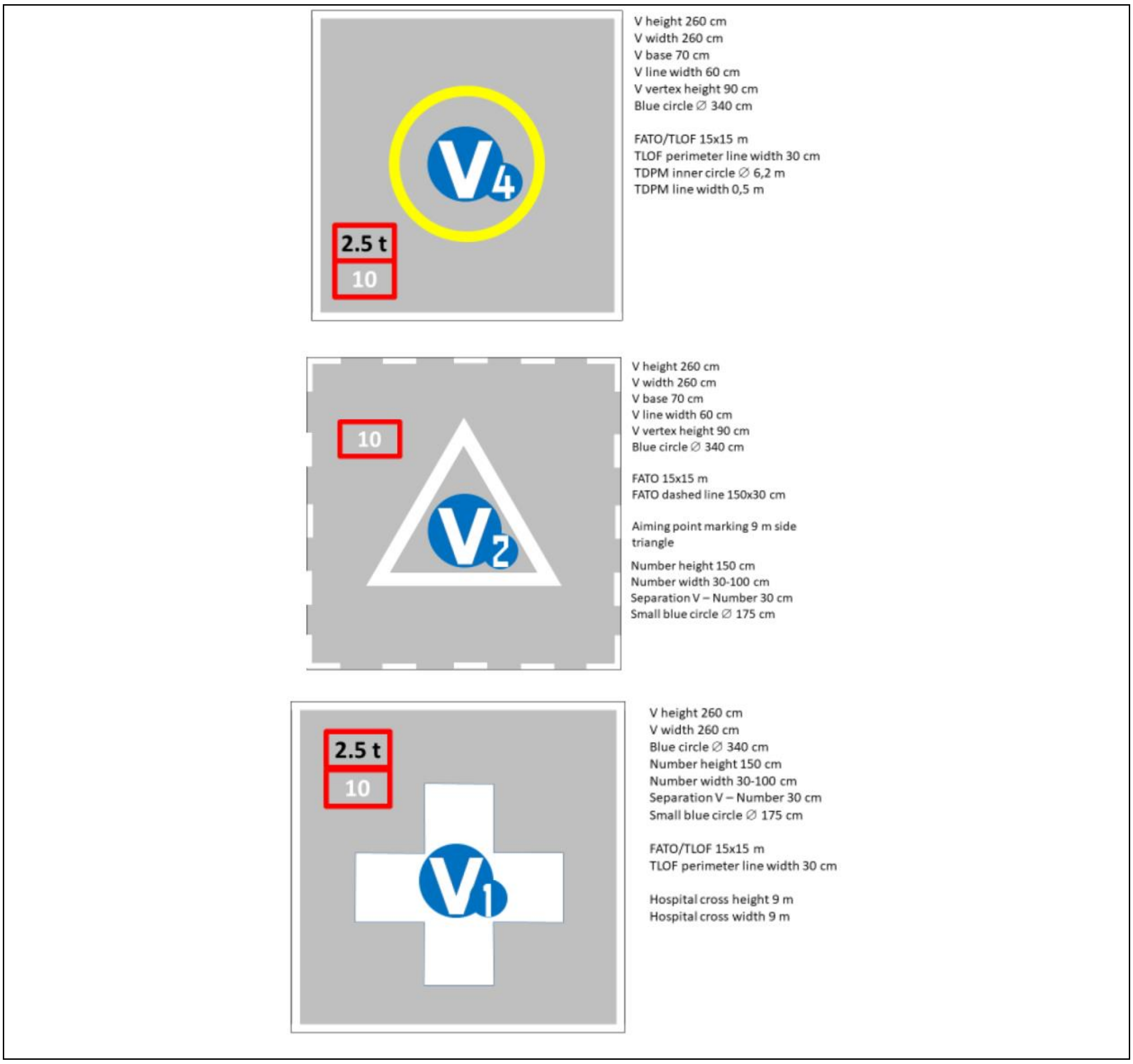


Figure 6-4. Vertiport identification, maximum allowable mass and D-value markings

6.4 Maximum Allowable Mass Marking

Note. - The objective of the maximum allowable mass marking is to provide the mass limitation of the vertiport such that it is visible to the pilot from the preferred final approach direction.

Application

6.4.1 A maximum allowable mass marking shall be displayed at an elevated vertiport.

6.4.2 A maximum allowable mass marking should be displayed at a surface-level vertiport.

Characteristics

6.4.3 A maximum allowable mass marking shall consist of a one-, two- or three-digit number.

6.4.4 The marking shall be expressed in tonnes (1 000 kg) rounded to the nearest 1000 kg followed by a letter “t”.

6.4.5 The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter “t”.

6.4.6 When the maximum allowable mass is expressed to 100 kg, the decimal place should be preceded with a decimal point marked with a 30 cm square.

All FATOs except runway-type FATOs

6.4.7 The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 6-7, for a D-value of more than 30 m. For a D-value with a dimension of between 15 m to 30 m the height of the numbers and the letter of the marking should be a minimum of 90 cm, and for a D-value of less than 15 m the height of the numbers and the letter of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

Figure 6-5. FATO designation marking and vertiport identification marking for a runway-type FATO

Runway-type FATOs

6.4.9 The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 6-5.

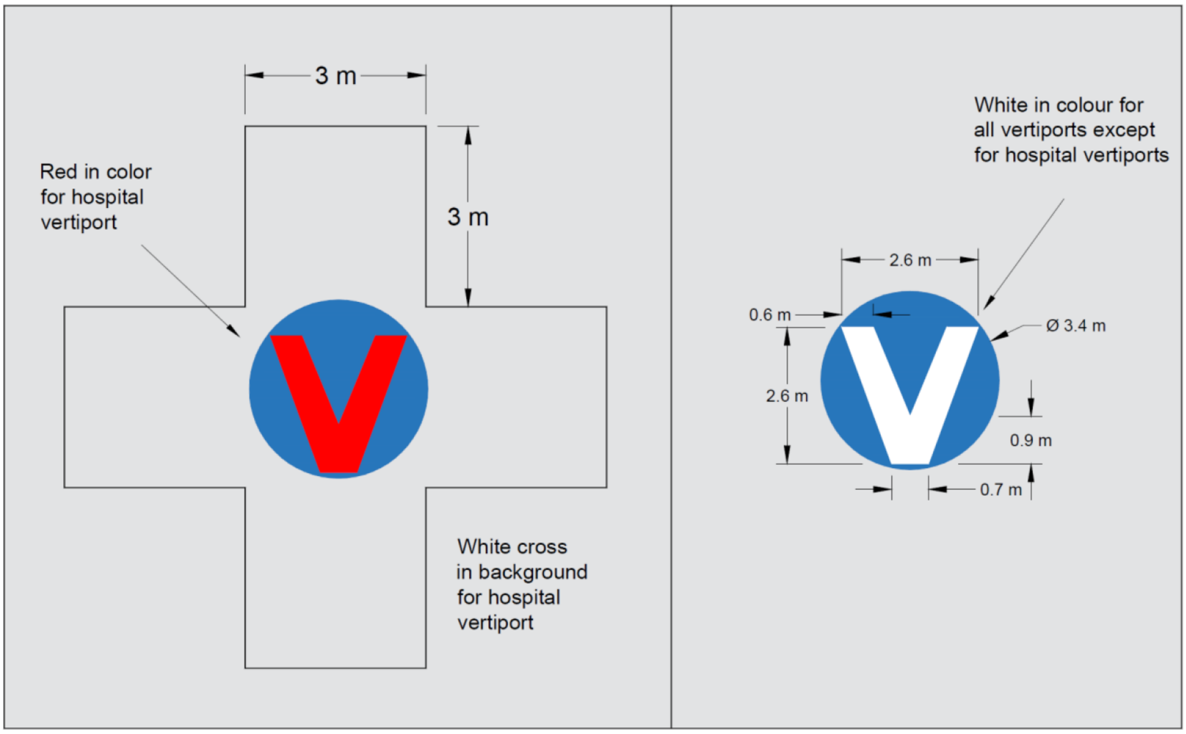


Figure 6-6 – Hospital vertiport identification and vertiport identification marking

6.5 D-Value Marking

Note. - The objective of the D-value marking is to provide to the pilot the "D" of the largest VCA that can be accommodated on the vertiport. This value may differ in size from the FATO and the TLOF provided in compliance with Chapter III-4.

6.5.1 The D-value marking shall be displayed at surface-level and elevated vertiports.

Note —The D-value is not required to be marked on a vertiport with a runway-type FATO.

Location

6.5.2 A D-value marking shall be located within the TLOF or FATO and so arranged as to be readable from the preferred final approach direction.

6.5.3 Where there is more than one approach direction, additional D-value markings should be provided such that at least one D-value marking is readable from the final approach directions.

Characteristics

6.5.4 The D-value marking shall be white. The D-value marking shall be rounded to the nearest whole metre with 0.5 rounded down.

6.6 FATO Perimeter Marking or Markers for Surface Level Vertiports

Note. - The objective of final approach and take-off area perimeter marking, or markers, is to provide to the pilot, where the perimeter of the FATO is not self-evident, an indication of the area that is free of obstacle and in which intended procedures, or permitted manoeuvring, may take place.

Application

6.6.1 FATO perimeter marking or markers shall be provided at a surface-level vertiport where the extent of a FATO with a solid surface is not self-evident.

Location

6.6.2 The FATO perimeter marking or markers shall be located on the edge of the FATO.

Characteristics - Runway-type FATOs

6.6.3 The perimeter of the FATO shall be defined with markings or markers spaced at equal intervals of not more than 50 m with at least three markings or markers on each side including a marking or marker at each corner.

6.6.4 A FATO perimeter marking shall be a rectangular stripe with a length of 9 m or one-fifth of the side of the FATO which it defines and a width of 1 m.

6.6.5 FATO perimeter markings shall be white.

6.6.6 A FATO perimeter marker shall have dimensional characteristics as shown in Figure 6-5.

6.6.7 FATO perimeter markers shall be of colour(s) that contrast effectively against the operating background.

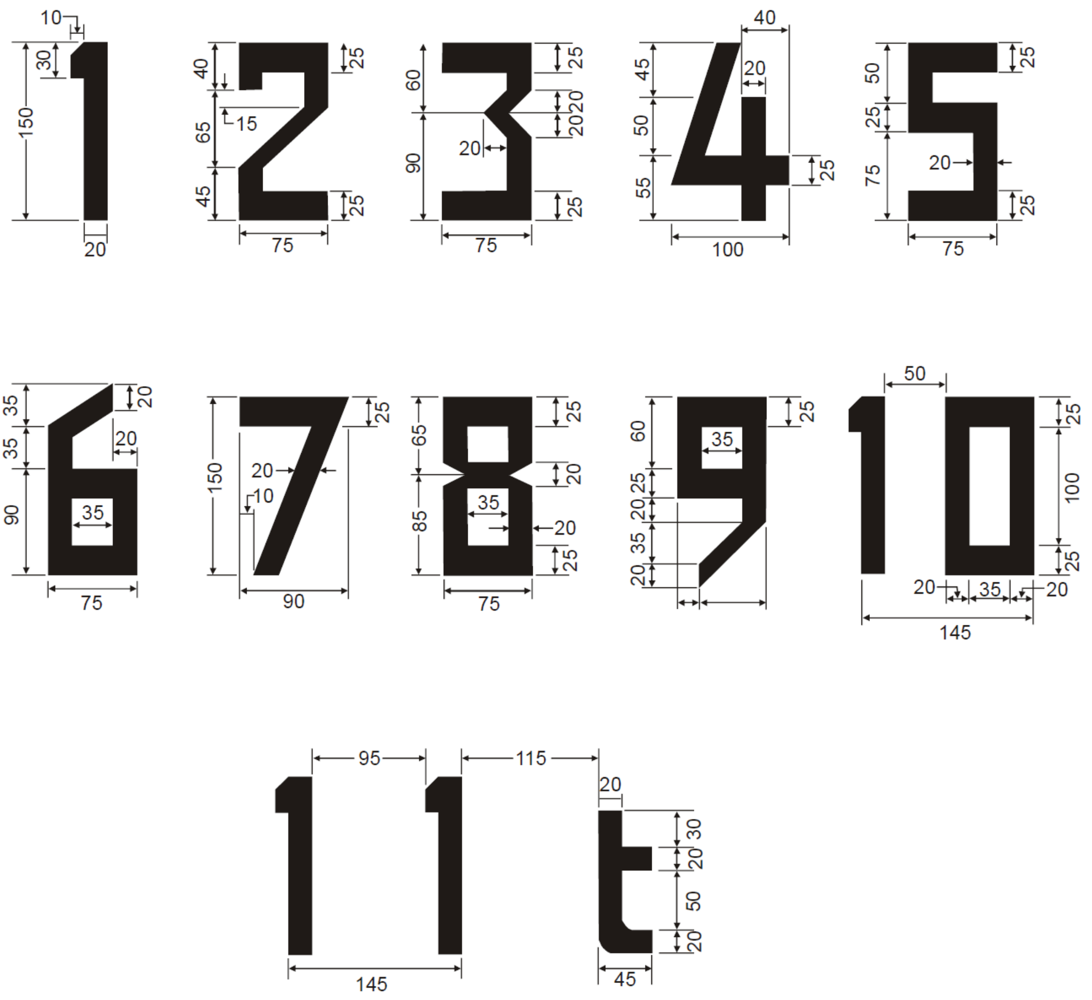
6.6.8 FATO perimeter markers should be a single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white should be used except where such colours would merge with the background.

Characteristics – All FATOs except runway-type FATOs

6.6.9 For an unpaved FATO the perimeter shall be defined with flush in-ground markers. The FATO perimeter markers shall be 30 cm in width, 1.5 m in length, and with end-to-end spacing of not less than 1.5 m and not more than 2 m. The corners of a square or rectangular FATO shall be defined.

6.6.10 For a paved FATO the perimeter shall be defined with a dashed line. The FATO perimeter marking segments shall be 30 cm in width, 1.5 m in length, and with end-to-end spacing of not less than 1.5 m and not more than 2 m. The corners of the square or rectangular FATO shall be defined.

6.6.11 FATO perimeter markings and flush in-ground markers shall be white.



Note.— All units are expressed in centimetres.

Figure 6-7 – Form and Proportions of Numbers and Letters

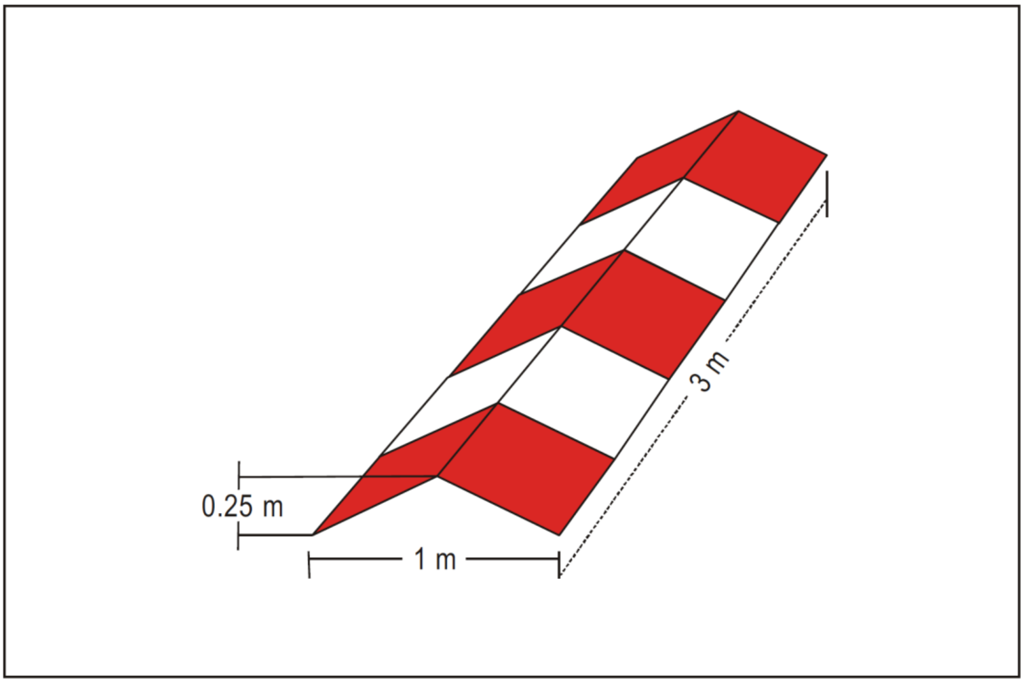


Figure 6-8. Runway-type FATO edge marker

6.7 FATO designation markings for runway-type FATO's

Note. - The objective of final approach and take-off area designation marking for runway-type FATOs is to provide to the pilot an indication of the magnetic heading of the runway

Application

6.7.1 A FATO designation marking should be provided where it is necessary to designate the FATO to the pilot.

Location

6.7.2 A FATO designation marking shall be located at the beginning of the FATO as shown in Figure 6-5.

Characteristics

6.7.3 A FATO designation marking shall consist of a two-digit number. The two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach. When the above rule would give a single digit number, it shall be preceded by a zero. The marking as shown in Figure 6-5, shall be supplemented by the vertiport identification marking letter 'V'.

6.8 Aiming Point Marking

Note. - The objective of the aiming point marking is to provide a visual cue indicating to the pilot the preferred approach/departure direction; the point to which the VCA approaches to the hover before positioning to a stand where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

Application

6.8.1 An aiming point marking should be provided at a vertiport where it is necessary for a pilot to make an approach to a particular point above a FATO before proceeding to a TLOF.

Location- Runway-type FATOs

6.8.2 The aiming point marking shall be located within the FATO.

Location - All FATOs except runway-type FATOs

6.8.3 The aiming point marking shall be located at the centre of the FATO.

Characteristics

6.8.4 The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach direction. The marking shall consist of continuous lines~~,~~ providing a contrast with the background colour, and the dimensions of the marking shall conform to those shown in Figure 6-9.

Note. - The aiming point, vertiport identification and FATO perimeter markings are white and may be edged with a 10 cm black border to improve contrast.

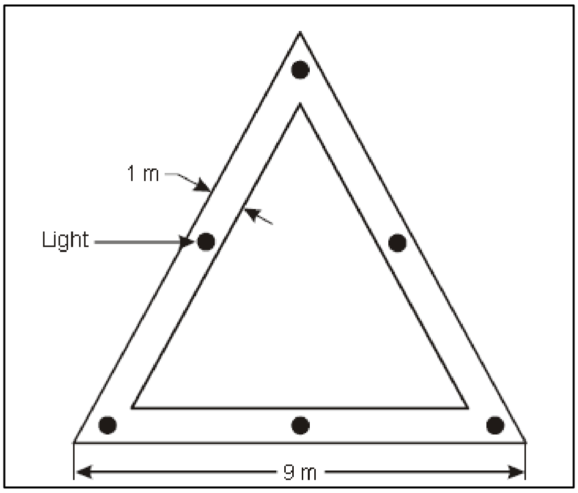


Figure 6-9 – Aiming point marking and lighting

6.9 TLOF Perimeter Marking

Note. - The objective of the touchdown and lift-off area perimeter marking is to provide to the pilot an indication of an area that is free of obstacles; has dynamic load bearing; and in which, when positioned in accordance with the TDPM, undercarriage containment is assured.

Application

6.9.1 A TLOF perimeter marking shall be displayed on a TLOF located in a FATO at a surface-level vertiport if the perimeter of the TLOF is not self-evident.

6.9.2 A TLOF perimeter marking shall be displayed on an elevated vertiport.

Location

6.9.3 The TLOF perimeter marking shall be located along the edge of the TLOF.

Characteristics

6.9.4 A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

6.10 Touchdown / Positioning Marking

Note. - The objective of a touchdown/positioning marking (TDPM) is to provide visual cues which permit a VCA to be placed in a specific position such that, when the pilot's seat is above the marking, the undercarriage is within the load-bearing area and all parts of the VCA will be clear of any obstacles by a safe margin.

Application

6.10.1 A TDPM shall be provided for a VCA to touch down or be accurately placed in a specific position.

6. 10.2 The TDPM marking shall be:

a) when there is no limitation on the direction of touchdown/positioning, a touchdown/positioning circle (TDPC) marking; and

b) when there is a limitation on the direction of touchdown/positioning:

1) for unidirectional applications, a shoulder line with an associated centre line; or

2) for multidirectional applications, a TDPC marking with prohibited landing sector(s) marked.

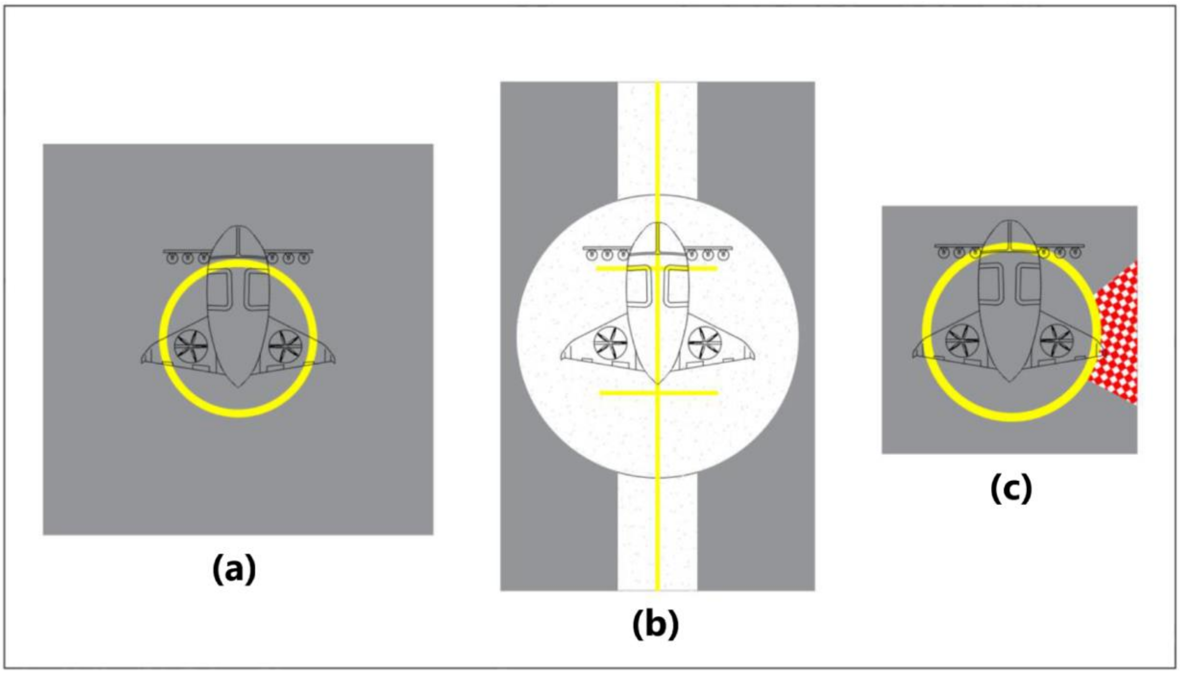


Figure 6-10 - (a) multidirectional TDPC with no limitation. (b) unidirectional marking shoulder line with associated centreline. (c) multidirectional TDPC with prohibited landing sector marking

Note. - The prohibited landing sector (PLS) marking, when provided, is not intended to move the VCA away from objects around the FATO, but to ensure that the tail is not placed in an orientation that might constitute a hazard. This is achieved by having the VCA nose clear of the hatched markings during the touchdown.

Location

6. 10.3 The inner edge/inner circumference of the touchdown/positioning marking shall be at a distance of 0.25 D from the centre of the area in which the VCA is to be positioned.

6. 10.4 Prohibited landing sector markings, when provided, shall be located on the touchdown/positioning marking, within the relevant headings, and extend to the inner edge of the TLOF perimeter marking.

Characteristics

6. 10.5 The inner diameter of the TDPC shall be 0.5 D of the largest VCA the area is intended to serve.

6. 10.6 A touchdown/positioning marking shall have a line width of at least 0.5 m. For a purpose-built shipboard vertiport, the line width shall be at least 1 m.

6. 10.7 The length of a shoulder line shall be 0.5 D of the largest VCA the area is intended to serve.

6. 10.8 The prohibited landing sector markings, when provided, shall be indicated by white and red hatched markings as shown in Figure 6-10.

6. 10.9 The TDPM shall take precedent when used in conjunction with other markings on the TLOF except for the prohibited landing sector marking.

6.11 Obstacle sector marking

Note. - The objective of obstacle sector marking is to provide the pilot with an indication of the sector of an omnidirectional obstacle-free volume that should not be used for take-off and landing due to the presence of obstacles above the revolution obstacle-free volume. The obstacle sector marking is not intended to indicate objects in the safety area or in the protected side slope of the FATO.

Application

6. 11.1 An obstacle sector marking should be provided at a vertiport where there are obstacles above the omnidirectional obstacle-free volume that cannot be removed.

Location

6. 11.2 Obstacle sector markings should be located at the edge of the vertiport identification marking or on the TDPM if it is provided, within the relevant headings, and extend to the inner edge of the FATO.

Characteristics

6. 11.3 The prohibited sector marking should be indicated by white and red chequered markings as shown in Figure 6-10.

6. 11.4 FATO, TLOF, TDPM and vertiport identification markings shall take precedence over obstacle sector markings.

6. 11.5 The arc of coverage of the obstacle sector marking should be sufficient to ensure a lateral separation between the VCA and the obstacle of 3.5 D for day operations and 5 D for night operations, when the VCA lands or takes off clear of the obstacle sector marking.

6.12 Vertiport Name Marking

Note. - The objective of a vertiport name marking is to provide to the pilot a means of identifying a vertiport which can be seen, and read, from all directions of approach

Application

6.12.1 A vertiport name marking should be provided at a vertiport where there is insufficient alternative means of visual identification.

Location

6. 12.2 The vertiport name marking should be located at a position such as it can be seen and read from all directions of approach.

6. 12.3 The vertiport name marking should be displayed on the vertiport so as to be visible, as far as practicable, at all angles above the horizontal. Where a limited obstacle sector (LOS) exist on a vertiport the marking should be located on that side of the "vertiport identification marking ". For a non-purpose built vertiport located on a ships side the marking should be located on the inboard side of the vertiport identification marking in the area between the TLOF perimeter marking and the boundary of the LOS.

Characteristics

6. 12.4 A vertiport name marking shall consist of the name or the alphanumeric designator of the vertiport as used in the radio (R/T) communications.

6. 12.5 A vertiport name marking intended for use at night or during conditions of poor visibility should be illuminated, either internally or externally.

Runway-type FATOs

6. 12.6 The characters of the marking should be not less than 3 m in height.

All FATOs except runway-type FATOs

6. 12.7 The characters of the marking should be not less than 1.5 m in height at surface level vertiports and not less than 1.2 m on elevated vertiports. The colour of the marking should contrast with the background and preferably be white.

6.13 VCA Taxiway Markings and Markers

Note1 - The objective of VCA taxiway markings and markers is, without being a hazard to the VCA, to provide to the pilot by day and, if necessary, by night, visual cues to guide movement along the taxiway.

Note2. - The specifications for taxi-holding position markings in CAR ADR - Aerodromes are equally applicable to taxiways intended for ground taxiing of VCAs.

Note3 - Ground taxi-routes and air taxi routes over a taxiway are not required to be marked.

Note4 - Unless otherwise indicated it may be assumed that a VCA taxiway is suitable for both ground taxiing and air taxiing of VCAs.

Note5 - Signage may be required on an aerodrome where it is necessary to indicate that a VCA taxiway is suitable only for the use of VCAs.

Application

6.13.1 The centre line of a VCA taxiway shall be identified with a marking.

6. 13.2 The edges of a VCA taxiway, if not self-evident, should be identified with markers or markings.

Location

6. 13.3 VCA taxiway markings shall be along the centre line and, if required, along the edges of a VCA taxiway.

6. 13.4 VCA taxiway edge markers shall be located at a distance of 1 m to 3 m beyond the edge of the VCA taxiway.

6. 13.5 VCA taxiway edge markers shall be spaced at intervals of not more than 15 m on each side of straight sections and 7.5 m on each side of curved sections with a minimum of four equally spaced markers per section.

Characteristics

6. 13.6 On a paved taxiway, a VCA taxiway centre line marking shall be a continuous yellow line 15 cm in width.

6. 13.7 On an unpaved taxiway that will not accommodate painted markings, a VCA taxiway centre line shall be marked with flush in-ground 15cm wide and approximately 1.5m in length yellow markers, spaced at intervals of not more than 30m on straight sections and not more than 15m on curves, with a minimum of four equally spaced markers per section.

6. 13.8 VCA taxiway edge markings shall be a continuous double yellow line, each 15 cm in width, and spaced 15 cm apart (nearest edge to nearest edge).

6. 13.9 A VCA taxiway edge marker shall be frangible to the wheeled undercarriage of a VCA.

6. 13.10 A VCA taxiway edge marker shall not exceed a plane originating at a height of 25 cm above the plane of the VCA taxiway, at a distance of 0.5 m from the edge of the VCA-taxiway and sloping upwards and outwards at a gradient of 5 per cent to a distance of 3 m beyond the edge of the VCA taxiway.

6. 13.11 A VCA taxiway edge marker shall be blue.

Note2 - If blue markers are used on an aerodrome, signage may be required to indicate that the VCA taxiway is suitable only for VCAs.

6. 13.12 If the VCA-taxiway is to be used at night, the edge markers shall be internally illuminated or retro-reflective.

6. 13.13 The marked surface of the marker, as seen by the pilot, should be a rectangle and have a minimum viewing area of 150 cm2, as shown in Figure 6-10. Markers commonly used are cylindrical in shape.

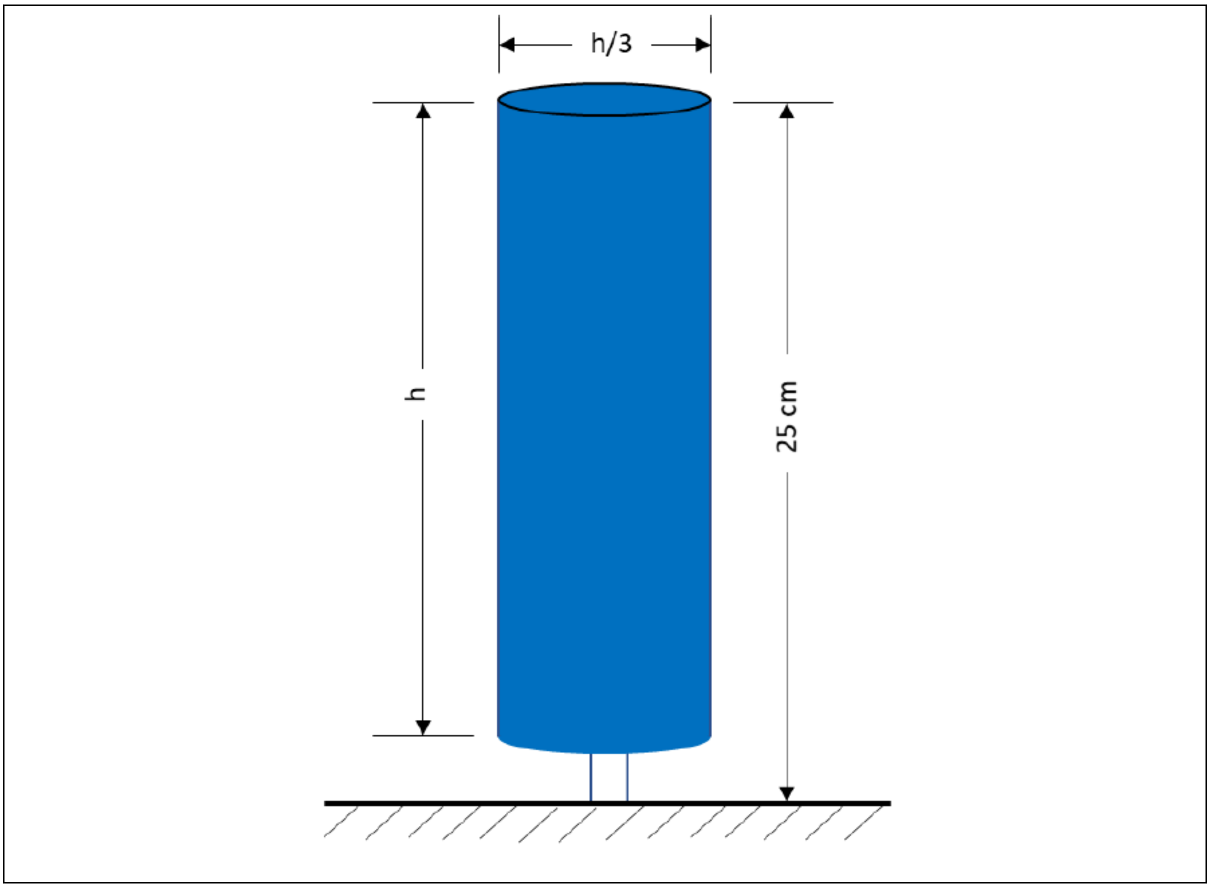


Figure 6-11. VCA taxiway edge marker

6.14 VCA Air Taxi-Route Markings and Markers

Note1 - The objective of VCA air taxi-route markings and markers is to provide to the pilot by day and, if necessary, by night, visual cues to guide movement along the air taxi-route.

Application

6.14.1 The centre line of a VCA air taxi-route shall be identified with markers or markings.

Location

6.14.2 A VCA air taxi-route centre line marking or flush in-ground centre line marker shall be located along the centre line of the VCA air taxiway.

Characteristics

6.14.3 A VCA air taxi-route centre line, when on a paved surface, shall be marked with a continuous yellow line 15 cm in width.

6.14.4 A VCA air taxi-route centre line, when on an unpaved surface that will not accommodate painted markings, shall be marked with flush in-ground 15 cm wide and approximately 1.5 m in length yellow markers, spaced at intervals of not more than 30 m on straight sections and not more than 15 m on curves, with a minimum of four equally spaced markers per section.

6.14.5 If the VCA air taxi-route is to be used at night, markers shall be either internally illuminated or retro-reflective.

6.15 VCA Stand Markings

Note1 - For VCA stands intended to be used only by wheeled VCAs not operating in the hover, standard markings as for fixed wing aircraft should be used taking into account the protection area requirements for ground taxiways in Chapter III-4.6.

Note2 - The objective of the VCA stand marking is to provide to the pilot a visual indication of an area that is free of obstacles and in which permitted manoeuvring, and all necessary ground functions, may take place; identification, mass and D-value limitation, when required; and guidance for manoeuvring and positioning of the VCA within the stand.

Application

6.15.1 A VTOL-capable aircraft stand perimeter marking should be provided when the stand is designed according to 4.7.6 (a) and (b).

6.15.2 A VTOL aircraft stand perimeter marking should be provided when the stand is designed according to 4.7.8 and 4.7.10, except when the aircraft enters and exits the stand not under its own power and the clearance distances can be assured with the use of alignment and lead-in/lead-out lines.

6.15.2 A VCA stand shall be provided with the appropriate TDPM. See Figure 6-10.

6.15.3 A VCA stand perimeter marking and a TLOF marking shall be provided on a VCA stand designed for VCAs in the hover and for turning as shown on Figure 6-12, except that a TDPM shall be provided if the VCA stand perimeter marking is not practicable.

6.15.4 A TLOF marking and a stop line shall be provided on a VCA stand intended to be used by VCAs in the hover and which does not allow the VCA to turn.

6.15.5 Alignment lines and lead-in/lead-out lines should be provided on a VCA stand.

6.15.6 Where the stand is designed to accommodate VCA with a D smaller than the Design-D, a box containing the limiting D-value should be displayed on the lead-in line. See Figure 6-12. A box containing the maximum allowable mass may be added if required.

Note1 - See Figures 4-6 to 4-13 of Chapter III-4.

Note2 - VCA stand identification markings may be provided where there is a need to identify individual stands.

Location

6.15.7 The TDPM, alignment lines and lead-in/lead-out lines shall be located such that every part of the VCA can be contained within the VCA stand during positioning and permitted manoeuvring.

6.15.8 A stop line shall be located on the VCA stand at right angles to the centre line.

6.15.9 Alignment lines and lead-in/lead-out lines shall be located as shown in Figure 6-13.

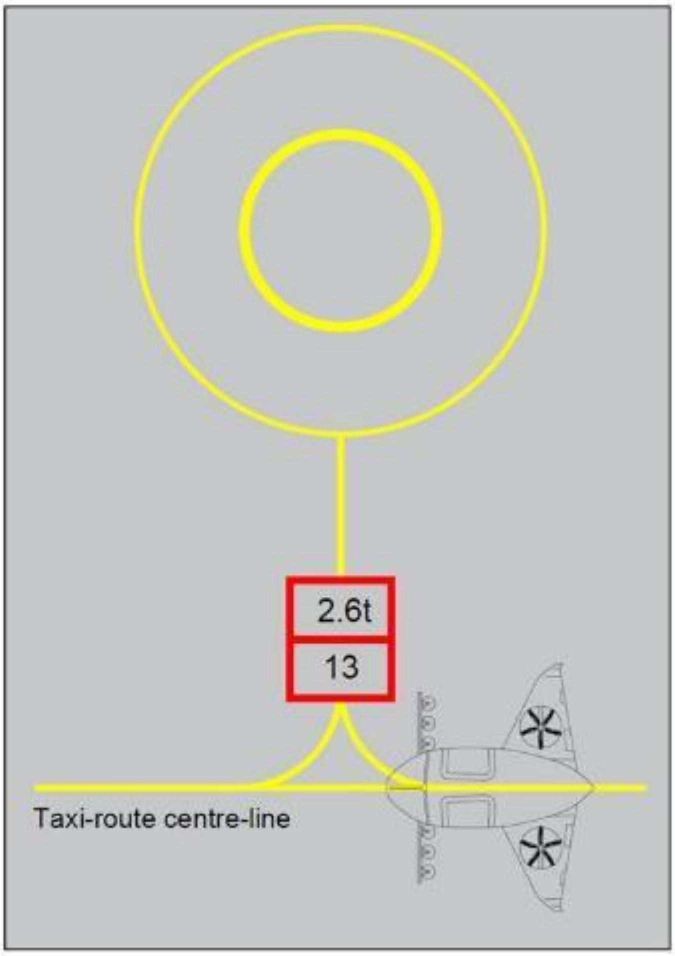


Figure 6-12. Restricted-size stand

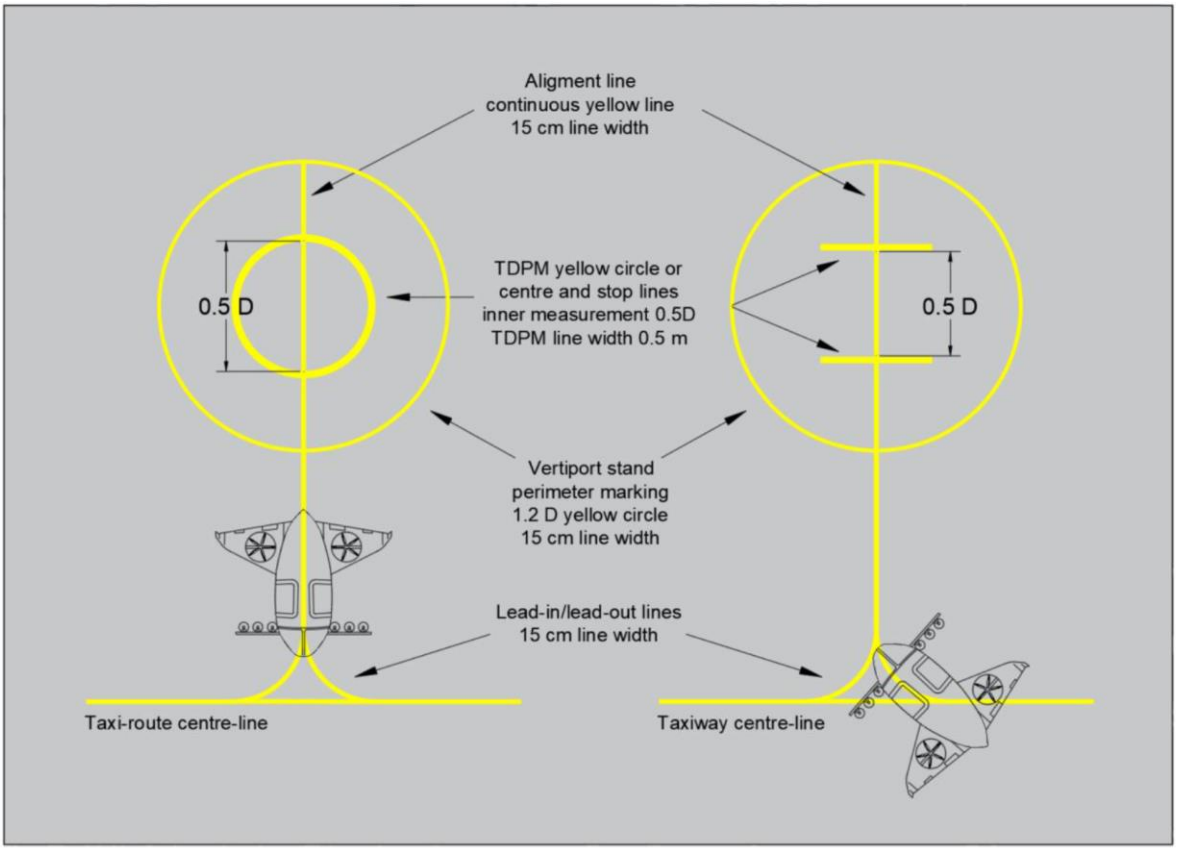


Figure 6-13 – VCA Stand Markings

Characteristics

6.15.9 A VCA stand perimeter marking shall consist of a continuous yellow line and have a line width of 15 cm.

6.15.11 A TDPM shall have the characteristics describe in Section 6.10 above.

6.15.12 Alignment lines, lead-in/lead-out lines and stop lines shall be continuous yellow lines and have a width of 15 cm. Where it is intended that VCA proceed in one direction only, arrows indicating the direction to be followed may be added as part of the alignment lines, see Figure 6-13.

6.15.13 Curved portions of alignment lines and lead-in/lead-out lines shall have radii appropriate to the most demanding VCA type the VCA stand is intended to serve.

6.15.14 Stand identification markings shall be marked in a contrasting colour so as to be easily readable.

6.15.15 When unpaved, the stand perimeter should be marked with flush in-ground markers.

Note1. - Where it is intended that VCAs proceed in one direction only, arrows indicating the direction to be followed may be added as part of the alignment lines.

Note2. - The characteristics of markings related to the stand size and alignment and lead-in/lead-out lines are illustrated in Figure 6-13 – examples of stands and their markings can be seen in Figures 4-5 to 4-9 of Chapter III-4.

6.16 Apron safety lines

Note. - The objective of the apron safety lines is to mark the limits of VCA clearance lines, parking areas for ground equipment, apron service roads and passengers' paths.

Note2. - VCA clearance lines are used to delineate the safety zone clear of the path of the critical VCA.

Note3. - Equipment limit lines are used to indicate the limits of areas which are intended for parking vehicles and aircraft servicing equipment when they are not in use.

Note4. - Passenger path lines are used to keep passengers, when walking on the apron, clear of hazards.

Application

6.16.1 Apron safety lines should be provided on an apron as required by the parking configurations and ground facilities.

Location

6.16.2 Apron safety lines should be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment, passengers and pedestrians, etc., to provide safe separation from VCA.

Characteristics

6.16.3 Apron safety lines should include such elements as VCA clearance lines and service road boundary lines as required by the parking configurations and ground facilities.

6.16.4 Apron safety lines should be of a conspicuous colour, preferably red, which should contrast with that used for VCA stand markings.

6.16.5 An apron safety line should be continuous in length and at least 10 cm in width.

6.17 Flight Path Alignment Guidance Marking

Note. - The objective of a flight path alignment guidance marking is to provide the pilot with a visual indication of the available approach and/or departure path direction(s).

Application

6.17.1 Flight path alignment guidance marking(s) should be provided at a vertiport where it is desirable and practicable to indicate available approach and/or departure path direction(s).

Note. — The flight path alignment guidance marking can be combined with a flight path alignment guidance lighting system described in Chapter III-7, section 3.

Location

6.17.2 The flight path alignment guidance marking shall be located in a straight line along the direction of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO or safety area.

Characteristics

6.17.3 A flight path alignment guidance marking shall consist of one or more arrows marked on the TLOF, FATO and/or safety area surface as shown in Figure 6-16. The stroke of the arrow(s) shall be 50 cm in width and at least 3 m in length. When combined with a flight path alignment guidance lighting system it shall take the form shown in Figure 6-16 which includes scheme for marking 'heads of the arrows' which are constant regardless of stroke length.

Note. — In the case of a flight path limited to a single approach direction or single departure direction, the arrow marking may be uni-directional. In the case of a vertiport with only a single approach/departure path available, one bi-directional arrow is marked.

6.17.4 The markings should be in a colour which provides good contrast against the background colour of the surface on which they are marked, preferably white.

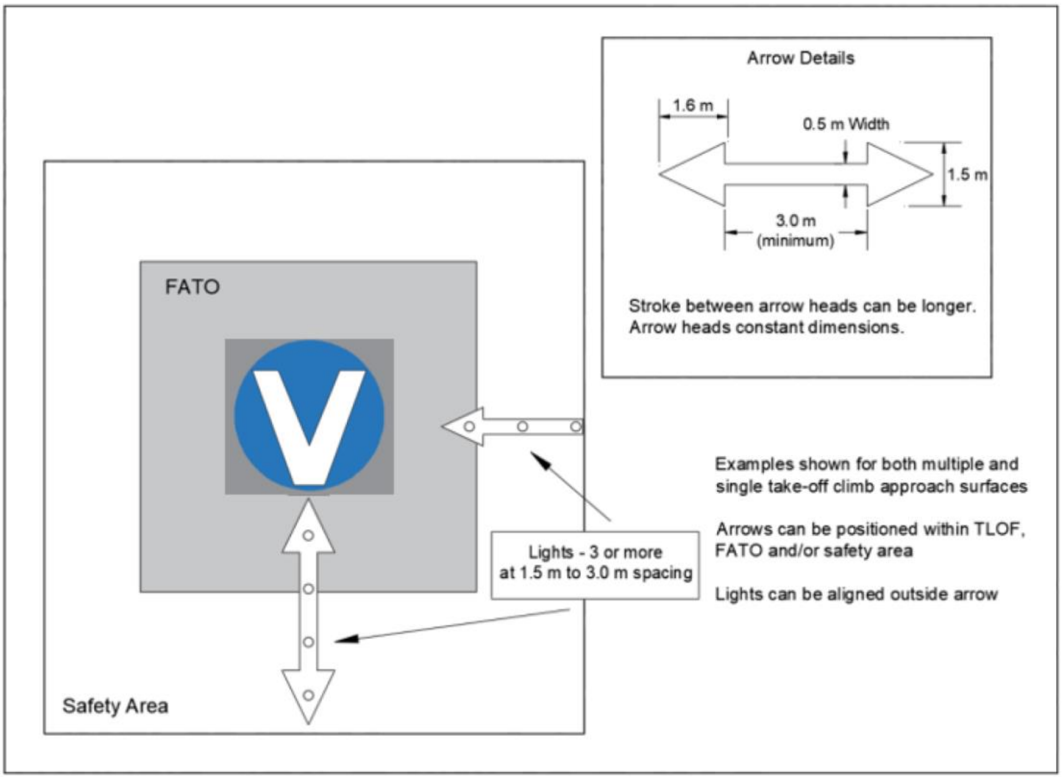


Figure 6-14 – Flight path alignment guidance markings and lights

6.18 Visual aids for denoting restricted-use areas

Note. - The objective of the markings and lights for denoting closed areas is to provide the pilot with an indication of FATOs, TLOFs, stands, taxiways or portion of taxiways that are closed.

Note. - The objective of the unserviceability markers and lights is to warn the pilots of a hole in a taxiway or apron pavement, or to outline for the pilots a portion of pavement, such as on an apron or a taxiway, that is under repair. They are not suitable for use when a FATO, a TLOF, a stand or a taxiway becomes unserviceable. In such instances, the FATO, TLOF, stand or taxiway is normally closed.

6.18.1 Closed Markings

Application

6.18.1.1 A closed marking should be displayed on a FATO, TLOF, stand, taxiway or portion of taxiway which is permanently closed to the use of all aircraft.

6.18.1.2 A closed marking should be displayed on a temporarily closed FATO or TLOF except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided to VCA operators.

6.18.1.3 Lighting on a closed FATO or TLOF shall not be operated, except as required for maintenance purposes.

Location

6.18.1.4. On a runway-type FATO, a closed marking should be placed at each end of the FATO.

6.18.1.5. On a FATO other than a runway-type FATO, a closed marking should be placed at the centre of the FATO.

6.18.1.6. On a taxiway, a closed marking should be placed at least at each end of the taxiway or portion thereof closed.

6.18.1.7. On a TLOF, a closed marking should be placed at the centre of the TLOF.

6.18.1.8. On a stand, a closed marking should be placed at the centre of the stand.

Characteristics

6.18.1.9 The closed marking should be of the form of a letter ‘X’. See Figure 6-15. The width of the strokes should be 1,5 m. When displayed on a FATO, the length of the strokes will extend at a distance of 15 cm of the FATO perimeter marking. When displayed on a taxiway, the length of the strokes will extend at a distance of 15 cm of the edge of the taxiway. The marking shall be white when displayed on a FATO and shall be yellow when displayed on a taxiway.

6.18.1.10 When a FATO, TLOF, stand, taxiway or portion of taxiway is permanently closed, all normal FATO, TLOF, stand, taxiway markings should be physically removed.

6.18.1.11 Lighting on a closed FATO, TLOF, stand, taxiway or portion of taxiway should not be operated, except as required for maintenance purposes.

6.18.1.12 In addition to closed markings, when the taxiway or portion thereof that is closed is intercepted by a usable taxiway which is used at night, unserviceability lights should be placed across the entrance to the closed area with a minimum of three lights at intervals not exceeding 3 m.

6.18.2 Unserviceable Areas

Application

6.18.2.1 Unserviceability markers should be displayed wherever any portion of a taxiway or apron is unfit for the movement of VCA, but it is still possible for VCA to bypass the area safely. On a movement area used at night, unserviceability lights shall be used.

Location

6.18.2.2 Unserviceability markers and lights should be placed at intervals sufficiently close so as to delineate the unserviceable area.

Characteristics (markers)

6.18.2.3 Unserviceability markers should consist of conspicuous upstanding devices such as cones or marker boards.

6.18.2.4 An unserviceability cone should be of a height that does not interfere with parts of the VCA and red, orange or yellow in combination with white.

6.18.2.5 An unserviceability marker board should be of a height that does not interfere with parts of the VCA and 0.6 m in length, with alternate red and white or orange and white vertical stripes.

Characteristics (lights)

6.18.2.6 An unserviceability light should consist of a red fixed light. The light should have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case should the intensity be less than 10 cd of red light.

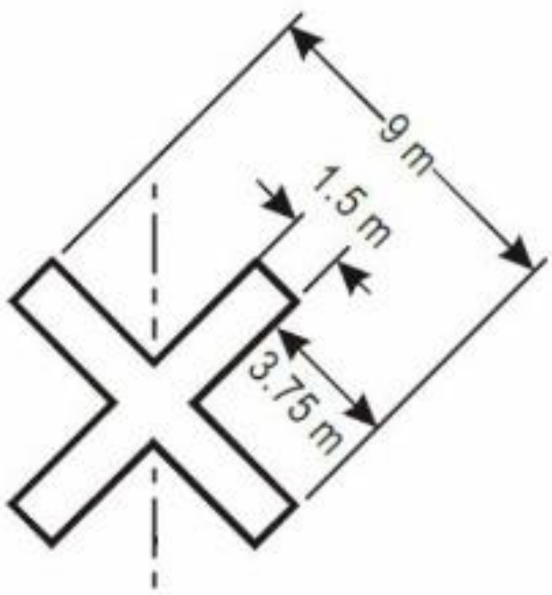


Figure 6-15. Closed FATO, TLOF, stand or taxiway marking

Chapter III-7 – Aeronautical Lights

Note1. — See CAR ADR Aerodromes, concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights.

Note2 — In the case of vertiports located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.

Note3 — As VCAs will generally come very close to extraneous light sources, it is particularly important to ensure that, unless such lights are navigation lights exhibited in accordance with international regulations, they are screened or located so as to avoid direct and reflected glare.

Note4 — Specifications Systems addressed in sections 7.3, 7.5, 7.6 and 7.7 of this Chapter are designed to provide effective lighting systems cues based on night conditions. Where lights are to be used in conditions other than night (i.e. - day or twilight) it may be necessary to increase the intensity of the lighting to maintain effective visual cues by use of a suitable brilliancy control. Guidance is provided in the Aerodrome Design Manual (Doc 9157), Part 4 Visual Aids, Chapter 5 Light Intensity Settings.

Note5 - The specifications for marking and lighting of obstacles included in Annex 14, Vol.I are equally applicable to vertiports and winching areas.

Note6 - In cases where operations into a vertiport are to be conducted at night with Night Vision Imaging Systems (NVIS), it is important to establish the compatibility of the NVIS with all vertiport lighting through an assessment by the VCA operator prior to use.

Note7 - The technical specifications for the lights address issues for VCA operations at night:

(1) distinguishing one defined area from another;

(2) providing conspicuity for acquiring visual contact with the vertiport;

(3) providing guidance in the approach and departure phases of flight; and

(4) providing visual cues to allow accurate manoeuvring and placement of the VCA when within the bounds of the vertiport.

Note8. - Lights and lighting systems installed at vertiports should be dimmable in order to reduce intensity, if needed.

Further guidance on lights is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4 – Visual aids and Document 9261, Heliport Manual.

7.1 Vertiport Beacon

Note. - The objective of the vertiport beacon is to provide, when necessary, a long-range visual guidance and when not provided by other visual means, or when identifying the vertiport is difficult due to surrounding lights.

Application

7.1.1 A vertiport beacon should be provided at a vertiport where:

a) long-range visual guidance is considered necessary and is not provided by other visual means; or

b) identification of the vertiport is difficult due to surrounding lights.

Location

7.1.2 The vertiport beacon shall be located on or adjacent to the vertiport preferably at an elevated position and so that it does not dazzle a pilot at short range.

Note — Where a vertiport beacon is likely to dazzle pilots at short range, it may be switched off during the final stages of the approach and landing.

Characteristics

7.1.3 The vertiport beacon shall emit repeated series of equally spaced short duration white flashes in the format in Figure 7-2.

7.1.4 The light from the beacon shall show at all angles of azimuth.

7.1.5 The effective light intensity distribution of each flash should be as shown in Figure 7-1, Illustration 1.

Note — Where brilliancy control is desired, settings of 10 per cent and 3 per cent have been found to be satisfactory. In addition, shielding may be necessary to ensure that pilots are not dazzled during the final stages of the approach and landing.

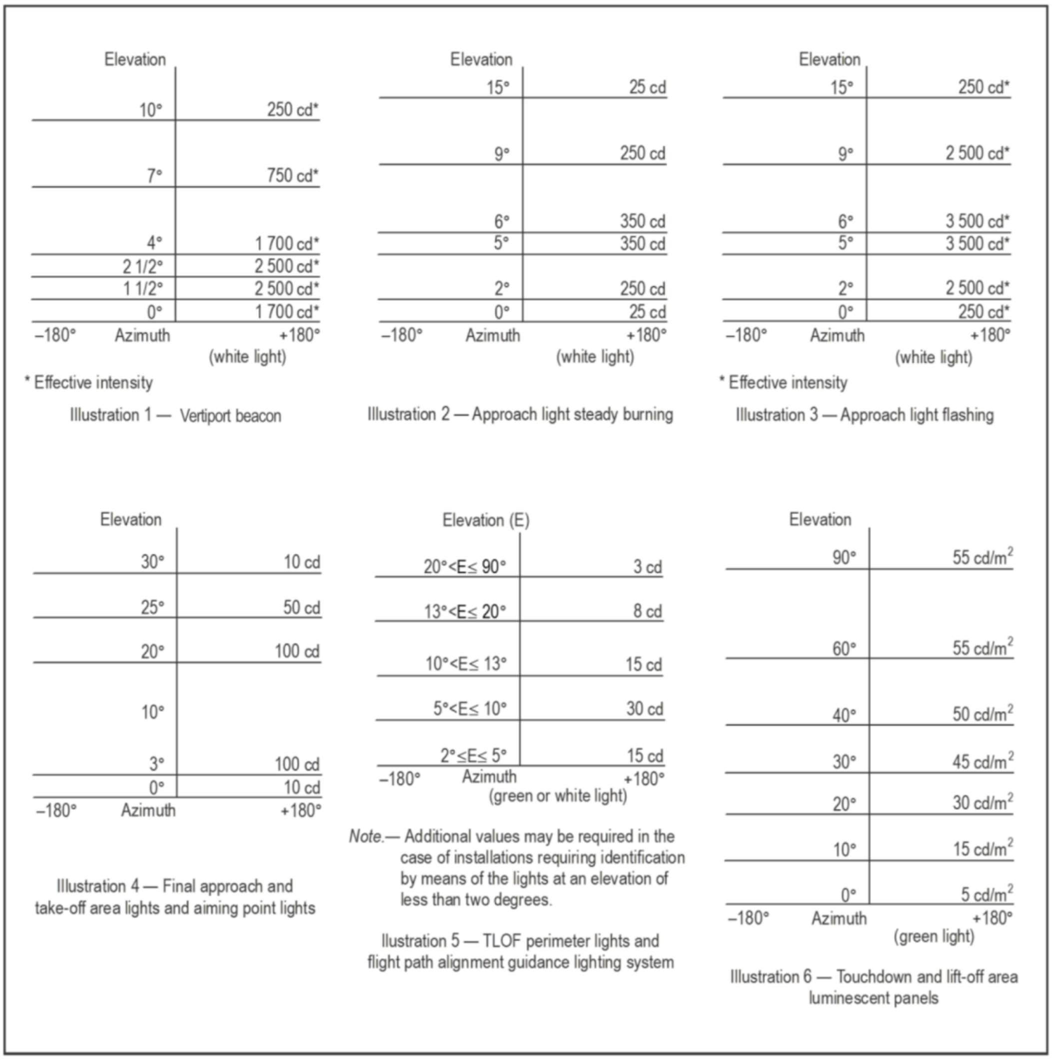


Figure 7-1 – Isocandela diagrams

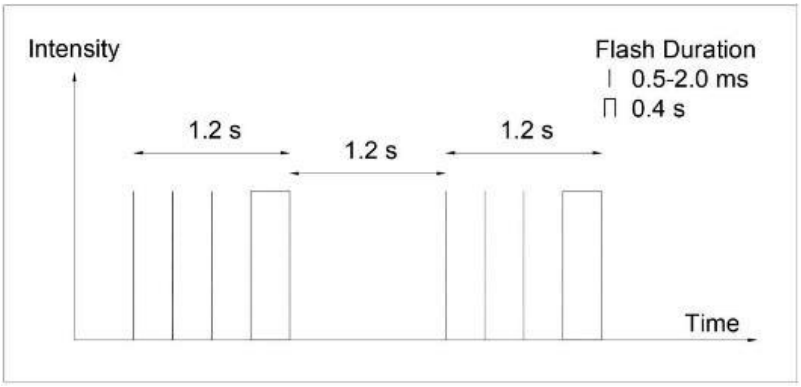


Figure 7-2 – Vertiport beacon flash characteristics

7.2 Approach Lighting System

Note. - The objective of an approach lighting system is to provide an indication of the preferred approach direction to enhance the closure rate information to pilots at night.

Application

7.2.1 An approach lighting system should be provided at a vertiport where it is desirable and practicable to indicate a preferred approach direction.

Location

7.2.2 The approach lighting system shall be located in a straight line along the preferred direction of approach.

Characteristics

7.2.3 An approach lighting system should consist of a row of three lights spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the FATO as shown in Figure 7-3a and 7-3b. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights and spaced at 4.5 m intervals. Where there is the need to make the final approach course more conspicuous additional lights spaced uniformly at 30 m intervals should be added beyond the crossbar. The lights beyond the crossbar may be steady or sequenced flashing, depending upon the environment.

Note. — Sequenced flashing lights may be useful where identification of the approach lighting system is difficult due to surrounding lights.

7.2.4 The steady lights shall be omni-directional white lights.

7.2.5 Sequenced flashing lights shall be omni-directional white lights.

7.2.6 The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure 7-1, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.

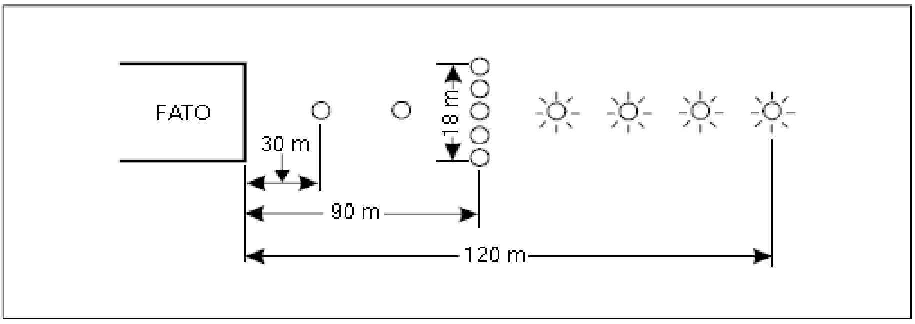


Figure 7-3a – Approach lighting system

7.2.7 A suitable brilliancy control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions.

Note. — The following intensity settings have been found suitable:

a) steady lights — 100 per cent, 30 per cent and 10 per cent; and

b) flashing lights — 100 per cent, 10 per cent and 3 per cent.

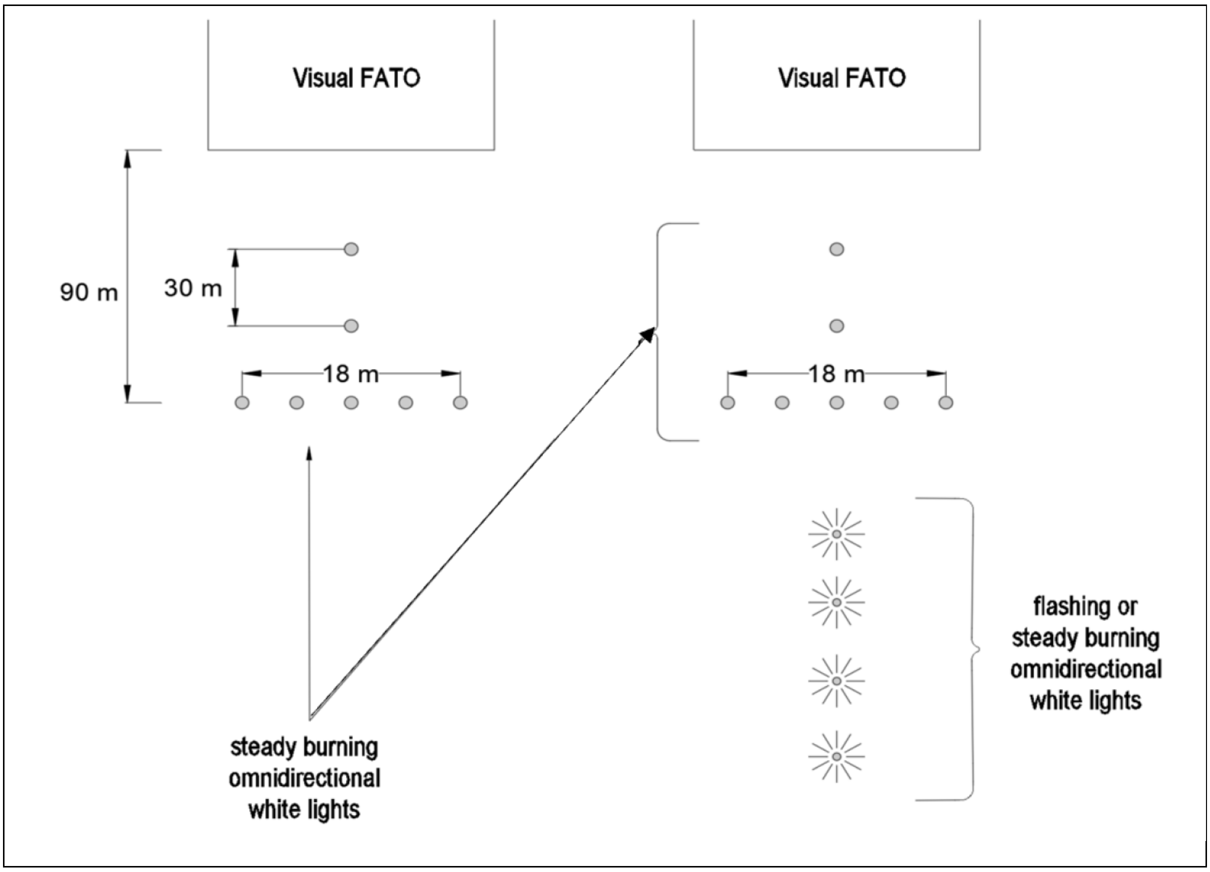


Figure 7-3b. Two different configurations of an approach lighting system

7.3 Flight Path Alignment Guidance Lighting System

Note. - The objective of the flight path alignment guidance lighting system is to provide the pilot with a visual indication, at night, of the available approach and/or departure path directions.

Application

7.3.1 Flight path alignment guidance lighting system(s) should be provided at a vertiport where it is desirable and practicable to indicate available approach and/or departure path direction(s).

Note. — The flight path alignment guidance lighting can be combined with a flight path alignment guidance marking(s) described in Chapter 6.

Location

7.3.2 The flight path alignment guidance lighting system shall be in a straight line along the direction(s) of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO, TLOF or safety area.

7.3.3 If combined with a flight path alignment guidance marking, as far as is practicable the lights should be located inside the “arrow” markings.

Characteristics

7.3.4 A flight path alignment guidance lighting system should consist of a row of three or more lights spaced uniformly a total minimum distance of 6 m. Intervals between lights should not be less than 1.5 m and should not exceed 3 m. Where space permits there should be 5 lights. (See Figure 6-16)

Note. — The number of lights and spacing between these lights may be adjusted to reflect the space available. If more than one flight path alignment system is used to indicate available approach and/or departure path direction(s), the characteristics for each system are typically kept the same. (See Figure 6-16)

7.3.5 The lights shall be steady omnidirectional inset white lights.

7.3.6 The distribution of the lights should be as indicated in Figure 7-1, Illustration 6.

7.3.7 A suitable control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions and to balance the flight path alignment guidance lighting system with other vertiport lights and general lighting that may be present around the vertiport.

7.4 Visual Alignment Guidance System

Note. - The objective of a visual alignment system is to provide conspicuous and discrete cues to assist the pilot to attain, and maintain, a specified approach track to a vertiport and a safe lateral clearance from obstacles when on final approach. Guidance on suitable visual alignment guidance systems is given in the Heliport Manual (Doc 9261).

Application

7.4.1 A visual alignment guidance system should be provided to serve the approach to a vertiport where one or more of the following conditions exist especially at night:

a) obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

b) the environment of the vertiport provides few visual surface cues; and

c) it is physically impracticable to install an approach lighting system.

Location

The visual alignment guidance system should be located such that a VCA is guided along the prescribed track towards the FATO and should be placed at its downwind edge and aligned along the preferred approach direction.

Characteristics

7.4.2 The signal of the system should be such that there is no confusion between the system and any associated visual approach slope indicator or other visual aids.

7.4.3 The signal format should be unique and conspicuous in all operational environments for which it is intended to use the visual alignment guidance system.

7.4.4 The system provides a minimum of three discrete signal sectors giving ‘offset to the right’, ‘on track’ and ‘offset to the left’ indications.

7.4.5 The system should be capable of adjustment in azimuth to within ±5 minutes of arc of the desired approach track.

7.4.6 Where the lights of the system need to be seen as discrete sources, light units should be located such that at the extremes of the system coverage the angle subtended between units as seen by the pilot should not be less than 3 minutes of arc. The angle subtended between light units of the system and other lights of comparable or greater intensity should also not be less than 3 minutes of arc. This can be met for lights on a line normal to the line of sight if they are separated by 1 m for every kilometre of viewing range.

7.4.7 The divergence of the ‘on track’ sector of the system should be 1° on either side of the centre line, see Figure 7-4.

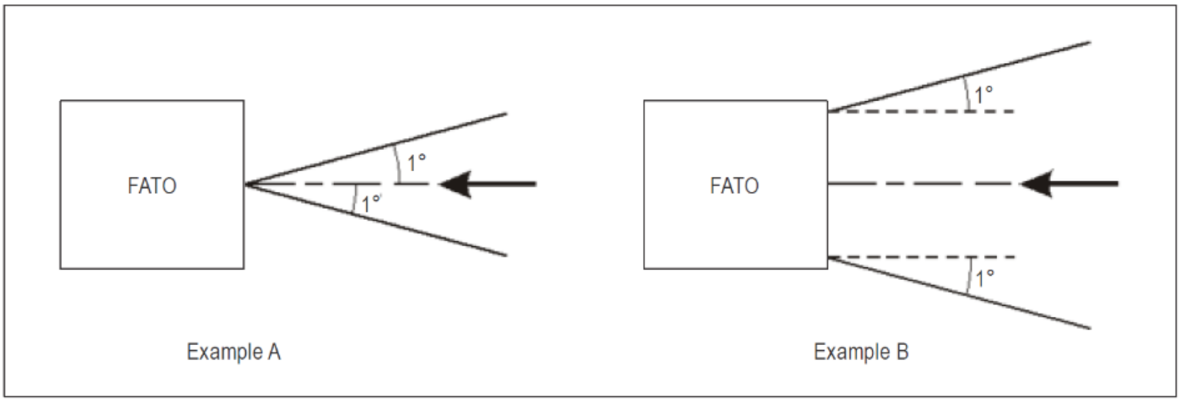


Figure 7-4. Divergence of the ‘on track’ sector

7.4.8 A suitable intensity control should be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing. When the system is used in conjunction with a visual approach slope indicator, the intensity settings should be compatible.

7.4.9 The angle of azimuthal setting of the system should be such that during an approach, the pilot of a VCA at the boundary of the ‘on track’ signal will clear all objects in the approach area by a safe margin. The characteristics of the obstacle protection surface as specified in Chapter III-7.5, and Figure 7-5 for visual approach indicators should equally apply to the visual alignment guidance system.

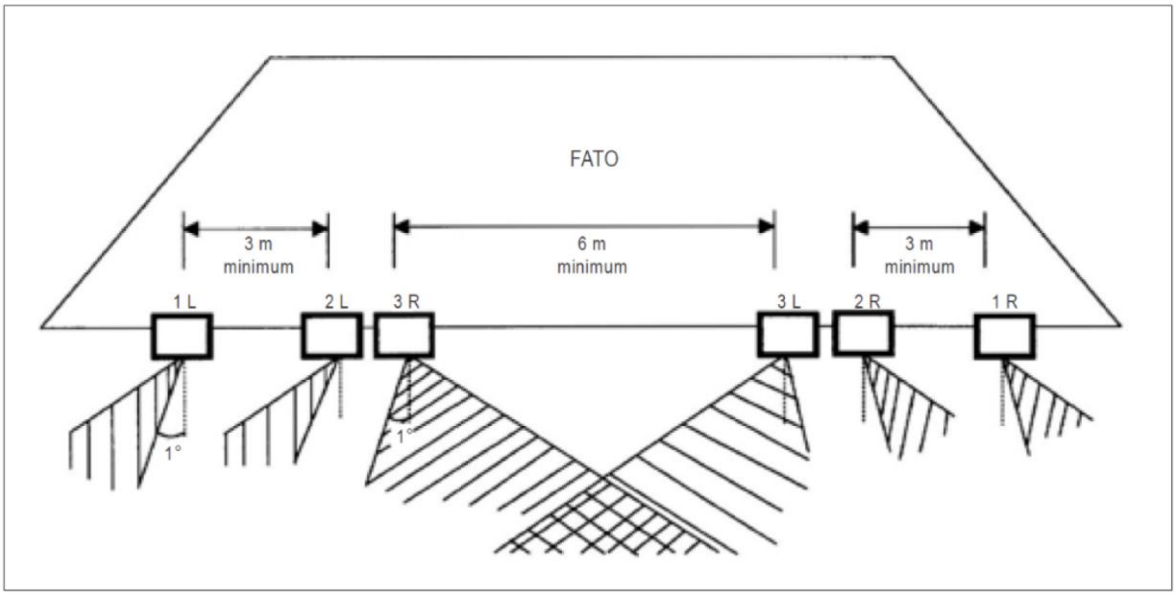


Figure 7-5. Siting of the visual alignment guidance system

Note: Further guidance on visual alignment guidance systems is given in ICAO Document 9261, Heliport Manual.

7.5 Visual Approach Slope Indicator

Note. - The objective of a visual approach slope indicator is to provide conspicuous and discrete colour cures within a specified elevation and azimuth, to assist the pilot to attain and maintain the approach slope to a desired position within a FATO.

Note. - Where a two-slope approach is in use, i.e. a shallow initial approach followed by a steep/vertical descent to the FATO, the provision of a visual slope indicator would not be appropriate; however, it may be used from longer approach distance, if a safety assessment indicates that it would not adversely affect the safety of operations of a VCA.

Application

7.5.1 A visual approach slope indicator should be provided to serve the approach to a vertiport, whether or not the vertiport is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist especially at night:

a) obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;

b) the environment of the vertiport provides few visual surface cues; and

c) the characteristics of the VCA require a stabilized approach.

Location

7.5.2 The HAPI system should be mounted and sited as low as possible so as not to constitute a hazard to VCA.

7.5.3 The HAPI system should be located such as to avoid dazzling pilots at the final stages of the approach and landing. The minimum setting angle of HAPI is 1°. On a vertiport, the HAPI system should preferably be installed either on the left or on the right side of the FATO. Sometimes it can be desirable to have it on the axis of the preferred approach. In those cases, the HAPI unit should be placed on the centre of the inner edge of the FATO.

Characteristics

7.5.4 Visual approach slope indicator systems for VCA operations include, but are not restricted to:

(i) precision approach path indicator (PAPI);

(ii) abbreviated precision approach path indicator (APAPI); or

(iii) VCA approach path indicator (HAPI).

Note: HAPI is the acronym for the helicopter approach path indicator and here is also used for the VCA approach path indicator.

7.5.5 The characteristics of the PAPI and APAPI system should correspond to those specified in ICAO Annex 14, Volume I, except that the angular size of the on-slope sector should be increased to 45 minutes.

7.5.6 If required, and when limitations at a vertiport that is elevated preclude the installation of a multi-unit system such as the PAPI or APAPI, a single unit indicator, such as the HAPI, should be installed.

7.5.7 The characteristics of the HAPI should be as follows:

(a) A HAPI, defined in Annex 14, Vol II Heliports, is designed to give visual indications of the desired approach slope and any vertical deviation from it.

(b) A HAPI should be located such that a VCA is guided to the desired position within the FATO and so as to avoid dazzling the pilot during final approach and landing. This will usually entail the HAPI being located adjacent to the nominal aiming point and aligned in azimuth with the preferred approach direction.

(c) The HAPI is a single unit device providing one normal approach path and three discrete deviation indications.

Note: The HAPI is closely associated with the safety of VCA operations. The system, when installed and used in the prescribed manner, will provide a safe margin, clear of all obstacles when on final approach. The HAPI may be installed on vertiports with different physical characteristics.

7.5.8 Type of signal

(c) The signal format of the HAPI should include four discrete signal sectors, providing an above slope, an on slope, a slightly below slope and a below slope signal.

(b) The angle of elevation setting of the HAPI should be such that during an approach the pilot of a VCA observing the upper boundary of the below slope signal will clear all objects in the approach area by a safe margin.

(c) The light distribution of the HAPI in red and green colours should be as shown in Figure 7-1, Illustration 4.

Sector	Format
Above	Flashing green
On slope	Green
Slightly below	Red
Below	Flashing red

Illustration A

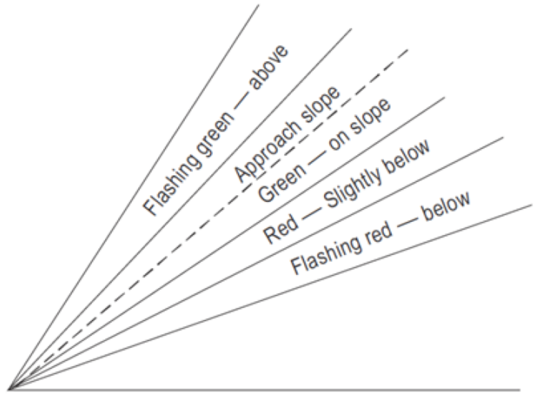


Illustration B

Figure 7-6. HAPI signal format

7.5.9 Setting angles

(a) The centre of the plane of transition between the steady-red and green signals should be aligned precisely with the unit's horizontal axis, see Figure 7-6. The unit setting angle and the centre of the on-course sector are not the same.

(b) A HAPI system should be capable of adjustment in elevation to any desired angle between 1° and 12° above the horizontal with an accuracy of ±5 minutes of arc.

(c) The HAPI units should be so designed that in the event of a vertical misalignment exceeding ±0.5°, the system will switch off automatically. If the flashing mechanism fails, no light will be omitted in the failed flashing sectors.

(d) The HAPI system should maintain its setting angle when exposed to downwash and environmental conditions.

7.5.10 Brilliancy: a suitable intensity control should be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

7.5.11 Obstacle considerations

(a) The HAPI unit should not penetrate any OLS.

(b) An obstacle protection surface should be established when it is intended to provide a visual approach slope indicator system. The characteristics of this surface, i.e. origin, divergence, length and slope, should correspond to those in the relevant column of Table 7-1 and Figure 7-7. New objects or extensions of existing objects should not be permitted above an obstacle protection surface except when, after a safety assessment, it is determined the object would not adversely affect the safety or significantly affect the regularity of operations of VCA.

Surface and dimensions	**FATO**	
Length of inner edge	Width of safety area	
Distance from end of FATO	3 m minimum	
Divergence	10 per cent	
Total length	2 500 m	
Slope:	PAPI	A[a] – 0.57°
	HAPI	A[b] – 0.65°
	APAPI	A[a] – 0.9°

a. As indicated in CAR ADR, Figure App 9-7 and Table App 9-3.

b. The angle of the upper boundary of the 'below slope' signal.

Table 7-1. Dimensions of the obstacle protection surface

7.5.12 Existing objects above an obstacle protection surface should be removed except when the object is shielded by an existing immoveable object, and after a safety assessment, it is determined the object would not adversely affect the safety or significantly affect the regularity of operations of VCA. In cases where an existing object could adversely affect the safety or significantly affect the regularity of VCA operations, one or more of the following measures should be taken:

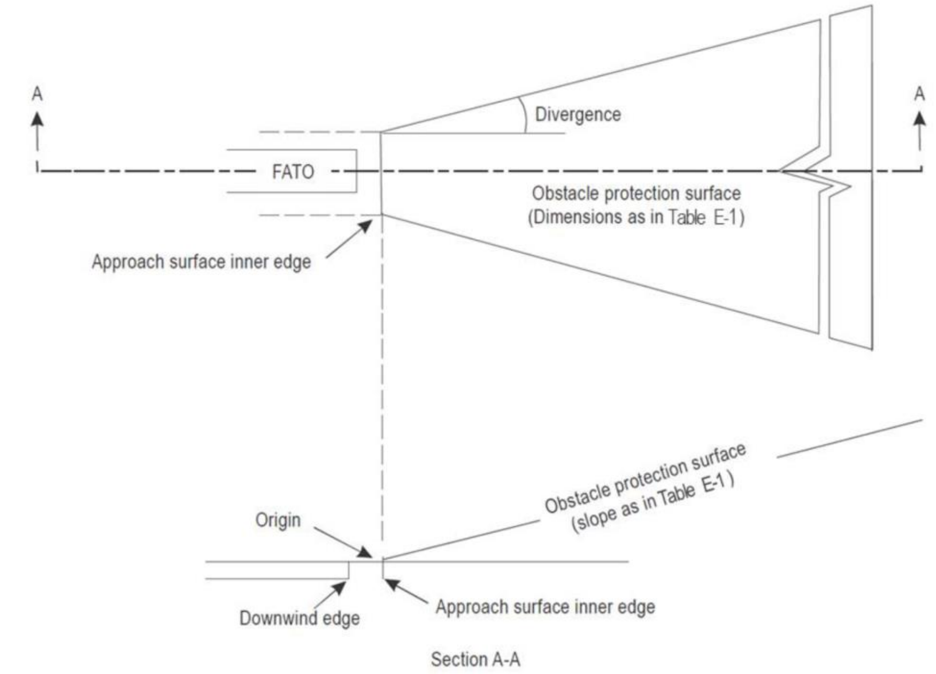
(a) suitably raise the approach slope of the system;

(b) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

(c) displace the axis of the system and its associated obstacle protection surface by no more than 5 degrees; and/or

(d) suitably displace the FATO and install a visual alignment guidance system.

7.5.13 The location and approach angle of the HAPI may be influenced by the presence of obstacles in the approach area. The area to be surveyed is shown in Table 7-1 and Figure 7-7.



Note: the HAPI should be located with the confines of the dotted lines either side of the FATO unless the width of the 'obstacle protection surface' is adjusted accordingly.

Figure 7-7. Obstacle protection surface

7.5.14 The azimuth spread of the light beam should be suitably restricted where an object located outside the obstacle protection surface of the HAPI system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and a safety assessment indicates that the object could adversely affect the safety of operations. The extent of the restriction should be such that the object remains outside the confines of the light beam.

Note: Other systems meeting the objective of the PAPI, APAPI or HAPI may be used at vertiports.

Note. - Further guidance on PAPI and APAPI light units are given in the ICAO Annex 14, Volume II, Heliports, ICAO Document 9261, Heliport Manual, and ICAO Document 9157, Part 4, Visual Aids.

Note. - The characteristics of the lights are specified in ICAO Annex 14, Volume I, Aerodromes.

7.6 FATO Lighting Systems for Onshore Surface-level Vertiports

Note. - The objective of a final approach and take-off area lighting system for onshore surface level vertiports is to provide to the pilot operating at night an indication of the shape, location and extent of the FATO.

Application

7.6.1 Where a FATO with a solid surface is established at a surface-level vertiport intended for use at night, FATO lights shall be provided except that they may be omitted where the FATO and the TLOF are nearly coincidental or the extent of the FATO is self-evident.

Location

7.6.2 FATO lights shall be placed along the edges of the FATO. The lights shall be uniformly spaced as follows:

a) for an area in the form of a square or rectangle, at intervals of not more than 50 m with a minimum of four lights on each side including a light at each corner; and

b) for any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

Characteristics

7.6.3 FATO lights shall be fixed omni-directional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

7.6.4 The light distribution of FATO lights should be as shown in Figure 7-1, Illustration 4.

7.6.5 The lights should not exceed a height of 25 cm and should be inset when a light extending above the surface would endanger VCA operations. Where a FATO is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground.

Figure 7-8. Lighting system for FATO at surface level

7.7 Aiming Point Lights

Note. - The objective of aiming point lights is to provide a visual cue indicating to the pilot by night the preferred approach/departure direction; the point to which the VCA approaches to hover before positioning to a TLOF, where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

Application

7.7.1 Where an aiming point marking is provided at a vertiport intended for use at night, aiming point lights should be provided.

Location

7.7.2 Aiming point lights shall be co-located with the aiming point marking.

Characteristics

7.7.3 Aiming point lights shall form a pattern of at least six omni-directional white lights as shown in Figure 6-9. The lights shall be inset when a light extending above the surface could endanger VCA operations.

7.7.4 The light distribution of aiming point lights should be as shown in Figure 7-1, Illustration 5.

7.7.5 Solid state lights and filament light sources should conform to the chromaticity specifications in CAR ADR, Appendix 9, 9.32.4 Chromaticities for lights having a solid-state light source.

7.8 Touchdown and Lift-Off Area Lighting System

Note. - The objective of a touchdown and lift-off area lighting system is to provide illumination of the TLOF and required elements within. For a TLOF located in a FATO, the objective is to provide discernibility, to the pilot on a final approach, of the TLOF and required elements within; while for a TLOF located on an elevated vertiport and shipboard vertiport, the objective is visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.

Application

7.8.1 A TLOF lighting system shall be provided at a vertiport intended for use at night.

Note. - Where a TLOF is located in a stand, the objective may be met with the use of ambient lighting or stand floodlighting.

7.8.2 For a surface-level vertiport, lighting for the TLOF in a FATO shall consist of one or more of the following:

a) perimeter lights;

b) floodlighting;

c) arrays of segmented point source lighting (ASPSL) or luminescent panel (LP) lighting to identify the TLOF when a) and b) are not practicable and FATO lights are available.

7.8.3 For an elevated vertiport and shipboard vertiport, lighting of the TLOF in a FATO shall consist of:

a) perimeter lights; and

b) ASPSL and/or LPs to identify the TDPM and/or floodlighting to illuminate the TLOF.

Note. — At elevated vertiports and shipboard vertiports surface texture cues within the TLOF are essential for VCA positioning during the final approach and landing. Such cues can be provided using various forms of lighting (ASPSL, LP, floodlights or a combination of these lights, etc.) in addition to perimeter lights. Best results have been demonstrated by the combination of perimeter lights and ASPSL in the form of encapsulated strips of light emitting diodes (LEDs) and inset lights to identify TDPM and vertiport identification markings.

7.8.4 TLOF ASPSL and/or LPs to identify the TDPM and/ or floodlighting should be provided at a surface-level vertiport intended for use at night when enhanced surface texture cues are required.

Location

7.8.5 TLOF perimeter lights shall be placed along the edge of the area designated for use as the TLOF or within a distance of 1.5 m from the edge. Where the TLOF is a circle the lights shall be:

a) located on straight lines in a pattern which will provide information to pilots on drift displacement; and

b) where a) is not practicable, evenly spaced around the perimeter of the TLOF at the appropriate interval, except that over a sector of 45 degrees the lights shall be spaced at half spacing.

7.8.6 TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated vertiports and not more than 5 m for surface-level vertiports. There shall be a minimum number of four lights on each side including a light at each corner. For a circular TLOF, where lights are installed in accordance with paragraph 7.8.5 b) there shall be a minimum of fourteen lights.

7.8.7 The TLOF perimeter lights shall be installed at an elevated vertiport such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

7.8.8 On surface-level vertiports, ASPSL or LPs, if provided to identify the TLOF, shall be placed along the marking designating the edge of the TLOF. Where the TLOF is a circle, they shall be located on straight lines circumscribing the area.

7.8.9 On surface-level vertiports the minimum number of LPs on a TLOF shall be nine. The total length of LPs in a pattern shall not be less than 50 per cent of the length of the pattern. There shall be an odd number with a minimum number of three panels on each side of the TLOF including a panel at each corner. LPs shall be uniformly spaced with a distance between adjacent panel ends of not more than 5 m on each side of the TLOF.

7.8.10 When LPs are used on an elevated vertiport to enhance surface texture cues, the panels should not be placed adjacent to the perimeter lights. They should be placed around a touchdown marking or coincident with vertiport identification marking.

7.8.11 TLOF floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

7.8.12 ASPSL and LPs when used to designate the TDPM and/or vertiport identification marking, should provide enhanced surface texture cues when compared to low-level floodlights.

Characteristics

7.8.13 The TLOF perimeter lights shall be fixed omni-directional lights showing green.

7.8.14 At a surface-level vertiport, ASPSL or LPs shall emit green light when used to define the perimeter of the TLOF.

7.8.15 The chromaticity and luminance of colours of LPs should conform to CAR ADR, Appendix 9, 9.32 COLOUR SPECIFICATIONS.

7.8.16 An LP shall have a minimum width of 6 cm. The panel housing shall be the same colour as the marking it defines.

7.8.17 For a surface level or elevated vertiport, the TLOF perimeter lights located in a FATO should not exceed a height of 5 cm and should be inset when a light extending above the surface could endanger VCA operations.

7.8.18 When located within the safety area of a surface level or elevated vertiport, the TLOF floodlights should not exceed a height of 25 cm.

7.8.19 The LPs shall not extend above the surface by more than 2.5 cm.

7.8.20 The light distribution of the perimeter lights should be as shown in Figure 7-1, Illustration 5.

7.8.21 The light distribution of the LPs should be as shown in Figure 7-1, Illustration 6.

7.8.22 The spectral distribution of TLOF area floodlights shall be such that the surface and obstacle marking can be correctly identified.

7.8.23 The average horizontal illuminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1 measured on the surface of the TLOF.

7.8.24 Lighting used to identify the TDPC should comprise a segmented circle of omni-directional ASPSL strips showing yellow. The segments should consist of ASPSL strips, and the total length of the ASPSL strips should not be less than 50 per cent of the circumference of the circle.

7.8.25 If utilized, the vertiport identification marking lighting should be omni-directional showing green.

7.8.26 For a TLOF in any location, the lighting system should provide sufficient illumination of the surface to enable a pilot, when in close proximity to the TLOF, to identify and use the TDPM to accurately place the VCA. This is the basic level of illumination, for example, for the TLOF in a stand, where the objective may be met by the use of ambient lighting or apron or stand floodlighting. In addition, for a TLOF in a FATO, the lighting system should provide sufficient illumination to allow the pilot, when on the final approach, to distinguish the TLOF from other defined areas on the vertiport.

7.8.27 In addition to the above, for a TLOF in a FATO on a vertiport that is elevated, the lighting system should allow:

(i) visual acquisition from a range that has been established with respect to the requirements of the vertiport; and

(ii) provide sufficient shape cues to permit an appropriate approach angle to be established.

Note. - Further guidance on TLOF lighting system is given in ICAO Document 9261, Heliport Manual.

7.9 Vertiport identification marking lighting

Note. — (a) The objective of a vertiport identification marking lighting is to provide the pilot with an indication of the presence of a vertiport; with its form, likely usage; and, the preferred direction(s) of approach.

Application

7.9.1 Where provided, the vertiport identification marking, letter 'V', should be outlined with edge lighting.

Characteristics

7.9.2 The letter 'V' should be outlined with green edge lighting consisting of subsections between 80 mm and 100 mm wide as shown in Figure 7-9. The mechanical housing should be coloured white.

7.9.3 If a subsection is made up of individual lighting elements (e.g. LEDs), then they should be of nominally identical performance (i.e. within manufacturing tolerances) and be equidistantly spaced within the subsection to aid textural cueing. Minimum spacing between the illuminated areas of the lighting elements should be 3 cm and maximum spacing 10 cm.

7.9.4 If the subsection comprises a continuous lighting element (e.g. fibre optic cable, electro luminescent panel), then to achieve textural cueing at short range, the element should be masked at 3.0 cm intervals on a 1:1 mark-space ratio.

7.9.5 The white cross marking at vertiports located at hospitals should be lit using green right-angled lit chevron markings located adjacent to each of the four internal corners of the 9 m x 9 m white cross. Each chevron should be 1.5 m to 1.6 m x 1.5 m to 1.6 m in size and be spaced by 4.0 m to 4.5 m as shown in Figure 7-10.

7.9.6 The cross marking should comprise subsections of between 80 mm and 100 mm width. Where applicable, the gaps between them should not be greater than 10 cm. The mechanical housing should be coloured white.

7.9.7 The vertiport identification marking lighting should be flush with the surrounding surface to protect accumulation of small fractions.

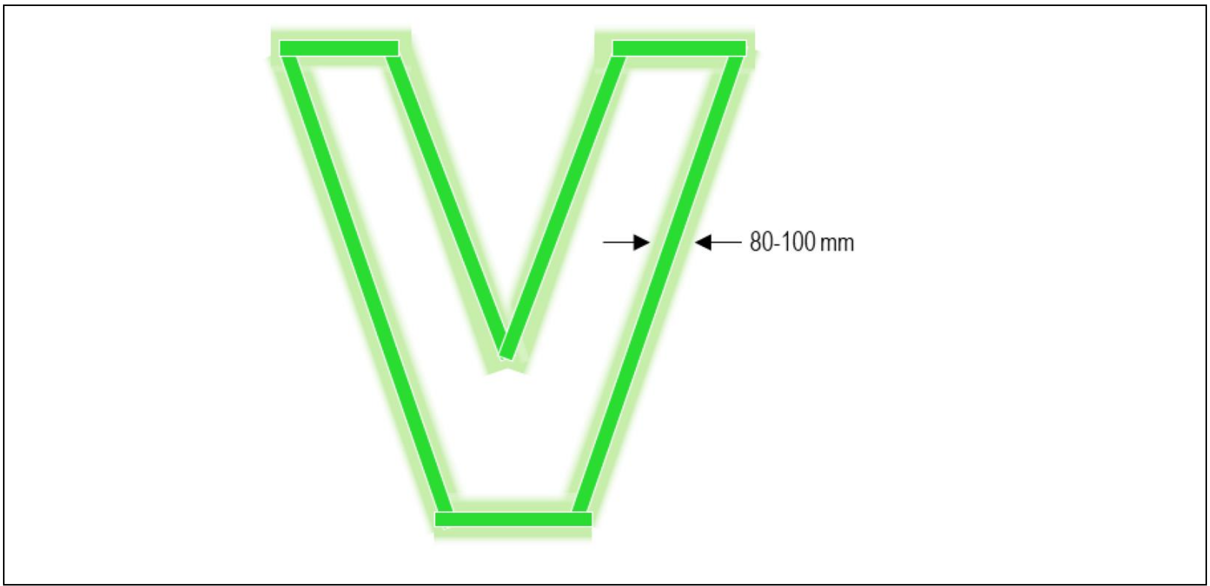


Figure 7-9. letter ‘V’ lighting

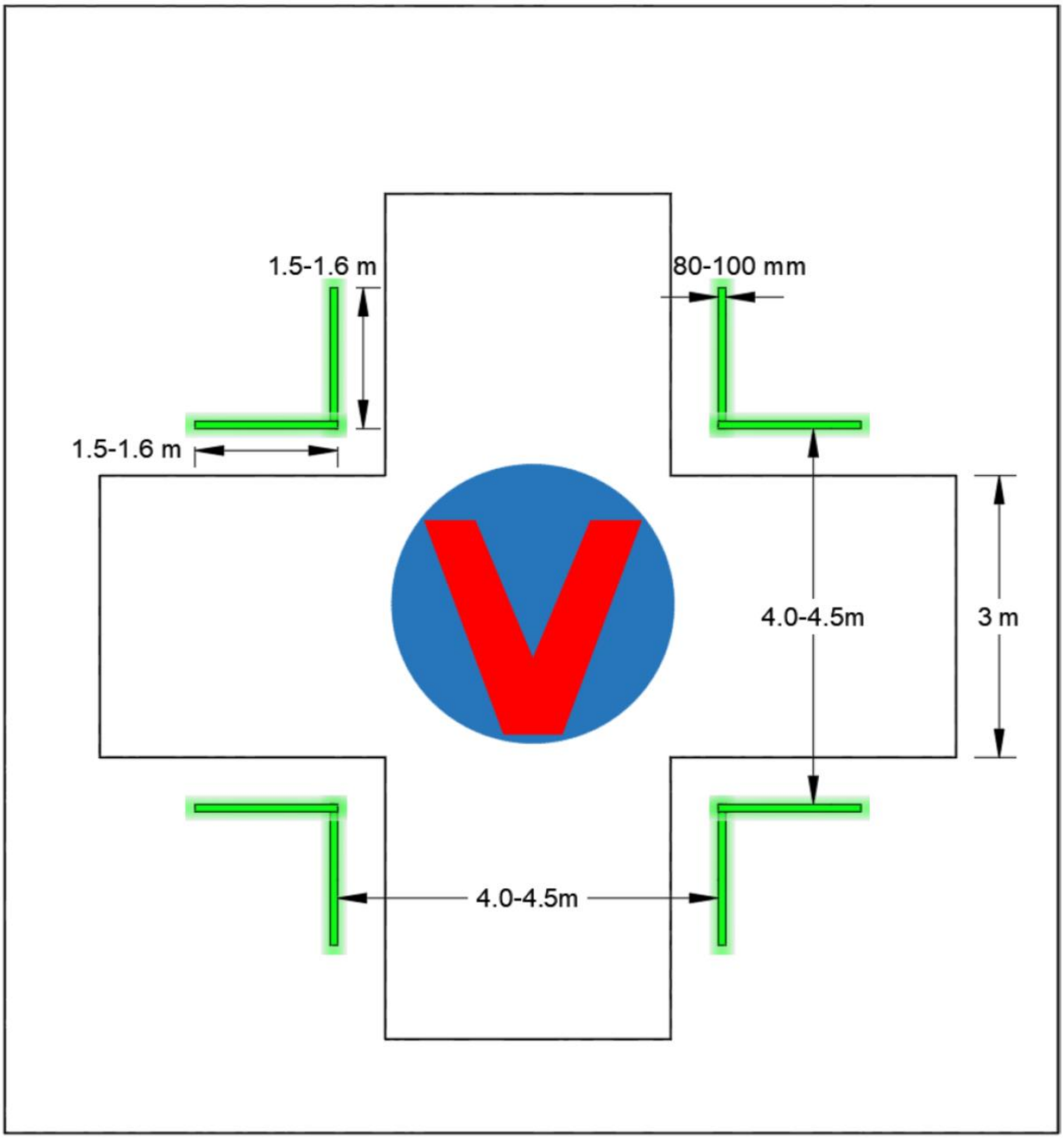


Figure 7-10. Vertiport cross lighting

7.10 Taxiway Lights

Note. — The specifications for taxiway centre line lights and taxiway edge lights in CAR ADR, Appendix 9, 9.18.9, are equally applicable to taxiways intended for ground taxiing of VCAs.

7.11 Visual Aids for Denoting Obstacles Outside and Below the Obstacle Limitation Surfaces

Note. - Arrangements for an aeronautical study of objects outside the obstacle limitation surface (OLS) and for other objects are addressed in CAR ADR – Aerodromes, Appendix 13.

7.11.1 Where an aeronautical study indicates that obstacles in areas outside and below the boundaries of the OLS, established for the vertiport, constitute a hazard to VCAs, they should be marked and lit, except that the marking may be omitted when the obstacle is lighted with high intensity obstacle lights by day.

7.11.2 Where an aeronautical study indicates that overhead wires or cables crossing a river, waterway, valley or highway constitute a hazard to VCAs, they shall be marked, and their supporting towers marked and lit. Marking of the supporting towers may be omitted when they are lighted by High-intensity Obstacle Lights by day.

Note: For obstacle marking and lighting specifications, refer to CAR ADR – Aerodromes, Appendix 13, Section 13.2.10.

7.12 Floodlighting of Obstacles

Application

7.12.1 At a vertiport intended for use at night, obstacles shall be floodlighted if it is not possible to display obstacle lights on them.

Location

7.12.2 Obstacle floodlights shall be arranged so as to illuminate the entire obstacle and as far as practicable in a manner so as not to dazzle the VCA pilots.

Characteristics

7.12.3 Obstacle floodlighting should be such as to produce a luminance of at least 10cd/m2.

7.13 VCA Stand Floodlighting

Note. - The objective of VCA stand floodlighting is to provide illumination of the stand surface and associated markings to assist the manoeuvring and positioning of a VCA and facilitation of essential operations around the VCA.

Application

7.13.1 Floodlighting should be provided on a VCA stand intended to be used at night.

Note. - Guidance on stand floodlighting is given in the apron floodlighting section in the Aerodrome Design Manual (Doc 9157), Part 4.

Location

7.13.2 VCA stand floodlights should be located so as to provide adequate illumination, with a minimum of glare to the pilot of a VCA in flight and on the ground, and to personnel on the stand. The arrangement and aiming of floodlights should be such that a VCA stand receives light from two or more directions to minimize shadows.

Characteristics

7.13.3 The spectral distribution of stand floodlights shall be such that the colours used for surface and obstacle marking can be correctly identified.

7.13.4 Horizontal and vertical illuminance shall be sufficient to ensure that visual cues are discernible for required manoeuvring and positioning, and essential operations around the VCA can be performed expeditiously without endangering personnel or equipment.

CHAPTER III-8 — EMERGENCY PLANNING

8.1 Emergency planning shall be established and implemented at a vertiport, commensurate with the level of VTOL-capable aircraft operations and other operational activities.

Note. — As regards to vertiport emergency planning, suitable international references are not developed. However, a vertiport operator may consider the requirements provided in CAR-HVD Part I – Onshore Heliports, Chapter I-8: Emergency Planning as a guidance

CHAPTER III-9: RESCUE AND FIREFIGHTING

9.1 Rescue and firefighting services and equipment shall be provided at a vertiport, commensurate with the level of VTOL-capable aircraft operations and other operational activities.

Note. — As regards to vertiport rescue and firefighting, suitable international references are not developed. However, a vertiport operator may consider the requirements provided in CAR-HVD Part I – Onshore Heliports, Chapter I-9: Rescue and firefighting as a guidance.

Chapter III-10 – Vertiport Operations

10.1 Vertiport Operations

10.1.1 The vertiport operator should provide an initial assessment to establish the obstacle environment surrounding the vertiport with reference to Chapter III-5. This should be validated annually by a Validation Assessment carried out by an aeronautical survey service provider (ASSP) approved by the GCAA as stipulated in CAR - ASSP. Action should be taken to ensure that the Obstacle Limitation Surfaces remain clear of all permanent and semi-permanent obstructions.

10.1.2 For areas outside the vertiport, safeguarding arrangements should be made with the local authorities to aid the control of potential buildings or other structures which may affect VCA operations.

10.1.3 The Vertiport Operator shall establish written policy, procedures and other relevant documentation as well as provide appropriate facilities and equipment to ensure that the vertiport can be operated and maintained in a condition that does not impair the safety of VCA operations.

Note - For guidance on the establishment of vertiport operational procedures refer to Appendix III-D.

10.1.4 The vertiport operator shall ensure that this information is made available to all applicable personnel and is reviewed and amended so that it remains current.

10.1.5 The vertiport operator shall ensure that there are sufficient trained and competent personnel for the planned tasks and activities to be performed in accordance with the vertiport operator's policy and procedures.

10.1.6 A safety management system (SMS) should be established, that should:

a) set the targets and standards to be achieved, and make clear to people what their responsibilities and accountabilities are;
b) identify hazards, assess risks and introduce control measures;
c) monitor that controls are in place and are effective. This should include proactive monitoring, such as inspection; reactive monitoring, such as accident/incident investigation and data trend analysis; and audit and review of standards;
d) Document the procedures outlined above and relevant key information, including policies, risk assessments and reports from monitoring activities.

Note - Appendices B and D provides guidance on the information that should be provided and maintained for the vertiport. The level of information provided may be determined based on the scope and complexity of the vertiport and VCA operations.

10.1.7 The vertiport operator holding a vertiport certificate should establish an internal quality assurance system to ensure compliance with, and the adequacy of, the procedures required by these regulations, and for the continuance in improvement of safety levels.

Note: For provisions related to internal quality system, refer to CAR ADR – Aerodromes, Chapter 4, Section 4.6.2.

10.1.8 Equipment and training records shall be maintained and retained for future reference.

10.2 Marshalling Signals

Note - For marshalling hand signals requirements, refer to Chapter I-10.2.

10.3 Charging Facility and Electric Infrastructure.

10.3.1 Vertiport operator shall maintain sufficient power generation, energy storage, and distribution for any system, as applicable, and installed to supply the power required for operation of connected loads during all intended operating conditions;

10.3.2 Vertiport operator shall ensure that any aircraft batteries stored on site shall be stored safely away from TLOF, FATO, and Safety Areas to ensure battery charging in a safe and secure manner.

10.3.3 To ensure the continuity of electric aircraft operations, uninterrupted power supply shall be available thus ensuring alternative energy vectors for general precautions, emergency planning and preparedness, and storage of hazardous materials.

10.4 Reserved

Chapter III-11 – Training and Development for Vertiport Personnel

11.1 General

11.1.1. All personnel assigned as an VLO or VPA duties on the vertiport shall be fully trained to carry out their duties to ensure competence in role and task.

11.1.2. Where vertiport personnel are performing duties as rescue and firefighting personnel, regular training in the use of all emergency response equipment, VCA familiarization and rescue tactics and techniques should be carried out and all such training should be formally recorded.

11.2. Structured Learning Programme (SLP)

11.2.1. The aim of Structured Learning Program is to provide vertiport personnel with the knowledge, skill and understanding, which will enable them to perform their tasks commensurate with their role within the organization efficiently, safely and competently.

11.2.2. All vertiport personnel should commence the process of acquiring initial competence through a Structured Learning Programme (SLP) and continued competence through a Maintenance of Competence Plan (MOC).

11.2.3. SLPs will provide Vertiport personnel with the initial acquisition of knowledge and skills in a controlled training/development environment. They should also have a MOC plan to refresh, enhance or attain additional skills to enable them to be fully competent in their current role.

11.2.4. The full list of vertiport duties and the environment in which they are to be carried out should be considered in detail. To be acceptable, vertiport personnel selected for a given operation should be able to clearly demonstrate safety in all operations.

11.2.5. The following Tables 2-1(a) and 2-1(b) provide guidance on the elements and assessment methods that should be considered for the basis of a Structured Learning Programme for Vertiport Operations Manager (VOM), VLO and VPA. Not all elements will be applicable to all vertiports.

Table 2-1(a) – Duration and Frequency of Training

Discipline	Initial Training	Refresher Training
Vertiport Operations Post Holder	4 days Structured Learning Programme	2 days Structured Learning Programme every 3 years
	Company On Job Training	Ongoing Competency Assessment

	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment	Ongoing Competency Assessment
Vertiport Landing Officer (VLO)	4-days Structured Learning Programme	3-days Structured Learning Programme every 2 years
	Company On Job Training	Ongoing Competency Assessment
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment Safety Critical Functions	Ongoing Competency Assessment (SCF)
	Work place Exercises and Drills	Ongoing records to be maintained
Vertiport Assistant (VPA)	3-days Structured Learning Programme	2-days Structured Learning Programme every 2 years
	Company On Job Training	Ongoing records to be maintained
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment Safety Critical Functions	Ongoing records to be maintained
	Work place Exercises and Drills	Ongoing records to be maintained

Note. - If any candidate fails to complete any course fully they should be not be deemed competent in acquisition, they should complete the course in full before a certificate can be issued

Table 2-1(b) – Structured Learning Programme

Practical Elements	Practical Elements where the candidate participates in practical elements as an individual or team member.
Technical Elements	Technical Elements where the main focus is for the candidate to understand the technical elements of the function.
Safety Critical Functions	Individual tasks that collectively or individually contribute to safe operations. These critical tasks need to be formally assessed.
Assessment Method	Formal methods and process of making judgments about performance. The means by which evidence of performance is collected and compared with the required competency standard and a judgment about performance is made and also fully recorded.

Practical Assessment	Practical Demonstration of operational skills & use of equipment
Technically Assessment	Technical Written Examination Paper to assess fully the knowledge and understanding of training objectives
Oral Assessment	Oral Technical Spoken Word Assessment to support the technical assessment in the knowledge and understanding of training objectives

Vertiport Operations	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
<u>Vertiport Planning</u> Status of ICAO, GCAA and other international regulations for vertiport planning and design Legal binding principles ICAO standards and recommended practices on vertiport requirements Types of vertiports (surface-level vertiports, elevated vertiports, helidecks and shipboard vertiports) Vertiport data Certification of VCAs VCA flight characteristics, aerodynamics of rotor systems Relevant VCA performance parameters (performance classes 1, 2 and 3) and classification of VCAs Geometric dimensioning of VCAs (overall length, rotor diameter, undercarriage width/length) Declared distances (LDAV, LDRV, RTODV, RTODAV, RTODRV, TDP, TODAV, TODRV)	Technical Oral		100%	YES

<u>Vertiport Design</u> Vertiports and aerodromes Final approach and take-off area (FATO) VCA clearways Safety area Touchdown and lift-off area (TLOF) VCA ground taxiways and ground taxi-routes VCA air taxiways, air taxi-routes and air transit routes Aprons Visual Aids - markings and markers	Technical Oral		100%	YES
<u>Obstacle Control</u> Regulations regarding obstacle limitation surfaces and sectors subject to type and usage of vertiport Control of obstacles at vertiports	Technical Oral		100%	YES
<u>Rescue and firefighting services</u> Levels of protection at on-shore vertiports and off-shore helidecks Types and quantities of extinguishing agents (principal & complementary agents) Portable and fixed principal agent application systems Personnel requirements (task resource analysis) Consideration of response areas (on and off vertiport area) Testing and inspection of rescue and firefighting equipment	Technical Oral		100%	YES

<u>Emergency planning</u> Vertiport emergency plan Coordination with agencies Accident investigation Disabled VCA removal plan Conducting exercises/drills	Technical Oral		100%	YES
<u>Safety management system</u> Safety policy and objectives Safety risk management Safety assurance including quality assurance Safety promotion Audits/inspections	Technical Oral		100%	YES
Vertiport Physical Characteristics	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Vertiport physical characteristics, to include: ‘D value’	Technical Oral		100%	YES
Access and Escape routes	Technical Oral		100%	YES
Vertiport visual aids, marking and lights	Technical Oral		100%	YES
Power supplies emergency power back-up systems	Technical Oral		100%	YES
Obstacle-protected surfaces, to include:	Technical Oral		100%	YES
Vertiport perimeter safety nets	Technical Oral		100%	YES
Safety Working practices on Vertiports	Technical Oral		100%	YES

Vertiport equipment and systems	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Plant and equipment for routine and non-emergency response operations	Technical Oral	20%	80%	YES
Fire Fighting Equipment – guidance on when and where to use various media	Technical Oral	20%	80%	YES
Principal agent requirements: principal agent type, delivery and testing	Technical Oral	20%	80%	YES
Complimentary media requirements	Technical Oral	20%	80%	YES
Portable and fixed principal agent application system (FMS/DIFFS/RMS)	Technical Oral	20%	80%	YES
Testing & Inspecting vertiport systems Daily – Monthly – Annual Checks.	Technical Oral	20%	80%	YES
Reporting vertiport and systems defects	Technical Oral	20%	80%	YES
Vertiport Operational Hazards	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Poor visibility effect on vertiport operations	Technical Oral		100%	YES
Rotors running – personnel contact with main or tail rotors	Technical Oral		100%	YES
Excessive wind turbulence.	Technical Oral		100%	YES
Obstacles on vertiport	Technical Oral		100%	YES
Noise hazard	Technical Oral		100%	YES

Loose items (baggage, freight, netting etc.) being sucked air intake.	Technical Oral		100%	YES
Passenger Transfer	Technical Oral		100%	YES
Baggage and cargo goods transfer	Technical Oral		100%	YES
Responsibilities during VCA Landing and Departure	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
The role of the Vertiport Landing Officer	Technical Oral		100%	
The key responsibilities of the VLO	Technical Oral		100%	
How the VLO is identifiable to the VCA crew.	Technical Oral		100%	
Controlling of landing and take-off of unmanned VCA.	Technical Oral		100%	
Vertiport procedures prior to landing	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
VCA type identification.	Technical Oral		100%	
30 minutes before VCA ETA	Technical Oral		100%	YES
10 minutes before VCA ETA	Technical Oral		100%	YES
Immediately before landing	Technical Oral		100%	YES
After landing - rotors running turnaround	Technical Oral		100%	YES
After landing - engines shut down and rotors not running	Technical Oral		100%	YES

VCA tie-down	Technical Oral		100%	YES
VCA start-up.	Technical Oral		100%	YES
Communications with all relevant personnel, VLOs, personnel, pilot, fire crews, VPAs, loaders and passengers (simulated)	Technical Oral		100%	
VLO and flight crew radio transmissions restricted to essential dialogue.	Technical Oral		100%	
How to ensure that the correct and agreed protocol for “clear to lift” signal to the pilot is understood	Technical Oral		100%	YES
VLO-to-pilot coms protocols are conducted correctly, to include ‘vertiport available’ or ‘do not land’ call to pilot.	Technical Oral		100%	YES
Limitation of radio coms and correct use of hand signals (Marshalling)	Technical Oral		100%	YES
Monitoring of environmental conditions and change in conditions	Technical Oral		100%	YES
Checking vertiport equipment availability.	Practicable Oral	80%	20%	YES
Checking and testing radio equipment	Practicable Oral	80%	20%	YES
VLO to ensure that the vertiport surface is free from any contamination, debris or damage after take-off.	Practicable Oral	80%	20%	YES
VLO ensuring that the VPA duties and responsibilities are clearly understood during VCA landing and departure.	Practicable Oral	80%	20%	YES
Briefing the VPAs prior to vertiport operations, to include a ‘tool-box-talk’.	Practicable Oral	80%	20%	YES

Ensuring VPAs are in the correct location	Practicable Oral	80%	20%	YES
Ensuring the VPAs are prepared for VCA emergencies	Practicable Oral	80%	20%	YES
Ensuring and VPAs are equipped with appropriate PPE.	Practicable Oral	80%	20%	YES
Vertiport protocols	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
Safe-to-approach, VCA agreed with operating company	Practicable Oral	80%	20%	YES
Supervision of Passenger and Cargo Handling	Practicable Oral	80%	20%	YES
VCA freight loading limitations and requirements and how these will vary for different types of VCAs.	Practicable Oral	80%	20%	YES
Checking freight manifests (inbound and outbound)	Practicable Oral	80%	20%	YES
Preparing for, and supervising, correct loading and unloading of freight and baggage. (VLOs should not become involved in manual activity, such as carrying bags, at the expense of their supervisory role).	Practicable Oral	80%	20%	YES
Supervising passenger baggage reclamation	Practicable Oral	80%	20%	YES
Supervise passenger handling	Practicable Oral	80%	20%	YES
Checking and interpreting information on passenger manifest and routing plans	Technical Oral		100%	YES
Receiving incoming manifest from pilot and handing over outgoing manifest to pilot.	Technical Oral		100%	YES

Supervising passenger safe access and egress on vertiport.	Practicable Oral	80%	20%	YES
Supervising passenger entry into VCA.	Practicable Oral	80%	20%	YES
Supervising passenger exit from VCA.	Practicable Oral	80%	20%	YES
Conducting passenger checks, to include: checking that passengers are wearing required PPE for region of operations, ear protection and seat belt harnesses are secure.	Practicable Oral	80%	20%	YES

11.3 Vertiport Training Provider Certification

11.3.1 General

11.3.1.1 Any organisation conducting commercial vertiport operations competency-based training and assessment shall be certified by the GCAA.

11.3.1.2 An organisation applying as a vertiport training provider (the applicant) shall be either a vertiport operator or any commercial organisation located within the UAE. If the training facility is located outside the UAE, the organisation shall bear all costs for the initial certification and subsequent audits/inspections conducted by the GCAA.

Note – Audits and inspections by the GCAA will also include third-party contracted services/activities.

11.3.1.3 The applicant shall be subjected to the following certification processes:

d) Phase 1 – A discussion phase at which the GCAA's overall requirements will be explained;
e) Phase 2 – An assessment phase in which the submission details including all relevant personnel, training documentations and facilities will be reviewed; and
f) Phase 3 - An inspection phase where all resources provided for the design, delivery, evaluation and control of training and assessments for vertiport operations personnel will be evaluated.

Note - A formal confirmation will be issued to the applicant to confirm GCAA acceptance after each phase. Where there are findings raised during the certification process, the applicant has up to 6 months to address the findings. If no satisfactory response is received thereafter, the application will be cancelled. Any extension is subjected to the approval of the GCAA. The applicant must formally inform GCAA if the application is withdrawn. Upon successful completion of certification process, a vertiport training *provider certificate will be issued.*

11.3.2 Application

11.3.2.1 The applicant shall submit for a formal application for an initial certification and for a change/variation to an existing certification via the GCAA e-Services website (***https://www.gcaa.gov.ae/en/***).

11.3.2.2 An application for an initial certification or change/variation to an approval shall include the following information:

f) the registered name and address of the training organisation;
g) the address of the organization requiring the initial certification or change/variation to the certification;
h) the intended scope of approval or change/variation to the scope of certification;
i) the name and signature of the accountable manager; and
j) the date of application.

11.3.3 Training facility requirements

11.3.3.1 The size and structure of training facilities shall commensurate with the type of vertiport training provided. Training facilities should ensure protection from the prevailing weather elements and proper operation of all planned training and examination on any particular day. A training facilities analysis should be carried out to determine appropriate training simulator/s and training aids required.

11.3.3.2 Fully enclosed appropriate accommodation separate from other facilities shall be provided for the instruction of theory and the conduct of knowledge examinations.

h) The maximum number of students undergoing knowledge training during any training course shall be defined.
i) The size of accommodation for examination purposes shall be such that no student can read the paperwork or computer screen of any other student from his/her position during examinations.
j) The accommodation environment shall be maintained such that students are able to concentrate on their studies or examination as appropriate, without undue distraction or discomfort.
k) In the case of a practical training, facilities separate from training classrooms shall be provided for practical instruction appropriate to the planned training course. If, however, the organisation is unable to provide such facilities, arrangements may be made with another organisation to provide such workshops and/or maintenance facilities, in which case a written agreement shall be made with such organisation specifying the conditions of access and use thereof. The GCAA shall be provided access

to any such contracted organisation and the written agreement shall specify this access.

l) The maximum number of students undergoing practical training during any training course shall be safely determined. Where a high-risk practical training is involved e.g. live fire evolution training, the maximum number should not exceed 7 per instructor or assessor. If a trained assistant is provided, a maximum number of students should not exceed 3 per assistant.

m) Office accommodation shall be provided for instructors and assessors of a standard to ensure that they can prepare for their duties without undue distraction or discomfort.

n) Secure storage facilities shall be provided for examination papers and training records. The storage environment shall be such that documents remain in good condition for the retention period of a minimum of 5 years. The storage facilities and office accommodation may be combined, subject to adequate security.

11.3.3.3 A maintenance program shall be established and implemented for all training facilities.

11.3.4 Training personnel requirements

11.3.4.1 The applicant shall appoint an accountable manager who has full authority for ensuring that all training commitments can be financed and carried out to the standard required by this regulation.

11.3.4.2 The applicant shall appoint a training post holder who will be responsible for managing the overall delivery of the training programs in accordance with these requirements.

11.3.4.3 The applicant shall provide sufficient staff to plan/perform knowledge and practical training, conduct examinations and assessments in accordance with these requirements, which include but not limited to instructor and assessor.

11.3.4.4 The experience and qualifications of instructors and assessors shall be appropriate to the training provided and established in accordance with these requirements, and/or with competence standards agreed by the GCAA.

11.3.4.5 Instructors and assessors shall be specified in the organisation manual for the acceptance of such staff.

11.3.4.6. Due to the size and complexity of the organisation, additional staff such course developers, maintenance team, administrative, safety, quality, etc maybe employed.

11.3.4.7 Instructors and assessors shall maintain their training competencies, at least, every 2 years relevant to current technology, practical skills, human factors and the latest training techniques appropriate to the knowledge being trained or examined.

11.3.5 Records of instructors and assessors

11.3.5.1 The training organisation shall maintain a record of all instructors and assessors. These records shall reflect the experience and qualification, training history and any subsequent trainings undertaken.

11.3.5.2 Terms of reference shall be drawn up for all instructors and assessors.

11.3.5.3 The following minimum information relevant to the scope of activity should be kept on record in respect of each instructor and assessor:

a) Name
b) Date of Birth
c) Personnel Number
d) Experience
e) Qualifications
f) Training history (before entry)
g) Subsequent Training
h) Scope of activity
i) Starting date of employment/contract
j) If appropriate – ending date of employment/contract.

11.3.5.4 The record should be kept in any format but should be under the control of the organisation's quality management system.

11.3.5.6 Persons authorised to access the records should be maintained at a minimum to ensure that records cannot be altered in an unauthorised manner or that such confidential records become accessible to unauthorised persons.

11.3.5.7 The records system shall be made available to GCAA for audit and inspection.

11.3.6 Instructional equipment

11.3.6.1 Each classroom shall have appropriate presentation equipment of a standard that ensures students can easily read presentation text/drawings/diagrams and figures from any position in the classroom. Presentation equipment shall include representative synthetic training devices to assist students in their understanding of the particular subject matter where such devices are considered beneficial for such purposes.

11.3.6.2 Training facilities shall have all tools and equipment necessary to perform the approved scope of training. Training facilities should, at least, include physical & virtual simulators, personal protective equipment, rescue and firefighting equipment, respiratory protection, smoke chambers, firefighting simulators. Additional tools and equipment should be added where relevant.

11.3.6.3 Practical training facilities shall have appropriate selection of VCA simulations including fuselage, engines, cabin parts, rotary components and avionics equipment at both dry and wet practical training areas. All students shall be provided with appropriate personal protective equipment for all practical trainings. Where training involves working in smoke environment, respiratory protective equipment (breathing apparatus) shall be provided to all students. Appropriate safety briefing shall be conducted before each practical training including use of PPE and/or RPE.

11.3.6.4 A maintenance program shall be established and implemented for all instructional equipment.

11.3.7 Training materials

11.3.7.1 Training course material shall be provided to all students, which, at least, include:

a) a training syllabus consisting of a full training programme, lesson plan, instructor guide, student notes, assessment, presentation materials; and
b) type of course content for each structured learning programme.

11.3.7.2 Training course notes, diagrams and any other instructional material should be accurate. Where an amendment service is not provided, a written warning to this effect should be given.

11.3.8 Student Records

11.3.8.1 The applicant shall keep all records including student training, examination and assessment records for a minimum of 5 years.

11.3.9 Safety and quality management systems

11.3.9.1 The applicant shall establish sufficient procedures acceptable to the GCAA to ensure proper training standards and compliance with all relevant requirements.

11.3.9.2 The applicant shall establish management systems which, at least, contain:

a) safety and quality management procedures
b) implementation of a management of change of the full training process
c) an independent audit function to monitor training standards, the integrity of knowledge examinations and practical assessments, compliance with and adequacy of the procedures
d) evaluation of training effectiveness e.g. course evaluation, customer engagement, industry visit, etc
e) a feedback system of audit findings to the person(s) and ultimately to the accountable manager to ensure, as necessary, corrective and preventive actions

11.3.9.3 The independent audit procedure should ensure that all aspects of compliance are checked at least annually and may be carried out as one complete single exercise or subdivided over a 12-month period in accordance with a scheduled plan.

11.3.9.4 Where the applicant is also approved to conduct training based on another GCAA regulation requiring a quality management system, then such system may be combined.

11.3.9.5 Where a part of the training or assessment is contracted to a third-party organisation:

a) a pre-audit procedure should be established whereby the training organisation should audit a prospective sub-contractor to determine whether the services of the sub-contractor meet the intent of this regulation.
b) an internal audit of the subcontractor should be performed at least once every 12 months to ensure continuous compliance with this regulation.
c) the sub-contract control procedure should record audits of the sub-contractor and to have a corrective action follow-up plan.

11.3.9.6 The independence of the audit system should be established by always ensuring that audits are carried out by personnel not responsible for the function or procedure being checked.

11.3.10 Training Conduct

11.3.10.1 The applicant shall ensure all students meet the necessary training pre-requisites requirements. Where practical training is involved, the fitness status of the students shall be verified by the organisation.

c) If the fitness status of a student is in doubt, he/she should be removed from the training course to seek the advice of an occupational medical physician to confirm the suitability of the student to continue with the training. Where relevant, students should submit a fitness declaration form.
d) Certain practical trainings may require above average fitness levels. Training organisations should determine the appropriate fitness levels for different practical trainings.

11.3.10.2 Training facilities should be regularly checked prior to the delivery of the training course. Where practical training is involved, a safety inspection should be conducted around the training area. Safety briefing including walk around may be necessary to familiarise students with the training area, facility and equipment.

11.3.10.3 Safe management procedures shall be implemented including use of personal protective equipment, health and safety arrangements, where practical training involves:

a) the use of flammable liquids or liquefied gases including determination of safe allowable quantity and exposure limit
b) working at height
c) working in confined spaces
d) working in smoke

e) manual handling
f) working in heat and humidity

11.3.10.4 The applicant shall ensure the validity and security of the competency-based training and assessment system.

c) Knowledge examinations and practical assessment can either be computerised or hard copy or a combination of both.
d) The methodologies to be used in a particular examination and assessment should be determined by the assessors

11.3.11 Training manual

11.3.11.1 The applicant shall provide a manual describing the organisation and its procedures and containing the following information:

a) a statement signed by the accountable manager confirming that the training organisation documentation and any associated manuals define the training organisation's compliance with this regulation and shall be complied with at all times.
b) the title(s) and name(s) of the person(s) nominated in accordance with this regulation
c) the duties and responsibilities of the person(s) specified in subparagraph 2.4.2, including matters on which they may deal directly with the GCAA on behalf of the training organisation.
d) a training organisation chart showing associated chains of responsibility of the person(s) specified in subparagraph 2.4.2.
e) a list of the training instructors and assessors.
f) a general description of the training and examination facilities located at each address specified in the training organisation's certificate, and if appropriate any other location, as required.
g) a list of the training courses which form the extent of the certification.
h) the training organisation's documentations amendment procedures.
i) the training organisation's procedures.
j) the training organisation's safety management system including quality assurance procedure, when authorised to conduct training, examination and assessments in locations different from those specified.
k) a list of the locations if more than 1 training location.
l) a list of subcontract organisations, if appropriate.

11.3.11.2 The applicant's documentations and any subsequent amendments shall be accepted by the GCAA

11.3.11.3 Notwithstanding paragraph 11.3.11.2, minor amendments to the documentation may be approved through internal quality documentation procedure.

11.3.12 Approval Validity

11.3.12.1 Upon issuance of a vertiport training provider certificate, it shall remain valid subject to:

d) the organisation remaining in compliance with this regulation, in accordance with the provisions related to the handling of findings as specified in this regulation; and
e) the GCAA being granted full access to the organisation to determine continued compliance with paragraph 11.3; and
f) the certificate not being surrendered or revoked.

11.3.12.2. Upon surrender or revocation of the vertiport training provider certificate, the document shall be returned to the GCAA.

Appendix III-A: Certificate or Landing Area Acceptance

All vertiports shall hold either a Vertiport Certificate or a Landing Area Acceptance in accordance with the following Table.

NOTE 1: **The categorisation of flights for Public Transport may differ for Flight Crew Licensing, Flight Operations and Airworthiness. Applicable Regulation should therefore apply. The issue of a Vertiport Certificate or Landing Area Acceptance, does not constitute an "approval" from Flight Operations Department, with reference to CAR AIR OPS.**

NOTE 2: The GCAA may issue a Vertiport Certificate or Landing Area Acceptance (whichever is deemed appropriate), once the criteria have been met; however, the responsibility for the maintenance and condition of the landing area, the facilities and for obstacle control, remains with the Certificate / Acceptance Holder.

Use of vertiport		Certificate or Landing Area Acceptance (LAA)
1	**Public vertiport** The vertiport is open to the public and served by VCAs performing commercial air transport operations offering services to the public either on demand or to a published schedule.	Certificate
2	**Hospitality and tourism** The vertiport is available for use by the public or guests of the hotel, resort, tourist attraction or organized event.	Certificate
3	**Private vertiport** The vertiport is not open to the public.	LAA
4	**Flight Training** The vertiport is used for providing flight training and the passengers carried are only those involved in the training.	LAA
5	**Hospitals / Clinics / HEMS** The vertiport is used for operations associated with VCA Emergency Medical Services.	LAA
6	**Corporate facility** The vertiport is used by a company for the transport of passengers, goods or mail as an aid to the conduct of company business.	LAA
7	**Shipboard vertiport**	LAA

	The vertiport is used for private operations and located on a ship that is registered in the UAE.	
8	**Emergency Evacuation Helipad (Vertipad)** A clear area on a roof of a tall building that is not intended to function fully as a vertiport, yet is capable of accommodating VCAs engaged in the emergency evacuation of building occupants.	No Certificate or LAA required. Refer Appendix III-F
9	**Temporary use** A landing area that is not identifiable as a vertiport and is only used on a temporary basis.	No Certificate or LAA required

Appendix III-B: Vertiport Operations Checklist

The following checklist may be used by the applicant and/or holder of a Vertiport Certificate to ensure compliance with the requirement in Chapter III-2.4.3 to provide and maintain written policy, procedures and other information on the operation of the vertiport. This information should be kept in a single document but where a particular requirement is contained in another document maintained by the vertiport operator, then the checklist should make reference to the document and location.

The level of information provided may be determined based on the scope and complexity of the vertiport and VCA operations.

Section	Compliance Status			Manual Page Reference
Part 1 – General Information	Yes	No	N/A	
Purpose and Scope of the Vertiport Operations Manual				
Conditions for Use of the Vertiport				
Limitations on the Operation of the Vertiport				
Name and contact details of responsible person(s)				
Obligations of the vertiport operator				
Part 2 - Particulars of the Vertiport Site	Yes	No	N/A	
Location Plan				
Vertiport Plan showing markings and lighting				
General Information	Yes	No	N/A	
Vertiport Name				
Vertiport Location				
Vertiport Reference Point WGS 84				
Vertiport Elevation				
Vertiport Dimensions & Related Information	Yes	No	N/A	
FATO, TLOF and Safety Area				

Description of Visual Aids				
Significant Obstacles –Geographic Coordinates				
Description of Pavement Surfaces				
Description of emergency response (refer Part 5)				
Part 3	Yes	No	N/A	
Reserved for Aeronautical Information Publication				
Part 4 – Operating Procedures	Yes	No	N/A	
Access to the Vertiport Movement Area	Yes	No	N/A	
Procedures for preventing unauthorised access onto movement area including				
Role of each agency with key responsibility for Vertiport security				
Procedures to control access of personnel and contractors				
Procedures to control access of vehicles and equipment				
Vertiport Movement Area Inspections	Yes	No	N/A	
Procedures for inspection of movement area including:				
Description of inspections undertaken including frequency				
Inspection checklists				
Description of defect reporting, record keeping and corrective actions				
Vertiport Maintenance	Yes	No	N/A	
Description of the procedures for the inspection and maintenance of the visual aids including markings and lighting				
Inspection checklists				
Details of record keeping and tracking of corrective actions				

Procedures for reporting results and for defect rectification				
Description of preventative maintenance program				
Vertiport Works Safety	Yes	No	N/A	
Procedures for works on or in the vicinity or the movement area or those that may extend above the OLS including:				
Works notification and work authority permit process				
Procedures for closing off and reopening work areas				
Formal acceptance of work areas prior to return them to service				
Supervisory oversight of works in progress				
Wildlife Hazard Management	Yes	No	N/A	
Description of methods to deal with dangers caused by wildlife on or in the vicinity of the Vertiport or in the flight path				
Obstacle Control	Yes	No	N/A	
Description of system to control and remove obstacles both on and off the vertiport.				
Frequency of obstacle assessment or confirmation				
Methodology to control new obstacles				
Description of systems to remove existing obstacles				
Process to notify the GCAA of obstacles				
Process to notify the GCAA of removed obstacles				
Refuelling	Yes	No	N/A	
Details of special areas set-up for storage of aviation fuel				
Description for method for accepting delivery				
Description for method for storage				
Description for method for dispensing				

Description of system for testing the quality of aviation fuel prior dispensing into aircraft				
Procedures for ensuring apron safety during fuelling operations				
Procedures for ensuring apron safety during defueling operations				
Charging Station	Yes	No	N/A	
Details of special areas set-up for storage of aviation Batteries				
Description for method for accepting delivery				
Description for method for storage				
Description of system for testing the quality of charging prior connecting to the aircraft				
Procedures for ensuring apron safety during charging operations				
Part 5 – Emergency response	Yes	No	N/A	
Types and amounts of media provided				
Manning levels				
Levels of supervision				
Polices or letters of agreement with third party organisations that provide essential equipment for safe operation of the Vertiport (e.g. water rescue)				
Contingency plans if organisations providing essential equipment not available				
Process for ensuring initial and continued competence of Emergency Response Personnel				
Description of available medical equipment including location				
Description of any tool kit provided				
Integrated Emergency Planning	Yes	No	N/A	
Description of arrangements for determining and implementing plans ensuring the integrated				

management of response to an aircraft incident/accident. These arrangements should take account of the complexity and size of the VCA operations.				
Policy statement of the distance the Emergency Response Personnel would respond to an off-vertiport accident				
Additional information/instructions within the emergency plan based upon the vertiport operator's hazard/risk registry				

Appendix III-C: Vertiport Data

To aid the process for an assessment of a vertiport, the following table may be used with reference to the VCA performance characteristics and dimensions:

VCAs operated in: Visual Instrument Precision Approach FATO Non-precision Approach FATO Non-instrument FATO	
Greatest overall dimension (D) of the largest VCA the FATO is intended to serve	
Largest VCA maximum take-off mass (MTOM)	
Vertiport name	
Vertiport reference point (WGS-84 coordinates)	
Vertiport elevation	
Vertiport type: surface-level, elevated or vertiport	
TLOF: dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1000 kg)	
FATO: true bearing to one-hundredth of a degree designation number (where appropriate) length width to the nearest metre slope surface type	
Safety area: length width surface type	

VCA ground taxiway, air taxiway and air transit route: designation width surface type	
Apron: surface type VCA stands	
Clearway: length ground profile	
Visual aids: visual aids for approach procedures markings lighting of FATO, TLOF, taxiways and aprons	

Distances to the nearest metre of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of a microwave landing system (MLS) in relation to the associated TLOF or FATO extremities.	
Declared Distances: Landing distance available (LDAV). Landing distance required (LDRV) Rejected take-off distance (RTODV) Rejected take-off distance available (RTODAV). Rejected take-off distance required (RTODRV) Take-off decision point (TDP), for VCA Take-off distance available (TODAV)	
Obstacle Limitation Surfaces: dimensions and slopes: Transitional Surface Slope: Height: Approach Surface* Width inner edge:	

Location of inner edge: First section: Divergence: Length: Outer width: Slope: Second section: Divergence: Length: Outer width: Slope: Third section: Divergence: Length: Outer width: Slope: Inner Horizontal Surface Height: Radius: Conical Surface Slope: Height: Take-Off Climb Surface Inner Edge: First section: Divergence: Length: Outer width: Slope: Second section: Divergence: Length: Outer width: Slope: Third section: Divergence: Length: Outer width:	

Slope: ***For Instrument (Precision Approach) FATO, refer to refer to Table 5.8**	

Appendix III-D: Vertiport Operations Guidance Material

The material contained in this Appendix is provided as an aid to assist vertiport operators who have been issued with a Landing Area Acceptance and may also be used as a basis for the written Vertiport Operational Procedures required by Chapter III-2.4.3 for Certificated Vertiports.

This guidance material should be made available to all personnel that are involved in the operation, maintenance or inspection of the vertiport, and those involved in the provision of an Emergency Response Team.

The information contained in this Appendix will be regarded by the GCAA as the primary indication of the standards likely to be achieved by the vertiport operator. A copy of this Appendix is available from the GCAA on request as a standalone document.

GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

Vertiport Operations Manual - Guidance

Part 1 – General Information

1.1 Purpose

The purpose of this guidance material is to ensure, as far as is practicable, the safe operation of the vertiports by stating policy and providing instructions and information to enable the vertiport operating staff to carry out their duties in a safe, responsible and efficient manner. The related sections are intended to achieve this aim.

1.2 Conditions of Use

For a vertiport that has been issued with a Landing Area Acceptance, the vertiport is only available for private (not Air Service) operations. Operations by VCAs conducting an Air Service or using instrument approach or departure procedures are only permitted at Certificated Vertiports.

No VCA should take-off or land at the vertiport unless such emergency response, medical services and emergency arrangements, as are required in respect of such a VCA, are provided there. Such services, equipment and facilities should at all time, when the vertiport is available for the take-off or landing of VCAs, be kept fit and ready for immediate use.

Changes in the physical characteristics of the vertiport including the erection of new buildings and alterations to existing buildings or to visual aids should not be made without prior assessment in line with the Guidance provided in SUB-PART A.

If the vertiport is available for the take-off and landing of VCAs at night, such systems of lighting the vertiport, as described in SUB-PART A, shall be in operation at all times when VCAs are taking-off or landing at night.

1.5 Distribution of the Guidance Material

This guidance material should be made available to every member of the vertiport operating staff.

Part 2 – Vertiport Operating Procedures and Safety Measures

2.1 Access to Vertiport Movement Area

Safeguards should be in place to prevent inadvertent entry of animals and deter the entry of unauthorised persons or vehicles to the vertiport movement area. Safeguards should be in place to ensure that there is reasonable protection of persons and property from VCA rotor wash.

All access to the vertiport movement area should be controlled, and access to the movement area only permitted for passengers, authorised persons or vehicles.

All vehicular entrances to the vertiport and movement areas should have gates or barriers. Barriers should be high enough to present a positive deterrent to persons inadvertently entering an movement area and yet low enough to be non-hazardous to VCA operations.

Vertiport operators may choose to secure their movement areas via the use of security guards and a mixture of fixed and movable barriers. Training of personnel should be considered as a part of any operational procedure. All users of the vertiport should comply with rules applicable to the vertiport as regards keeping gates and barriers closed.

All vehicular entrances should be provided with appropriate warning notices.

No vehicle should proceed onto the manoeuvring area without authorisation. Vehicles should give way to VCAs at all times and all vehicles operating on the manoeuvring should display their vehicle hazard warning lights.

Drivers should be briefed and vehicles should be escorted, if considered necessary.

2.2 Vertiport Movement Area Inspections

The vertiport should be inspected prior to the commencement of VCA operations. Additional inspections should be carried out taking into account:

a) the frequency of operations;

b) duration of operations;

c) types of VCA served;

d) the vertiport environment; and

e) the complexity of operations and the size of the vertiport.

These inspections should ensure that the Movement Area is clear of foreign objects, harmful irregularities, temporary obstructions or hazardous conditions. These inspections should include the condition of the TLOF, signs, markings, lighting and the wind direction indicator. Details of each inspection should be recorded and should include any corrective action taken.

During periods of unusual weather conditions, additional inspections may be required.

In the event of any unserviceability that cannot be corrected within a reasonable time, VCA operators that normally use the vertiport should be made aware of the unserviceability.

A surface inspection of the appropriate area should be carried out whenever an accident or incident occurs, or a report of debris on the VCA movement area is made.

2.3 Vertiport Movement Area Surface Condition and Maintenance

The vertiport facilities should be maintained in a condition that does not impair the safety, security, regularity or efficiency of VCA operations.

Assessments of the condition and bearing strength of the TLOF area should be carried out during routine and non-routine surface inspections.

The bearing strength should be assessed with reference to the maximum all up weight (MAUW) of the largest VCA likely to use the vertiport.

Where the assessment reveals a critical condition, the decision should be made on whether the surface conditions justify withdrawal of part or all of the manoeuvring area.

Vertiport users and operators of should be advised of any changes in the vertiport operational state.

2.4 Vertiport visual aids

Each visual aid for navigation should provide reliable and accurate Guidance to vertiport users and any unserviceable or deteriorated items should be restored back into service without undue delay.

2.5 Vertiport Works Safety

Works and maintenance on the movement area should only be allowed with prior approval and working parties should be briefed, having regard to the circumstances prevailing.

Short term work on or near the FATO or TLOF in use, or within the protected surfaces, should be continuously monitored.

All temporary obstacles and equipment, including personnel and vehicles, should be removed prior to the arrival or departure of VCAs.

Areas of work should to be clearly defined, and drivers of vehicles should adhere to briefed routes to and from such areas. Conduct of the work and vehicle movements should to be monitored throughout operational hours.

If works are in progress on the movement area, it should be suitably marked.

2.6 Wildlife Hazard Management

The vertiport management has a duty of care toward VCA operators and should meet this responsibility as far as is reasonably practicable. This is achieved by providing an active Wildlife Management Control Programme utilising available staff and other resources in an efficient and effective manner, thereby reducing the bird strike hazard to VCA on and around the vertiport and to restrict access of animals entering the vertiport.

The vertiport and the visible surrounding areas should be monitored for wildlife activity, taking appropriate action when a hazard is detected. A warning should be issued to pilots by RTF (if possible) whenever birds are flocking on or near to the FATO and dispersal action is not complete or has not been fully effective.

All bird strikes and near misses, whether observed or reported, are to be notified to the GCAA via the Voluntary Occurrence Reporting System (VORSI) on the GCAA website.

Refer to Part 2.10 for reporting of Safety Incidents.

2.7 Obstacle Control

An initial assessment should be undertaken to establish the obstacle environment surrounding the vertiport with reference to the Obstacle Limitation Surfaces (OLS) specified in Chapter III-5. This should be validated annually by a Validation Assessment as described in AMC 61.

Action should be taken to ensure that the Obstacle Limitation Surfaces remain clear of all permanent and semi-permanent obstructions.

For areas outside the vertiport, safeguarding arrangements should be made with the local municipalities to aid the control of potential buildings or other structures which may affect VCA operations.

2.8 Reporting of accidents

The following notification procedure should be followed when a VCA accident has occurred on or in the vicinity of the vertiport;

if any person suffers death or serious injury; or

if the VCA suffers substantial damage, or structural failure requiring major repairs; or

if a VCA is missing or completely inaccessible.

A nominated person should telephone the GCAA Duty Inspector to report a VCA accident or serious incident on +971 50 641 4667, and pass as much of the following information as is available:

a) VCA type, model, nationality and registration

b) name of owner and operator

c) name of pilot in command

d) date and time (UTC) of accident

e) last point of departure and next point of intended landing of the VCA

f) location of the accident

g) number of persons on board the VCA at the time of the accident

h) number of persons killed or seriously injured

i) number of persons killed or injured elsewhere than on the VCA

j) nature of the accident and brief description of damage to the VCA

2.9 Disabled VCA Removal

The wreckage of a VCA must not be removed or interfered with unless specific permission has been given by the GCAA except for the following purposes:

The extrication of persons, animals or mail

To prevent further destruction by fire or other danger

To remove an obstruction to the public, to air navigation or other transport.

If no immediate danger to persons, animals or mail exists, and specific permission has been given by the GCAA to move the wreckage, sketches and photographs of the incident and surrounding areas should be obtained with as much detail as possible prior to moving the wreckage, to assist in any subsequent investigation.

2.10 Reporting of Safety Incidents

The GCAA has developed a voluntary reporting system (VORSY) available on the GCAA website *www.gcaa.gov.ae/en/vorsy/eform.aspx*. Guidance on the GCAA's voluntary reporting is found in AMC 57 – Voluntary Occurrence Reporting System.

A VORSY report may be reported when there is information that may help in improving aviation safety but it has not been reported through an existing channel, or the vertiport operator wishes for others to learn and benefit from a safety event or hazard without disclosing their identify.

For less significant or minor incidents details should be kept and include:

Date of occurrence;

Action taken; and

Photos and Drawings.

Part 3 –Safety Management System Guidance Material

This guidance material is written for small, non-complex organisations. Whether or not this guidance material is suitable for your organisation will depend on various factors including the size, complexity and the level of risk associated with your activities. For further guidance, please refer to CAR Part X (Safety Management System Requirements).

3.1 Introduction

This Guidance Material has been developed to direct all personnel in the safe operations of the organisation and defines the policy that governs the operation of the vertiport.

SMS is a pro-active, integrated approach to safety management. SMS is part of an overall management process in order to ensure that the goals of the organisation can be accomplished. It embraces the principle that the identification and management of risk increases the likelihood of accomplishing the mission. Hazards can be identified and dealt with systematically through the Hazard Reporting Program that facilitates continuing improvement and professionalism. Auditing and monitoring processes ensures that VCAs are operated in such a way as to minimize the risks inherent in-flight operations.

3.2 Safety Management Plan

Safety holds the key to this organisation's future and affects everything we do.

The Safety Management Plan is the tool used to define how SMS supports the organisation's Operations Plan. Organisation management is committed to the SMS, and is required to give leadership to the program and demonstrate through everyday actions, the commitment to safety and its priority in the achievements of the organisation.

The processes in place in the Safety Management Plan include the active involvement of all personnel, who, through planning and review, must continue to drive efforts for continuing improvement in safety and safety performance. The term "Safety Management" should be taken to mean safety, security, health, and environmental management. The key focus is the safe operations of airworthy VCA.

Safety audits are essential components of the Safety Management Plan. They review systems, identify safety issues, prioritize safety issues, must involve all personnel, and enhance the safety of operations.

3.3 Safety Principles

Management embraces the following safety principles:

a) Always operate in the safest manner practicable

b) A culture of open reporting of all safety hazards in which management will not initiate disciplinary action against any personnel, who in good faith, due to unintentional conduct, disclose a hazard or safety incident

c) Never take unnecessary risks

d) Safe does not mean risk free

e) Everyone is responsible for the identification and management of risk

f) Familiarity and prolonged exposure without a mishap leads to a loss of appreciation of risk

3.4 Key Personnel

The Vertiport Operator has overall accountability for safety and the safe management of operational services and systems planned, provided and operated by the vertiport. Safety accountabilities include:

a) All operations are conducted in the safest manner practicable.

b) Ensuring the safety of all employees, customers, passengers and visitors.

c) Development of long-term safety objectives, including establishment of safety policies and practices.

d) Implementation of management systems that will establish and maintain safe work practices.

e) Ensuring the vertiport's business plan is sufficiently resourced to enable the success of the safety policy and management system.

f) Taking a leadership role in the vertiport's safety programme and ensuring that safety does not become subordinate to financial matters.

g) Appointing competent and safety conscious persons and monitoring their performance to ensure that safety is given a high priority within their training and development plans.

h) Setting safety targets and objectives and monitoring achievements.

3.5 Compliance with Standards

All personnel have the duty to comply with approved standards. These include organisation policy, procedures; VCA manufacturer's operating procedures and limitations, and government regulations. Research shows that once you start deviating from the rules, you are almost twice as likely to commit an error with serious consequences.

Breaking the rules usually does not result in an accident; however, it always results in greater risk for the operation, and the organisation supports the principle of, "NEVER take unnecessary risks."

3.6 Intentional Non-compliance with Standards

Behaviour is a function of consequences. Management is committed to identifying deviations from standards and taking immediate corrective action. Corrective action can include counselling, training, discipline, grounding or removal. Corrective action must be consistent and fair.

Organisation management makes a clear distinction between honest mistakes and intentional non-compliance with standards. Honest mistakes occur, and they should be addressed through counselling and training.

Research has shown that most accidents involve some form of flawed decision-making. This most often involves some form of non-compliance with known standards. Non-compliance rarely results in an accident; however, it always results in greater risk for the operation.

Organisation policy agrees with the following conclusions:

a) Compliance with known procedures produces known outcomes

b) Compliance with standards helps guarantee repeatable results

c) Bad rules produce bad results

d) Complacency affects the safe operation of the VCA and cannot be tolerated

e) Standards are mechanisms for change

f) The hardest thing to do, and the right thing to do are often the same thing

3.7 Rewarding People

Reward systems are often upside down. Reinforced bad behaviour breeds continued bad behaviour. This is unacceptable. This organisation is committed to the principle that people should be rewarded for normal, positive performance of *their* duties that complies with organisation standards. Personnel will not be rewarded for accomplishing the mission by breaking the rules.

3.8 Safety Promotion

Safety is promoted as a “core value.” Procedures, practices and allocation of resources and training must clearly demonstrate the organisation’s commitment to safety. We must change the perception that the mission is what’s most important no matter the risk. The following methods are used to promote safety:

a) Posting the Safety Policy in prominent locations around the base of operations

b) Starting meetings with a comment or review about safety issues

c) Having a safety bulletin board

d) Having an employee safety feedback process

3.9 Document and Data Information Control

All safety documents should be controlled through the technical library. This includes the SMS, operations, maintenance and training manual. Change control procedures should be incorporated into each of these documents.

The Safety Officer should be responsible for maintaining and safekeeping safety related data, including the minutes of safety meetings, information on hazard and risk analysis, risk management, remedial action, incident and accident investigations, and audit reports.

3.10 Hazard Identification and Risk Management

Risk management is the identification and control of risk and is the responsibility of every member of the organisation. The first goal of risk management is to avoid the hazard. The organisation should establish sufficient independent and effective barriers, controls and recovery measures to manage the risk posed by hazards to a level as low as practicable. These barriers, controls and recovery measures can be equipment, work processes, standard operating procedures, training or other similar means to prevent the release of hazards and limit their consequences should they be released. The organisation should ensure that all individuals responsible for safety critical barriers, controls, and recovery measures are aware of their responsibilities and competent to carry them out. The organisation should establish who is doing what to manage key risks and ensure that these people and the things they should do are up to the task.

The systematic identification and control of all major hazards is foundational. The success of the organisation depends on the effectiveness of the Hazard Management Program.

The purpose of the risk assessment process is to identify risks, assess them in terms of severity and likelihood so that appropriate mitigation measures can be implemented to either eliminate the risk or reduce the risk to as low as reasonably practicable. The assessment process also allows the risks to be ranked in order of risk potential so that priorities can then be established and resources can be targeted more effectively.

The risk assessment process starts with identifying the hazards associated with the vertiport operation and then the actual risks associated with the hazard. It is important to include people with the relevant expertise and experience in the risk assessment process to ensure the robustness of the process. All risk assessments are reliant on the quality of the information used to make the assessment and the knowledge of the people conducting the assessment.

The hazard/risk identification process should be both proactive and reactive and depending on the size and complexity of the vertiport the following methods may be useful to identify safety hazards and the risks associated with them:

Brainstorming, where any relevant persons meet to identify/review potential hazards and associated risks at the vertiport. This may be required for a range of items or to consider a specific risk.

Vertiport incident reports.

Confidential voluntary reports.

Internal/external audits.

Either internal or external safety assessments/technical inspections.

Liaison with other similar vertiports.

Generic hazard checklists.

Following the identification of a hazard, the risks associated with the hazard will need to be assessed. The risk should be assessed in terms of severity (the severity of the potential adverse consequences) and probability (the likelihood of the risk causing adverse consequences).

SEVERITY OF CONSEQUENCES		
Aviation definition	**Meaning**	**Value**
Catastrophic	Equipment destroyed. Multiple deaths.	A
Hazardous	A large reduction in safety margins, physical distress or a workload such that the personnel cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.	B
Major	A significant reduction in safety margins, a reduction in the ability of personnel to cope with adverse operating conditions as a result of the workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.	C
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	D
Negligible	Little consequence	E

PROBABILITY OF OCCURRENCE		
Qualitative definition	**Meaning**	**Value**
Frequent	Likely to occur many times	5
Reasonably probable	Likely to occur sometimes	4
Remote	Unlikely, but possible to occur.	3

Extremely remote	Very unlikely to occur	2
Extremely improbable	Almost inconceivable that the event will occur	1

When the levels of severity and likelihood have been defined, a Risk Tolerability Matrix can then be used to assess the tolerability of the risk. While the severity of the consequences can be defined relatively easily, the likelihood of occurrence (probability) may be more subjective and rely on a logical, common sense analysis of the inter-related facts.

Risk Tolerability Matrix

Probability

Severity	1 Extremely improbable	2 Improbable	3 Remote	4 Occasional	5 Frequent
A Catastrophic	Review	Review	Unacceptable	Unacceptable	Unacceptable
B Hazardous	Acceptable	Review	Review	Unacceptable	Unacceptable
C Major	Acceptable	Review	Review	Review	Unacceptable
D Minor	Acceptable	Acceptable	Review	Review	Review
E Negligible	Acceptable	Acceptable	Acceptable	Review	Review

From the risk tolerability matrix the risk can then be classified as either acceptable, to be reviewed or un-acceptable allowing a suitable risk mitigation strategy to be developed if required.

Unacceptable: If the risk is unacceptable, major mitigation will be necessary to reduce the severity of the consequences and/or the likelihood of the occurrence associated with the hazard.

Review: If the risk needs to be reviewed the severity of the consequences or the probability of occurrence is of concern; measures to mitigate the risk to as low as reasonably practicable should be sought. Where the risk is still in the review category after this action has been taken it may be that the cost or actions required to reduce the risk further are too prohibitive. The risk may be accepted, provided that the risk is understood and has the endorsement of the individual ultimately accountable for safety at the vertiport.

Acceptable: If the risk is acceptable the consequence is so unlikely or not severe enough to be of concern; the risk is tolerable. However, consideration should still be given to reducing the risk further to as low as reasonably practicable in order to further minimise the risk of an accident or incident.

If the level of risk falls into the **unacceptable** or **review** categories, mitigation measures should be introduced to reduce the risk to an acceptable level. Mitigation strategies could include eliminating the risk altogether or taking measures to reduce the severity if the risk occurred or the likelihood of the risk occurring. Risks should be managed to be as low as reasonably practicable, which means that the risk must be balanced against the time, cost and difficulty of taking measures to reduce or eliminate the risk.

Where the risk cannot be further reduced by reasonably practicable means, the following actions are to be taken:

If a high severity risk, the matter is to be brought to the Safety Review Board (SRB). The risk will be reviewed by the SRB, and if accepted will be signed off by the Senior Manager/Accountable Manager. Or if deemed necessary, a more senior director.

For a risk with a less potential severity, the matter should be reviewed by another manager reporting to the Accountable Manager and signed off. The reviewing manager must note the reasons and considerations for accepting the risk.

The final outcomes of the risk assessment process will be recorded and filed.

Risk Assessment Form

<table>
<tr><td colspan="4">RECORD OF ASSESSMENT</td></tr>
<tr><td colspan="4">Ref. No.</td></tr>
<tr><td colspan="2">Base: Section/Department:</td><td colspan="2">Type of harm:</td></tr>
<tr><td colspan="2">Work Activity:</td><td>Injury</td><td></td></tr>
<tr><td colspan="2">Team:</td><td>Damage to environment</td><td></td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Assessor Name:</td><td colspan="3">Signature:</td></tr>
</table>

Date of Assessment:		Review date:	
Employees at risk:			
Others who may be at risk:			
IF ADDITIONAL CONTROL MEASURES ARE REQUIRED, CAN THEY BE IMPLEMENTED IMMEDIATELY			YES / NO
IF NO, SUMMARISE ACTION PLAN BELOW			
Action required:	Target Date	Action by:	Completed by (Name & Date)
Date for full implementation of control measures:			
Assessment accepted by: (relevant manager):			
Title:			
Date:			

Risk Assessment Form (continued)

RISK ASSESSMENT

Hazards/Risks	Severity	Probability	Risk Rating	Additional control measures required	Residual Risk Rating		

3.11 Occurrence and Hazard Reporting

All occurrences and hazards identified by an employee should be reported using a reporting system. An example of an Occurrence and Hazard Report is given below.

Occurrence Report -- Hazard Identification Report	
Date:	Time:
Location:	Employee name:
Event or unsafe act(s) observed:	
Injuries/Illnesses experienced:	
Corrective action(s) taken:	
Causal Factors:	
Comments/*Recommendation*s:	
Safety Officer's Signature:	Date:

Occurrence - Definition

An occurrence is defined as: Any unplanned safety related event, including accidents and incidents that could impact the safety of guests, passengers, organisation personnel, equipment, property or the environment.

Hazard – Definition

A hazard is defined as: Something that has the potential to cause harm to a persons, loss of or damage to equipment, property or the environment.

Occurrences

All relevant comments and agreed actions should be recorded in the report. Reports should be closed when all actions have been taken. Occurrences should be reviewed on a monthly basis.

Personnel may anonymously report hazards using the same report.

Personnel who report should be treated fairly and justly, without punitive action from management except in the case of known reckless disregard for regulations and standards, or repeated substandard performance.

3.12 Management of Change (MOC)

The systematic approach to managing and monitoring organisational change is part of the risk management process. Safety issues associated with change are identified and standards associated with change are maintained during the change process.

Procedures for managing change include:

a) Risk assessment
b) Identification of the goals and objectives and nature of the proposed change
c) Operational procedures are identified
d) Changes in location, equipment or operating conditions are analyzed
e) Maintenance and operator Manuals are posted with current changes
f) All personnel are made aware of and understand changes
g) Level of management with authority to approve changes identified
h) The responsibility for reviewing, evaluating and recording the potential safety hazards from the change or its implementation
i) Approval of the agreed change and the implementation procedure(s)

There are methods for managing the introduction of new technology. All personnel should be consulted when changes to the work environment, process or practices could have health or safety implications. Changes to resource levels and competencies associated risks are assessed as part of the change control procedure.

Therefore an objective of the safety management system is to provide a framework for managing change and addressing risks when introducing or changing:

a) Equipment
b) Systems
c) Procedures
d) Personnel structures

All such changes must be adequately addressed to ensure that safety is not degraded during or as a consequence of such changes and that wherever practical, safety is enhanced by such changes.

Part 4 – Vertiport Emergency Services

4.1 Principle Objective

The principal objective of a Vertiport Emergency Response Team is to save lives. For this reason, the provision of means for dealing with a VCA accident/incident occurring at or in the immediate vicinity of a vertiport provides the greatest opportunity for saving lives.

VCA Rescue is defined as actions taken to save persons involved in a VCA accident/incident, support self-evacuation, and to assist the removal of injured / trapped persons.

The operational objective is to staff the Vertiport Emergency Response Team and respond as quickly as possible to any VCA accident/incident.

4.2 Equipment Inspection

At the start of each initial flight, all the appropriate rescue equipment should be inspected, be in position and available for immediate use.

4.3 Training

The Emergency Response Team should be provided with training and be competent in the safe use of fire extinguishers.

Equipment and training records should be maintained and retained for future reference.

Training should be conducted in the following subjects depending on the complexity of the operations.

Training
Familiarization of vertiport
Familiarization of VCA
Familiarization of fire extinguishers/Diffs
Familiarization of emergency call out procedures
Practical emergency exercise
Vertiport Inspection Familiarization/Training
VCA Start up Procedure Training

VCA landing Procedure Training
VCA Charging Procedure Training
VCA Fuelling Procedure Training

4.4 Emergency Response

EMERGENCY CALL OUT INSTRUCTION

IN THE EVENT OF AN VCA CRASH / ENGINE FIRE / ACCIDENT THE FOLLOWING ACTION IS TO BE UNDERTAKEN IMMEDIATELY

CALL IMMEDIATELY!

CIVIL DEFENCE / FIRE SERVICE	998 / +971 XX XXX XXXX
AMBULANCE SERVICE	997
POLICE	999
VERTIPORT OPERATOR/OWNER	+971 XX XXX XXXX
GCAA DUTY INVESTIGATOR	+971 50 641 4667

PROVIDE THE FOLLOWING INFORMATION

METHANE FORM

Time		**Date**	
Organisation			
Name of Caller		**Tel No**	

M	Major incident (Crash / Fire)	Has a Major Incident been declared? YES/NO	
E	Exact Location	What is the exact location or geographical area of incident? Any landmarks?	
T	Type of Incident	What kind of incident is it? (crash on land on/off vertiport, on water, fire, collision, etc)	
H	Hazards	What hazards or potential hazards can be identified?	

A	Access	What are the best routes for access and egress into the scene?	
N	Number of casualties	How many casualties are there and what condition are they in?	
E	Emergency Services	Which and how many emergency responder assets/personnel are required or are responding/ already on-scene?	

Appendix III-E: Design Acceptance

E1 General

E1.1 A Design Acceptance will provide assurance that the proposed vertiport will comply with the physical characteristic requirements contained in this CAR-HVD PART III.

E.1.2 The issuance of a Design Acceptance does not constitute approval to commence construction of the vertiport

E2 Request

E2.1 To request a Design Acceptance, the applicant must have access to the ANA e-Services as detailed in Chapter III-2.2, and commence the process to request a Vertiport Certificate or a Landing Area Acceptance.

E2.2 A request for a Design Acceptance will be subject to the payment of any applicable GCAA Services Fees.

E3 Information

E3.1 The information required to support the request for a Design Acceptance shall include design drawings and a design report or other documentation which provides details on the:

a) physical size and layout of the facility;
b) Airspace (Classification, height, etc)
c) the obstacle environment surrounding the vertiport and areas of public
d) location of the vertiport with regards to buildings and areas of public use;
e) size, colour and layout of any markings;
f) layout, location and colour of any lighting and other visual aids; and
g) details of the Emergency Response to be provided in accordance with Chapter 9 paragraphs 9.6, 9.7 and 9.8.
h) surface and/or pavement characteristics

E3.2 The GCAA may ask for clarification or additional information. Once satisfied, the GCAA will issue a Design Acceptance of the proposal.

E4 Acceptance

E4.1 A Design Acceptance shall be valid for a period of one year. If construction of the vertiport has not been completed by that time, the applicant should request for an extension of the Design Acceptance to ensure that the proposal remains in compliance with GCAA Regulations.

E4.2 The issue of a Design Acceptance does not permit the vertiport to be used for VCA operations when construction is completed. The vertiport operator must still obtain a Vertiport Certificate or a Landing Area Acceptance as detailed in Chapter III-2.

Appendix III-F: Emergency Evacuation Vertipad

1 Introduction

1.1 An emergency evacuation vertipad is a clear area on a roof of a tall building that is not intended to function fully as a vertiport, yet is capable of accommodating VCAs engaged in emergency evacuation operations.

1.2 To facilitate emergency evacuation operations, local building requirements (where applicable) may require structures over a specified height to provide a clear area on the roof capable of accommodating a VCA. Since the cleared area is not intended to function as a vertiport, there is no requirement to apply for certification or acceptance from the GCAA, however permissions or approvals may be required from the appropriate authorities, municipalities or the Civil Defence.

1.3 An emergency evacuation vertipad shall not show the Vertiport Identification Marking detailed in Chapter III-7.2.

1.4 The owner/occupier of a building with an emergency evacuation vertipad shall provide details of the emergency evacuation vertipad to the GCAA at ***ana@gcaa.gov.ae***. This information shall include the name of the building, its geographic location in WGS-84 coordinates and the D-Value.

1.5 The D-value is the largest overall dimension of the largest VCA intended to use the vertipad. It is 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 VCA structure.

1.6 Operators of emergency evacuation vertipads should also advise the local air traffic services of the facility and should produce supporting procedures.

1.7 If the emergency evacuation vertipad is no longer intended to be used, all markings shall be removed or the Closed Marking detailed in Chapter 7.16 shall be painted on the vertipad.

2 Final Approach and Take-Off (FATO) Areas

2.1 An emergency evacuation vertipad should be provided with a final approach and take-off area (FATO) that should be obstacle free.

2.2 The dimension of the FATO should of sufficient size and shape to contain an area within which can be drawn a circle of 1.25 D.

3 Touchdown and Lift-Off (TLOF) Area

3.1 An emergency evacuation vertipad should be provided with a touchdown and lift-off area (TLOF), with the centre of the TLOF co-located with the centre of the FATO.

3.2 The TLOF should be of sufficient size to contain a circle of diameter of at least 0.83 D.

3.3 The TLOF should be dynamic load bearing.

3.4 A TLOF perimeter marking should be displayed along the edge of the TLOF.

3.5 A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

4 Vertipad Identification Marking

4.1 An emergency evacuation vertipad should be provided with a vertipad identification marking located at the centre of the TLOF.

4.2 The vertipad identification marking should consist of a yellow colored ‘E’ as depicted in Figure F-1, with dimensions no less than those shown.

5 Maximum Allowable Mass

5.1 A marking indicating the maximum allowable mass for which the vertipad has been designed to accommodate should be displayed at an emergency evacuation vertipad.

5.2 A maximum allowable mass marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

5.3 The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter “t”.

6 D-Value Marking

6.1 The D-value marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

6.2 The D-value marking should be white. It should be rounded down to the nearest whole number, followed by the letter "m".

7 Building Fire Protection

7.1 The buildings fire protection system shall be designed so as to afford fire protection for the evacuation vertipad to support its operational function.

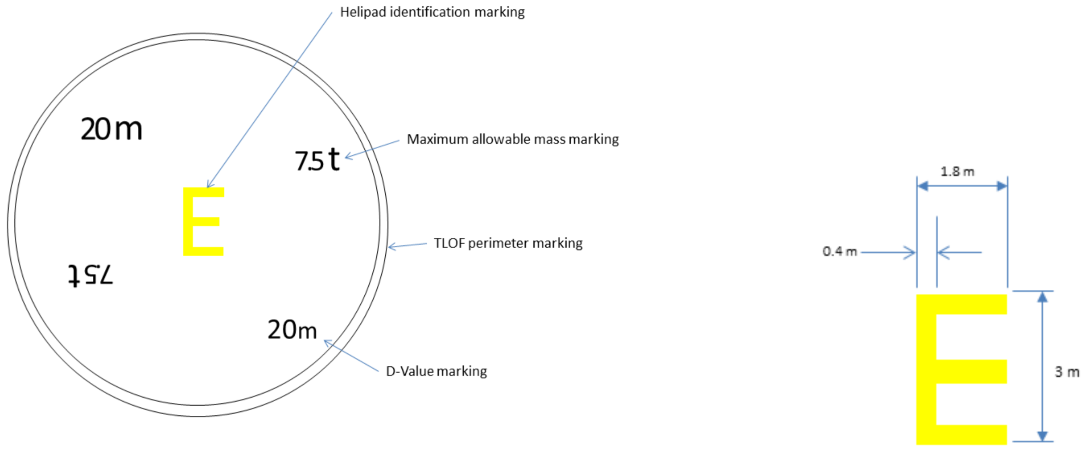


Figure F-1 – Emergency Evacuation Vertipad Markings

PART IV – (Reserved)

PART V – (Reserved)

PART VI – (Reserved)

PART VII – Hybrid Heliport/Vertiport Operations – (Reserved)